



TEST REPORT

No. 2013TAR328

for

Sony Mobile Communications AB

GSM 850/900/1800/1900 quad bands and CDMA2000 850/1900

dual bands mobile phone

Type: PM-0370-BV

FCC ID: PY7PM-0370

with

Hardware Version: A

Software Version: 12.0.B.1.36

Issued Date: Apr. 17th, 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

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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.

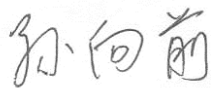
1.3. Project data

Receipt of Sample Mar. 20th, 2013
Testing Start Date: Mar. 22th, 2013
Testing End Date: Apr. 17th, 2013

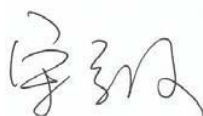
1.4. Signature



Qu Pengfei
(Prepared this test report)



Sun Xiangqian
(Reviewed this test report)



Song Chongwen
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name: Sony Mobile Communications (China) Co. Ltd
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City: Beijing
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Country: China
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2.2. Manufacturer Information

Company Name: Sony Mobile Communications AB
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Postal Code: 22188
Country: Sweden
Contact Person: Nordlof, Anders
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Fax: +46-10-800 2441

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

3.1. About EUT

Description	GSM 850/900/1800/1900, GPRS, EDGE, CDMA2000 Band Class 0/1 Bluetooth EDR & BLE, WLAN (802.11b/g/n), FM, NFC, GPS receiver mobile phone
Type	PM-0370-BV
FCC ID	PY7PM-0370
Frequency range	GSM 850: 824.2 MHz - 848.8 MHz PCS 1900: 1850.2 MHz -1909.8 MHz CDMA2000 Band Class 0: 824MHz-849MHz CDMA2000 Band Class 1: 1850MHz-1910MHz
Antenna	Internal
Power supply	Battery or charger (travel adaptor / vehicle adaptor)
Output power	30.18 dBm maximum ERP measured for GSM850 30.53 dBm maximum EIRP measured for PCS1900 26.41 dBm maximum ERP measured for CDMA2000 BC0 26.93 dBm maximum EIRP measured for CDMA2000 BC1
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

EUT ID*	SN	IMEI	HW Version	SW Version
EUT2	CB5123BEWA	004402146480755	A	12.0.B.1.36
EUT3	CB5123NF05	004402146480623	A	12.0.B.1.36

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

3.3. Internal Identification of AE used during the test

AE ID*	Description	SN	Revision
#23496	Travel Charger	8512W19100304	1
#23813	USB Cable	123107D1000A4AE	1
#23496			
Commercial name		EP880	
Type		AC-0400-US	
Manufacturer		Salcomp	

#23813

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 CDMA2000 850/1900 dual bands mobile phone with integrated antenna and inbuilt battery.

The EUT supports two SIM card slots.

GSM SIM card slot supports GSM 900/1800/1900MHz bands. It also supports GPRS service with multi-slots class 8 and EGPRS service with multi-slots class 8 too.

CTC SIM card slot supports GSM 850/900/1800/1900MHz bands and CDMA2000 bands 0/1. It also supports GPRS service with multi-slots class 12 and EGPRS service with multi-slots class 12 too.

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 b/g/n) and Wi-Fi hotspot functions.

It includes normal option: travel charger, Portable Hands-Free 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

EUT Set-up No.	Combination of EUT and AE	Remarks
Set. 1	EUT2 + #23496+ #23813	Tests with travel charger
Set. 2	EUT2	ERP/EIRP/RSE tests
Set. 3	EUT3	Conducted RF tests

4. Reference Documents

4.1. Reference Documents for testing

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

Reference	Title	Version
FCC Part 24	PERSONAL COMMUNICATIONS SERVICES	10-1-11 Edition
FCC Part 22	PUBLIC MOBILE SERVICES	10-1-11 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 X 6.1 meters X 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 X 6.7 meters X 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	22.235, 2.1055	A.4	P
5	Occupied Bandwidth	2.1049(h)(i)	A.5	P
6	Emission Bandwidth	22.917(b)	A.6	P
7	Band Edge Compliance	22.917(b)	A.7	P
8	Conducted Spurious Emission	22.917, 2.1057	A.8	P

PCS 1900

Items	Test Name	Clause in FCC rules	Section in this report	Verdict
1	Output Power	24.232(b)	A.1	P
2	Emission Limit	24.238, 2.1051	A.2	P
3	Conducted Emission	15.107/207	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	2014-03-28
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	2014-04-14
7	Universal Radio Communication Tester	CMU200	102228	R&S	2013-07-7
8	Universal Radio Communication Tester	E5515C	MY48361083	Agilent	2014-03-16
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	2014-03-19
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; 824.4MHz, 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

CTC SIM CardSlot Measurement result

GSM (GMSK)

Frequency(MHz)	Power Step	Peak output power(dBm)
824.2	5	33.14
836.6	5	33.29
848.8	5	33.20

GPRS (GMSK, Time Slot 1)

Frequency(MHz)	Power Step	Peak output power(dBm)
824.2	3	33.16
836.6	3	33.29
848.8	3	33.21

EGPRS (8PSK, Time Slot 1)

Frequency(MHz)	Power Step	Peak output power(dBm)
824.2	6	27.09
836.6	6	26.87
848.8	6	26.72

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)	± 2	30 \pm 1
GPRS	3	30dBm(1W)	± 2	30 \pm 1
EGPRS	5	30dBm(1W)	± 2	30 \pm 1

CTC SIM CardSlot Measurement result

GSM (GMSK)

Frequency(MHz)	Power Step	Peak output power(dBm)
1850.2	0	30.51
1880.0	0	30.55
1909.8	0	30.49

GPRS (GMSK, Time Slot 1)

Frequency(MHz)	Power Step	Peak output power(dBm)
1850.2	3	30.53
1880.0	3	30.58
1909.8	3	30.48

EGPRS (8PSK, Time Slot 1)

Frequency(MHz)	Power Step	Peak output power(dBm)
1850.2	5	26.31
1880.0	5	26.28
1909.8	5	26.20

GSM SIM CardSlot Measurement result

GSM (GMSK)

Frequency(MHz)	Power Step	Peak output power(dBm)
1850.2	0	30.03
1880.0	0	30.04
1909.8	0	30.00

GPRS (GMSK, Time Slot 1)

Frequency(MHz)	Power Step	Peak output power(dBm)
1850.2	3	30.03
1880.0	3	30.06
1909.8	3	30.01

EGPRS (8PSK, Time Slot 1)

Frequency(MHz)	Power Step	Peak output power(dBm)
1850.2	5	25.50
1880.0	5	25.55
1909.8	5	25.53

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.

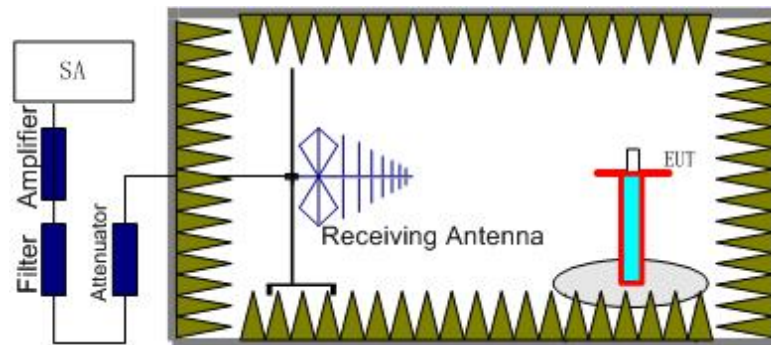
Rule Part 24.232(b) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."

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."

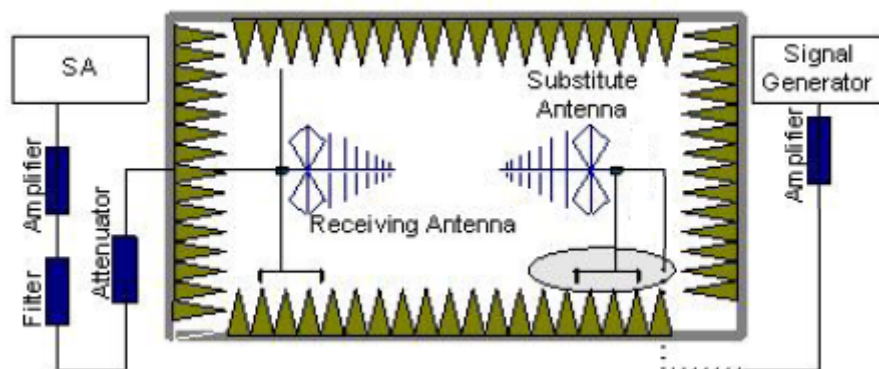
A.1.3.2 Method of Measurement

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, 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.

4. 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:
Power (EIRP) = $P_{Mea} - P_{Ag} - P_{cl} - G_a$
5. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15.

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)

CTC SIM card slot 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	-18.42	2.07	-53.00	0.84	2.15	29.52	Vertical
836.60	-17.77	2.08	-53.00	0.90	2.15	30.10	Vertical
848.80	-18.30	2.09	-53.00	0.95	2.15	29.51	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	-18.36	2.07	-53.00	0.84	2.15	29.58	Horizontal
836.60	-17.69	2.08	-53.00	0.90	2.15	30.18	Horizontal
848.80	-18.19	2.09	-53.00	0.95	2.15	29.62	Horizontal

EGPRS (8PSK)

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	Correction (dB)	Peak ERP(dBm)	Polarization
824.20	-21.66	2.07	-53.00	0.84	2.15	26.28	Horizontal
836.60	-21.57	2.08	-53.00	0.90	2.15	26.30	Horizontal
848.80	-22.47	2.09	-53.00	0.95	2.15	25.34	Horizontal

Sample calculation: GSM, 836.6 MHz

$$\begin{aligned} \text{Peak ERP(dBm)} &= P_{\text{Mea}}(-17.77 \text{ dBm}) - G_a (0.90 \text{ dBi}) - P_{\text{Ag}} (-53.00 \text{ dB}) - P_{\text{cl}} (2.08 \text{ dB}) - 2.15 \text{ dB} \\ &= 30.10 \text{ dBm} \end{aligned}$$

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)

CTC SIM card slot measurement result

GSM (GMSK)

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	Peak EIRP(dBm)	Polarization
1850.20	-27.07	3.19	-53.00	-4.56	27.30	Horizontal
1880.00	-25.44	3.11	-53.00	-4.43	28.88	Horizontal
1909.80	-26.56	3.18	-53.00	-4.30	27.56	Horizontal

GPRS (GMSK)

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	Peak EIRP(dBm)	Polarization
1850.20	-27.02	3.19	-53.00	-4.56	27.35	Horizontal
1880.00	-25.34	3.11	-53.00	-4.43	28.98	Horizontal
1909.80	-26.59	3.18	-53.00	-4.30	27.53	Horizontal

EGPRS (8PSK)

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	Peak EIRP(dBm)	Polarization
1850.20	-29.55	3.19	-53.00	-4.56	24.82	Horizontal
1880.00	-27.54	3.11	-53.00	-4.43	26.78	Horizontal
1909.80	-28.35	3.18	-53.00	-4.30	25.77	Horizontal

GSM SIM card slot measurement result

GSM (GMSK)

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	Peak EIRP(dBm)	Polarization
1850.20	-24.39	3.19	-53.00	-4.56	29.98	Horizontal
1880.00	-23.88	3.11	-53.00	-4.43	30.44	Horizontal
1909.80	-23.59	3.18	-53.00	-4.30	30.53	Horizontal

GPRS (GMSK)

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a (dBi)	Peak EIRP(dBm)	Polarization
1850.20	-24.43	3.19	-53.00	-4.56	29.94	Horizontal
1880.00	-23.97	3.11	-53.00	-4.43	30.35	Horizontal
1909.80	-23.92	3.18	-53.00	-4.30	30.20	Horizontal

EGPRS (8PSK)

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a (dBi)	Peak EIRP(dBm)	Polarization
1850.20	-27.50	3.19	-53.00	-4.56	26.87	Horizontal
1880.00	-26.74	3.11	-53.00	-4.43	27.58	Horizontal
1909.80	-26.65	3.18	-53.00	-4.30	27.47	Horizontal

Sample calculation: GSM, 1909.8 MHz, GSM SIM card slot

Peak EIRP(dBm) = P_{Mea}(-23.59dBm) - G_a (-4.30 dBi) - P_{Ag} (-50.00 dB) - P_{cl} (3.18 dB) = 30.53 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)

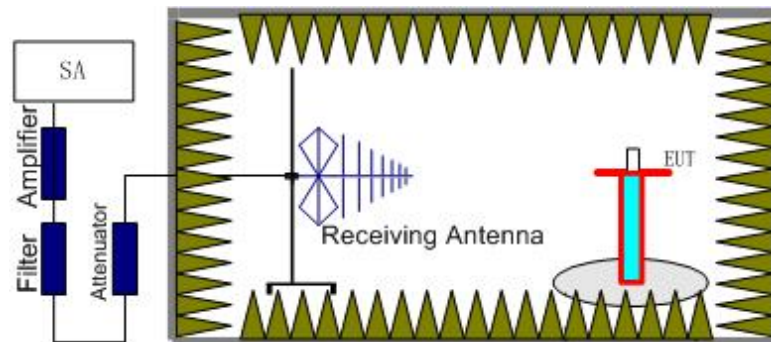
A.2.1 Measurement Method

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

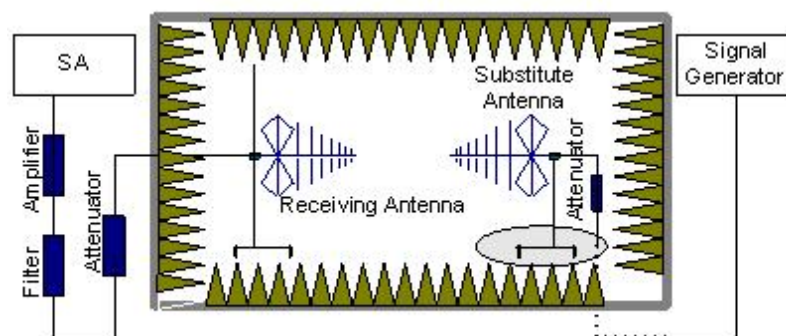
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz. The resolution bandwidth is set 1MHz as outlined in Part 24.238. The spectrum was scanned with the mobile station transmitting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

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, $ERP = EIRP - 2.15dB$.

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.

CTC SIM card slot:

GSM Mode Channel 128/824.2MHz

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
1648.48	-57.59	2.91	-5.45	2.15	-57.20	-13.00	Vertical I
2472.90	-58.98	3.60	-5.45	2.15	-59.28	-13.00	Horizontal
3616.78	-67.00	4.38	-8.06	2.15	-65.47	-13.00	Horizontal
5243.59	-70.34	4.93	-9.13	2.15	-68.29	-13.00	Vertical
6500.44	-66.90	5.84	-10.55	2.15	-64.34	-13.00	Vertical
8103.48	-67.57	6.90	-11.73	2.15	-64.89	-13.00	Horizontal

GSM Mode Channel 190/836.6MHz

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
1948.13	-65.18	3.18	-4.17	2.15	-66.34	-13.00	Vertical
2510.15	-68.92	3.98	-6.81	2.15	-68.24	-13.00	Vertical
3092.94	-67.24	4.62	-8.47	2.15	-65.54	-13.00	Horizontal
4641.18	-65.97	5.17	-9.70	2.15	-63.59	-13.00	Vertical
6374.27	-66.17	5.85	-10.32	2.15	-63.85	-13.00	Vertical
8931.10	-66.22	7.48	-12.32	2.15	-63.53	-13.00	Horizontal

GSM Mode Channel 251/848.8MHz

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
1697.61	-69.83	3.11	-4.49	2.15	-70.60	-13.00	Vertical
2546.37	-67.50	4.08	-7.14	2.15	-66.59	-13.00	Horizontal
3610.43	-73.59	4.52	-8.35	2.15	-71.91	-13.00	Vertical
5074.15	-67.88	5.54	-10.09	2.15	-65.48	-13.00	Vertical
6885.61	-64.83	6.44	-11.16	2.15	-62.26	-13.00	Horizontal
8953.27	-66.52	7.58	-12.60	2.15	-63.65	-13.00	Vertical

GSM Mode Channel 512/1850.2MHz

Frequency (MHz)	P _{Mea} (dBm)	P _{pl} (dB)	G _a (dBi)	Peak EIRP (dBm)	Limit (dBm)	Polarity
5550.59	-46.80	4.52	-8.21	-43.11	-13.00	Horizontal
9251.10	-44.30	5.45	-10.06	-39.69	-13.00	Vertical
10203.91	-49.65	6.82	-11.42	-45.05	-13.00	Vertical
12952.05	-66.25	7.50	-12.44	-61.31	-13.00	Vertical
15601.20	-59.58	8.54	-12.40	-55.72	-13.00	Vertical
17569.08	-61.56	9.55	-13.51	-57.60	-13.00	Vertical

GSM Mode Channel 661/1880.0MHz

Frequency (MHz)	P _{Mea} (dBm)	P _{pl} (dB)	G _a (dBi)	Peak EIRP (dBm)	Limit (dBm)	Polarity
4246.06	-44.58	4.52	-8.21	-40.89	-13.00	Vertical
5640.15	-44.56	5.45	-10.06	-39.95	-13.00	Vertical
9400.29	-68.98	6.46	-11.15	-64.29	-13.00	Horizontal
10725.44	-53.20	8.54	-12.40	-49.34	-13.00	Horizontal
12506.83	-60.70	9.22	-13.97	-55.95	-13.00	Vertical
15614.82	-56.33	10.57	-12.40	-54.50	-13.00	Vertical

GSM Mode Channel 810/1909.8MHz

Frequency (MHz)	P _{Mea} (dBm)	P _{pl} (dB)	G _a (dBi)	Peak EIRP (dBm)	Limit (dBm)	Polarity
4165.96	-47.63	4.49	-8.28	-43.84	-13.00	Vertical
5729.51	-41.42	5.55	-10.09	-36.88	-13.00	Vertical
6946.62	-46.60	6.72	-11.54	-41.78	-13.00	Vertical
8627.10	-50.27	8.64	-12.40	-46.51	-13.00	Horizontal
10203.04	-61.95	9.23	-13.47	-57.71	-13.00	Horizontal
13235.27	-61.26	10.19	-13.23	-58.22	-13.00	Horizontal

GSM SIM card slot:

GSM Mode Channel 512/1850.2MHz

Frequency (MHz)	P _{Mea} (dBm)	P _{pl} (dB)	G _a (dBi)	Peak EIRP (dBm)	Limit (dBm)	Polarity
5550.59	-44.79	5.46	-10.02	-40.23	-13.00	Vertical
9251.10	-56.55	6.07	-10.75	-51.87	-13.00	Vertical
10203.91	-49.20	6.42	-11.34	-44.28	-13.00	Vertical
12952.05	-67.61	7.66	-12.60	-62.67	-13.00	Horizontal
15601.20	-51.61	8.39	-12.40	-47.60	-13.00	Vertical
17569.08	-48.47	8.86	-13.24	-44.09	-13.00	Vertical

GSM Mode Channel 661/1880.0MHz

Frequency (MHz)	P _{Mea} (dBm)	P _{pl} (dB)	G _a (dBi)	Peak EIRP (dBm)	Limit (dBm)	Polarity
4246.06	-58.20	4.15	-7.48	-54.87	-13.00	Horizontal
5640.15	-46.04	4.52	-8.21	-42.35	-13.00	Vertical
9400.29	-43.36	5.45	-10.06	-38.75	-13.00	Vertical
10725.44	-47.01	6.82	-11.42	-42.41	-13.00	Vertical
12506.83	-68.79	8.21	-12.42	-64.58	-13.00	Vertical
15614.82	-57.31	10.64	-13.38	-54.57	-13.00	Horizontal

GSM Mode Channel 810/1909.8MHz

Frequency (MHz)	PMea (dBm)	Ppl (dB)	Ga (dBi)	Peak EIRP (dBm)	Limit (dBm)	Polarity
4165.96	-41.57	5.55	-10.09	-37.03	-13.00	Vertical
5729.51	-46.70	6.72	-11.54	-41.88	-13.00	Vertical
6946.62	-59.62	7.79	-12.58	-54.83	-13.00	Horizontal
8627.10	-63.41	8.65	-13.18	-58.88	-13.00	Vertical
10203.04	-61.37	9.34	-14.00	-56.71	-13.00	Horizontal
13235.27	-60.67	11.04	-13.30	-58.41	-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. For test layout photo, please refer to Pic.2 in Annex B.

A.3.1 Limit

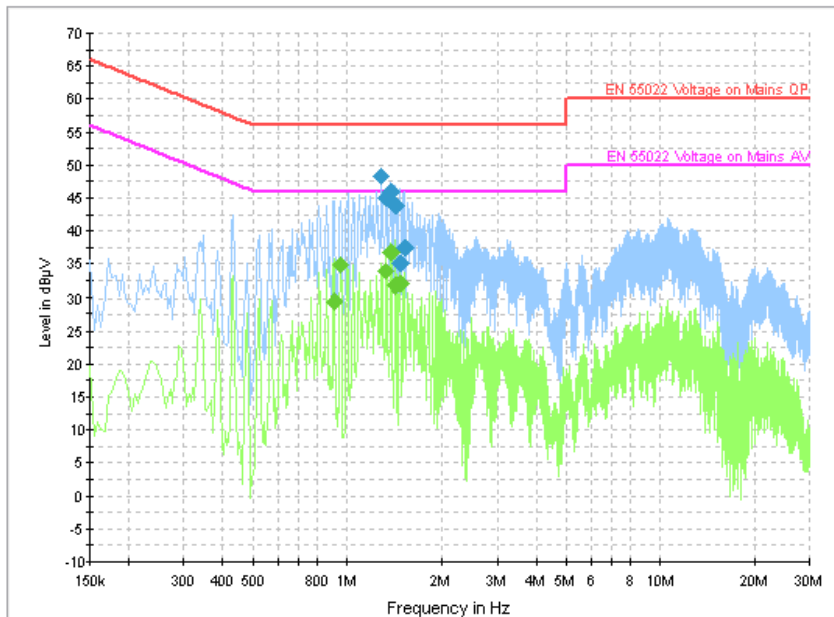
Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	Quasi -Peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50

* Decreases with logarithm of the frequency

A.3.2 Measurement result

CTC SIM card slot:

GSM850MHz



IF bandwidth 9 kHz

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

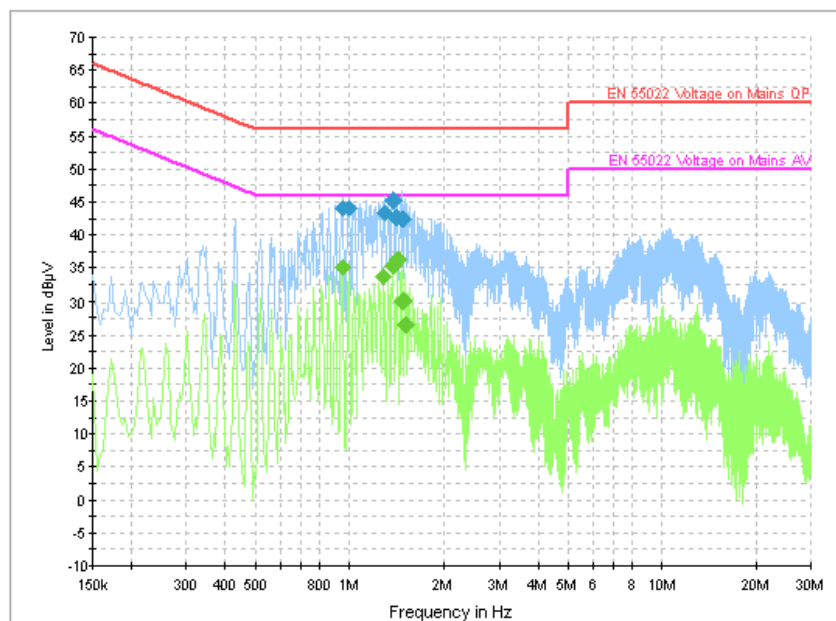
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
1.288500	48.3	GND	L1	10.0	7.7	56.0
1.338000	44.9	GND	L1	10.0	11.1	56.0
1.383000	45.9	GND	L1	10.0	10.1	56.0
1.432500	43.8	GND	L1	10.0	12.2	56.0
1.482000	35.1	GND	L1	10.0	20.9	56.0
1.527000	37.3	GND	L1	10.0	18.7	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.910500	29.5	GND	L1	10.0	16.5	46.0
0.951000	34.9	GND	L1	10.0	11.1	46.0
1.338000	33.8	GND	L1	10.0	12.2	46.0
1.383000	36.8	GND	L1	10.0	9.2	46.0
1.432500	31.9	GND	L1	10.0	14.1	46.0
1.477500	32.0	GND	L1	10.0	14.0	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.

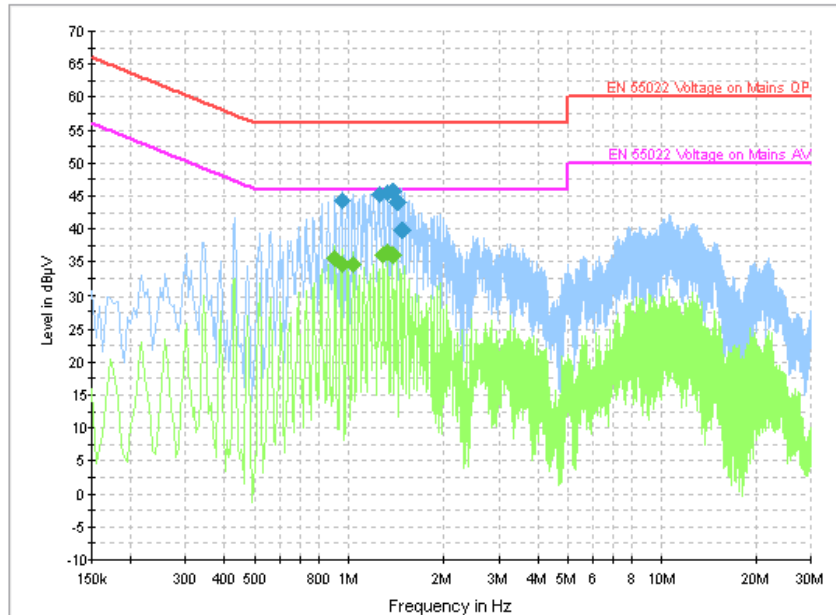
Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.951000	44.2	GND	L1	10.0	11.8	56.0
0.996000	44.1	GND	L1	10.0	11.9	56.0
1.297500	43.3	GND	L1	10.0	12.7	56.0
1.383000	45.3	GND	L1	10.0	10.7	56.0
1.414500	42.5	GND	L1	10.0	13.5	56.0
1.473000	42.5	GND	L1	10.0	13.5	56.0

Final Result 2

Frequency (MHz)	Average (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.951000	35.0	GND	L1	10.0	11.0	46.0
1.288500	33.7	GND	L1	10.0	12.3	46.0
1.383000	35.2	GND	L1	10.0	10.8	46.0
1.423500	36.2	GND	L1	10.0	9.8	46.0
1.473000	30.1	GND	L1	10.0	15.9	46.0
1.518000	26.6	GND	L1	10.0	19.4	46.0

**GSM SIM card slot:
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 μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.951000	44.3	GND	L1	10.0	11.7	56.0
1.252500	45.1	GND	L1	10.0	10.9	56.0
1.338000	45.5	GND	L1	10.0	10.5	56.0
1.383000	45.7	GND	L1	10.0	10.3	56.0
1.428000	44.0	GND	L1	10.0	12.0	56.0
1.473000	39.8	GND	L1	10.0	16.2	56.0

Final Result 2

Frequency (MHz)	Average (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.906000	35.5	GND	L1	10.0	10.5	46.0
0.951000	34.6	GND	L1	10.0	11.4	46.0
1.036500	34.7	GND	L1	10.0	11.3	46.0
1.293000	35.9	GND	L1	10.0	10.1	46.0
1.338000	36.4	GND	L1	10.0	9.6	46.0
1.383000	36.0	GND	L1	10.0	10.0	46.0

A.4 FREQUENCY STABILITY

Reference

FCC: CFR Part 2.1055, 22.235, 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 4.1VDC. 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. 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 section

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 100 percent of the nominal value for other than hand carried battery equipment.

A.4.3 Measurement results

CTC SIM card slot:

GSM 850

Room Temperature: 24 °C

Frequency Error vs Voltage

Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.5	-17	0.020
3.7	-32	0.038
4.1	-37	0.044

Note:High voltage and normal voltage are both 4.1V.

Frequency Error vs Temperature

temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
50	-17	0.020
40	-15	0.018
30	-18	0.022
20	-19	0.023
10	-15	0.017
0	-11	0.013
- 10	-16	0.020
- 20	26	0.031
- 30	-16	0.019

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	-25	0.013
3.7	-25	0.014
4.1	-40	0.022

Frequency Error vs Temperature

temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
50	-35	0.018
40	-22	0.012
30	-20	0.010
20	-32	0.017
10	-30	0.016
0	-27	0.014
- 10	-23	0.012
- 20	-23	0.012
- 30	17	0.009

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

GSM SIM card slot:

PCS 1900

Room Temperature: 24°C

Frequency Error vs Voltage

Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.5	-25	0.013
3.7	-30	0.016
4.1	-30	0.016

Frequency Error vs Temperature

temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
50	-23	0.012
40	-22	0.012
30	-29	0.015
20	-21	0.011
10	-31	0.017
0	-23	0.012
- 10	-21	0.011
- 20	-27	0.014
- 30	-26	0.014

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

CTC SIM card slot:

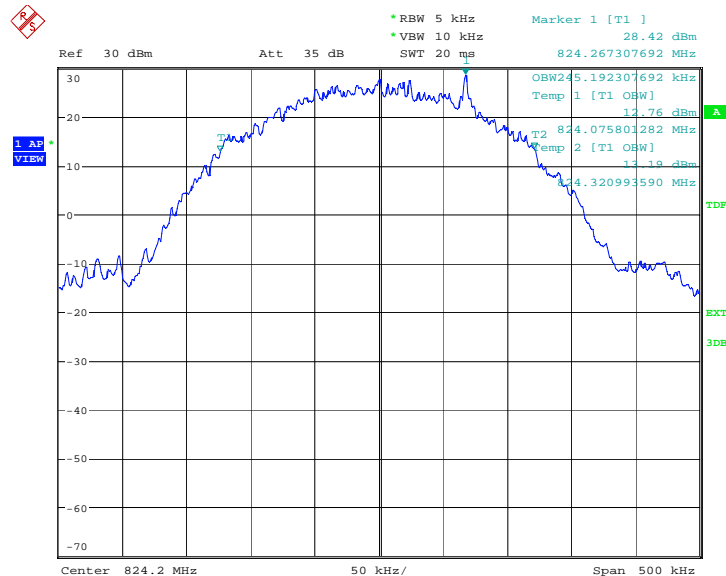
GSM 850(99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
824.2	245.192
836.6	244.391
848.8	245.192

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

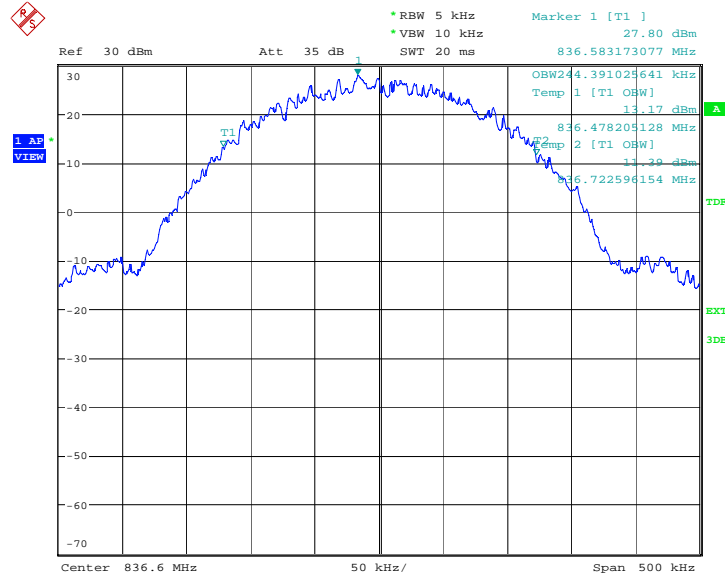
GSM 850

Channel 128-Occupied Bandwidth (-20dBc BW)



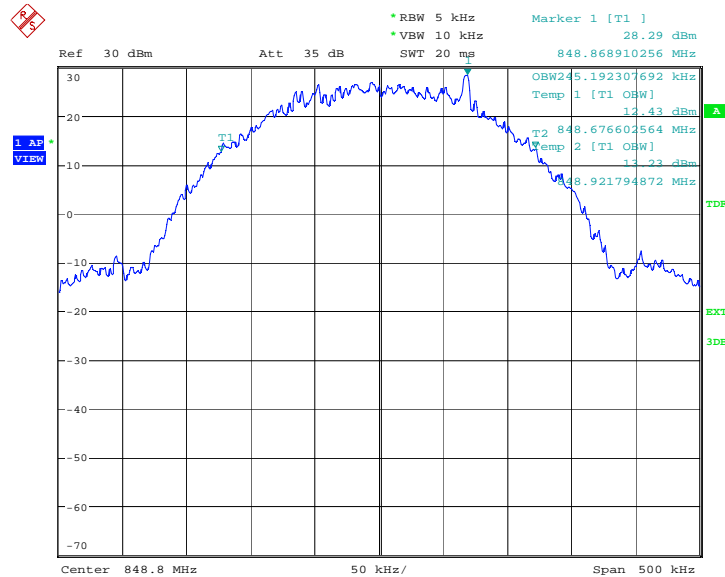
Date: 25.MAR.2013 11:28:03

Channel 190-Occupied Bandwidth (-20dBc BW)



Date: 25.MAR.2013 11:28:35

Channel 251-Occupied Bandwidth (-20dBc BW)



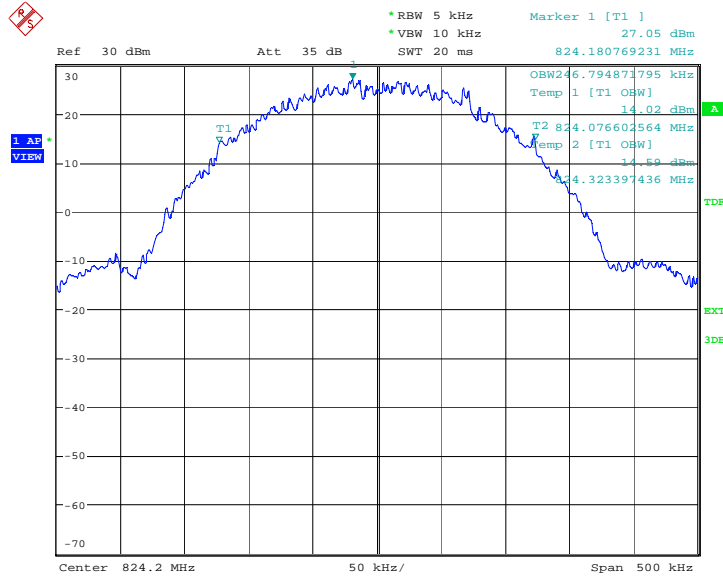
Date: 25.MAR.2013 11:29:07

GPRS 850(-20dBc)

Frequency(MHz)	Occupied Bandwidth (-20dBc BW)(kHz)
824.2	246.795
836.6	244.391
848.8	245.192

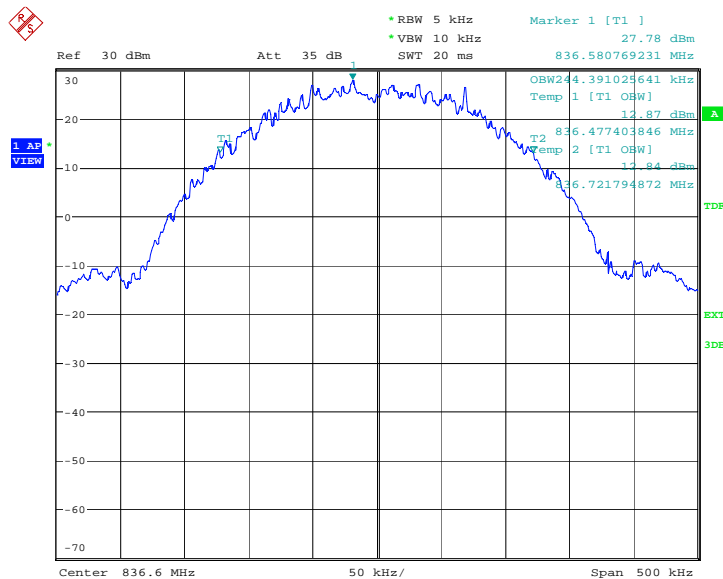
GPRS 850

Channel 128-Occupied Bandwidth (-20dBc BW)



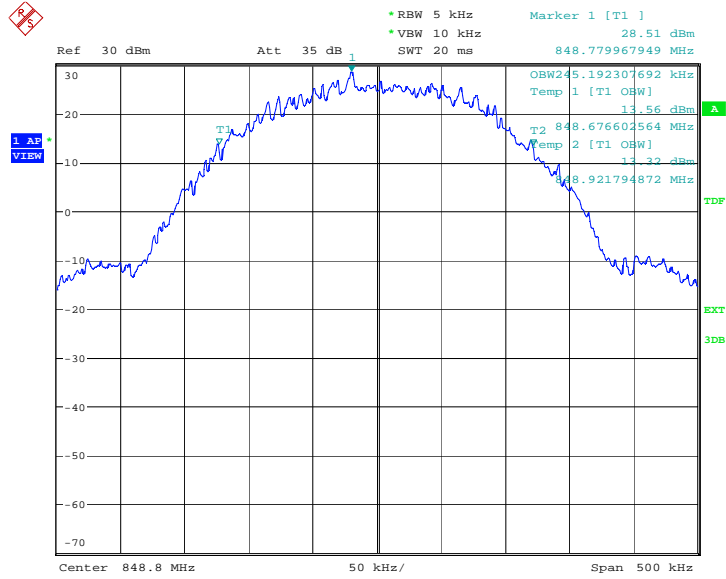
Date: 25.MAR.2013 11:41:45

Channel 190-Occupied Bandwidth (-20dBc BW)



Date: 25.MAR.2013 11:42:17

Channel 251-Occupied Bandwidth (-20dBc BW)



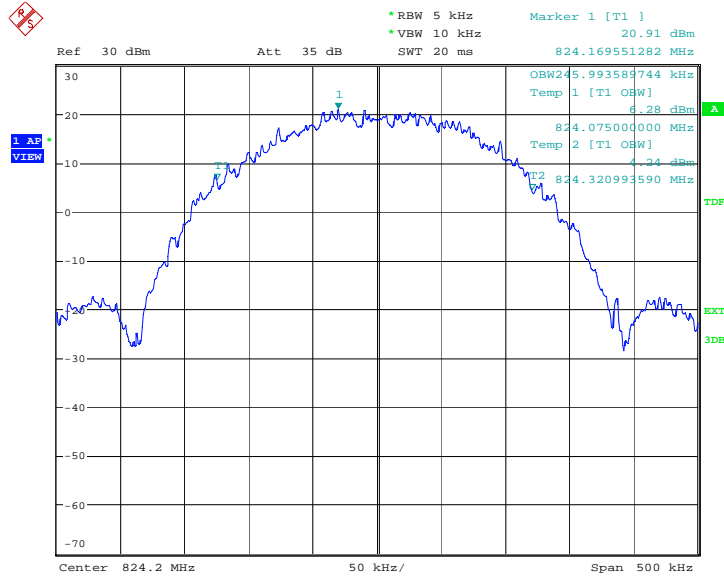
Date: 25.MAR.2013 11:42:49

EGPRS 850(-20dBc)

Frequency(MHz)	Occupied Bandwidth (-20Bc BW)(kHz)
824.2	245.994
836.6	249.199
848.8	248.397

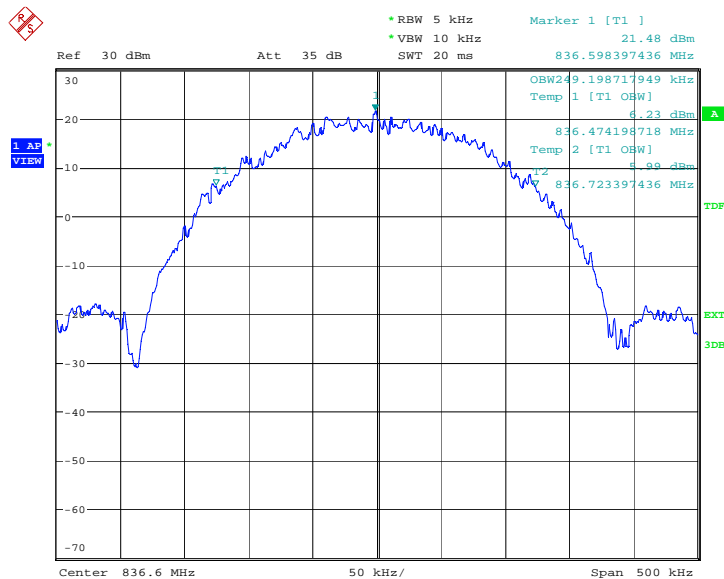
EGPRS 850

Channel 128-Occupied Bandwidth (-20dBc BW)



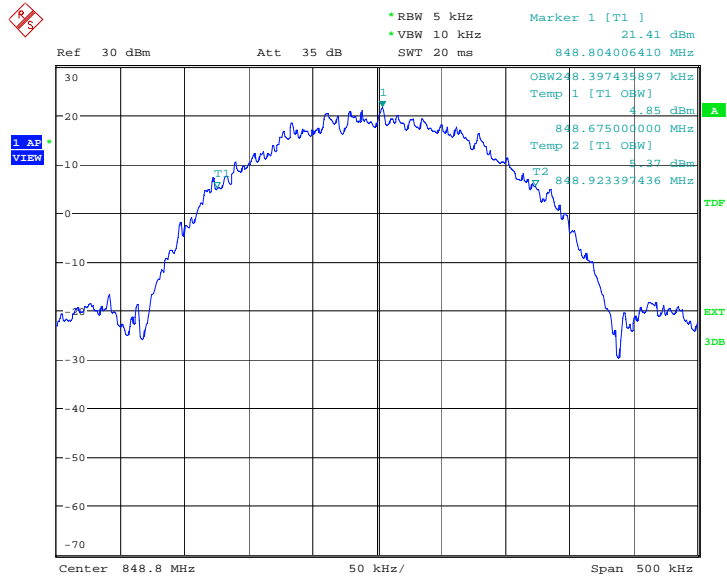
Date: 25.MAR.2013 11:50:51

Channel 190-Occupied Bandwidth (-20dBc BW)



Date: 25.MAR.2013 11:51:23

Channel 251-Occupied Bandwidth (-20dBc BW)



Date: 25.MAR.2013 11:51:55

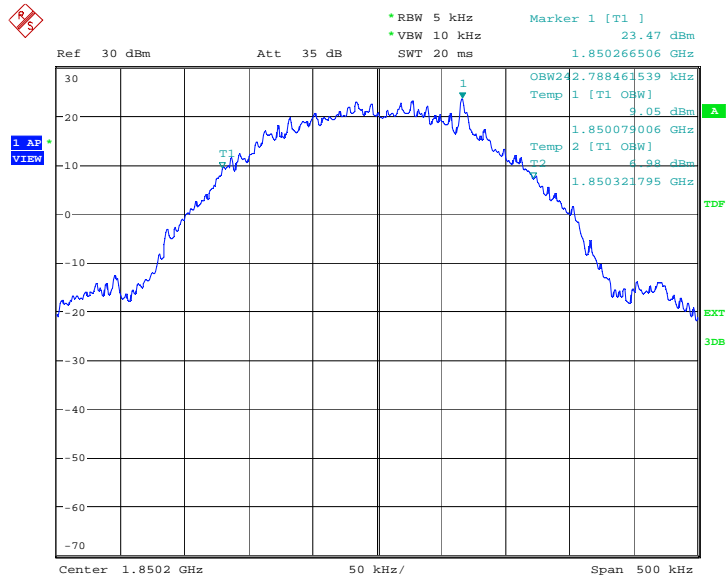
PCS 1900(99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
1850.2	242.788
1880.0	241.987
1909.8	244.391

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

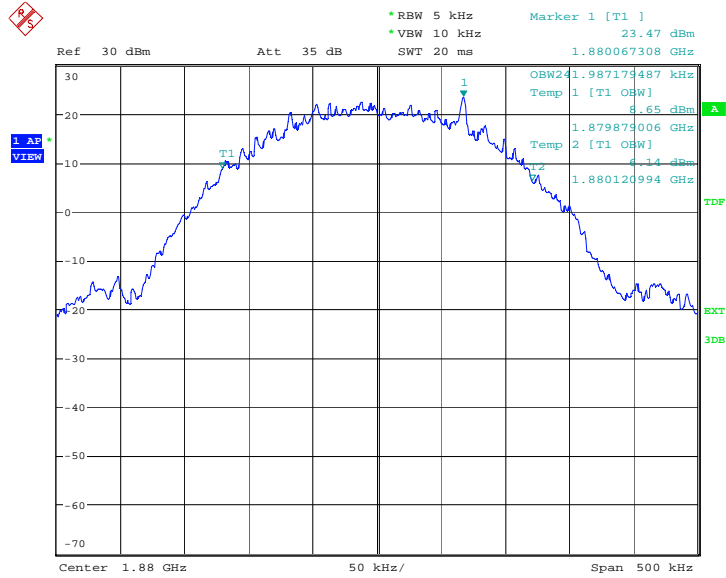
PCS 1900

Channel 512-Occupied Bandwidth (-20dBc BW)



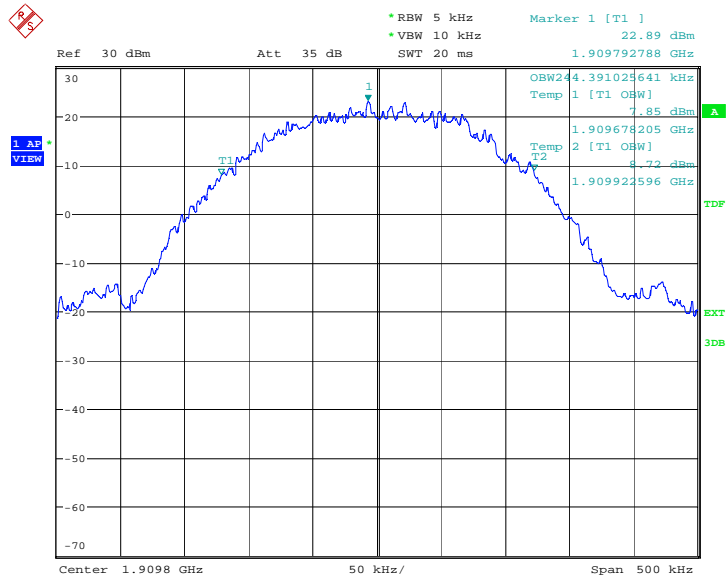
Date: 25.MAR.2013 12:01:48

Channel 661-Occupied Bandwidth (-20dBc BW)



Date: 25.MAR.2013 12:02:20

Channel 810-Occupied Bandwidth (-20dBc BW)



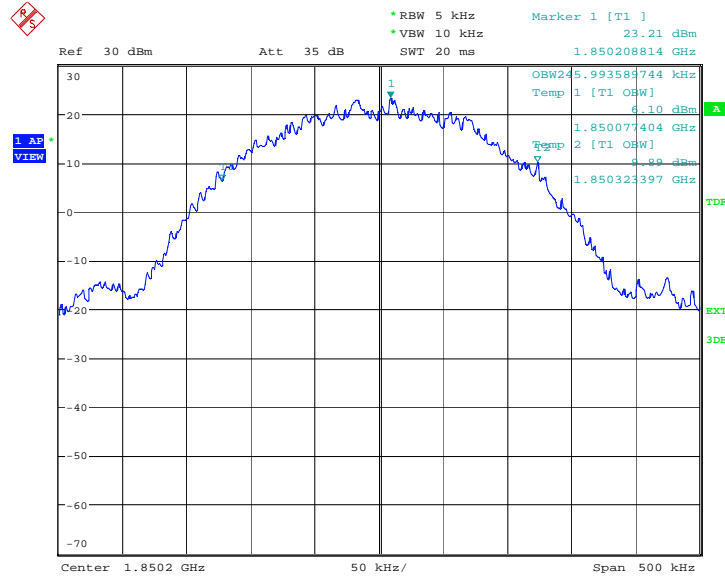
Date: 25.MAR.2013 12:02:52

GPRS 1900(-20dBc)

Frequency(MHz)	Occupied Bandwidth (-20dBc BW)(kHz)
1850.2	245.994
1880.0	243.590
1909.8	242.788

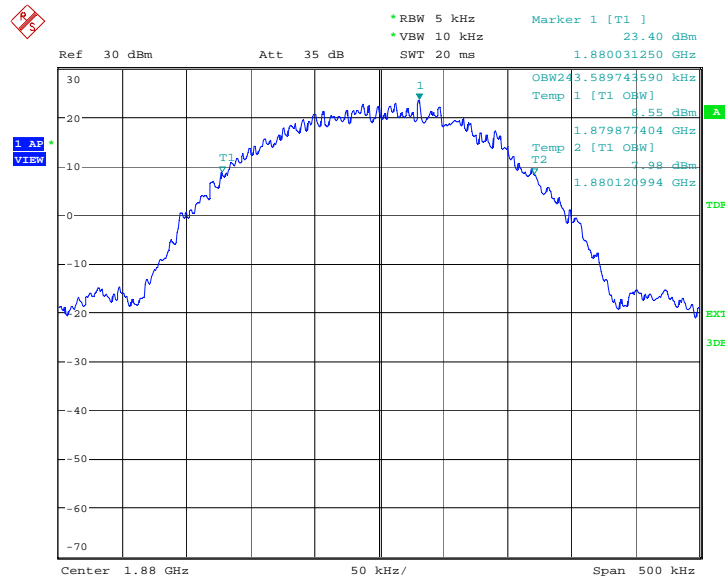
GPRS 1900

Channel 512-Occupied Bandwidth -20dBc BW)



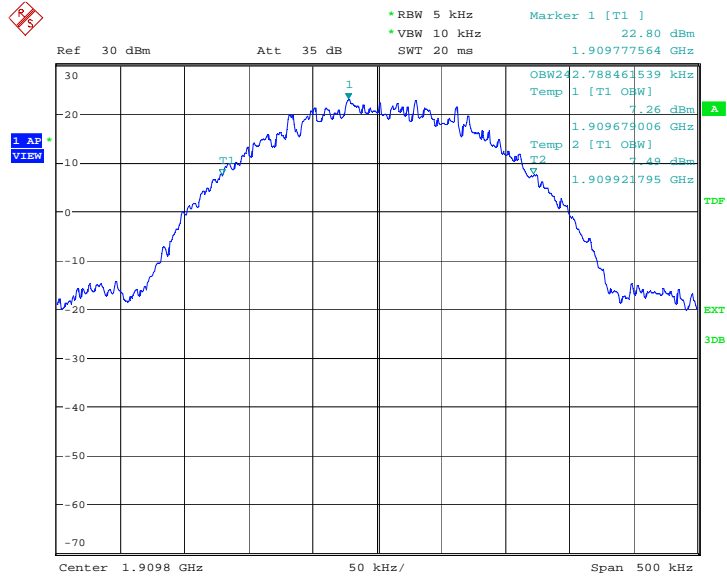
Date: 25.MAR.2013 11:46:14

Channel 661-Occupied Bandwidth (-20dBc BW)



Date: 25.MAR.2013 11:46:46

Channel 810-Occupied Bandwidth (-20dBc BW)



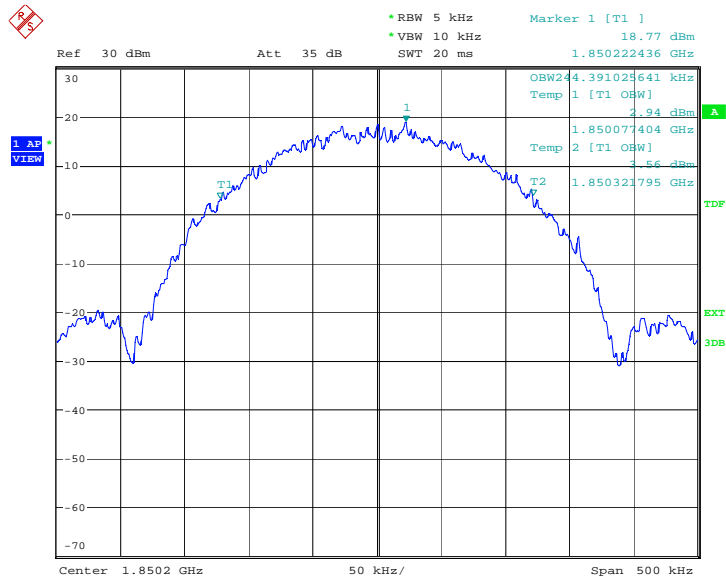
Date: 25.MAR.2013 11:47:18

EGPRS 1900(-20dBc)

Frequency(MHz)	Occupied Bandwidth (-20dBc BW)(kHz)
1850.2	244.391
1880.0	241.987
1909.8	243.590

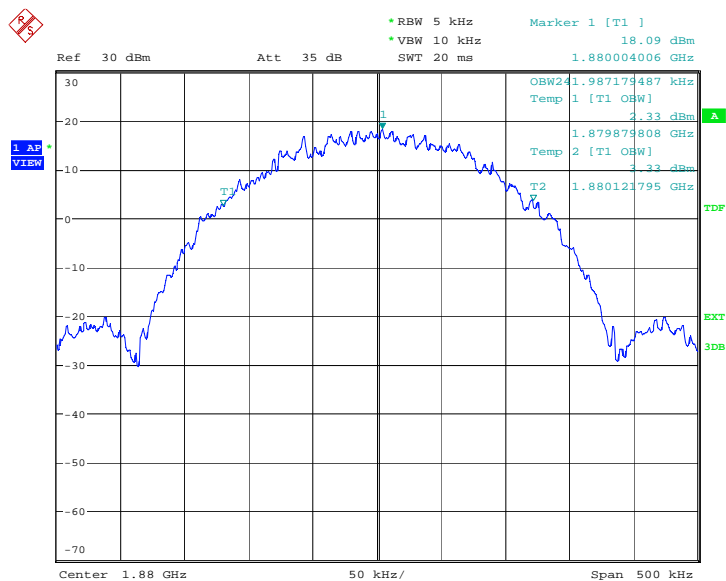
EGPRS 1900

Channel 512-Occupied Bandwidth (-20dBc BW)



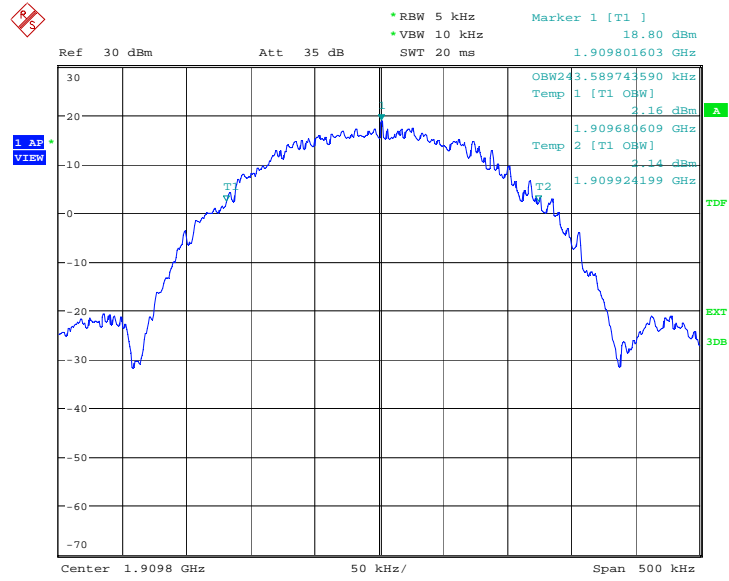
Date: 25.MAR.2013 11:55:28

Channel 661-Occupied Bandwidth (-20dBc BW)



Date: 25.MAR.2013 11:56:00

Channel 810-Occupied Bandwidth (-20dBc BW)



Date: 25.MAR.2013 11:56:32

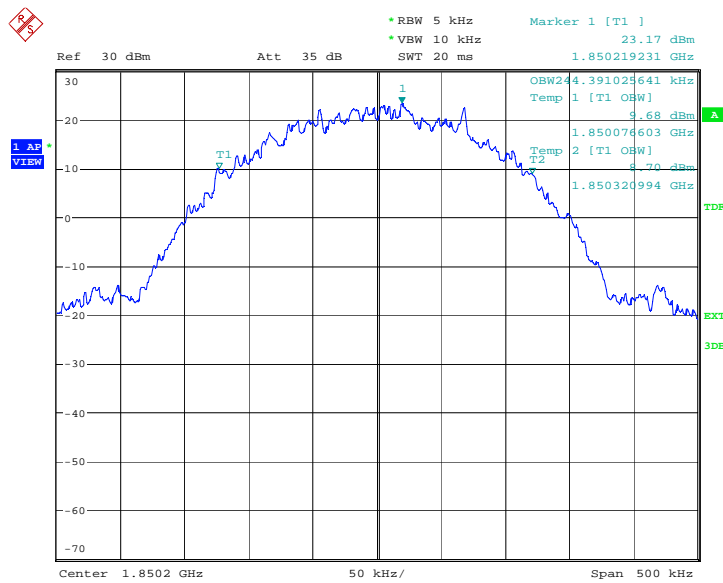
GSM SIM card slot:
PCS 1900(99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
1850.2	244.391
1880.0	245.192
1909.8	242.788

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

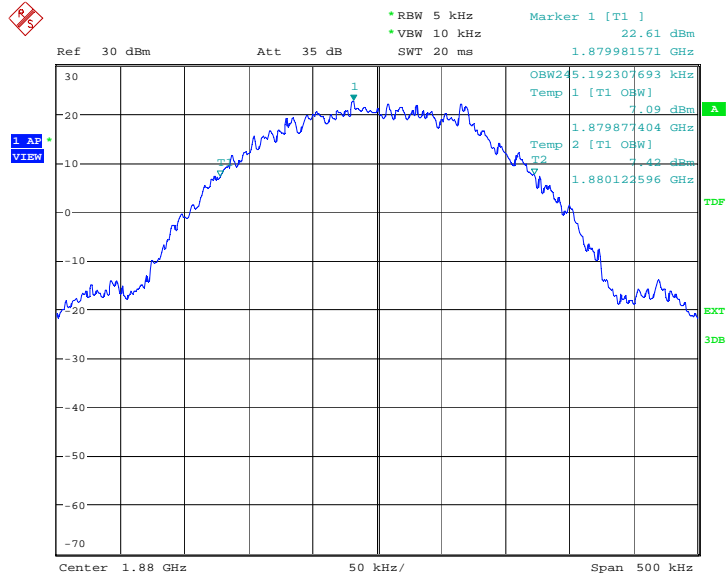
PCS 1900

Channel 512-Occupied Bandwidth (-20dBc BW)



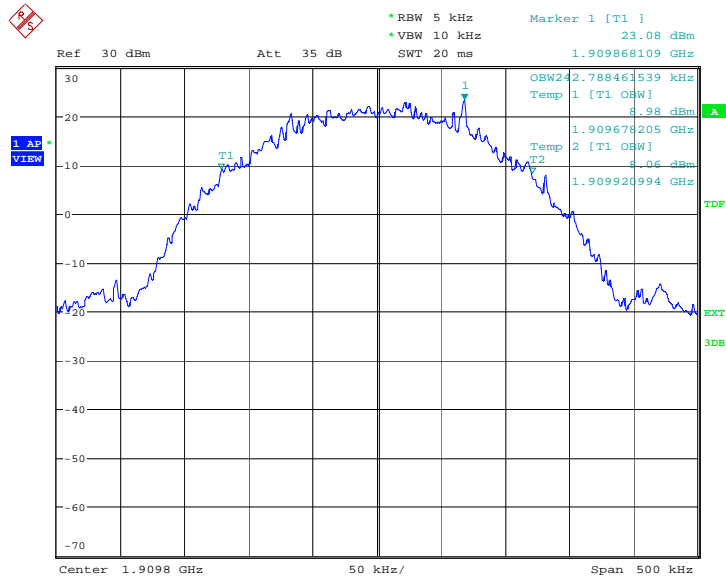
Date: 26.MAR.2013 01:30:56

Channel 661-Occupied Bandwidth (-20dBc BW)



Date: 26.MAR.2013 01:31:29

Channel 810-Occupied Bandwidth (-20dBc BW)



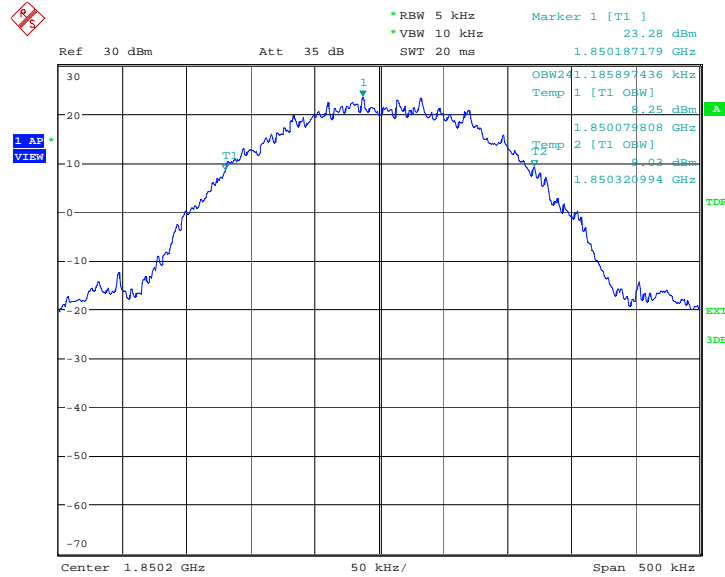
Date: 26.MAR.2013 01:32:01

GPRS 1900(-20dBc)

Frequency(MHz)	Occupied Bandwidth (-20dBc BW)(kHz)
1850.2	241.186
1880.0	247.596
1909.8	241.987

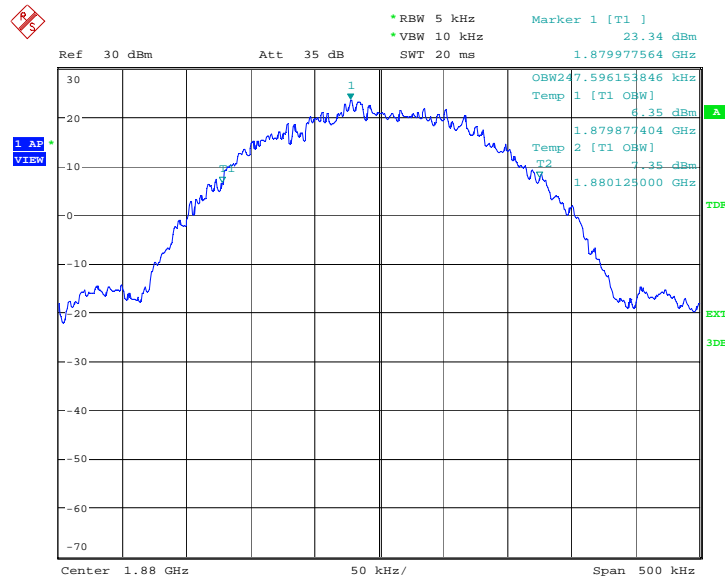
GPRS 1900

Channel 512-Occupied Bandwidth -20dBc BW)



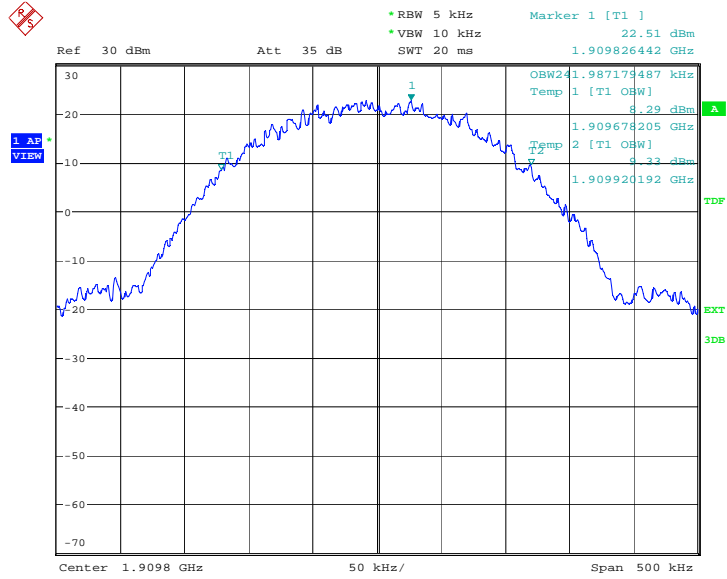
Date: 26.MAR.2013 01:47:24

Channel 661-Occupied Bandwidth (-20dBc BW)



Date: 26.MAR.2013 01:47:56

Channel 810-Occupied Bandwidth (-20dBc BW)



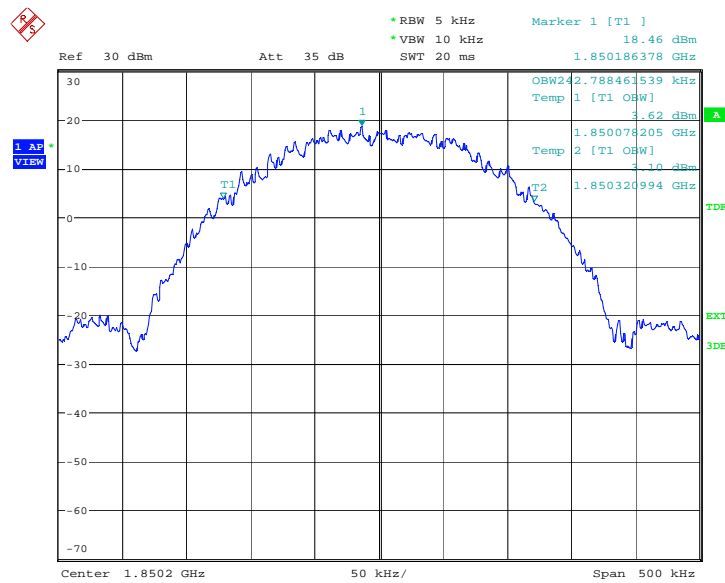
Date: 26.MAR.2013 01:48:28

EGPRS 1900(-20dBc)

Frequency(MHz)	Occupied Bandwidth (-20dBc BW)(kHz)
1850.2	242.788
1880.0	243.590
1909.8	245.994

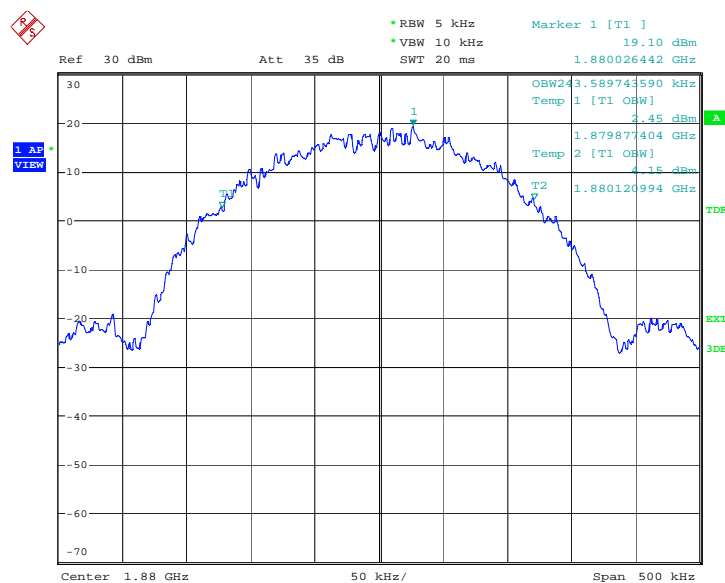
EGPRS 1900

Channel 512-Occupied Bandwidth (-20dBc BW)



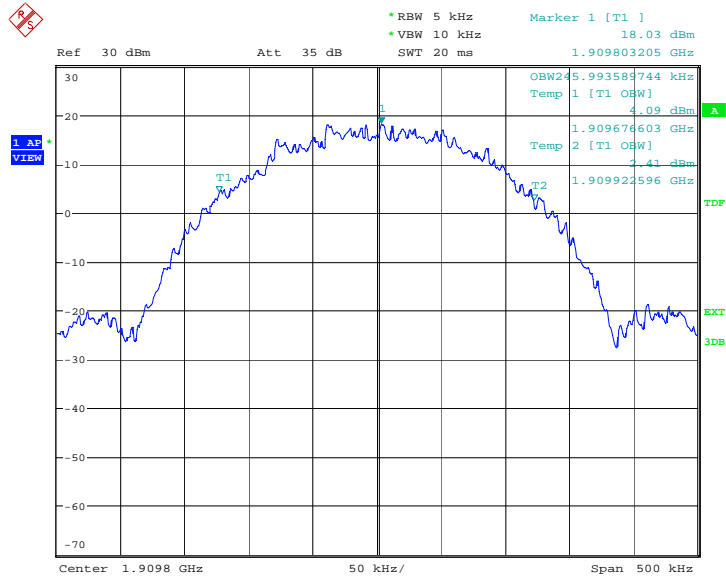
Date: 26.MAR.2013 02:00:33

Channel 661-Occupied Bandwidth (-20dBc BW)



Date: 26.MAR.2013 02:01:05

Channel 810-Occupied Bandwidth (-20dBc BW)



Date: 26.MAR.2013 02:01:37

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

CTC SIM card slot:

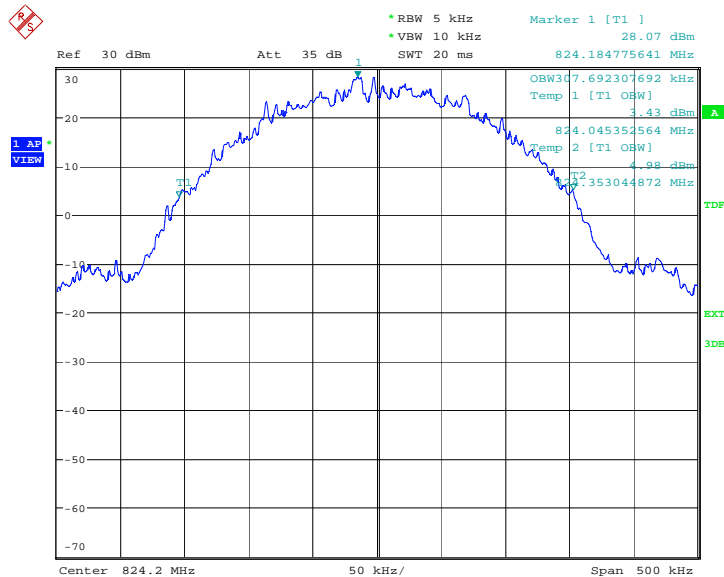
GSM 850(-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc BW)(kHz)
824.2	307.692
836.6	306.090
848.8	305.288

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

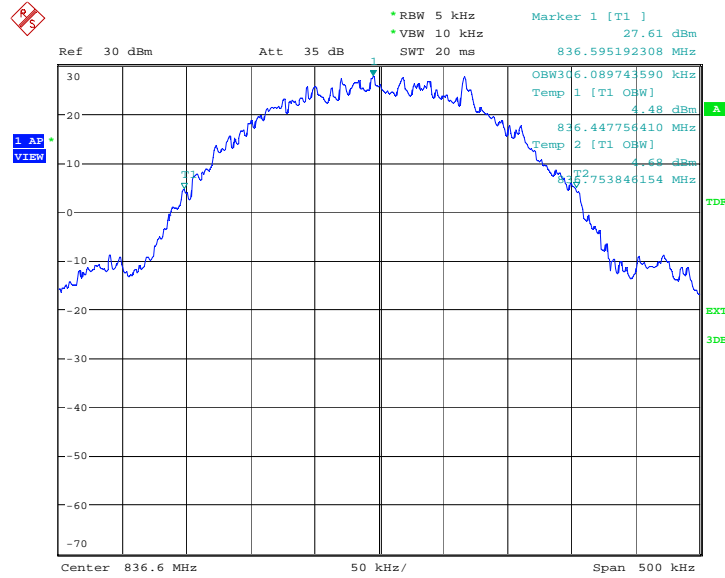
GSM 850

Channel 128-Occupied Bandwidth (-26dBc BW)



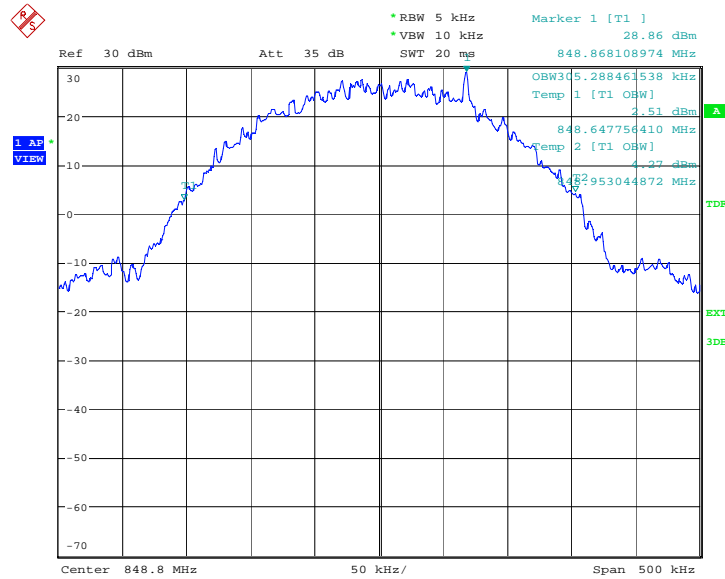
Date: 25.MAR.2013 11:29:41

Channel 190-Occupied Bandwidth (-26dBc BW)



Date: 25.MAR.2013 11:30:13

Channel 251-Occupied Bandwidth (-26dBc BW)



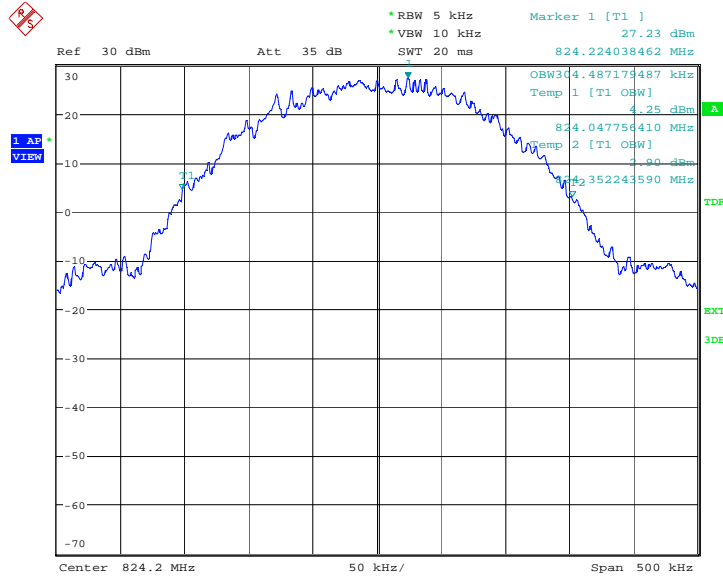
Date: 25.MAR.2013 11:30:45

GPRS 850(-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc BW)(kHz)
824.2	304.487
836.6	306.090
848.8	304.487

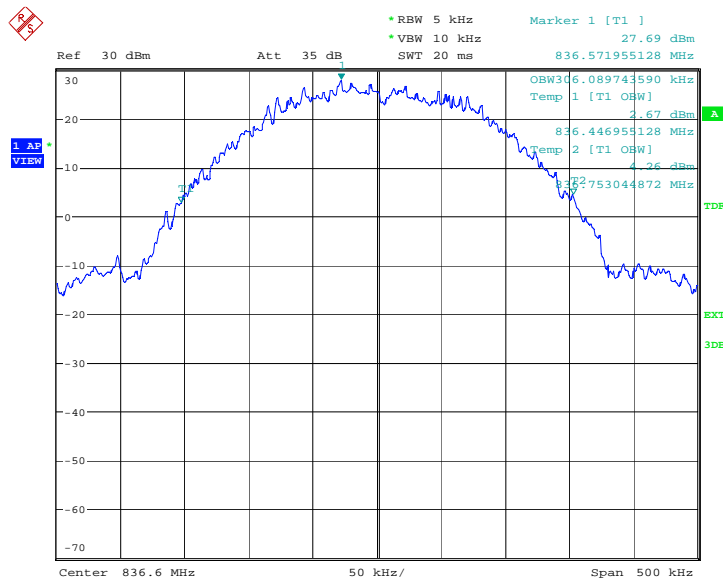
GPRS 850

Channel 128-Occupied Bandwidth (-26dBc BW)



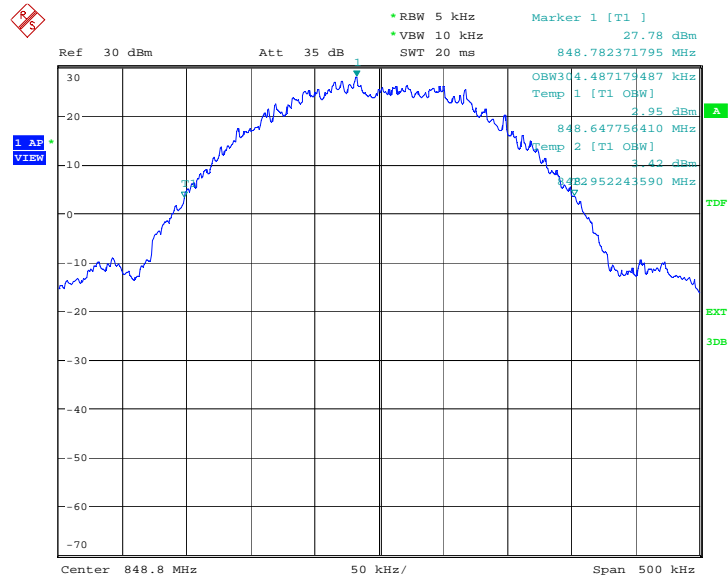
Date: 25.MAR.2013 11:43:23

Channel 190-Occupied Bandwidth (-26dBc BW)



Date: 25.MAR.2013 11:43:55

Channel 251-Occupied Bandwidth (-26dBc BW)



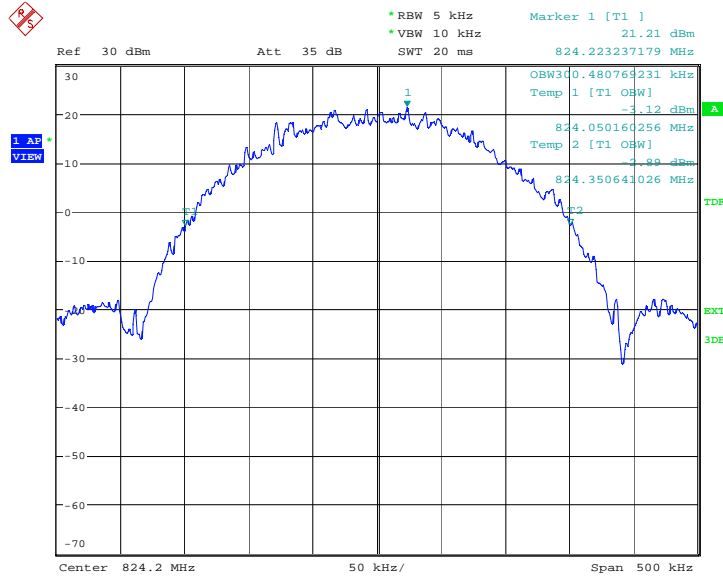
Date: 25.MAR.2013 11:44:27

EGPRS 850(-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc BW)(kHz)
824.2	300.481
836.6	302.083
848.8	300.481

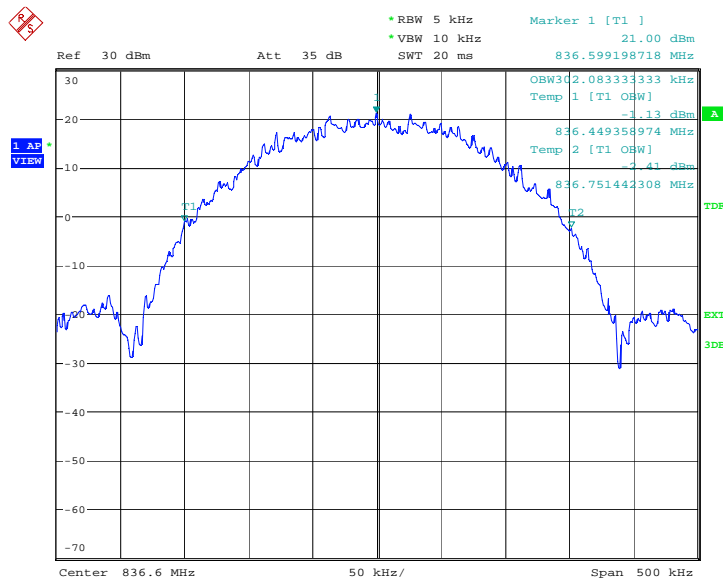
EGPRS 850

Channel 128-Occupied Bandwidth (-26dBc BW)



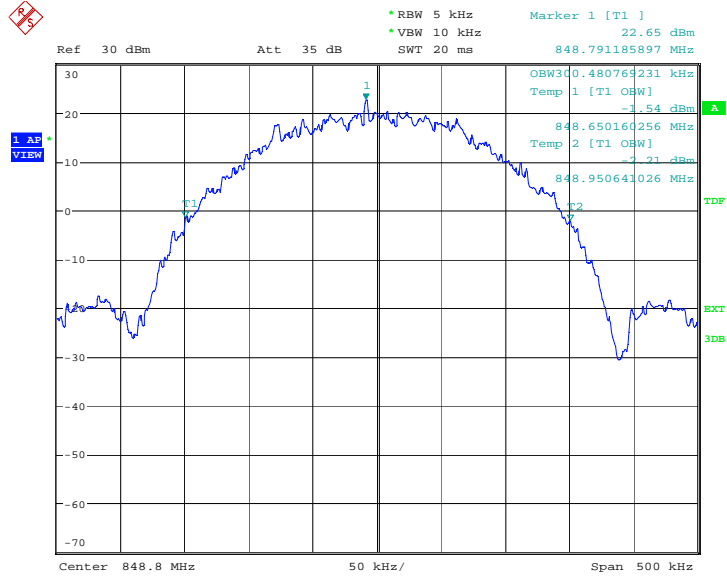
Date: 25.MAR.2013 11:52:29

Channel 190-Occupied Bandwidth (-26dBc BW)



Date: 25.MAR.2013 11:53:01

Channel 251-Occupied Bandwidth (-26dBc BW)



Date: 25.MAR.2013 11:53:33

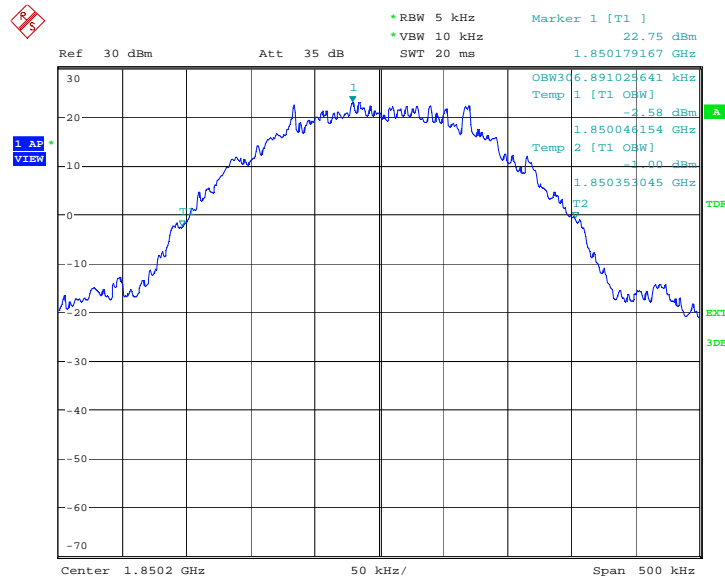
PCS 1900(-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc BW)(kHz)
1850.2	306.891
1880.0	304.487
1909.8	306.090

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

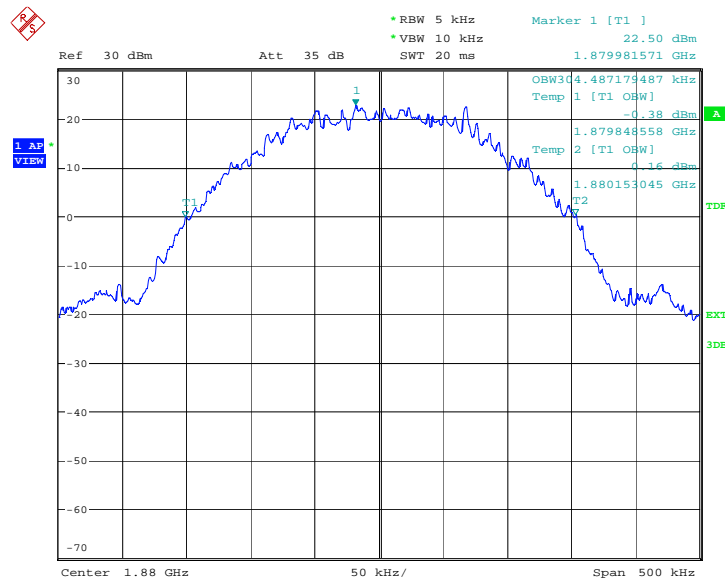
PCS 1900

Channel 512-Occupied Bandwidth (-26dBc BW)



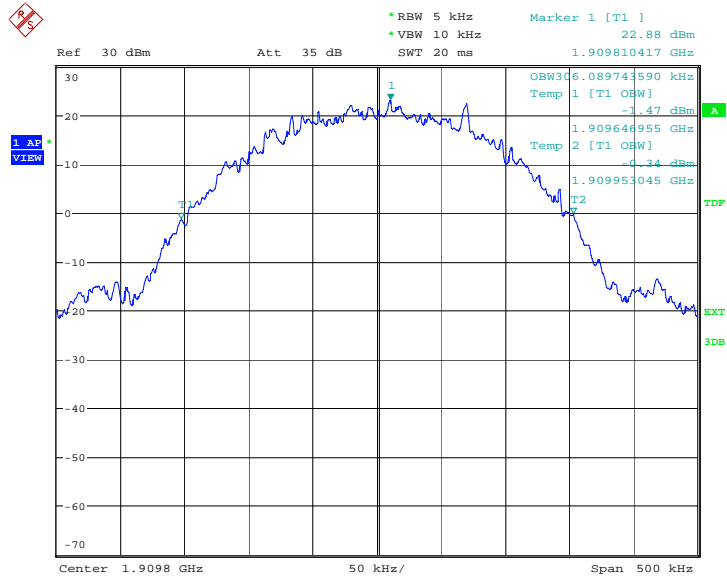
Date: 25.MAR.2013 12:03:26

Channel 661-Occupied Bandwidth (-26dBc BW)



Date: 25.MAR.2013 12:03:58

Channel 810-Occupied Bandwidth (-26dBc BW)



Date: 25.MAR.2013 12:04:30

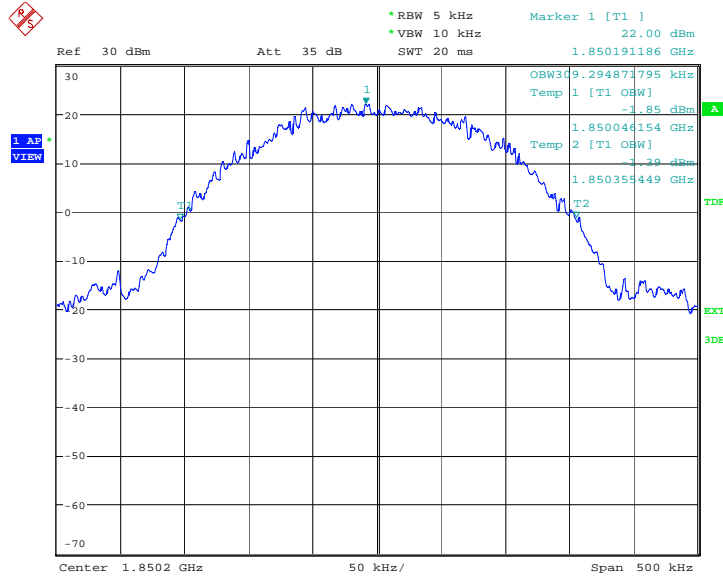
GPRS 1900(-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc BW)(kHz)
1850.2	309.295
1880.0	307.692
1909.8	308.494

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

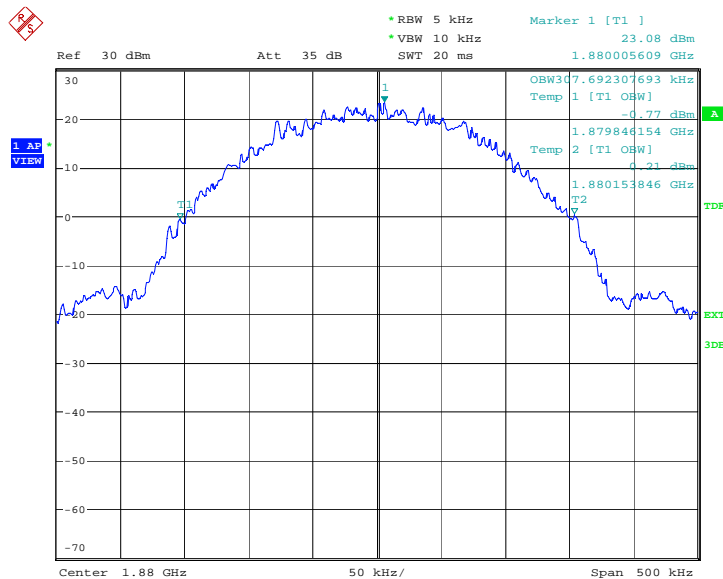
GPRS 1900

Channel 512-Occupied Bandwidth (-26dBc BW)



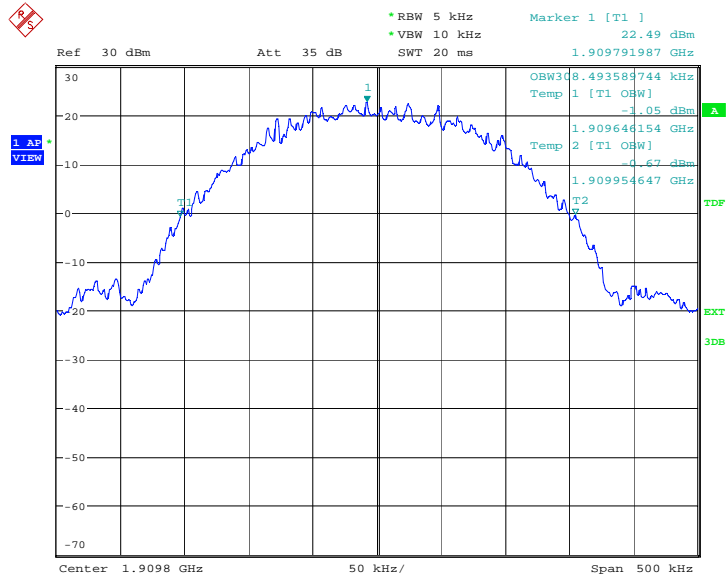
Date: 25.MAR.2013 11:47:52

Channel 661-Occupied Bandwidth (-26dBc BW)



Date: 25.MAR.2013 11:48:24

Channel 810-Occupied Bandwidth (-26dBc BW)



Date: 25.MAR.2013 11:48:56

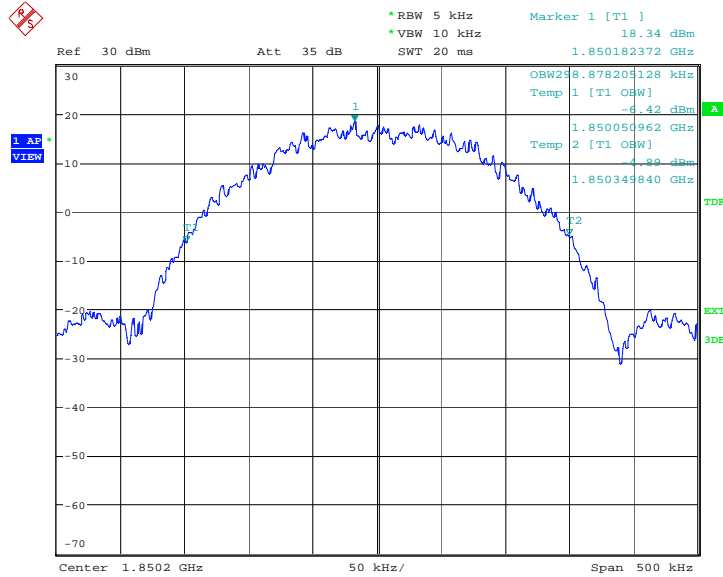
EGPRS 1900(-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc BW)(kHz)
1850.2	298.878
1880.0	297.276
1909.8	300.481

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

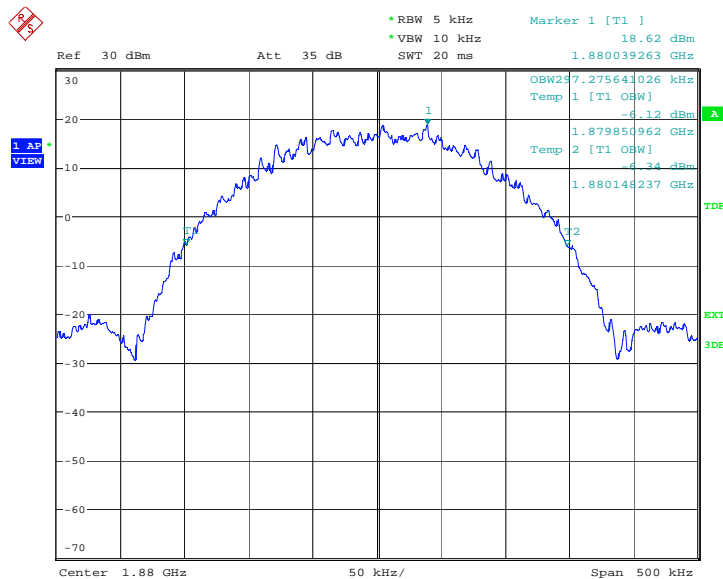
EGPRS 1900

Channel 512-Occupied Bandwidth (-26dBc BW)



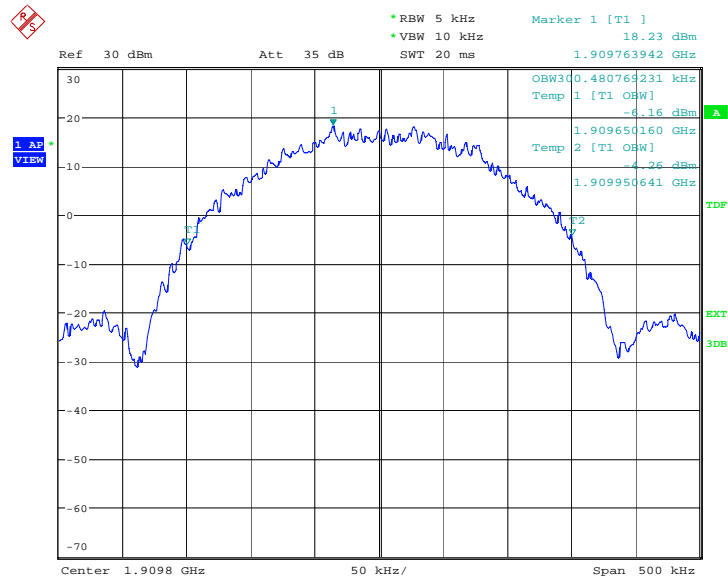
Date: 25.MAR.2013 11:57:06

Channel 661-Occupied Bandwidth (-26dBc BW)



Date: 25.MAR.2013 11:57:38

Channel 810-Occupied Bandwidth (-26dBc BW)



Date: 25.MAR.2013 11:58:10

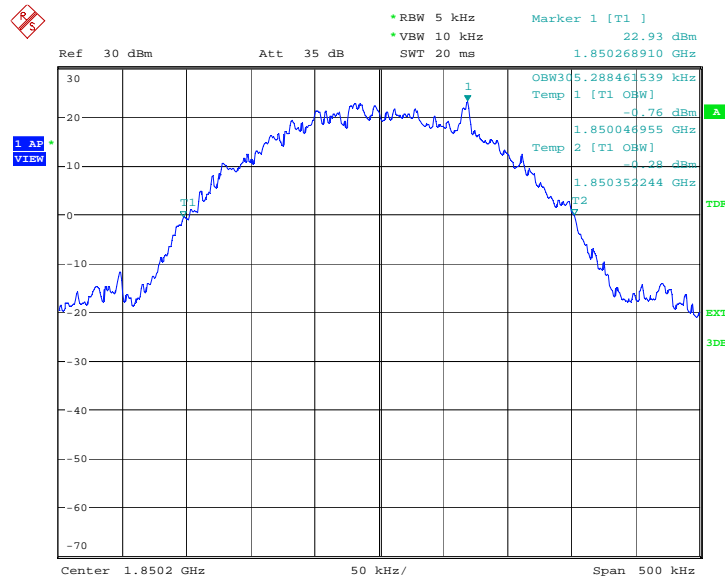
GSM SIM card slot:
PCS 1900(-26dBc)

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

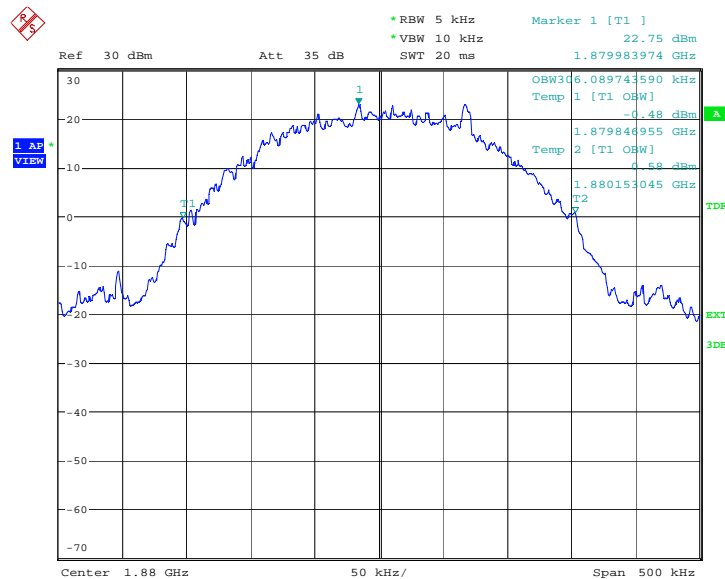
PCS 1900

Channel 512-Occupied Bandwidth (-26dBc BW)



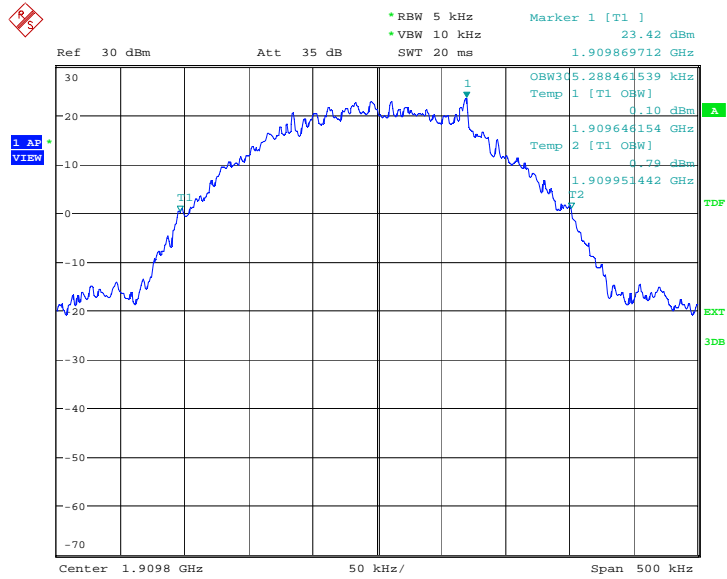
Date: 26.MAR.2013 01:32:34

Channel 661-Occupied Bandwidth (-26dBc BW)



Date: 26.MAR.2013 01:33:06

Channel 810-Occupied Bandwidth (-26dBc BW)



Date: 26.MAR.2013 01:33:39

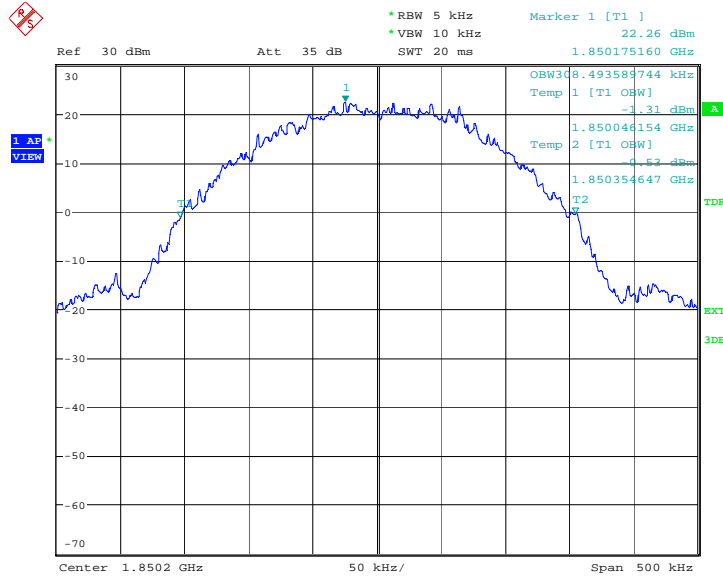
GPRS 1900(-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc BW)(kHz)
1850.2	308.494
1880.0	303.686
1909.8	304.487

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

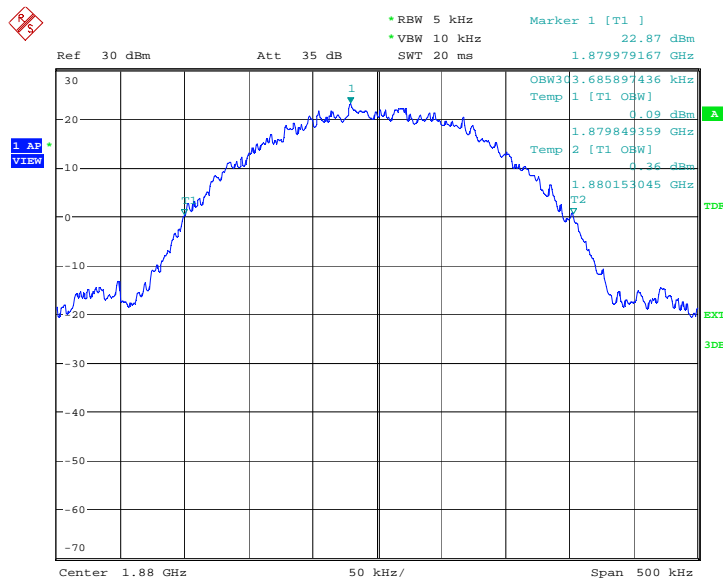
GPRS 1900

Channel 512-Occupied Bandwidth (-26dBc BW)



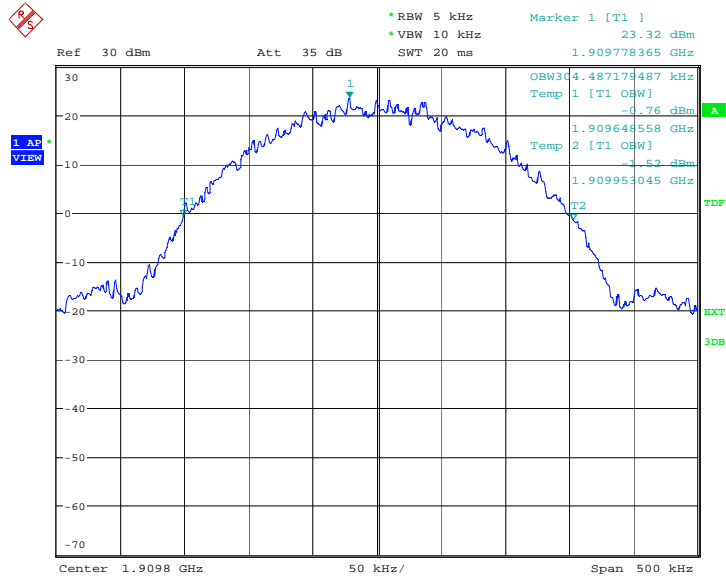
Date: 26.MAR.2013 01:49:02

Channel 661-Occupied Bandwidth (-26dBc BW)



Date: 26.MAR.2013 01:49:34

Channel 810-Occupied Bandwidth (-26dBc BW)



Date: 26.MAR.2013 01:50:06

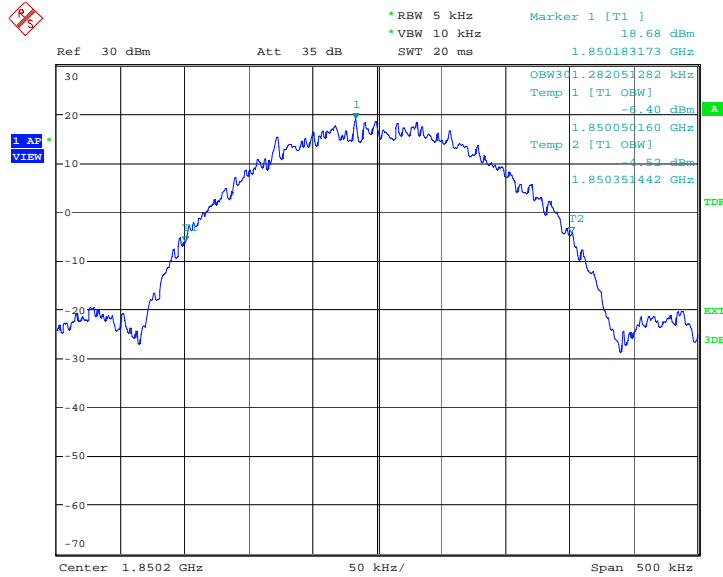
EGPRS 1900(-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc BW)(kHz)
1850.2	301.282
1880.0	302.083
1909.8	302.885

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

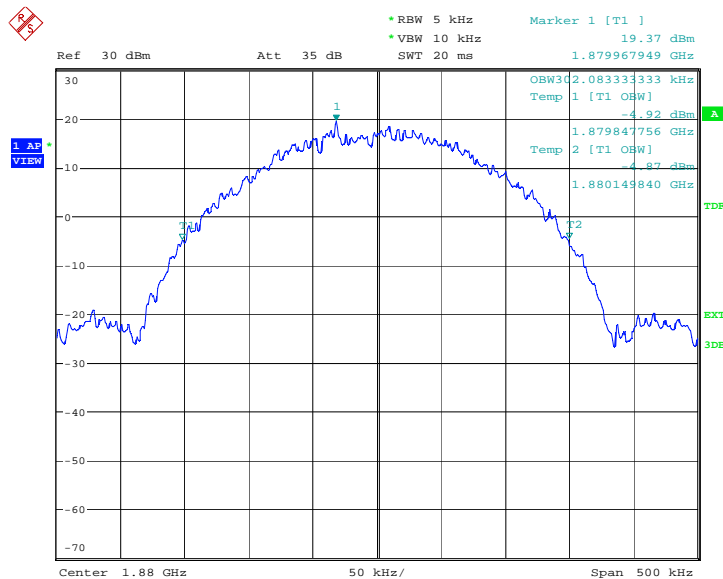
EGPRS 1900

Channel 512-Occupied Bandwidth (-26dBc BW)



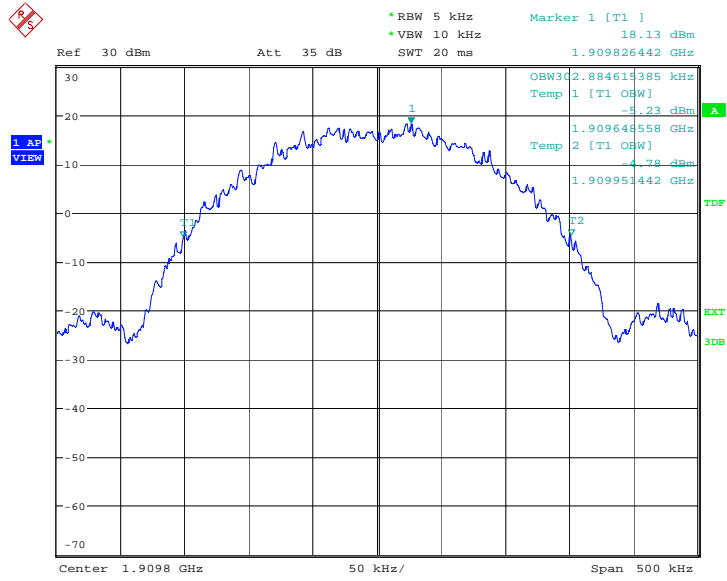
Date: 26.MAR.2013 02:02:11

Channel 661-Occupied Bandwidth (-26dBc BW)



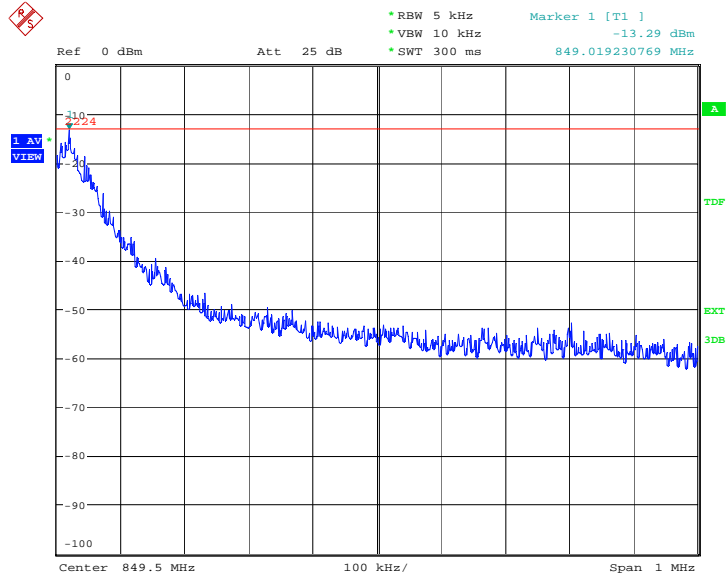
Date: 26.MAR.2013 02:02:43

Channel 810-Occupied Bandwidth (-26dBc BW)



Date: 26.MAR.2013 02:03:15

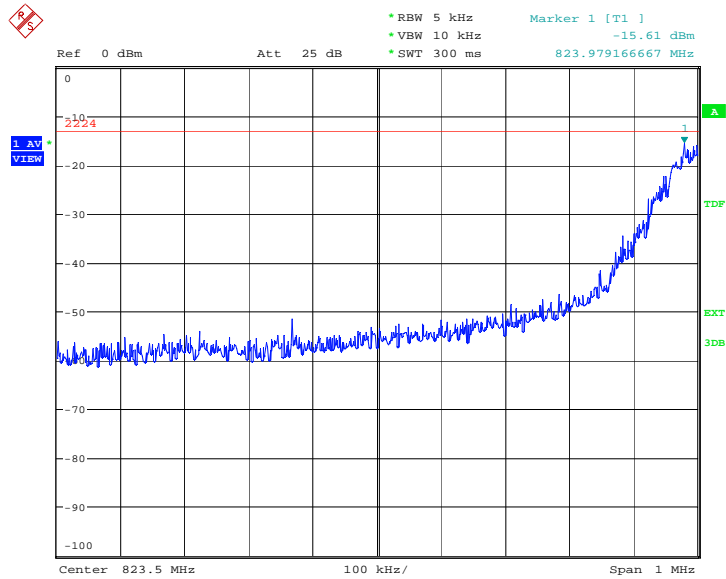
HIGH BAND EDGE BLOCK-C (GSM850) –Channel 251



Date: 25.MAR.2013 11:31:12

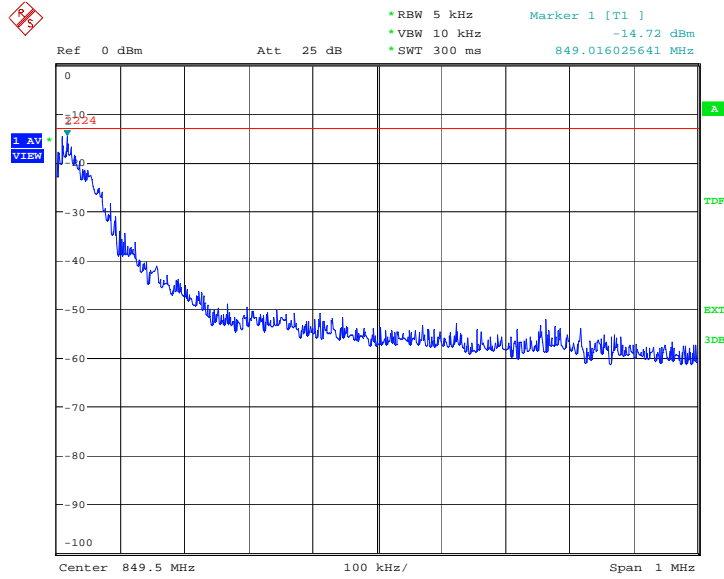
GPRS 850

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



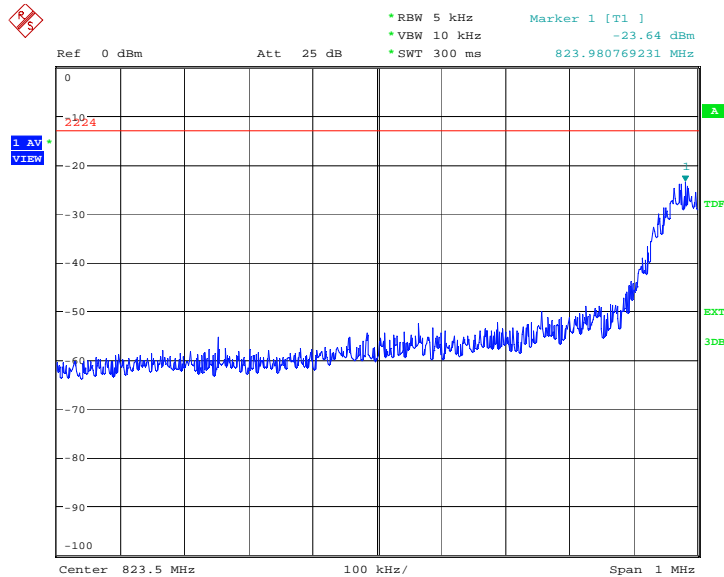
Date: 25.MAR.2013 11:44:41

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



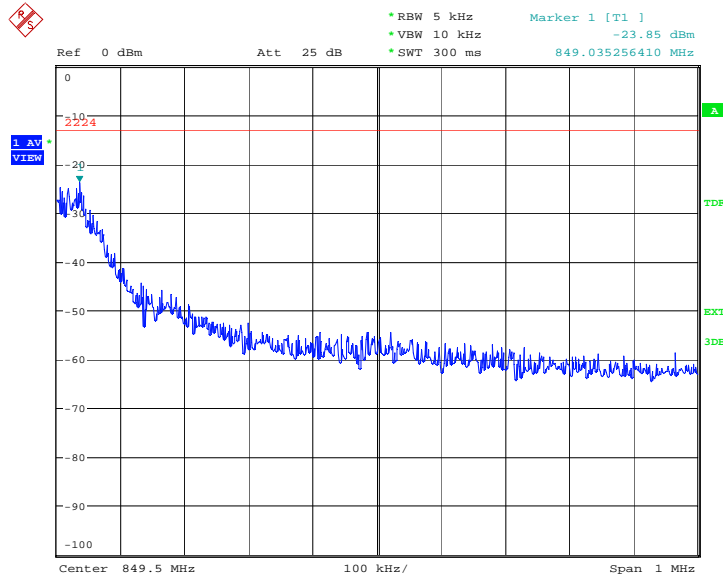
Date: 25.MAR.2013 11:44:55

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



Date: 25.MAR.2013 11:53:47

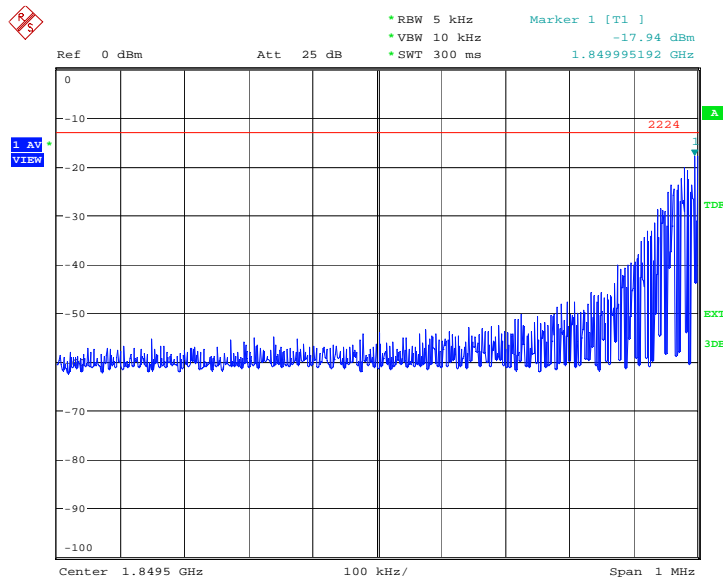
HIGH BAND EDGE BLOCK-C (GSM850) –Channel 251



Date: 25.MAR.2013 11:54:01

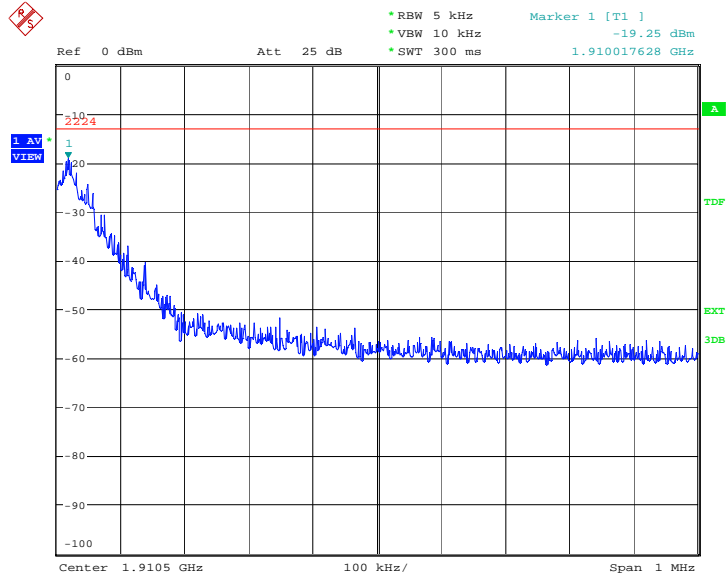
PCS 1900

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



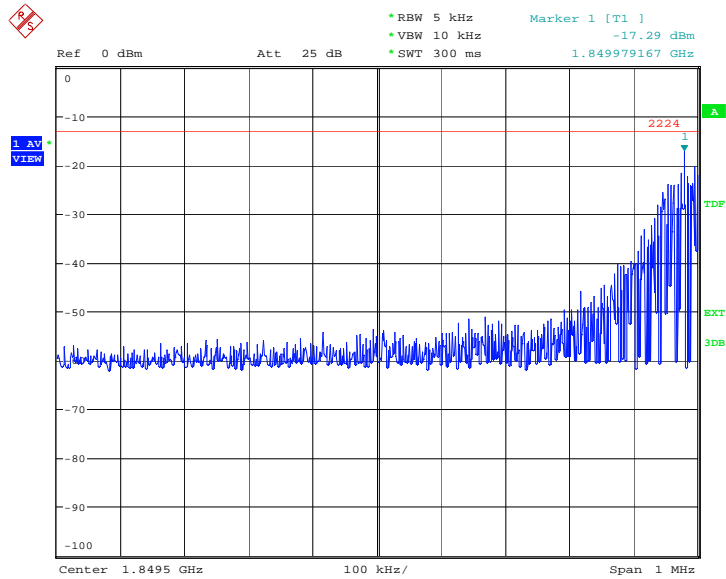
Date: 25.MAR.2013 12:04:44

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



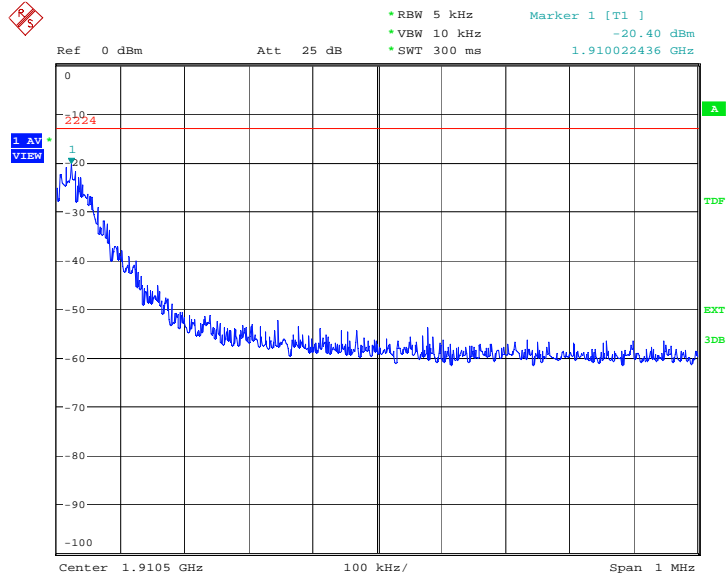
Date: 25.MAR.2013 12:04:58

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



Date: 25.MAR.2013 11:49:10

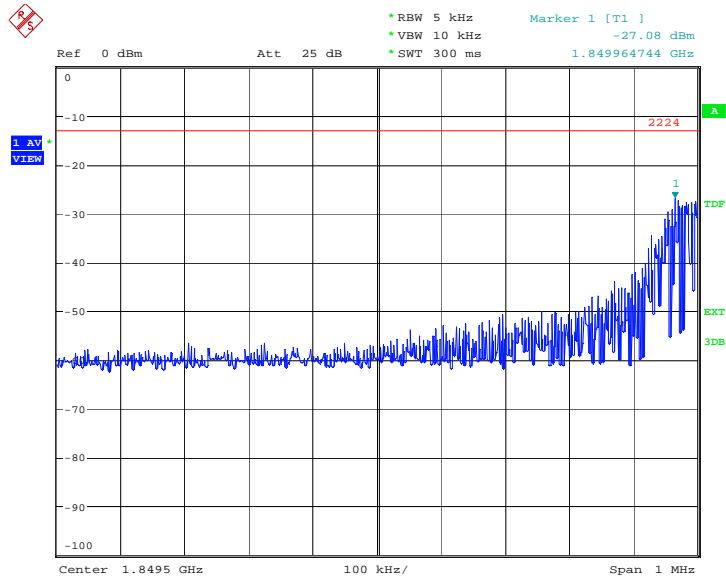
HIGH BAND EDGE BLOCK-C (PCS-1900) –Channel 810



Date: 25.MAR.2013 11:49:24

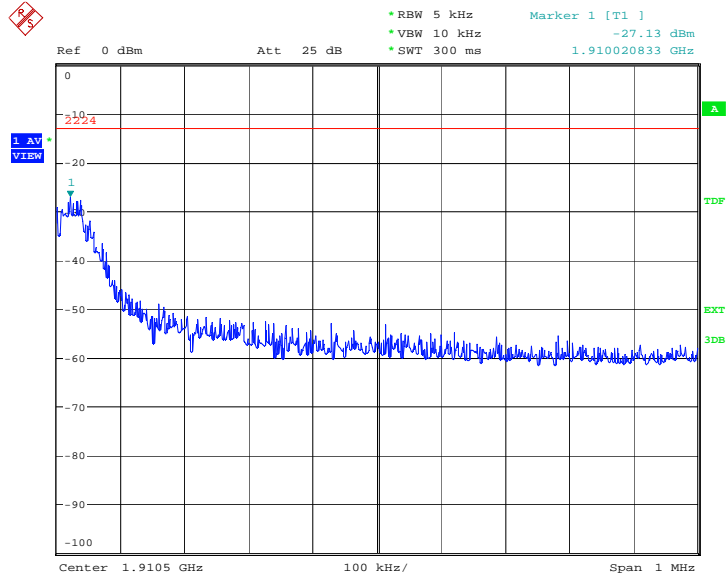
EGPRS 1900

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



Date: 25.MAR.2013 11:58:24

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

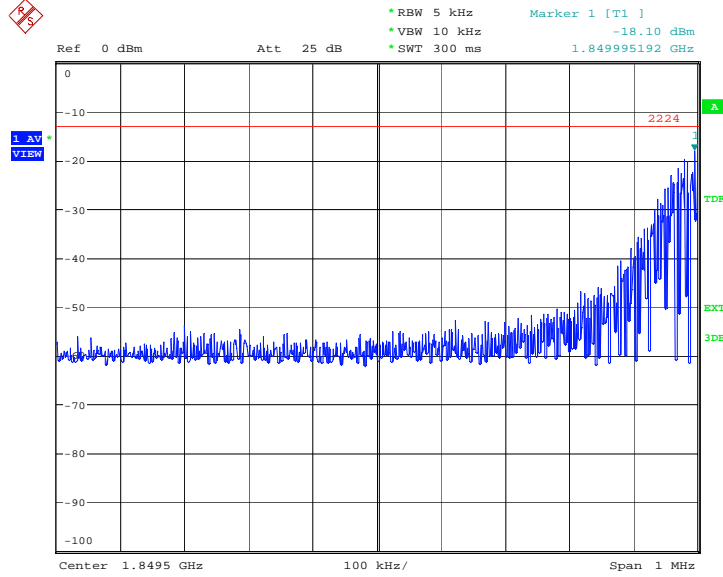


Date: 25.MAR.2013 11:58:38

CTC SIM card slot:

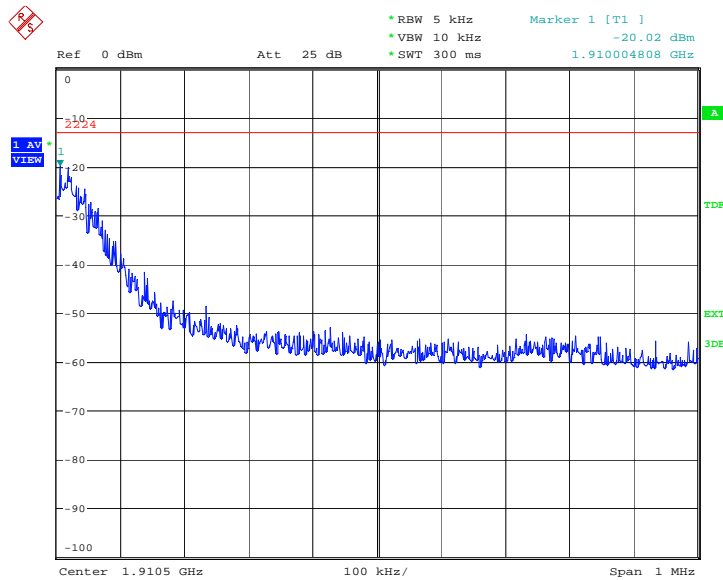
PCS 1900

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



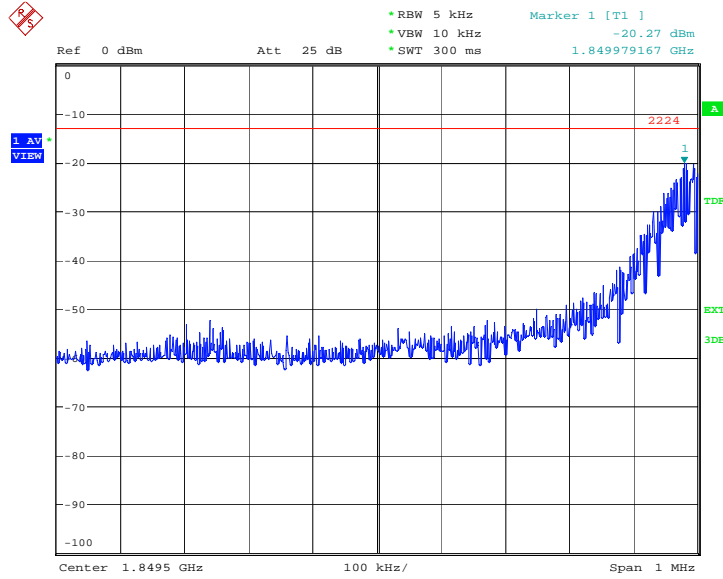
Date: 26.MAR.2013 01:33:53

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



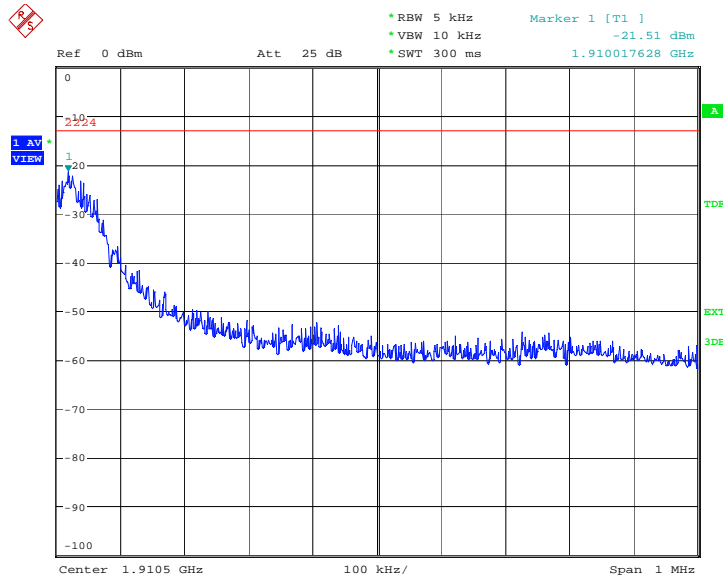
Date: 26.MAR.2013 01:34:07

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



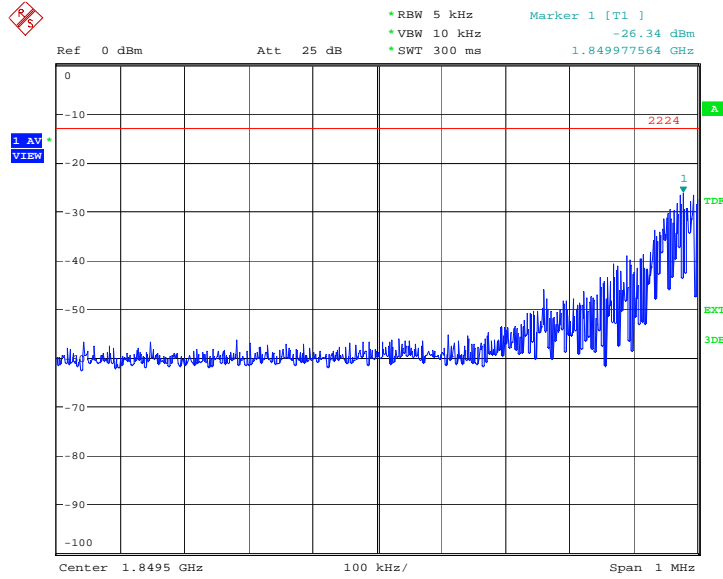
Date: 26.MAR.2013 01:50:20

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



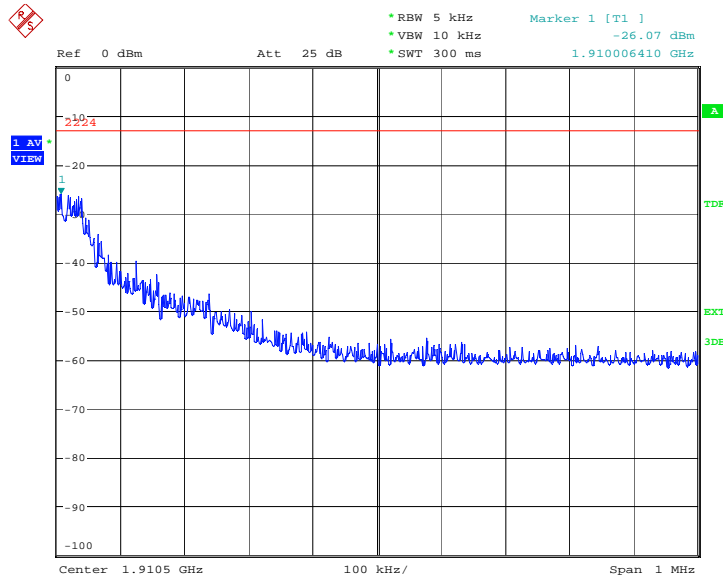
Date: 26.MAR.2013 01:50:34

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



Date: 26.MAR.2013 02:03:29

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



Date: 26.MAR.2013 02:03:43

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

CTC SIM card slot:

Measurement Uncertainty: 0.3dB

GSM850

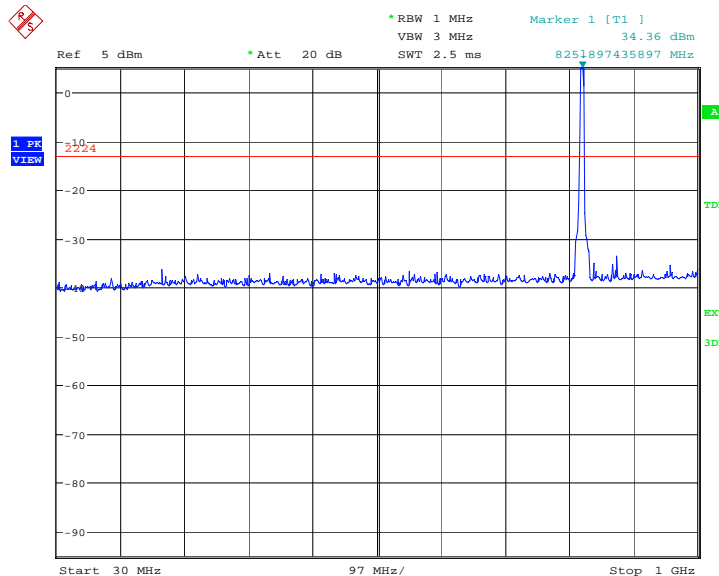
Harmonic	Tx ch. 128 Freq. (MHz)	Level (dBm)	Tx ch. 190 Freq. (MHz)	Level (dBm)	Tx ch. Freq. (MHz) 251	Level (dBm)
2	1648.4	nf	1673.2	nf	1697.6	nf
3	2472.6	nf	2509.8	nf	2546.4	nf
4	3296.8	nf	3346.4	nf	3395.2	nf
5	4121	nf	4183	nf	4244	nf
6	4945.2	nf	5019.6	nf	5092.8	nf
7	5769.4	nf	5856.2	nf	5941.6	nf
8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

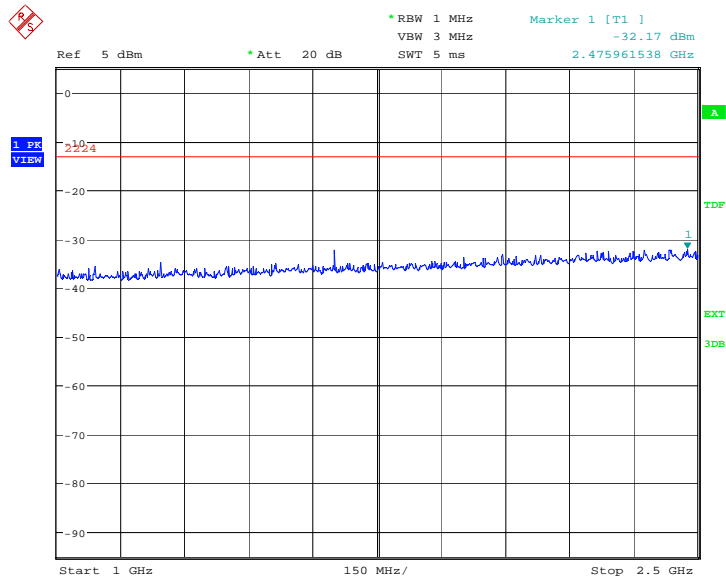
NOTE: peak above the limit line is the carrier frequency.



Date: 25.MAR.2013 11:31:41

A.8.3.2 Channel 128: 1GHz – 2.5GHz

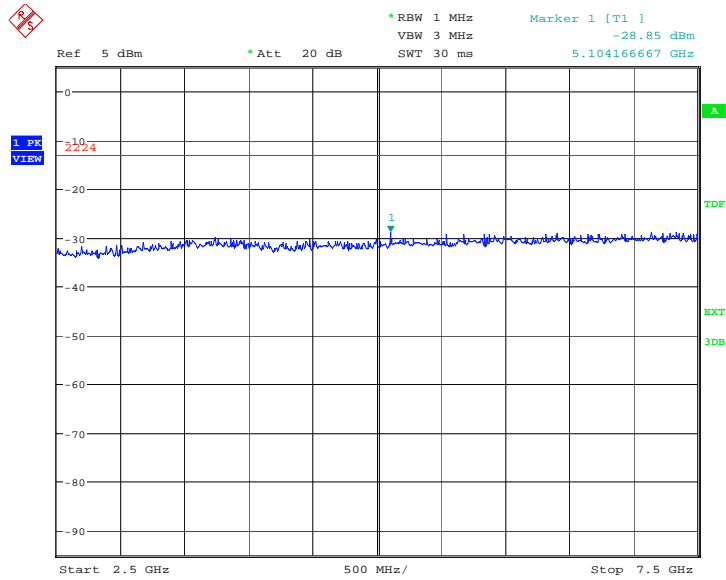
Spurious emission limit –13dBm.



Date: 25.MAR.2013 11:32:09

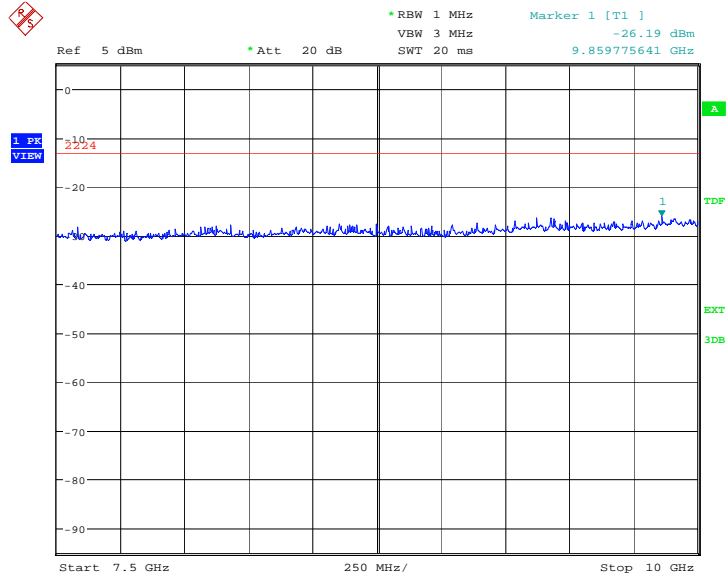
A.8.3.3 Channel 128: 2.5GHz – 7.5GHz

Spurious emission limit –13dBm.



Date: 25.MAR.2013 11:32:37

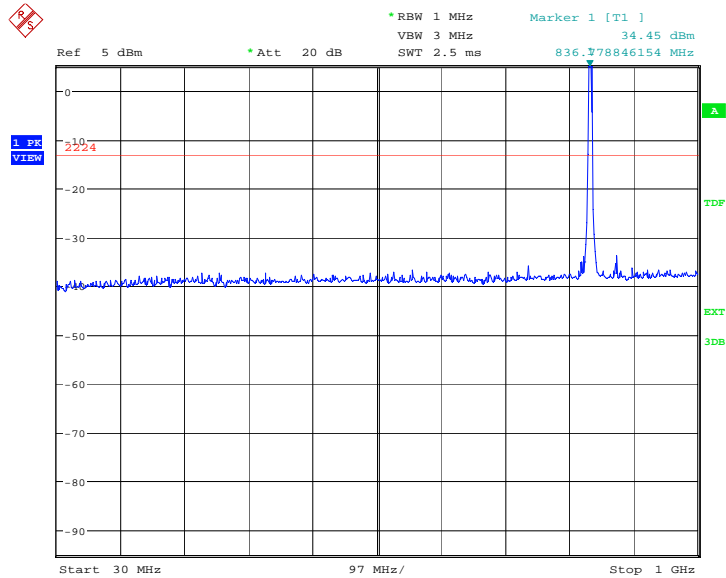
A.8.3.4 Channel 128: 7.5GHz –10GHz
Spurious emission limit –13dBm.



Date: 25.MAR.2013 11:33:05

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

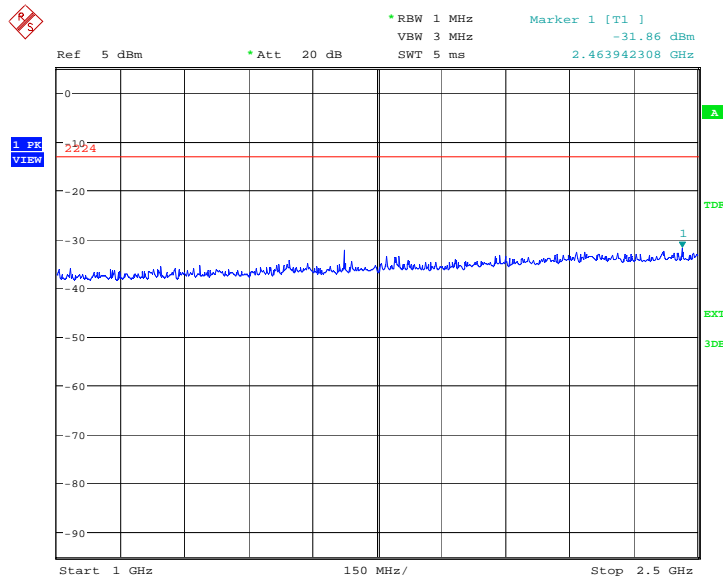
NOTE: peak above the limit line is the carrier frequency.



Date: 25.MAR.2013 11:33:34

A.8.3.6 Channel 190: 1GHz –2.5GHz

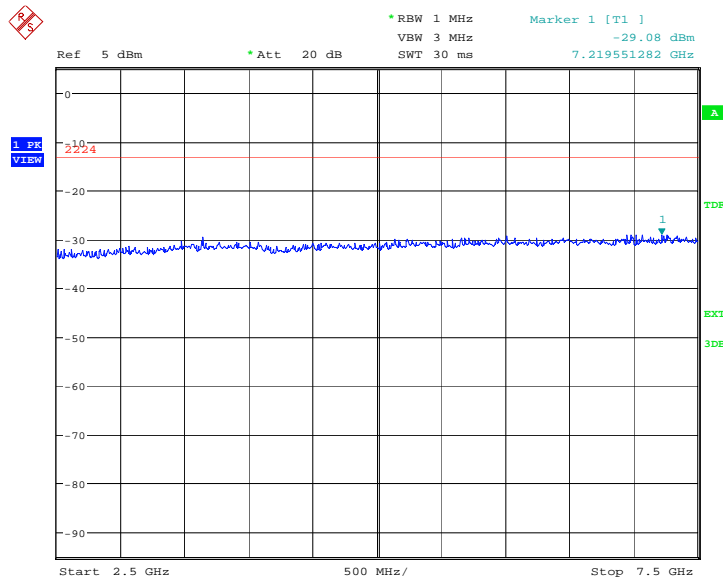
Spurious emission limit –13dBm



Date: 25.MAR.2013 11:34:02

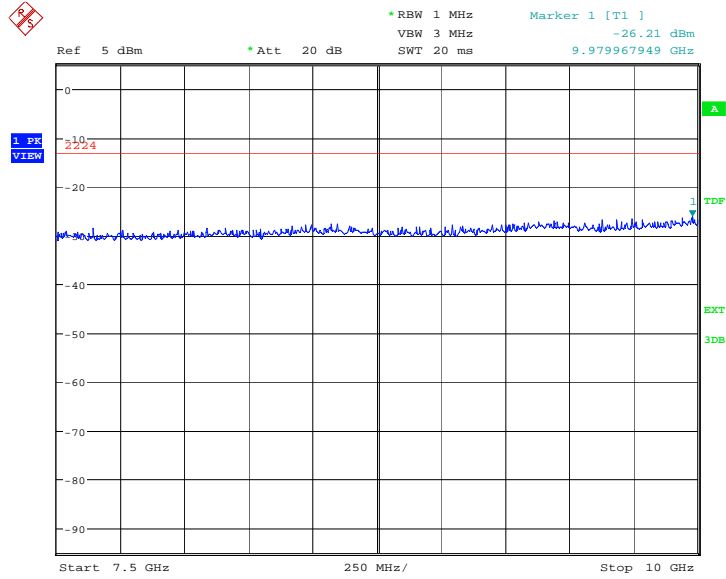
A.8.3.7 Channel 190: 2.5GHz –7.5GHz

Spurious emission limit –13dBm



Date: 25.MAR.2013 11:34:30

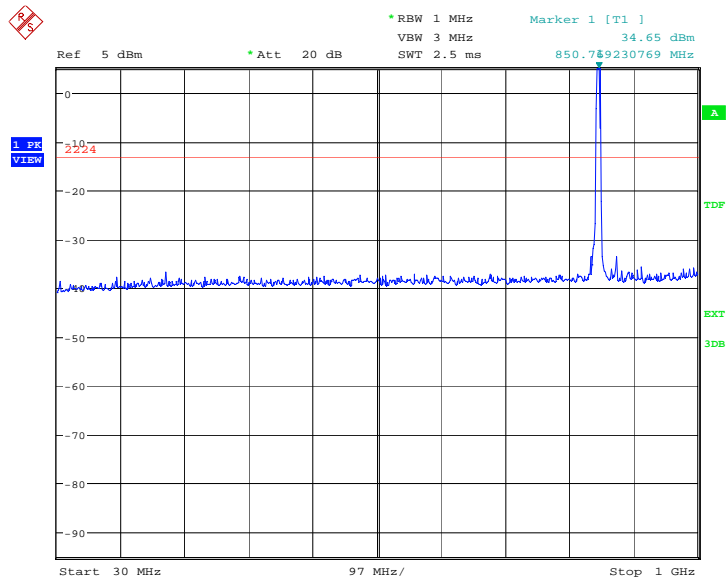
A.8.3.8 Channel 190: 7.5GHz –10GHz
Spurious emission limit –13dBm



Date: 25.MAR.2013 11:34:58

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

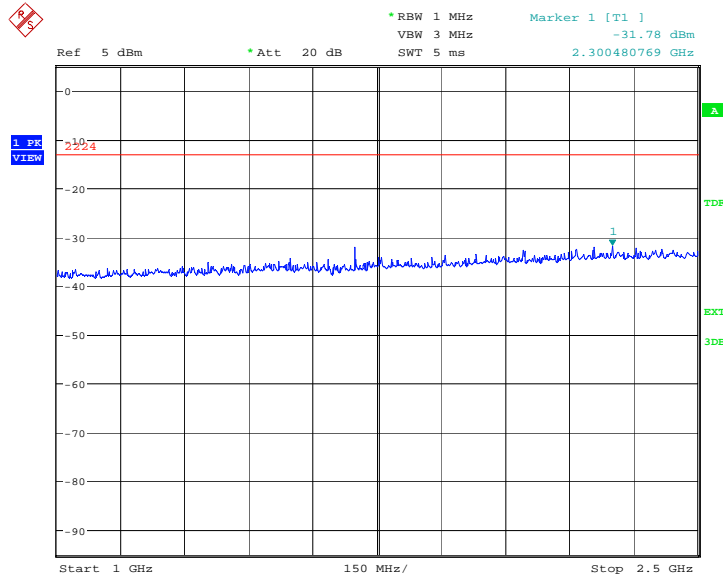
NOTE: peak above the limit line is the carrier frequency.



Date: 25.MAR.2013 11:35:27

A.8.3.10 Channel 251: 1GHz – 2.5GHz

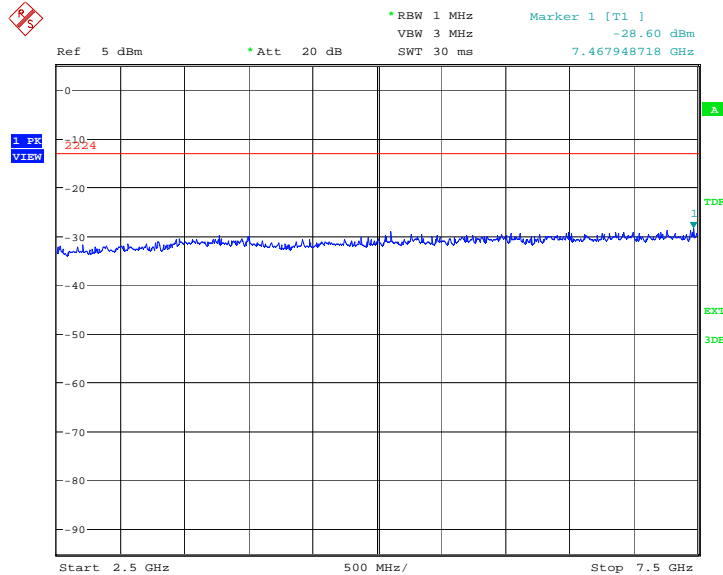
Spurious emission limit –13dBm.



Date: 25.MAR.2013 11:35:55

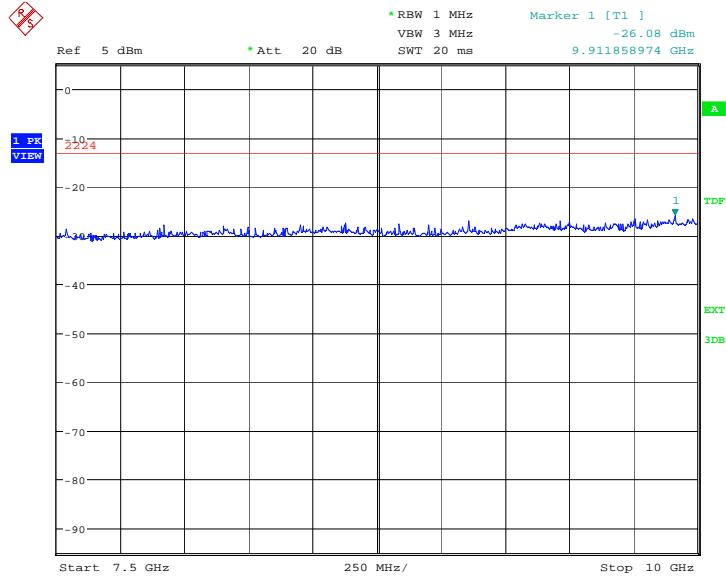
A.8.3.11 Channel 251:2.5GHz – 7.5GHz

Spurious emission limit –13dBm.



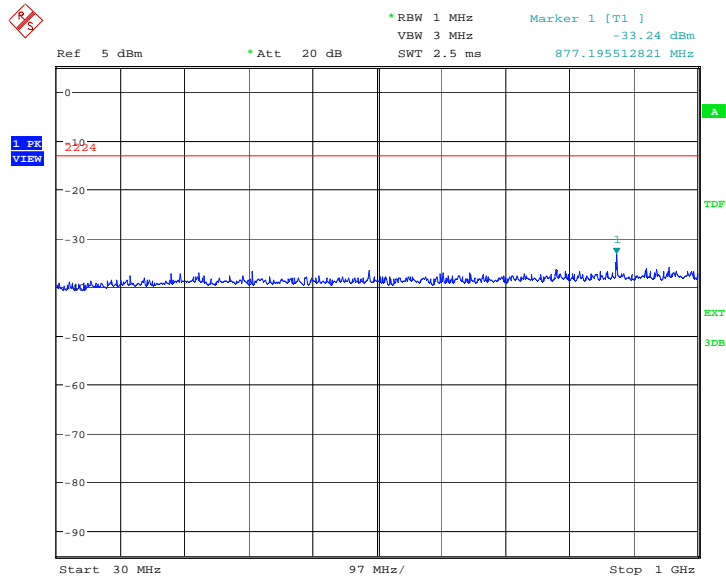
Date: 25.MAR.2013 11:36:23

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



Date: 25.MAR.2013 11:36:51

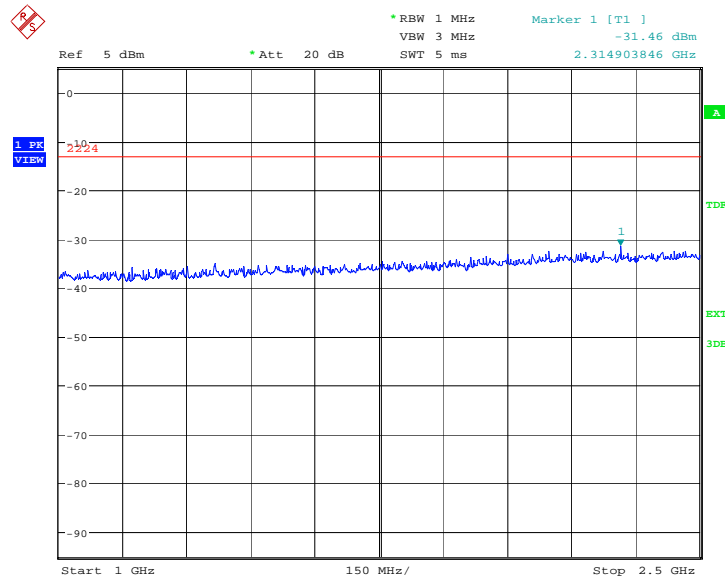
A.8.3.13 Idle mode: 30MHz – 1GHz
Spurious emission limit –13dBm.



Date: 25.MAR.2013 11:37:20

A.8.3.14 Idle mode: 1GHz – 2.5GHz

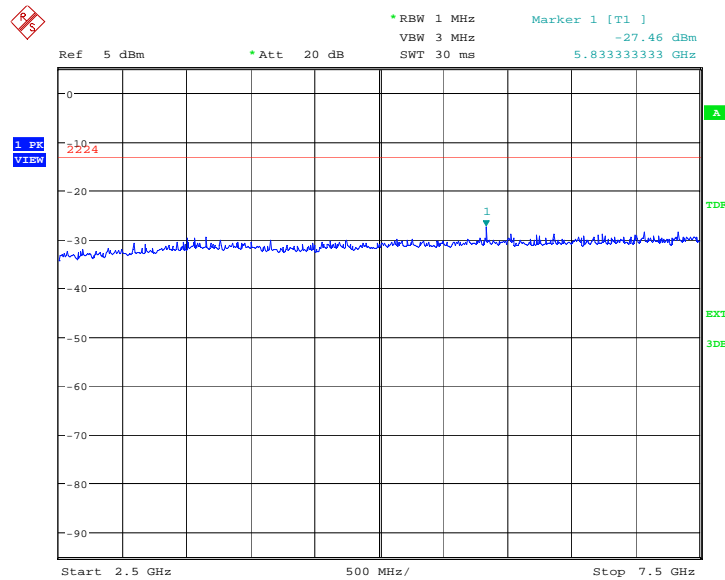
Spurious emission limit –13dBm.



Date: 25.MAR.2013 11:37:48

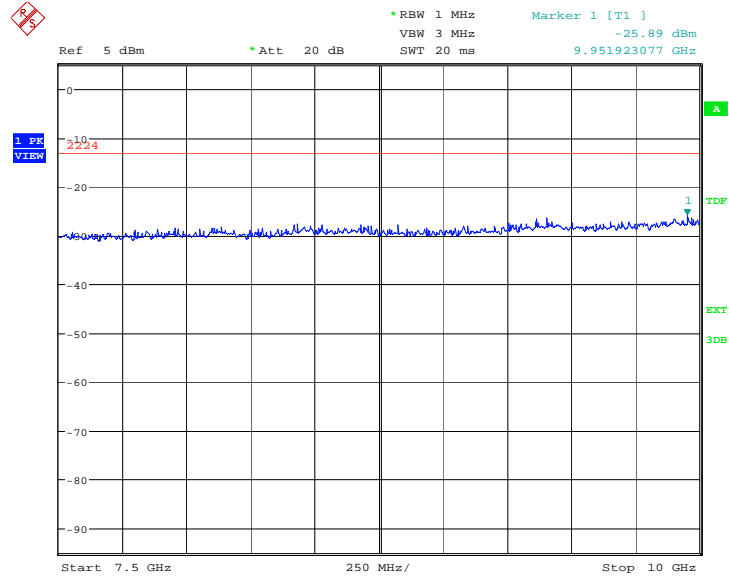
A.8.3.15 Idle mode: 2.5GHz – 7.5GHz

Spurious emission limit –13dBm.



Date: 25.MAR.2013 11:38:16

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



Date: 25.MAR.2013 11:38:44

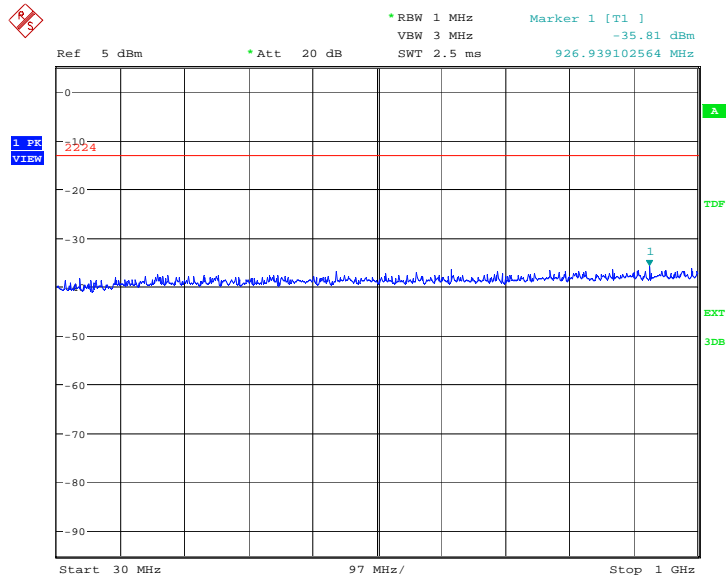
PCS1900

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

A.8.3.17 Channel 512: 30MHz – 1GHz

Spurious emission limit –13dBm.

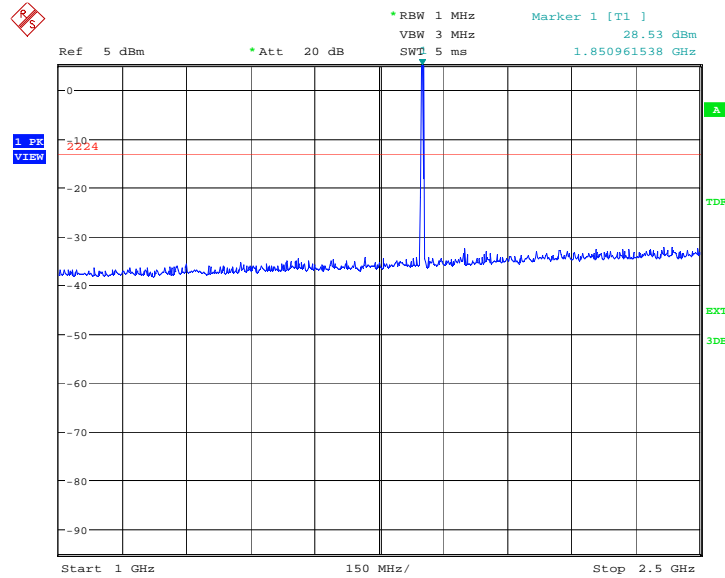


Date: 25.MAR.2013 12:05:26

A.8.3.18 Channel 512: 1GHz – 2.5GHz

Spurious emission limit –13dBm.

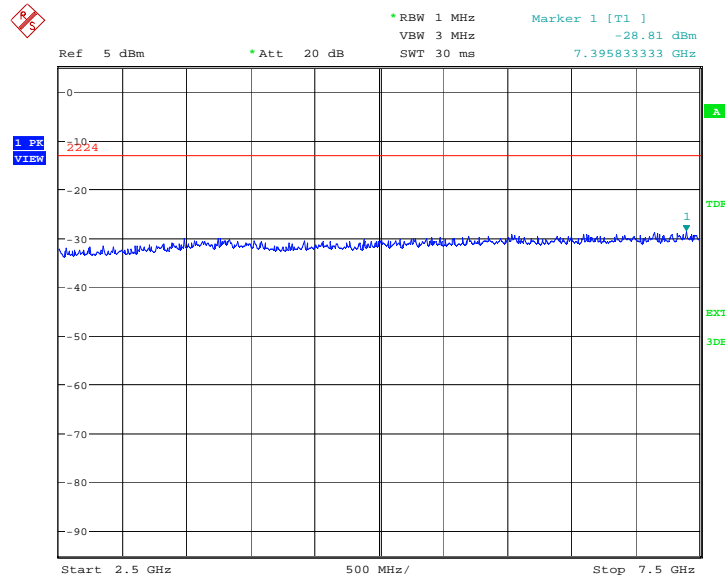
NOTE: peak above the limit line is the carrier frequency.



Date: 25.MAR.2013 12:05:54

A.8.3.19 Channel 512: 2.5GHz – 7.5GHz

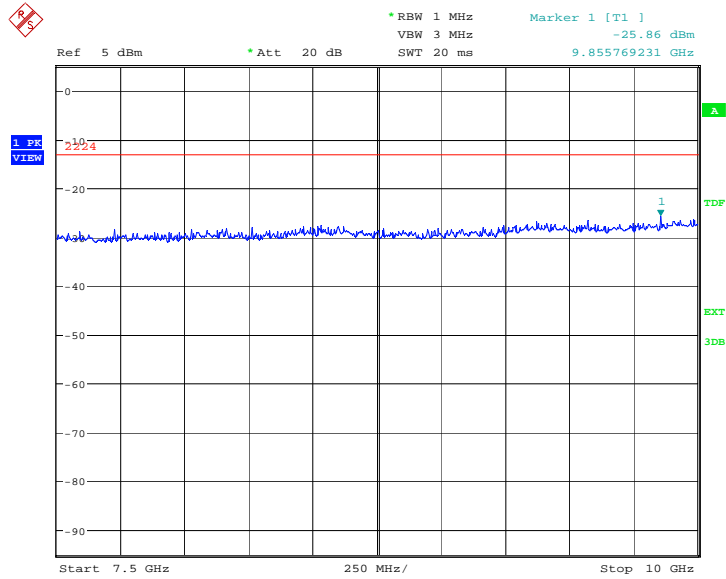
Spurious emission limit –13dBm.



Date: 25.MAR.2013 12:06:22

A.8.3.20 Channel 512: 7.5GHz –10GHz

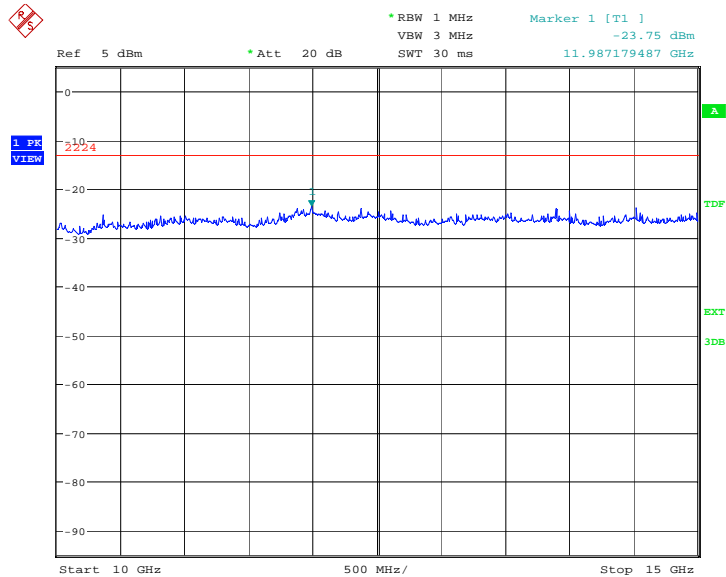
Spurious emission limit –13dBm.



Date: 25.MAR.2013 12:06:50

A.8.3.21 Channel 512: 10GHz –15GHz

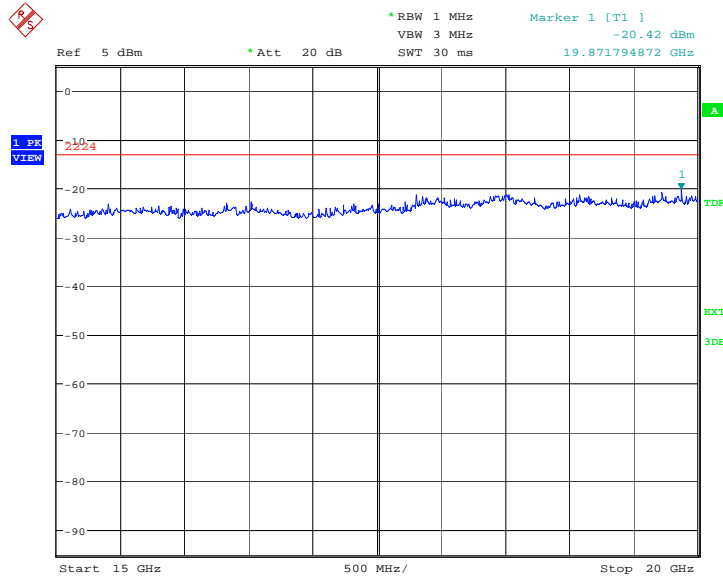
Spurious emission limit –13dBm.



Date: 25.MAR.2013 12:07:19

A.8.3.22 Channel 512: 15GHz –20GHz

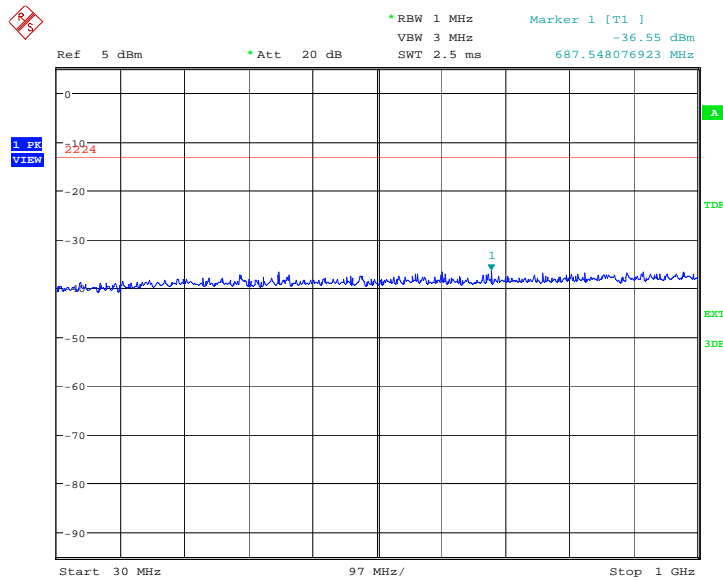
Spurious emission limit –13dBm.



Date: 25.MAR.2013 12:07:47

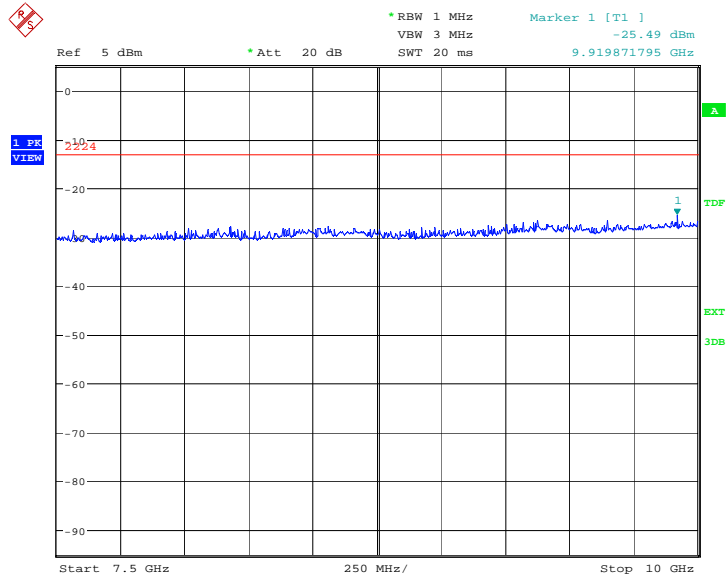
A.8.3.23 Channel 661: 30MHz – 1GHz

Spurious emission limit –13dBm



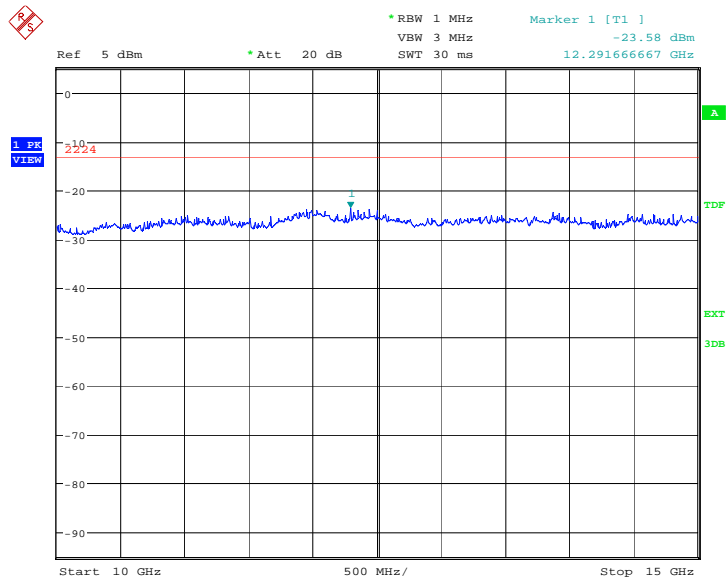
Date: 25.MAR.2013 12:08:15

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



Date: 25.MAR.2013 12:09:40

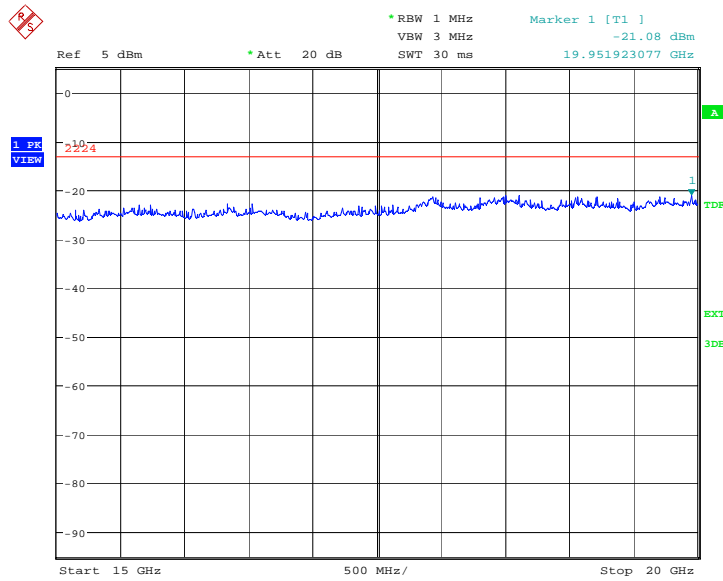
A.8.3.27 Channel 661: 10GHz –15GHz
Spurious emission limit –13dBm.



Date: 25.MAR.2013 12:10:08

A.8.3.28 Channel 661: 15GHz –20GHz

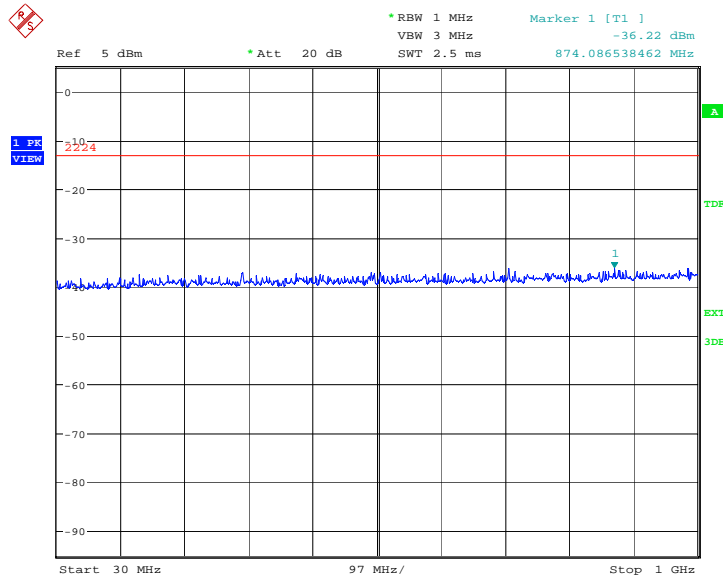
Spurious emission limit –13dBm.



Date: 25.MAR.2013 12:10:36

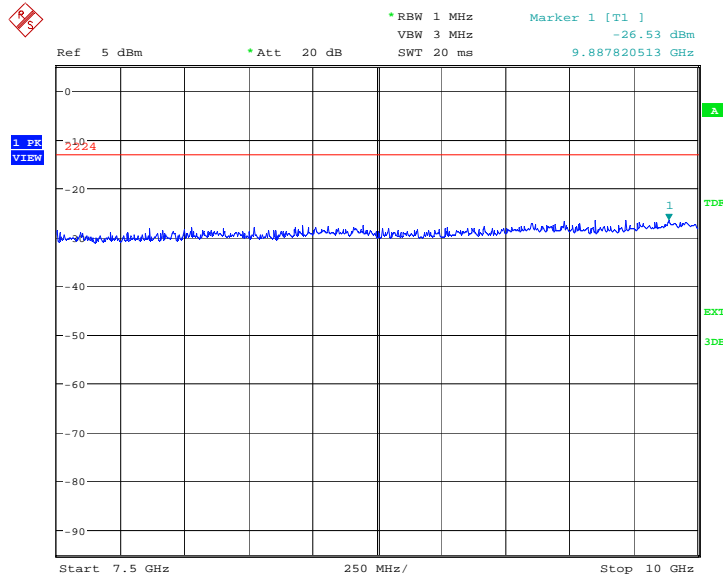
A.8.3.29 Channel 810: 30MHz – 1GHz

Spurious emission limit –13dBm.



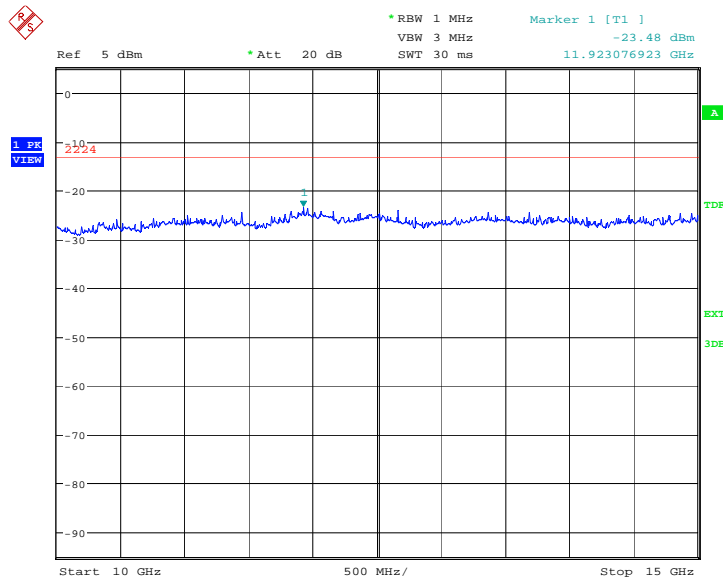
Date: 25.MAR.2013 12:11:05

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



Date: 25.MAR.2013 12:12:30

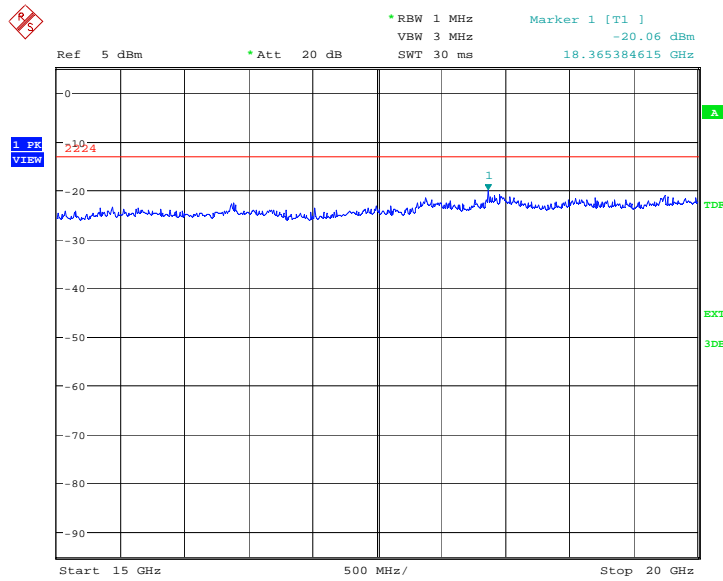
A.8.3.33 Channel 810: 10GHz –15GHz
Spurious emission limit –13dBm.



Date: 25.MAR.2013 12:12:58

A.8.3.34 Channel 810: 15GHz –20GHz

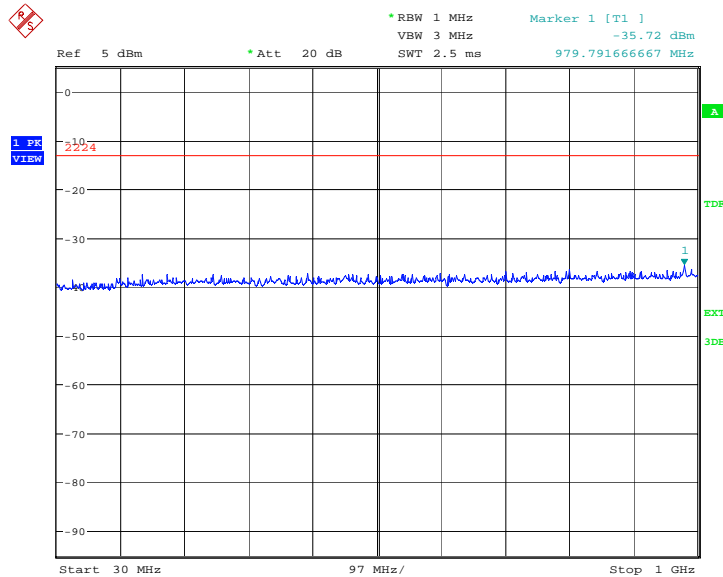
Spurious emission limit –13dBm.



Date: 25.MAR.2013 12:13:26

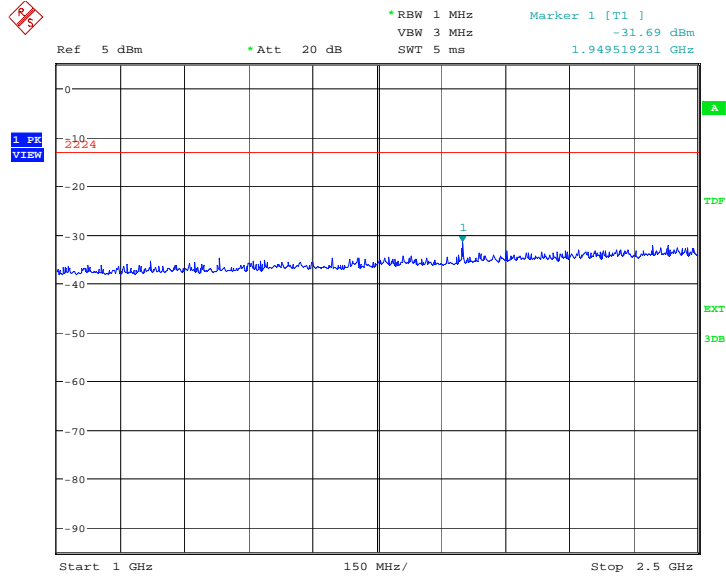
A.8.3.35 Idle mode: 30MHz – 1GHz

Spurious emission limit –13dBm.



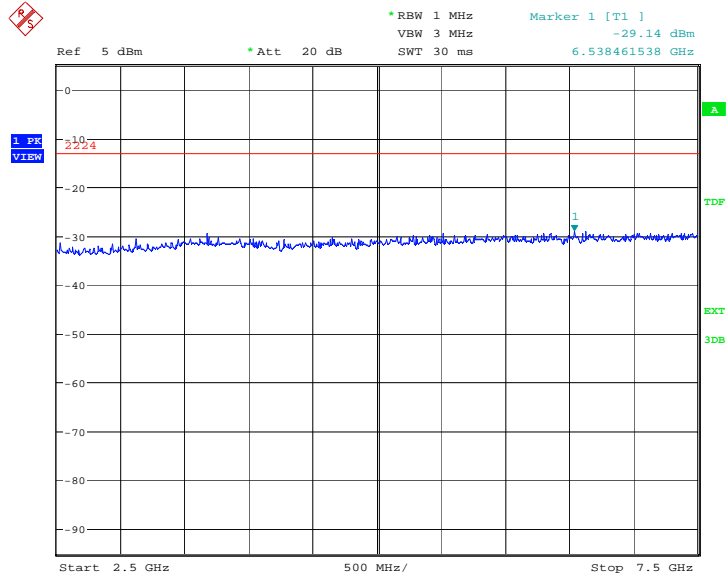
Date: 25.MAR.2013 12:13:54

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



Date: 25.MAR.2013 12:14:23

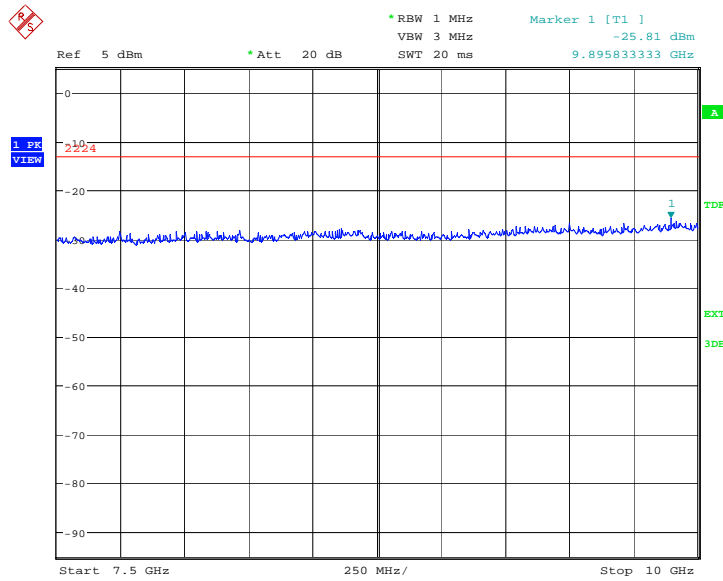
A.8.3.37 Idle mode: 2.5GHz – 7.5GHz
Spurious emission limit –13dBm.



Date: 25.MAR.2013 12:14:51

A.8.3.38 Idle mode: 7.5GHz – 10GHz

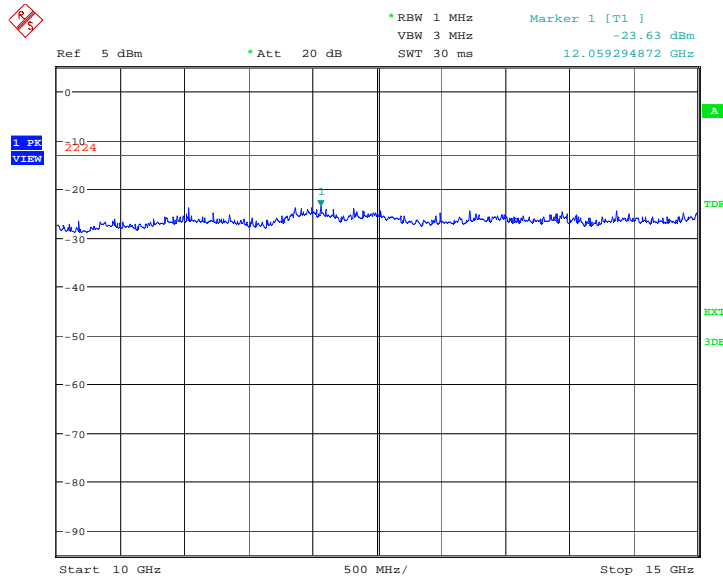
Spurious emission limit –13dBm.



Date: 25.MAR.2013 12:15:19

A.8.3.39 Idle mode: 10GHz –15GHz

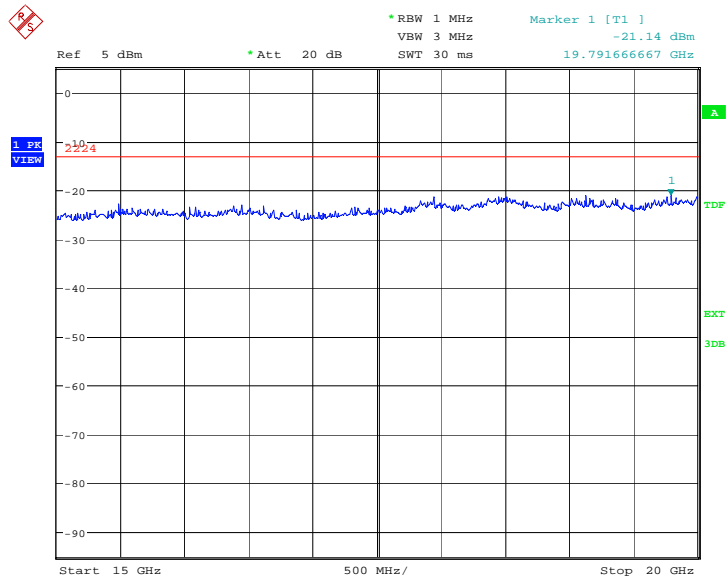
Spurious emission limit –13dBm.



Date: 25.MAR.2013 12:15:47

A.8.3.40 IDLE mode: 15GHz –20GHz

Spurious emission limit –13dBm.



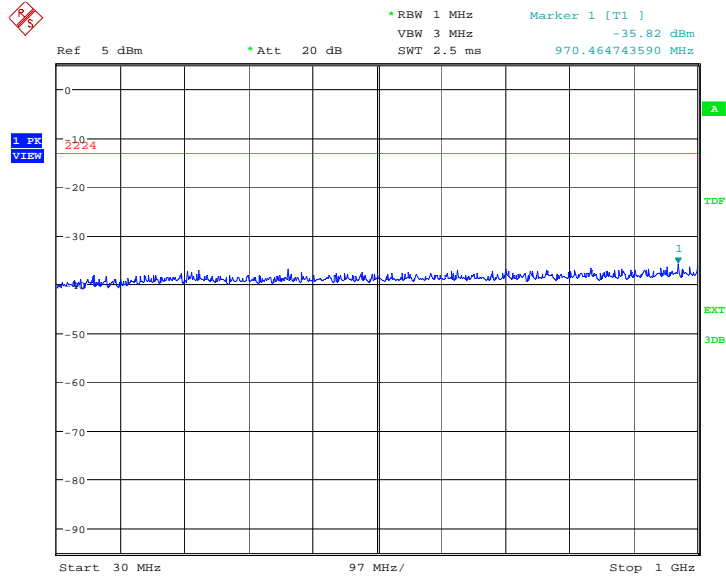
Date: 25.MAR.2013 12:16:15

GSM SIM card slot:

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						

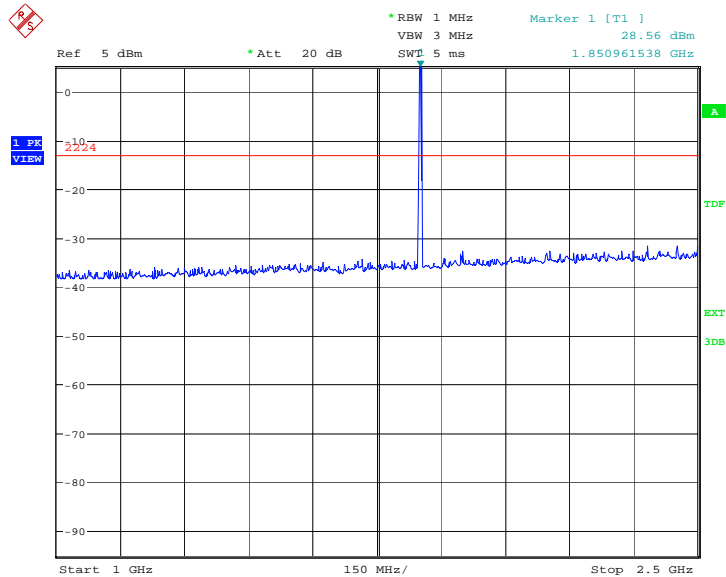
A.8.3.1 Channel 512: 30MHz – 1GHz
Spurious emission limit –13dBm.



Date: 26.MAR.2013 01:34:35

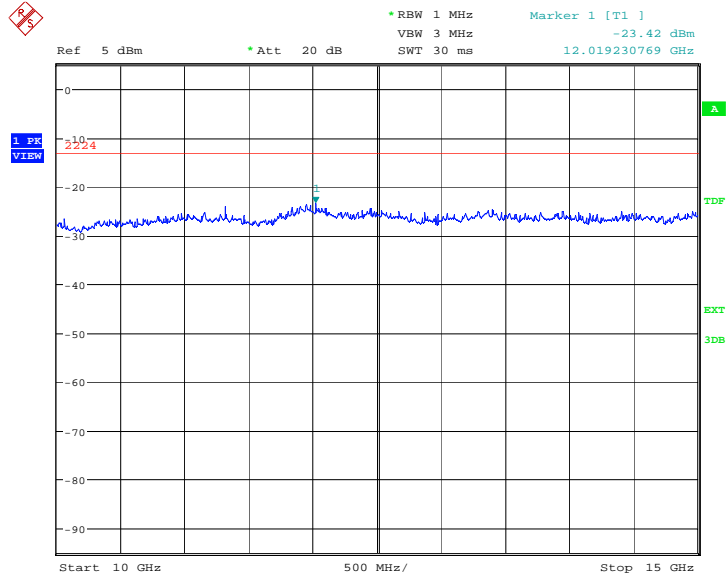
A.8.3.2 Channel 512: 1GHz – 2.5GHz
Spurious emission limit –13dBm.

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



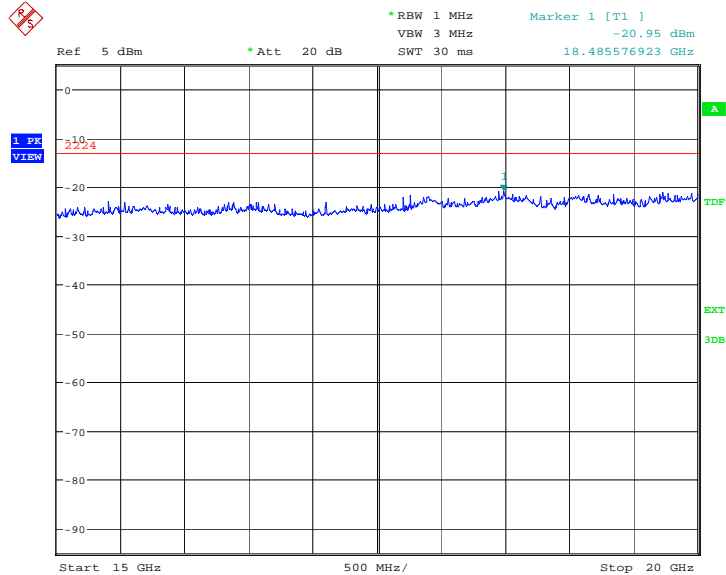
Date: 26.MAR.2013 01:35:03

A.8.3.5 Channel 512: 10GHz –15GHz
Spurious emission limit –13dBm.



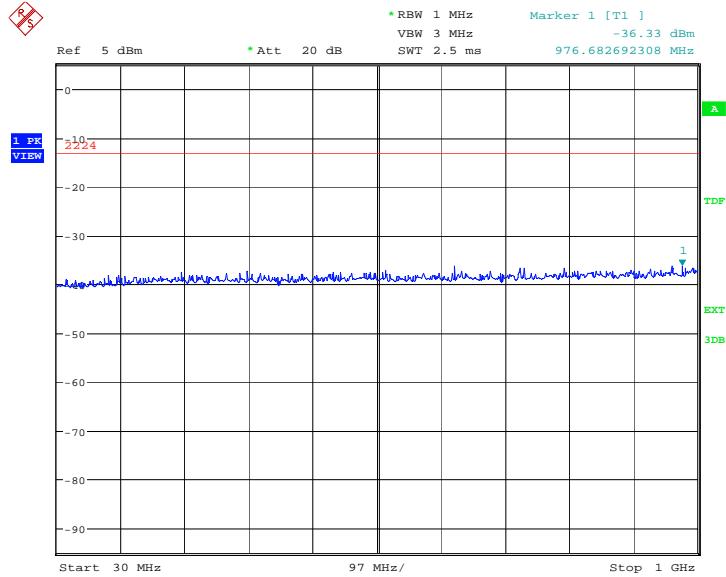
Date: 26.MAR.2013 01:36:28

A.8.3.6 Channel 512: 15GHz –20GHz
Spurious emission limit –13dBm.



Date: 26.MAR.2013 01:36:56

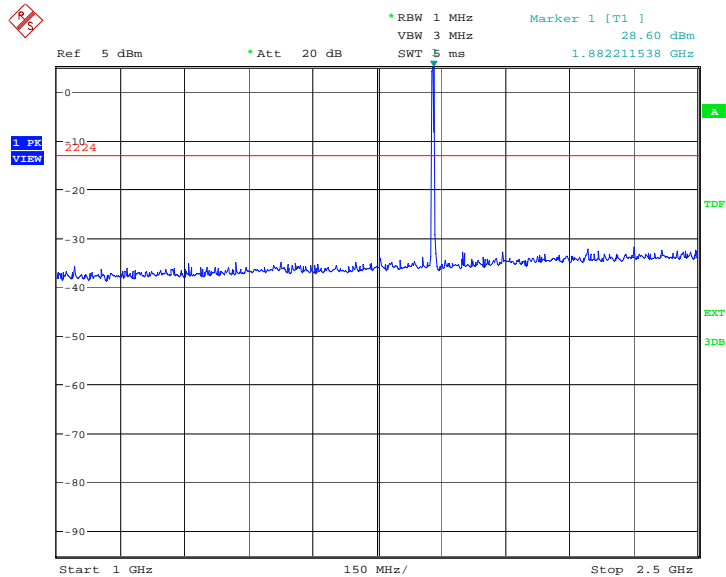
A.8.3.7 Channel 661: 30MHz – 1GHz
Spurious emission limit –13dBm



Date: 26.MAR.2013 01:37:25

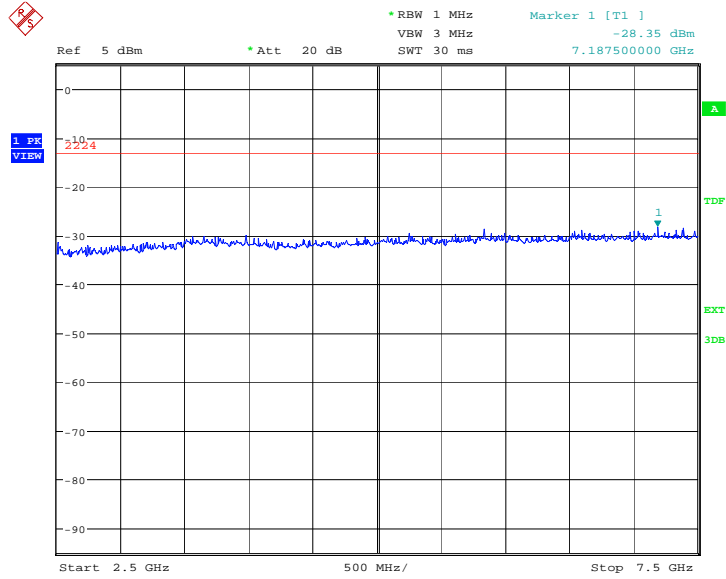
A.8.3.8 Channel 661: 1GHz –2.5GHz
Spurious emission limit –13dBm

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



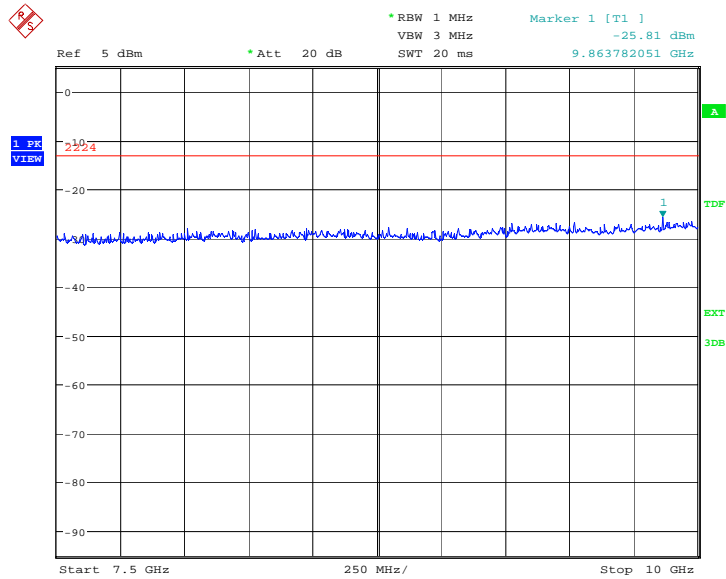
Date: 26.MAR.2013 01:37:53

A.8.3.9 Channel 661: 2.5GHz –7.5GHz
Spurious emission limit –13dBm



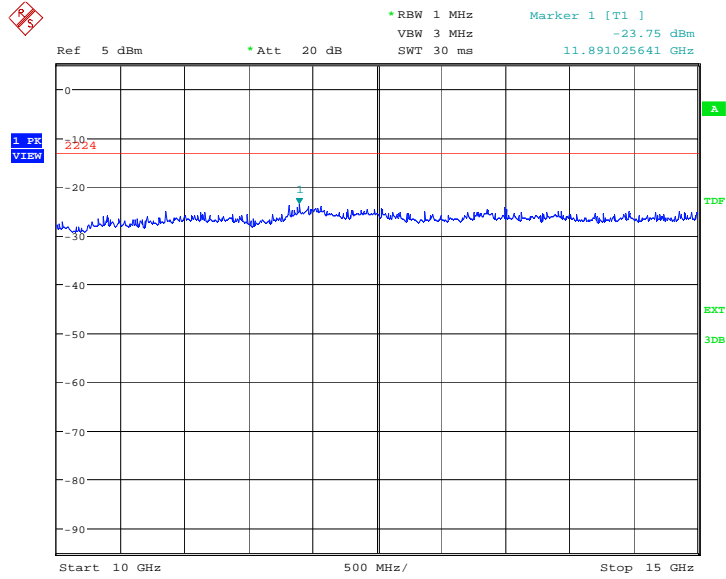
Date: 26.MAR.2013 01:38:21

A.8.3.10 Channel 661: 7.5GHz –10GHz
Spurious emission limit –13dBm



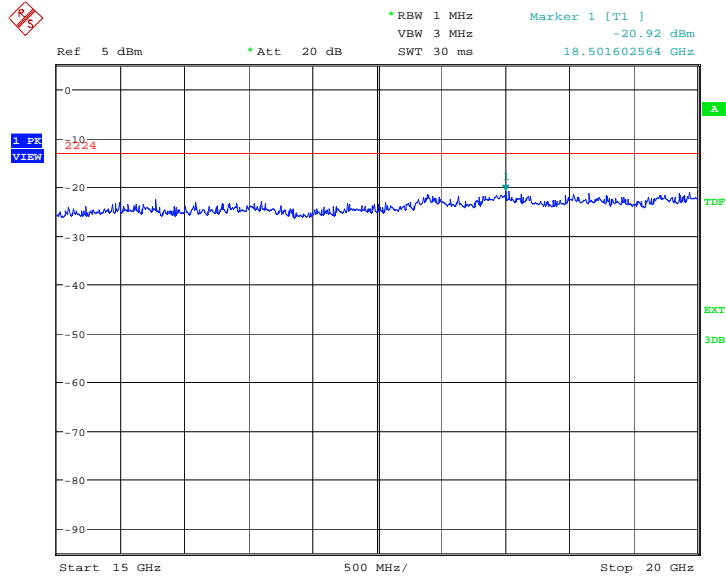
Date: 26.MAR.2013 01:38:49

A.8.3.11 Channel 661: 10GHz –15GHz
Spurious emission limit –13dBm.



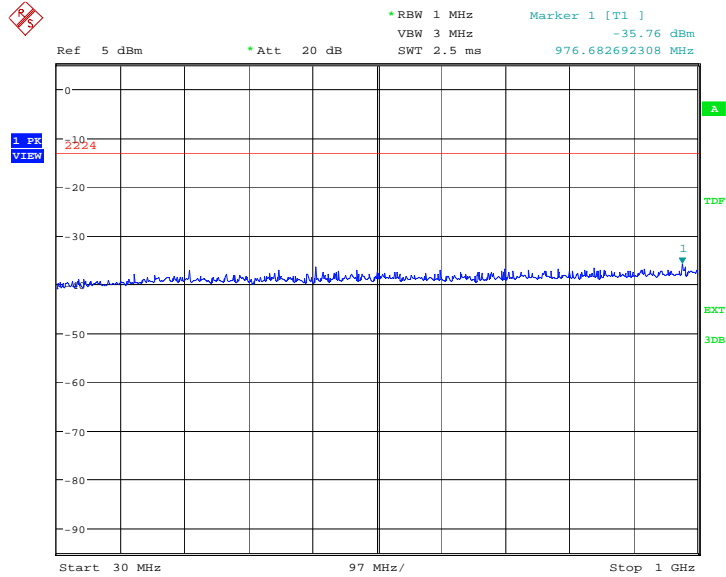
Date: 26.MAR.2013 01:39:17

A.8.3.12 Channel 661: 15GHz –20GHz
Spurious emission limit –13dBm.



Date: 26.MAR.2013 01:39:45

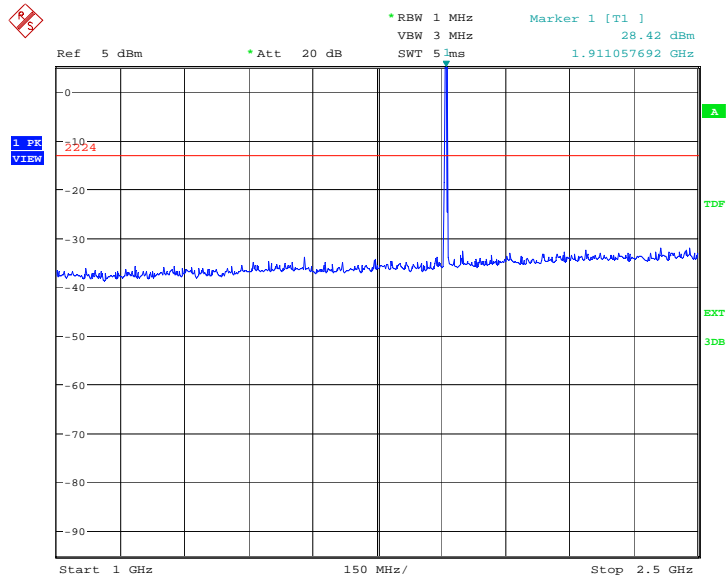
A.8.3.13 Channel 810: 30MHz – 1GHz
Spurious emission limit –13dBm.



Date: 26.MAR.2013 01:40:14

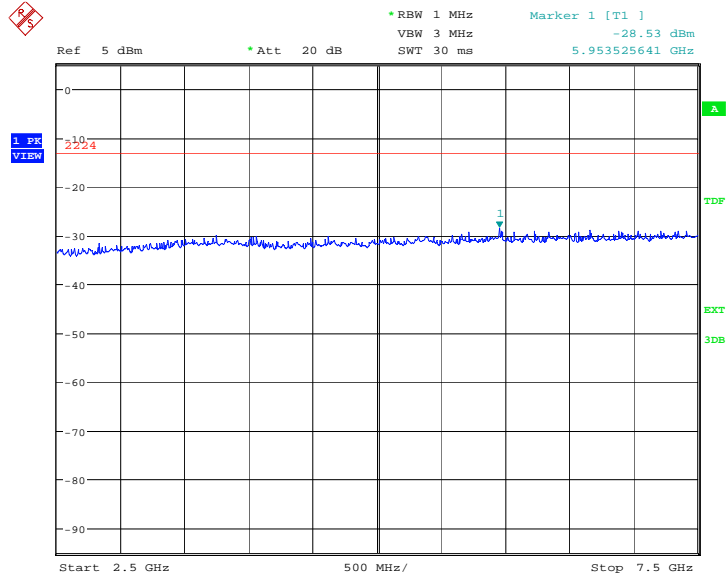
A.8.3.14 Channel 810: 1GHz – 2.5GHz
Spurious emission limit –13dBm.

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



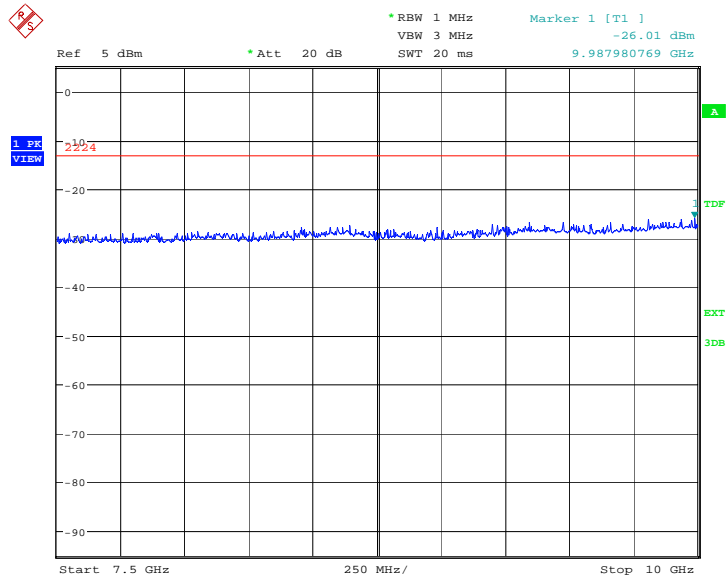
Date: 26.MAR.2013 01:40:42

A.8.3.15 Channel 810:2.5GHz – 7.5GHz
Spurious emission limit –13dBm.



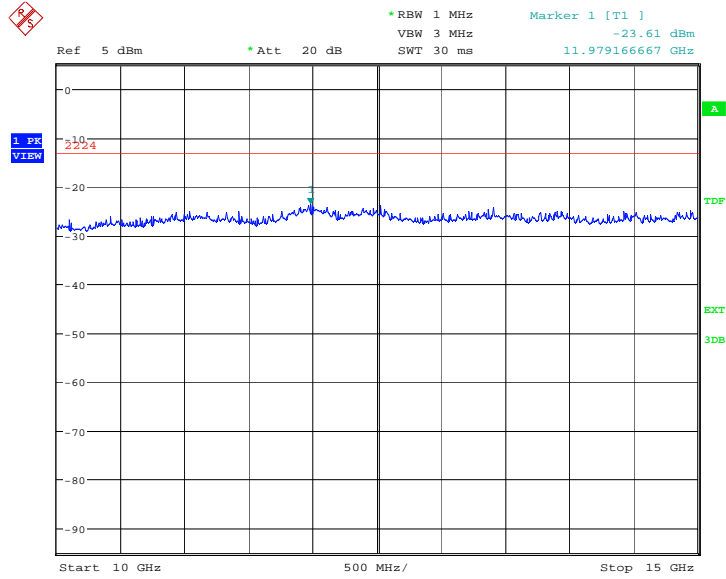
Date: 26.MAR.2013 01:41:10

A.8.3.16 Channel 810: 7.5GHz – 10GHz
Spurious emission limit –13dBm.



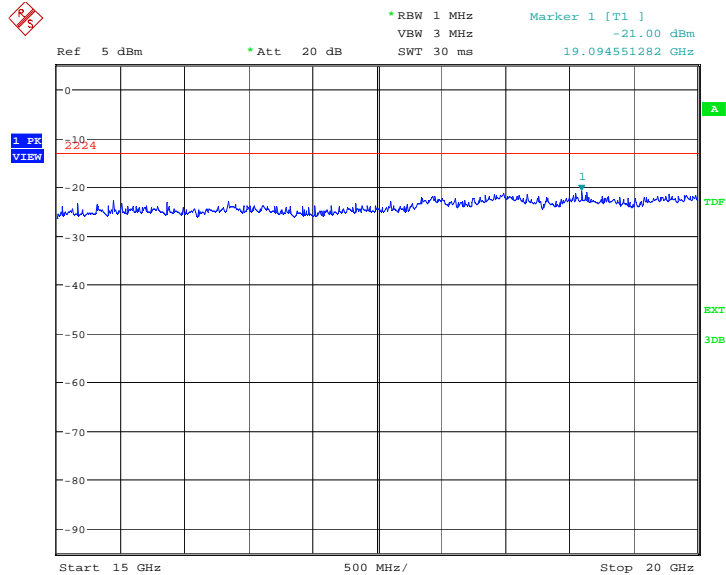
Date: 26.MAR.2013 01:41:38

A.8.3.17 Channel 810: 10GHz –15GHz
Spurious emission limit –13dBm.



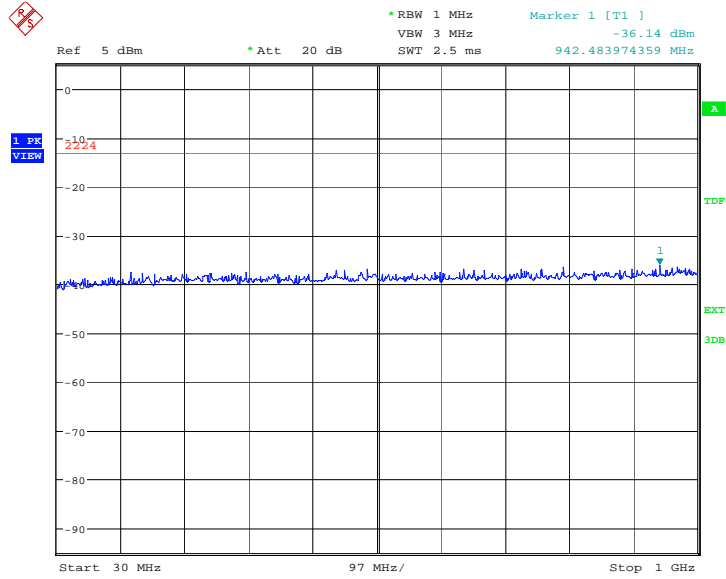
Date: 26.MAR.2013 01:42:07

A.8.3.18 Channel 810: 15GHz –20GHz
Spurious emission limit –13dBm.



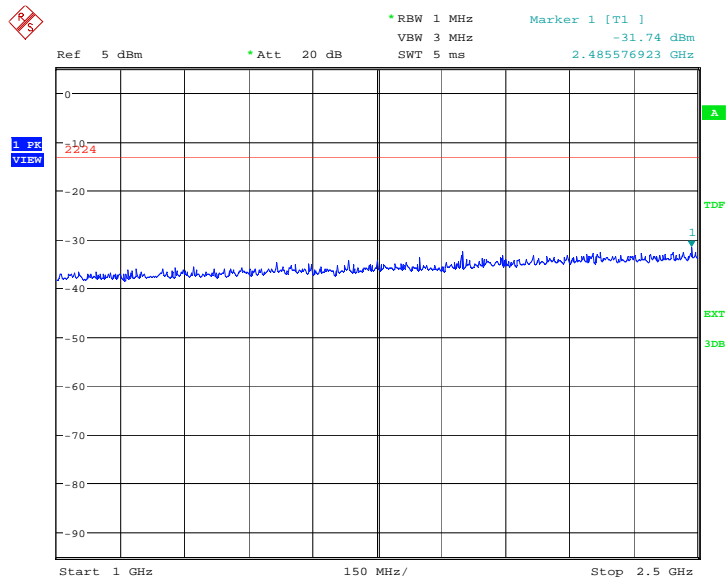
Date: 26.MAR.2013 01:42:35

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



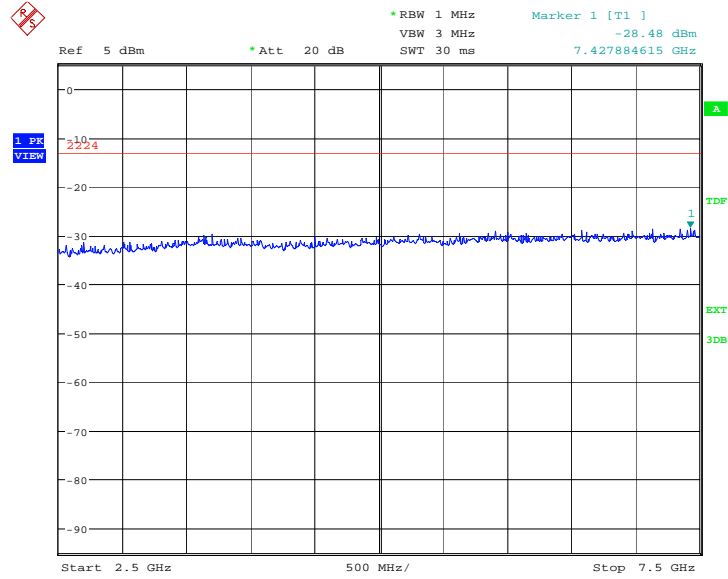
Date: 26.MAR.2013 01:43:03

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



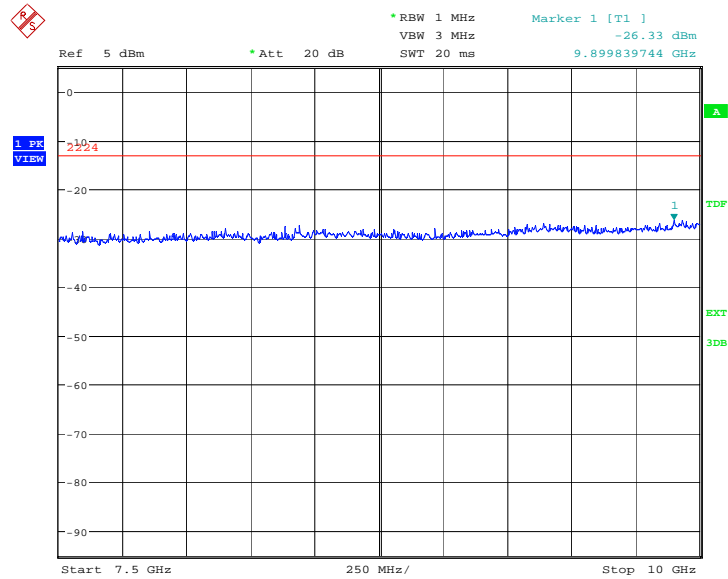
Date: 26.MAR.2013 01:43:32

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



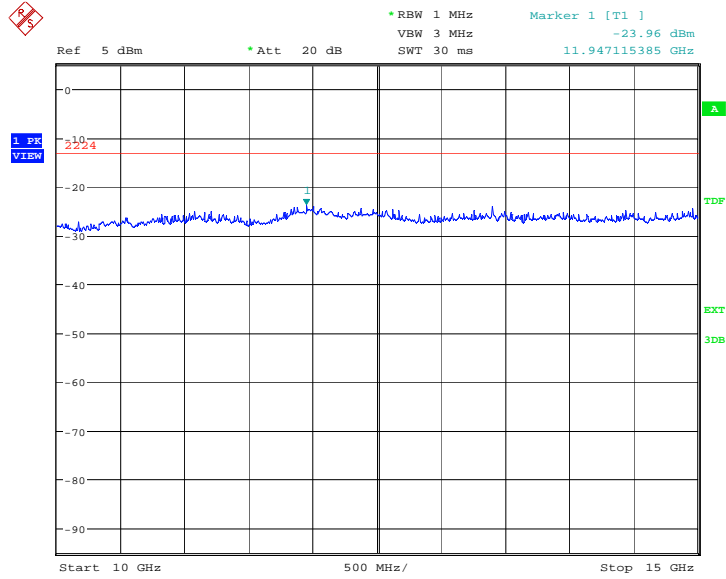
Date: 26.MAR.2013 01:44:00

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



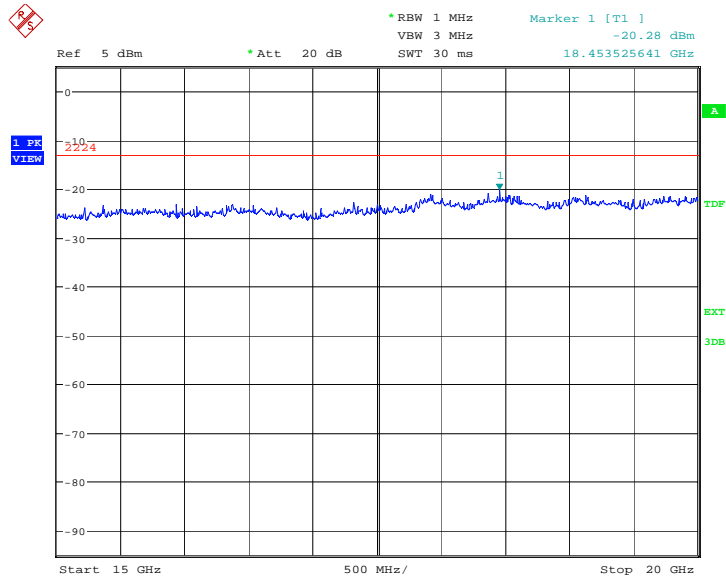
Date: 26.MAR.2013 01:44:28

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



Date: 26.MAR.2013 01:44:56

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



Date: 26.MAR.2013 01:45:24