TEST REPORT

No. 2012TAR322

for

Sony Mobile Communications AB

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

Type: PM-0200-BV

FCC ID: PY7PM-0200

IC No.: 4170B-PM0200

with

Hardware Version: A

Software Version: 6.1.E.0.35

Issued Date: Jun. 15th, 2012

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

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

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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:	+86-10-62304633-2678
Fax:	+86-10-62304633-2504

1.2. Testing Environment

Normal Temperature:	15-35℃
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	May 14th, 2012
Testing Start Date:	May 31st, 2012
Testing End Date:	Jun. 14th, 2012

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
Address /Post:	Sony Mobile R&D Center, No. 16, Guangshun South Street, Chaoyang District
City:	Beijing
Postal Code:	100102
Country:	China
Contact Person:	Ma, Gang
Telephone:	+86-10-58656312
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2.2. Manufacturer Information

Company Name:	Sony Mobile Communications AB
Address /Post:	Nya Vattentornet, 22188 Lund, Sweden
City:	Lund
Postal Code:	22188
Country:	Sweden
Contact Person:	Nordlof, Anders
Telephone:	+46-10-802 3919
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3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	GSM 850/900/1800/1900, GPRS, EDGE, WCDMA FDD Band 1/2/4/5/8, BT EDR2.0, WLAN (802.11 b/g/n), FM, GPS receiver mobile phone
Type	PM-0200-BV
FCC ID	PY7PM-0200
IC No.	4170B-PM0200
Frequency range (Tx)	GSM 850: 824.2 MHz - 848.8 MHz PCS 1900: 1850.2 MHz -1909.8 MHz WCDMA FDD Band 2:1850 MHz -1910 MHz WCDMA FDD Band 4:1710 MHz -1755 MHz WCDMA FDD Band 5:824 MHz - 849 MHz
Antenna	Internal
Power supply	Battery or charger
Output power	32.67 dBm maximum ERP measured for GSM850 32.90 dBm maximum EIRP measured for PCS1900 28.66 dBm maximum EIRP measured for WCDMA FDD Band 2 28.49 dBm maximum EIRP measured for WCDMA FDD Band 4 26.83 dBm maximum ERP measured for WCDMA FDD Band 5
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
N01	CB5A1K245R	004402145746859	A	6.1.E.0.35
N04	CB5A1K23XT	004402145747238	A	6.1.E.0.35

*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
#22405	Travel Charger	0912W06203353	1
AE2	USB Cable	120812AD128862E	1

#22405

Type	CAA-0004008-US
Manufacturer	EMERSON
Length of cable	78 cm (length of USB cable)

AE2

Commercial Name	EC480
Manufacturer	Sony Mobile
Length of cable	78 cm

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

3.4. General Description

The Equipment Under Test (EUT) is a model of GSM 850/900/1800/1900 quad bands and UMTS FDD 1/2/4/5/8 mobile phone with integrated antenna and inbuilt Li-Polymer battery.
The EUT supports GSM 850/900/1800/1900MHz bands and WCDMA FDD bands 1/2/4/5/8. It also supports GPRS service with multi-slots class 10 and EGPRS service with multi-slots class 10 too. The HSDPA and HSUPA features are also supported.
It has MP3, camera, FM radio, USB memory, GPS receiver, NFC, Bluetooth (EDR), ANT+, WLAN (802.11 b/g/n) and Wi-Fi hotspot functions.
It consists of normal option: travel charger.
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	N01 + #22405 + AE2	Tests with travel charger
Set. 2	N01	ERP/EIRP/RSE tests
Set. 3	N04	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 22	PUBLIC MOBILE SERVICES	10-1-10 Edition
FCC Part 24	PERSONAL COMMUNICATIONS SERVICES	10-1-10 Edition
RSS-132	Cellular Telephones Employing New Technologies Operating in the Bands 824-849 MHz and 869-894 MHz	Issue2
RSS-133	2 GHz Personal Communications Services	Issue5
ANSI/TIA-603-C	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2004
ANSI C63.4	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2003

5. LABORATORY ENVIRONMENT

Control room / conducted chamber did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ˚C, Max. = 35 ˚C
Relative humidity	Min. =20 %, Max. = 80 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 2 MΩ
Ground system resistance	< 0.5 Ω

Fully-anechoic chamber 2 (8.6 meters×6.1 meters×3.85 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ˚C, Max. = 30 ˚C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 2 MΩ
Ground system resistance	< 1 Ω
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 4000 MHz

Semi-anechoic chamber 2 / Fully-anechoic chamber 3 (10 meters×6.7 meters×6.15 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ˚C, Max. = 30 ˚C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 2 MΩ
Ground system resistance	< 0.5 Ω
Normalised site attenuation (NSA)	< ±3.5 dB, 3 m distance
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 3000 MHz

6. SUMMARY OF TEST RESULTS

6.1. Summary of test results

Abbreviations used in this clause:

P	Pass
NA	Not applicable
F	Fail

GSM 850

Items	Test Name	Clause in FCC rules	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	4.5	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)	4.5	A.5	P
6	Emission Bandwidth	22.917(b)	4.5	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)	6.4	A.1	P
2	Emission Limit	24.238, 2.1051	6.5	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)	6.5	A.5	P
6	Emission Bandwidth	24.238(a)	6.5	A.6	P
7	Band Edge Compliance	24.238(a)	6.5	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.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE
1	Test Receiver	ESCI	100344	R&S	2013-03-28
3	Test Receiver	ESU26	100376	R&S	2012-11-08
4	EMI Antenna	VULB 9163	514	Schwarzbeck	2014-11-10
5	EMI Antenna	3117	00139065	ETS-Lindgren	2014-07-31
6	LISN	ESH2-Z5	829991/012	R&S	2013-04-16
7	Universal Radio Communication Tester	CMU200	102228	R&S	2012-07-07
8	Universal Radio Communication Tester	E5515C	MY48361083	Agilent	2013-03-16
9	Spectrum Analyzer	E4440A	MY48250642	Agilent	2013-03-04
10	EMI Antenna	9117	177	Schwarzbeck	2012-06-29
11	EMI Antenna	VULB 9163	482	Schwarzbeck	2014-02-17
12	EMI Antenna	3117	00119024	ETS-Lindgren	2014-02-02
13	EMI Antenna	3117	00058889	ETS-Lindgren	2014-02-02
14	Signal Generator	N5183A	MY49060052	Agilent	2013-03-19
15	Climatic chamber	PL-2G	343074	ESPEC	2013-05-12

ANNEX A: MEASUREMENT RESULTS

A.1 OUTPUT POWER

Reference

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

IC: RSS 132, Issue 2, Section 4.4. RSS 133, Issue 5, Section 6.4.

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

Measurement result

GSM (GMSK)

Frequency(MHz)	Power Step	Peak output power(dBm)
824.2	5	33.70
836.6	5	33.66
848.8	5	**33.73**

GPRS (GMSK, Time Slot 1)

Frequency(MHz)	Power Step	Peak output power(dBm)
824.2	3	33.67
836.6	3	33.69
848.8	3	**33.71**

EGPRS (8PSK, Time Slot 1)

Frequency(MHz)	Power Step	Peak output power(dBm)
824.2	6	**26.15**
836.6	6	26.11
848.8	6	26.09

Note: Expanded measurement uncertainty for GSM850 is *U* = 0.52dB, k=2.

PCS1900

Limit

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

Measurement result

GSM (GMSK)

Frequency(MHz)	Power Step	Peak output power(dBm)
1850.2	0	30.50
1880.0	0	**30.71**
1909.8	0	30.48

GPRS (GMSK, Time Slot 1)

Frequency(MHz)	Power Step	Peak output power(dBm)
1850.2	3	30.61
1880.0	3	**30.82**
1909.8	3	30.58

EGPRS (8PSK, Time Slot 1)

Frequency(MHz)	Power Step	Peak output power(dBm)
1850.2	5	25.15
1880.0	5	**25.21**
1909.8	5	24.96

Note: Expanded measurement uncertainty for PCS1900 is *U* =0.83dB, k=2.

A.1.3 Radiated

A.1.3.1 Description

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

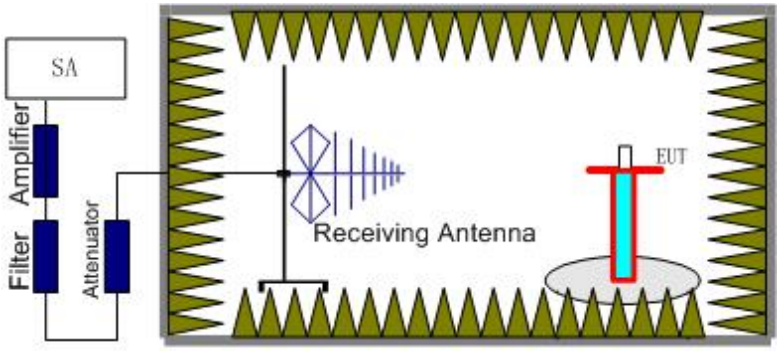
Rule Part 24.232(b) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."

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.”

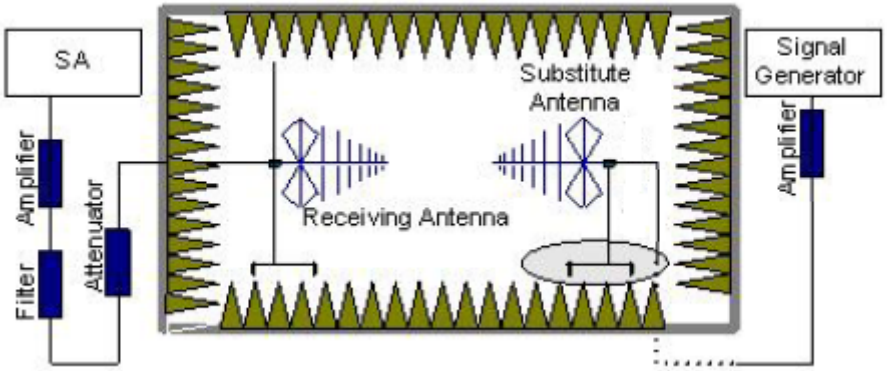
A.1.3.2 Method of Measurement

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)

Measurement result

GSM (GMSK)

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	Correction (dB)	Peak ERP(dBm)	Polarization
824.2	-15.9	2.26	-53	0.84	2.15	31.85	Vertical
836.6	-15.02	2.26	-53	0.90	2.15	**32.67**	Vertical
848.8	-16.17	2.28	-53	0.95	2.15	31.45	Vertical

GPRS (GMSK)

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	Correction (dB)	Peak ERP(dBm)	Polarization
824.2	-16.48	2.26	-53	0.84	2.15	31.27	Vertical
836.6	-16.06	2.26	-53	0.90	2.15	**31.63**	Vertical
848.8	-16.64	2.28	-53	0.95	2.15	30.98	Vertical

EGPRS (8PSK)

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	Correction (dB)	Peak ERP(dBm)	Polarization
824.2	-20.73	2.26	-53	0.84	2.15	27.02	Vertical
836.6	-20.30	2.26	-53	0.90	2.15	**27.39**	Vertical
848.8	-21.32	2.28	-53	0.95	2.15	26.30	Vertical

Sample calculation: GSM, 836.6 MHz

Peak ERP(dBm) = P_{Mea}(-15.02 dBm) - G_a (0.90 dBi) - P_{Ag} (-53.00 dB) - P_{cl} (2.26 dB) -2.15 dB
= 32.67 dBm

ANALYZER SETTINGS: RBW = VBW = 3MHz

Note: Expanded measurement uncertainty for GSM850 is *U* = 0.96dB, k=2.

PCS1900- EIRP 24.232(b)

Limits

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

Measurement result

GSM (GMSK)

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	Peak EIRP(dBm)	Polarization
1850.20	-15.85	5.95	-50.00	-4.56	32.76	Horizontal
1880.00	-14.48	7.05	-50.00	-4.43	**32.90**	Horizontal
1909.80	-12.40	9.12	-50.00	-4.30	32.78	Horizontal

GPRS (GMSK)

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	Peak EIRP(dBm)	Polarization
1850.20	-16.37	5.95	-50.00	-4.56	32.24	Vertical
1880.00	-14.60	7.05	-50.00	-4.43	**32.78**	Horizontal
1909.80	-12.85	9.12	-50.00	-4.30	32.33	Vertical

EGPRS (8PSK)

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	Peak EIRP(dBm)	Polarization
1850.20	-17.54	5.95	-50.00	-4.56	**31.07**	Horizontal
1880.00	-17.01	7.05	-50.00	-4.43	30.37	Horizontal
1909.80	-14.69	9.12	-50.00	-4.30	30.49	Horizontal

Sample calculation: GSM, 1880.00 MHz

Peak EIRP(dBm) = P_{Mea}(-14.48 dBm) - G_a (-4.43 dBi) - P_{Ag} (-50.00 dB) - P_{cl} (7.05 dB) = 32.90 dBm

ANALYZER SETTINGS: RBW = VBW = 3MHz

Note: Expanded measurement uncertainty for PCS1900 is *U* = 1.07dB, k=2.

A.2 EMISSION LIMT

Reference

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

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

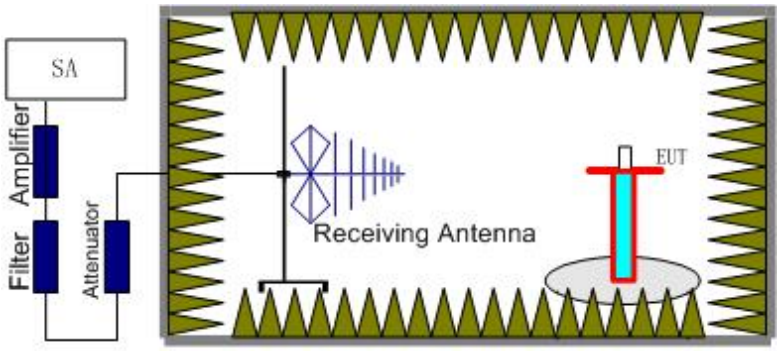
A.2.1 Measurement Method

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

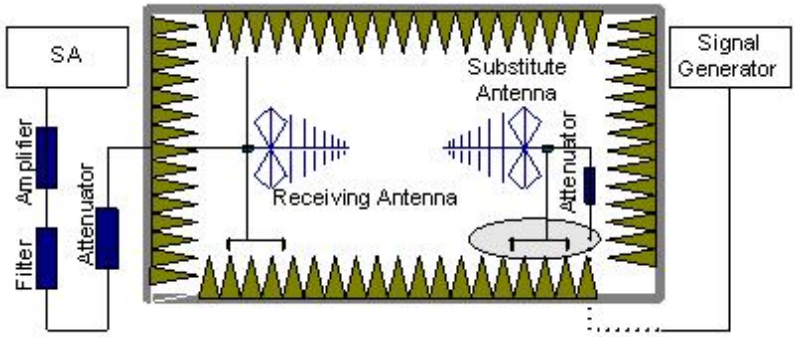
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz. The resolution bandwidth is set 1MHz as outlined in Part 24.238. The spectrum was scanned with the mobile station transmitting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

The procedure of radiated spurious emissions is as follows:

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



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



In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna. Adjust the level of the signal generator output until the value of the receiver reaches the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. The Path loss (P_{pl}) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain (G_a) should be recorded after test.
   An amplifier should be connected in for the test.
   The Path loss (P_{pl}) is the summation of the cable loss and the gain of the amplifier.
   The measurement results are obtained as described below:
   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.

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
1648.55	-51.12	3.57	-5.45	2.15	-51.39	-13	Horizontal
2532.33	-59.92	4.28	-5.48	2.15	-60.87	-13	Horizontal
3834.22	-69.19	5.53	-8.30	2.15	-68.57	-13	Vertical
5030.18	-65.65	6.77	-9.72	2.15	-64.85	-13	Vertical
7178.15	-67.51	8.72	-11.21	2.15	-67.17	-13	Horizontal
8466.54	-64.82	7.85	-12.18	2.15	-62.64	-13	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
1672.99	-50.52	3.46	-5.34	2.15	-50.79	-13	Horizontal
1943.71	-42.74	8.89	-4.15	2.15	-49.63	-13	Horizontal
2434.60	-61.00	4.26	-5.20	2.15	-62.21	-13	Horizontal
3836.13	-69.16	5.60	-8.30	2.15	-68.61	-13	Vertical
5090.16	-67.51	7.51	-9.75	2.15	-67.42	-13	Horizontal
7496.89	-66.95	8.34	-11.4	2.15	-66.04	-13	Vertical

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
1697.49	-49.72	3.62	-5.23	2.15	-50.26	-13	Horizontal
3240.53	-70.56	5.02	-7.28	2.15	-70.45	-13	Vertical
3978.37	-67.65	5.91	-8.47	2.15	-67.24	-13	Vertical
5143.65	-69.62	7.13	-9.79	2.15	-69.11	-13	Horizontal
6815.10	-69.19	7.59	-10.92	2.15	-68.01	-13	Vertical
8560.54	-67.59	7.72	-12.25	2.15	-65.21	-13	Horizontal

GSM Mode Channel 512/1850.2MHz

Frequency (MHz)	P_{Mea} (dBm)	P_{pl} (dB)	G_a (dBi)	Peak EIRP (dBm)	Limit （dBm）	Polarity
3700.60	-53.19	5.31	-8.14	-50.36	-13	Horizontal
5550.72	-57.34	8.71	-10.02	-56.03	-13	Horizontal
6269.99	-67.44	9.15	-10.42	-66.17	-13	Vertical
9048.62	-67.31	8.35	-12.60	-63.06	-13	Vertical
10146.38	-68.16	8.51	-12.43	-64.24	-13	Horizontal
13782.51	-60.25	11.40	-13.91	-57.74	-13	Vertical

GSM Mode Channel 661/1880.0MHz

Frequency (MHz)	P_{Mea} (dBm)	P_{pl} (dB)	G_a (dBi)	Peak EIRP (dBm)	Limit （dBm）	Polarity
3116.91	-71.13	4.88	-6.98	-69.03	-13	Vertical
3760.26	-53.24	5.96	-8.21	-50.99	-13	Horizontal
5640.19	-56.30	9.59	-10.06	-55.83	-13	Horizontal
8096.16	-66.76	7.49	-11.96	-62.29	-13	Vertical
11023.36	-66.24	8.99	-12.40	-62.83	-13	Vertical
14062.30	-61.41	12.10	-13.95	-59.56	-13	Horizontal

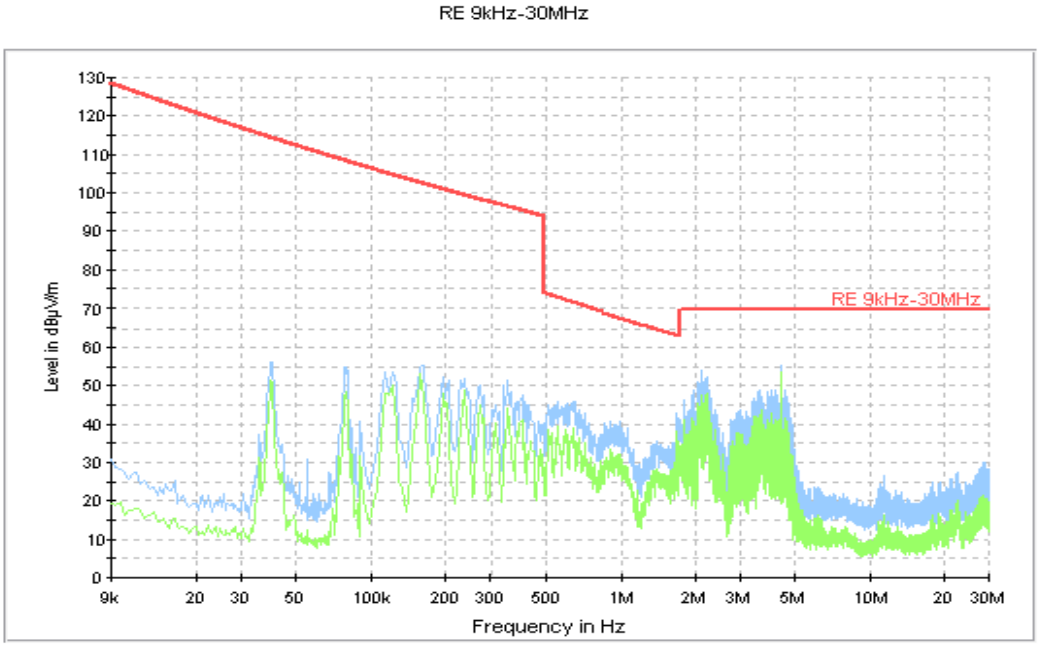
GSM Mode Channel 810/1909.8MHz

Frequency (MHz)	P_{Mea} (dBm)	P_{pl} (dB)	G_a (dBi)	Peak EIRP (dBm)	Limit （dBm）	Polarity
3819.34	-58.71	5.56	-8.28	-55.99	-13	Horizontal
5256.71	-65.39	7.59	-9.85	-63.13	-13	Vertical
8731.98	-68.25	8.07	-12.39	-63.93	-13	Vertical
10494.17	-63.87	8.86	-12.50	-60.23	-13	Horizontal
11426.69	-63.58	9.30	-12.40	-60.48	-13	Horizontal
14567.40	-62.50	12.18	-13.59	-61.09	-13	Horizontal

Note: Expanded measurement uncertainty for this test item is *U* = 4.21dB, k=2.

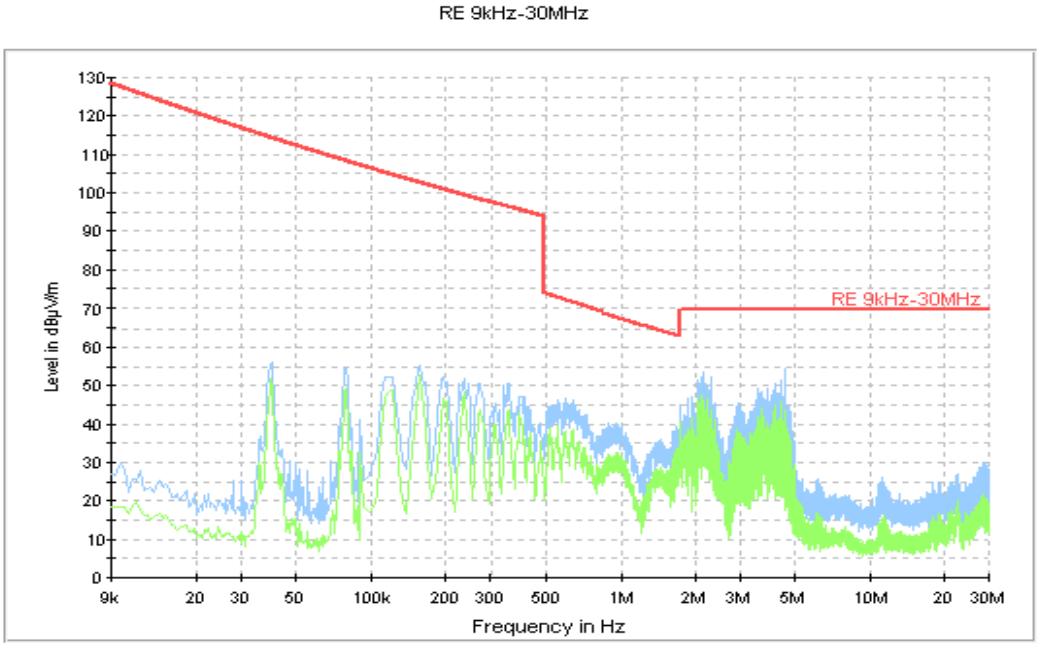
GSM 850

A.2.3.1 RADIATED SPURIOUS EMISSIONS-EUT in Traffic Mode: 9 kHz – 30 MHz (channel 251, worst case for 3 channels)



PCS 1900

A.2.3.2 RADIATED SPURIOUS EMISSIONS-EUT in Traffic Mode: 9 kHz – 30 MHz (channel 512, worst case for 3 channels)



A.3 CONDUCTED EMISSION

Reference

FCC: CFR Part 15.107/207.

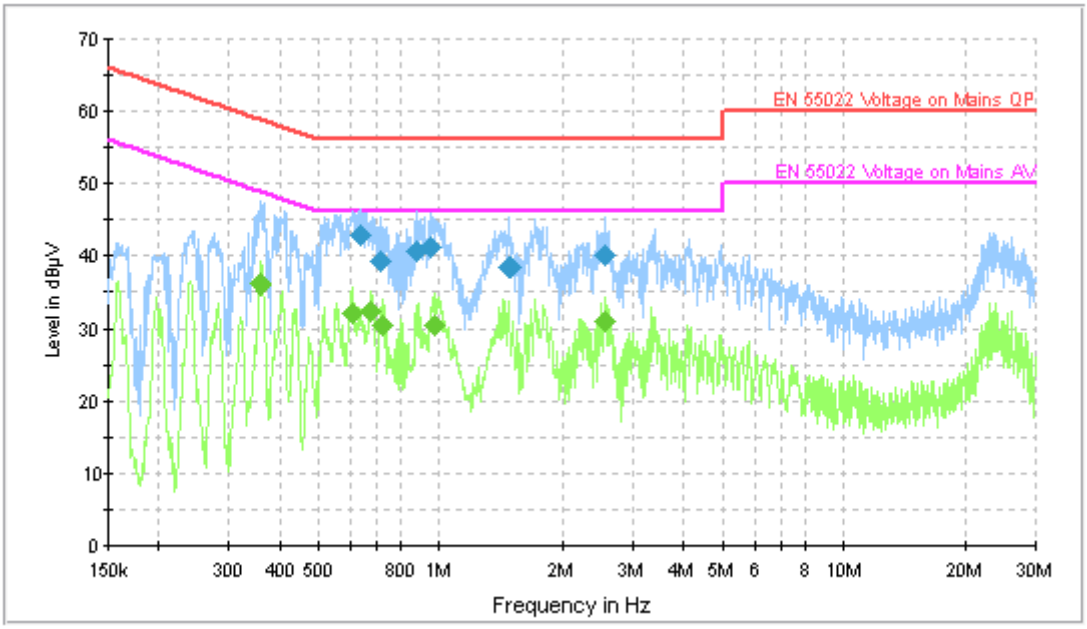
The measurement procedure in ANSI C63.4-2003 is used. Conducted Emission is measured with travel charger. For test layout photo, please refer to Pic.2 in Annex B.

A.3.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi -Peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50
* Decreases with logarithm of the frequency		

A.3.2 Measurement result

GSM850MHz



IF bandwidth 9 kHz

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

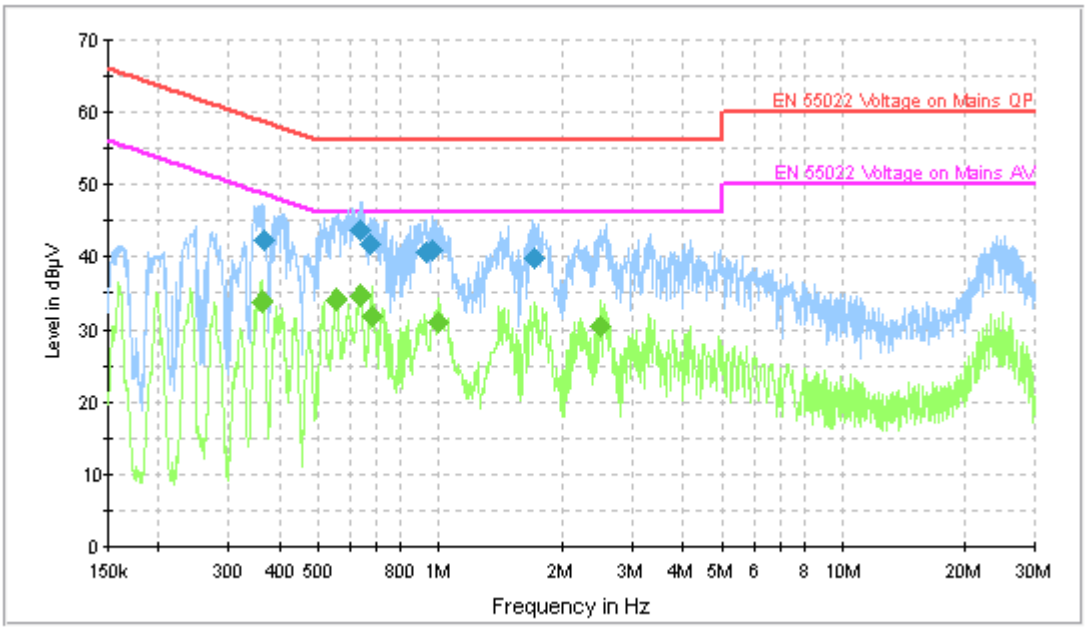
Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.635537	42.9	5000.0	9.000	GND	N	10.3	13.1	56.0
0.710028	39.3	5000.0	9.000	GND	N	10.3	16.7	56.0
0.875671	40.6	5000.0	9.000	GND	N	10.3	15.4	56.0
0.952285	41.2	5000.0	9.000	GND	N	10.3	14.8	56.0
1.479122	38.3	5000.0	9.000	GND	N	10.3	17.7	56.0
2.551373	39.9	5000.0	9.000	GND	N	10.4	16.1	56.0

Final Result 2

Frequency (MHz)	Average (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.359719	36.0	5000.0	9.000	GND	N	10.2	12.7	48.7
0.605796	32.4	5000.0	9.000	GND	N	10.3	13.6	46.0
0.676800	32.6	5000.0	9.000	GND	N	10.3	13.4	46.0
0.722905	30.4	5000.0	9.000	GND	N	10.3	15.6	46.0
0.975381	30.6	5000.0	9.000	GND	N	10.3	15.4	46.0
2.551373	31.1	5000.0	9.000	GND	N	10.4	14.9	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)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.366243	42.3	5000.0	9.000	GND	N	10.2	16.3	58.6
0.639356	43.5	5000.0	9.000	GND	N	10.3	12.5	56.0
0.672758	41.8	5000.0	9.000	GND	N	10.3	14.2	56.0
0.926955	40.6	5000.0	9.000	GND	N	10.3	15.4	56.0
0.963764	40.8	5000.0	9.000	GND	N	10.3	15.2	56.0
1.697645	39.7	5000.0	9.000	GND	N	10.3	16.3	56.0

Final Result 2

Frequency (MHz)	Average (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.361881	33.8	5000.0	9.000	GND	N	10.2	14.9	48.7
0.555391	34.1	5000.0	9.000	GND	N	10.3	11.9	46.0
0.635537	34.6	5000.0	9.000	GND	N	10.3	11.4	46.0
0.680867	32.0	5000.0	9.000	GND	N	10.3	14.0	46.0
0.993070	31.2	5000.0	9.000	GND	N	10.3	14.8	46.0
2.498431	30.7	5000.0	9.000	GND	N	10.4	15.3	46.0

A.4 FREQUENCY STABILITY

Reference

FCC: CFR Part 2.1055, 22.235, 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℃.
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℃ increments from -30℃ to +50℃. 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℃.
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℃ to -30℃. 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℃ during the measurement procedure.

A.4.2 Measurement Limit

A.4.2.1 For Hand carried battery powered equipment

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.5VDC and 4.1VDC, with a nominal voltage of 3.7VDC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance of -5.4 % and +10.8 %. For the purposes of measuring frequency stability these voltage limits are to be used.

A.4.2.2 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 115 percent of the nominal value for other than hand carried battery equipment.

A.4.3 Measurement results

GSM 850

Room Temperature: 24 ℃

Frequency Error vs Voltage

Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.5	-14	0.017
3.7	-13	0.016
4.1	-14	0.017

Frequency Error vs Temperature

temperature(℃)	Frequency error(Hz)	Frequency error(ppm)
-30	-15	0.018
-20	-14	0.017
-10	-14	0.017
0	-14	0.017
10	-13	0.016
20	-13	0.016
30	-13	0.016
40	-14	0.017
50	-14	0.017

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

PCS 1900

Room Temperature: 24℃

Frequency Error vs Voltage

Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.5	38	0.020
3.7	37	0.020
4.1	37	0.020

Frequency Error vs Temperature

temperature(℃)	Frequency error(Hz)	Frequency error(ppm)
-30	39	0.021
-20	39	0.021
-10	38	0.020
0	37	0.020
10	37	0.020
20	37	0.020
30	37	0.020
40	37	0.020
50	38	0.020

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

A.5 OCCUPIED BANDWIDTH

Reference

FCC: CFR Part 2.1049(h)(i).

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

A.5.1 Occupied Bandwidth Results

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

Measurement Parameters:

RBW = 5 kHz, VBW = 10 kHz

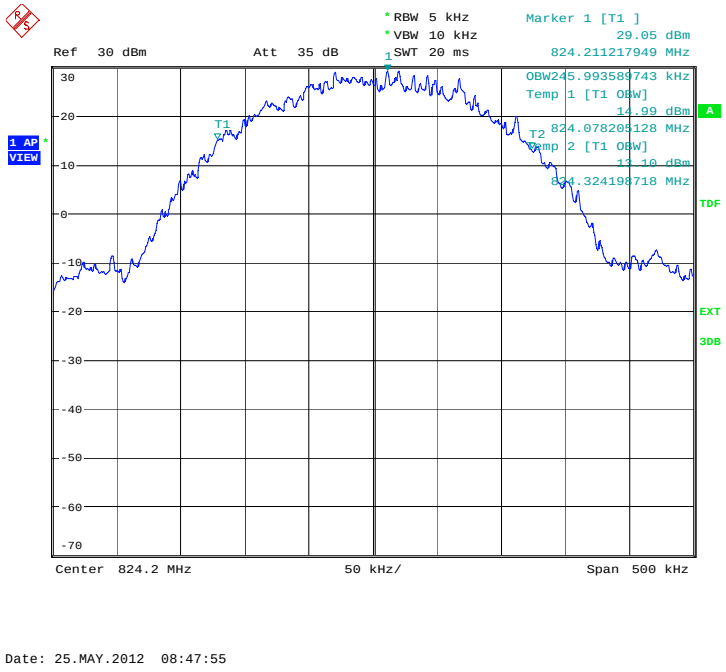
GSM 850(99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
824.2	245.994
836.6	242.788
848.8	244.391

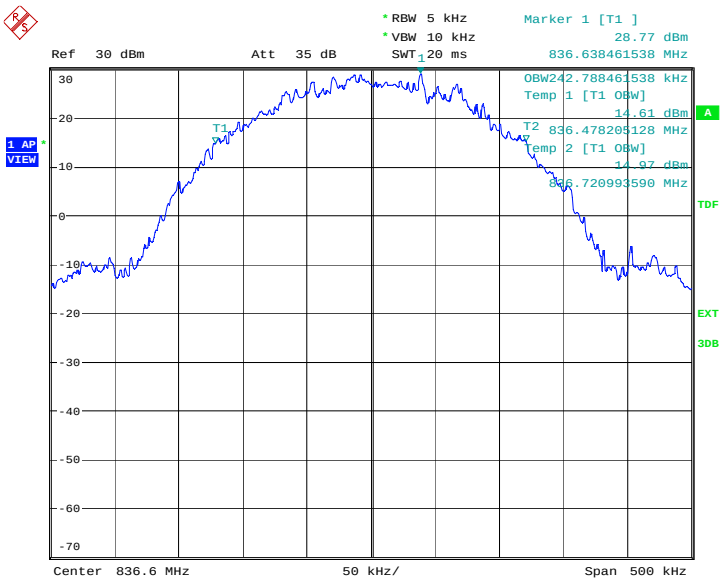
Expanded measurement uncertainty for this test item is 1.1 kHz, k=2

GSM 850

Channel 128-Occupied Bandwidth (-20dBc BW)

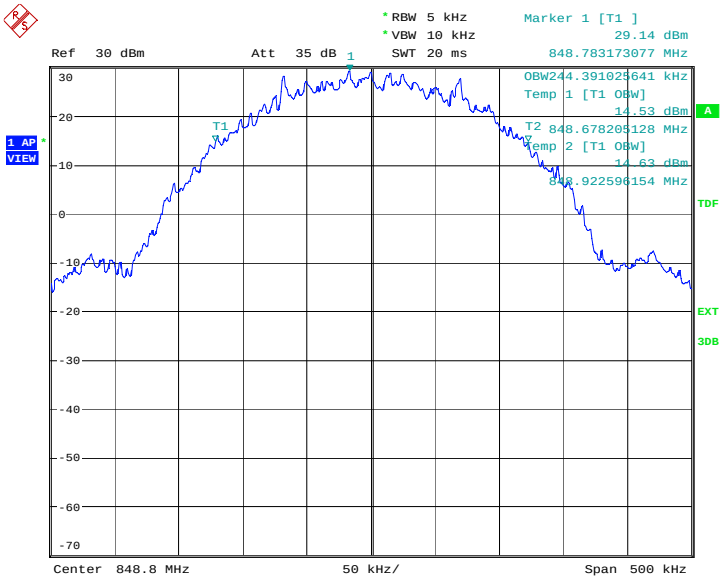


Channel 190-Occupied Bandwidth (-20dBc BW)



Date: 25.MAY.2012 08:48:27

Channel 251-Occupied Bandwidth (-20dBc BW)



Date: 25.MAY.2012 08:48:59

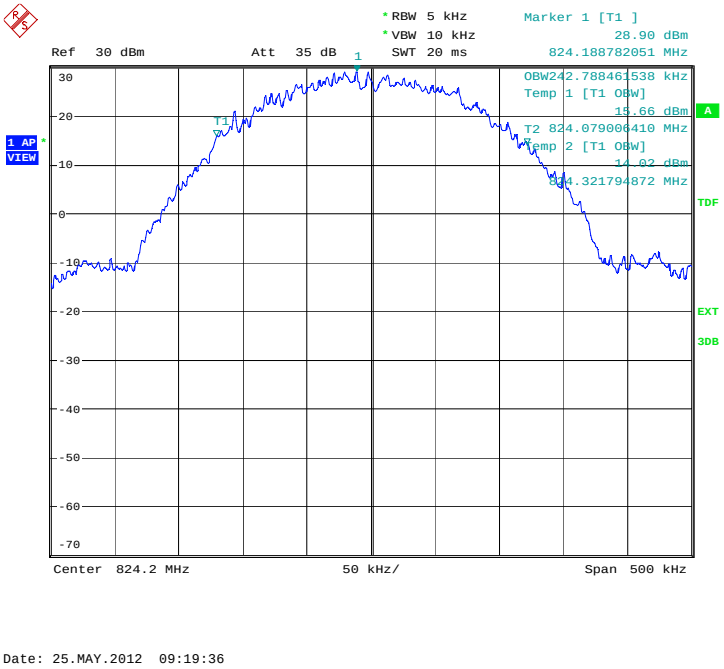
GPRS 850(99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
824.2	242.788
836.6	241.186
848.8	245.192

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

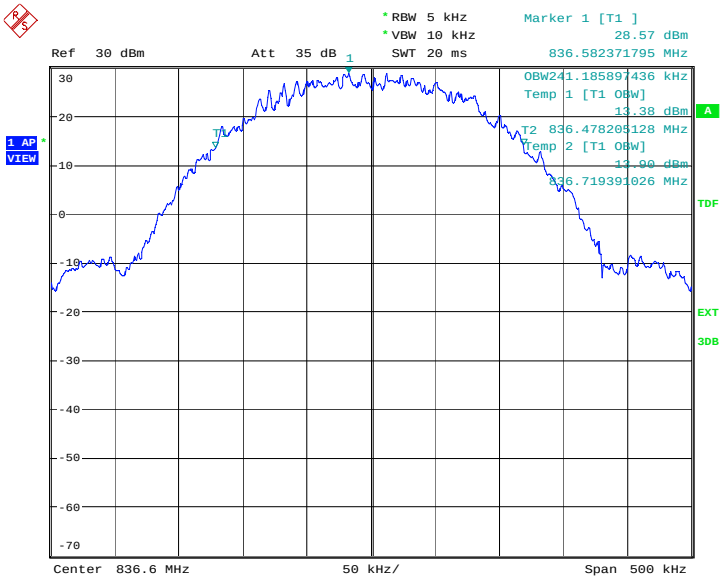
GPRS 850

Channel 128-Occupied Bandwidth (-20dBc BW)



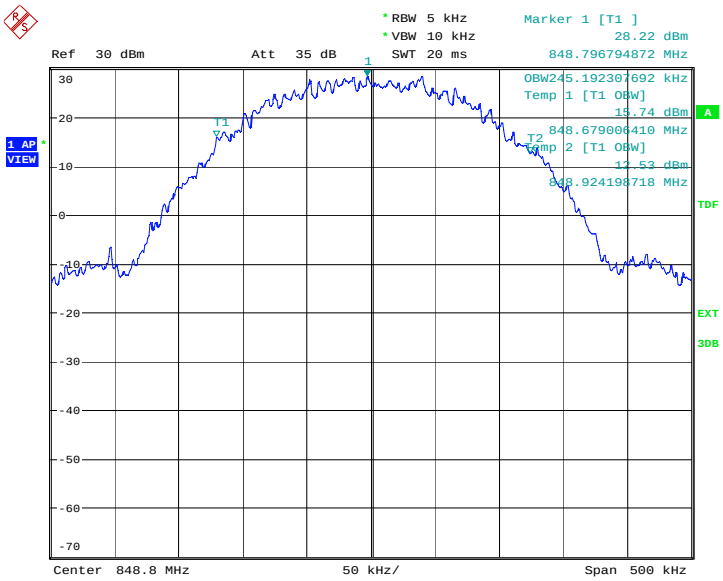
Date: 25.MAY.2012 09:19:36

Channel 190-Occupied Bandwidth (-20dBc BW)



Date: 25.MAY.2012 09:20:08

Channel 251-Occupied Bandwidth (-20dBc BW)



Date: 25.MAY.2012 09:20:41

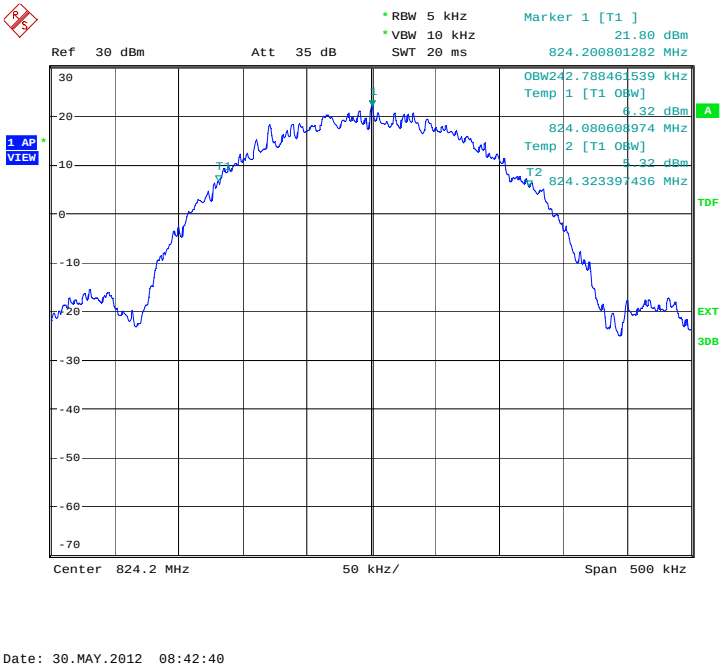
EGPRS 850(99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
824.2	242.788
836.6	244.391
848.8	244.391

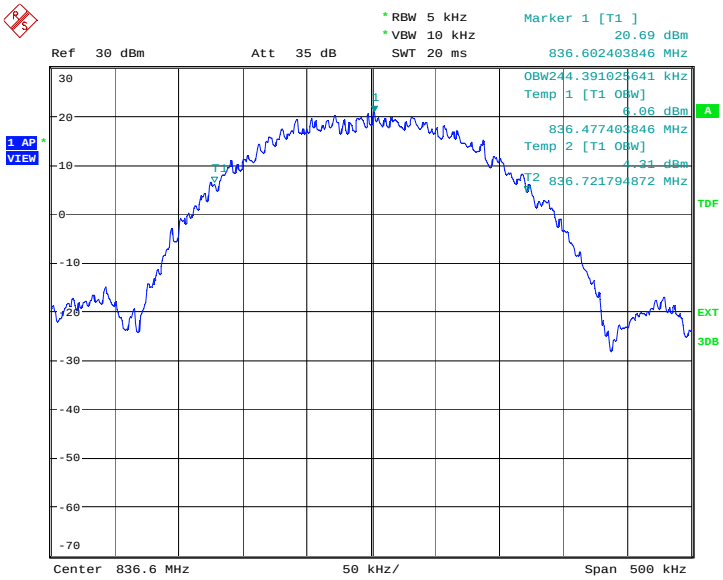
Expanded measurement uncertainty for this test item is 1.1 kHz, k=2

EGPRS 850

Channel 128-Occupied Bandwidth (-20dBc BW)

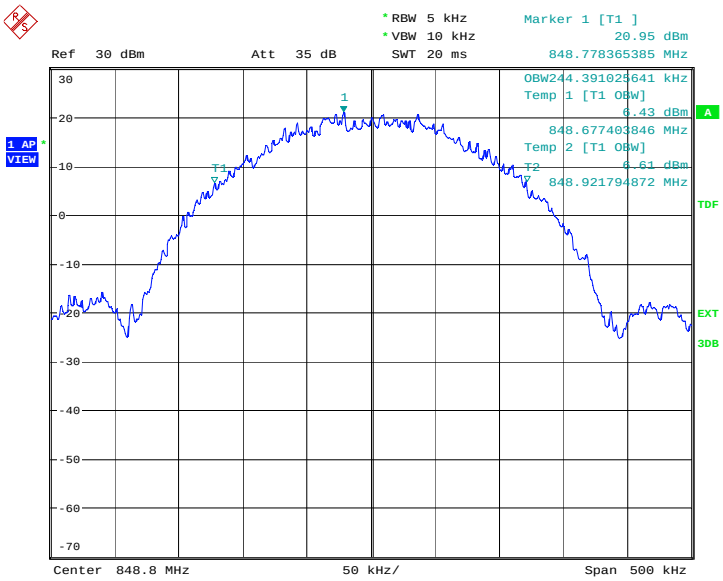


Channel 190-Occupied Bandwidth (-20dBc BW)



Date: 30.MAY.2012 08:43:49

Channel 251-Occupied Bandwidth (-20dBc BW)



Date: 30.MAY.2012 08:45:09

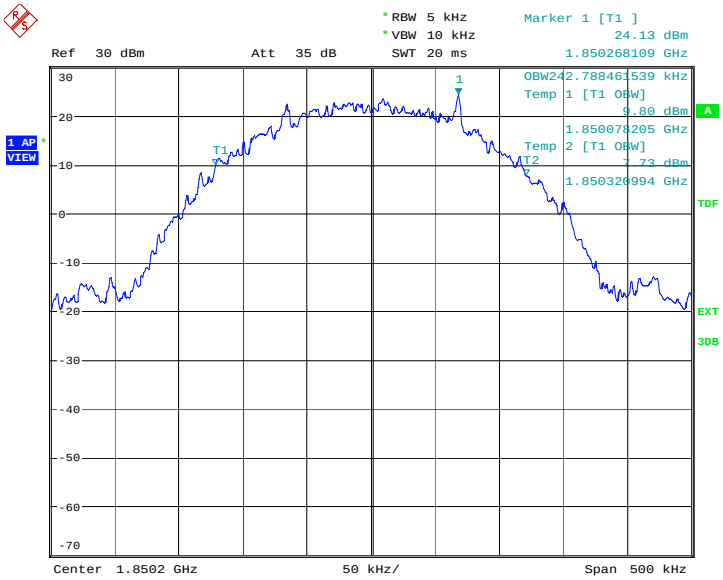
PCS 1900(99%)

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

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

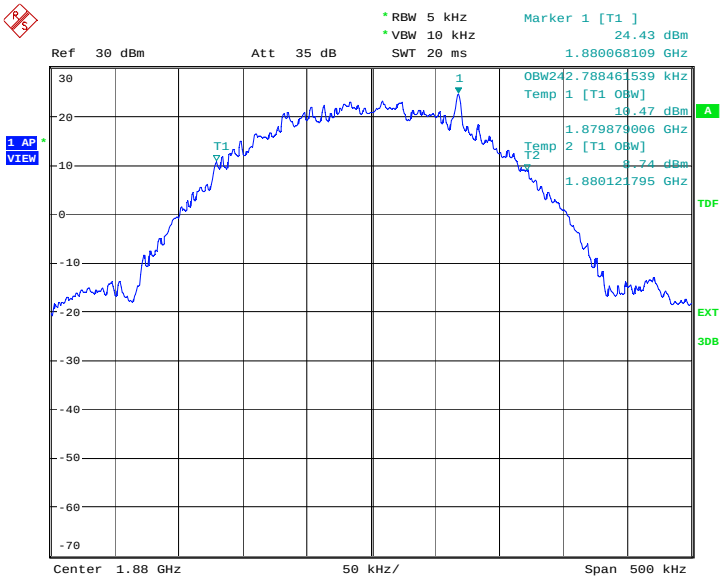
PCS 1900

Channel 512-Occupied Bandwidth (-20dBc BW)



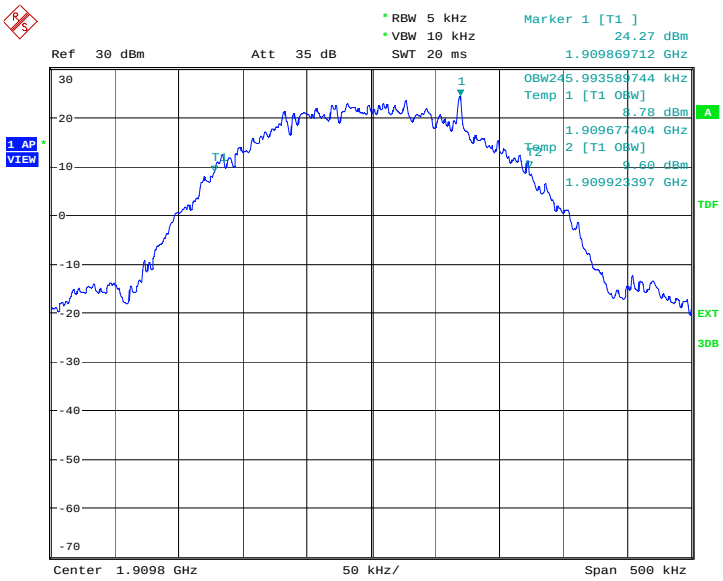
Date: 30.MAY.2012 08:08:24

Channel 661-Occupied Bandwidth (-20dBc BW)



Date: 30.MAY.2012 08:08:56

Channel 810-Occupied Bandwidth (-20dBc BW)



Date: 30.MAY.2012 08:09:29

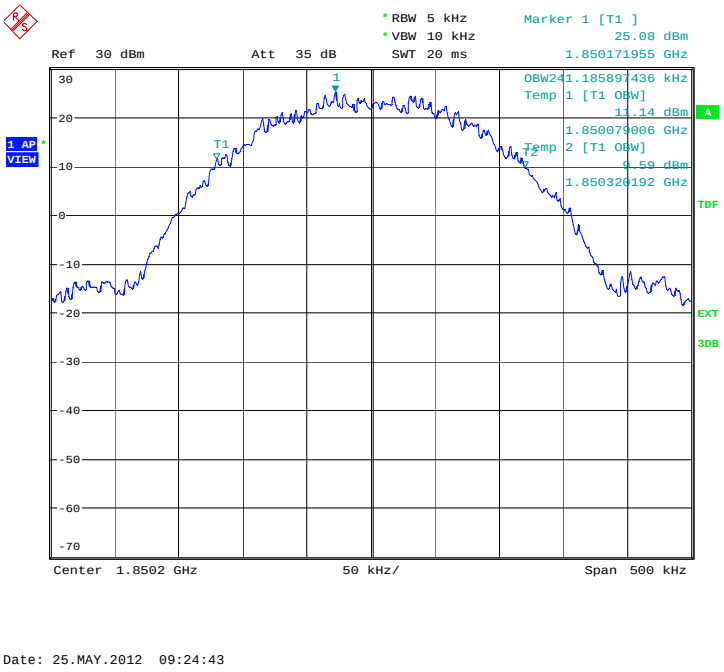
GPRS 1900(99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
1850.2	241.186
1880.0	245.192
1909.8	244.391

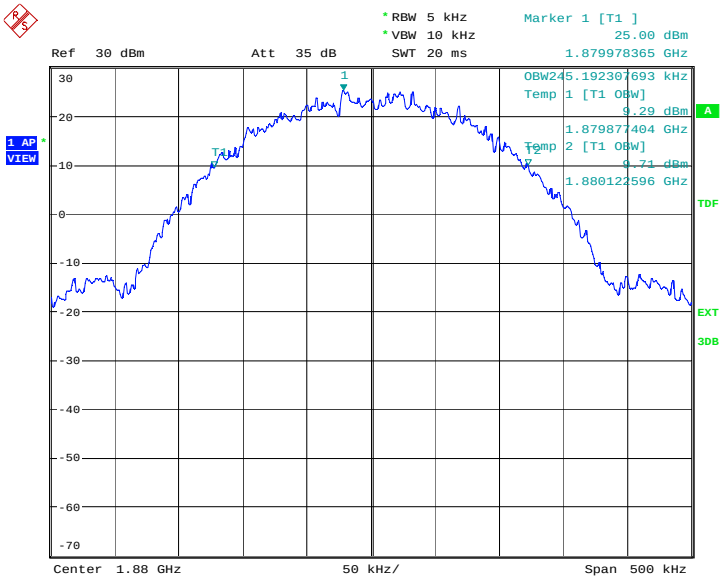
Expanded measurement uncertainty for this test item is 1.1 kHz, k=2

GPRS 1900

Channel 512-Occupied Bandwidth -20dBc BW)

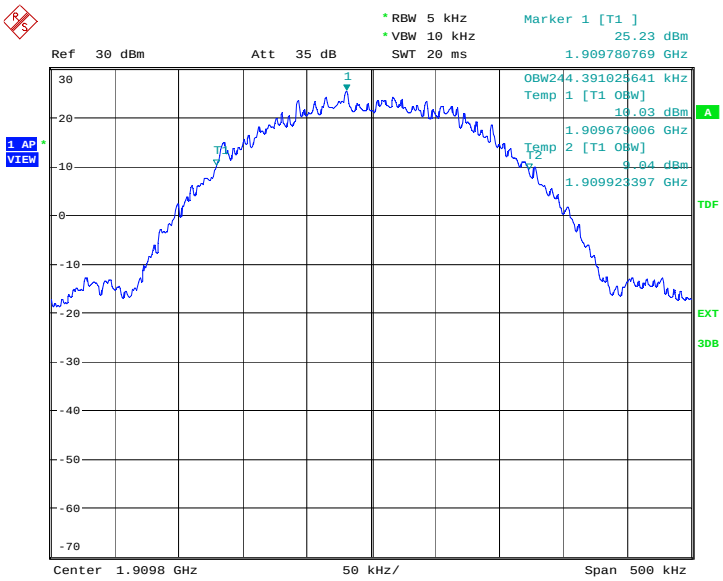


Channel 661-Occupied Bandwidth (-20dBc BW)



Date: 25.MAY.2012 09:25:15

Channel 810-Occupied Bandwidth (-20dBc BW)



Date: 25.MAY.2012 09:25:47

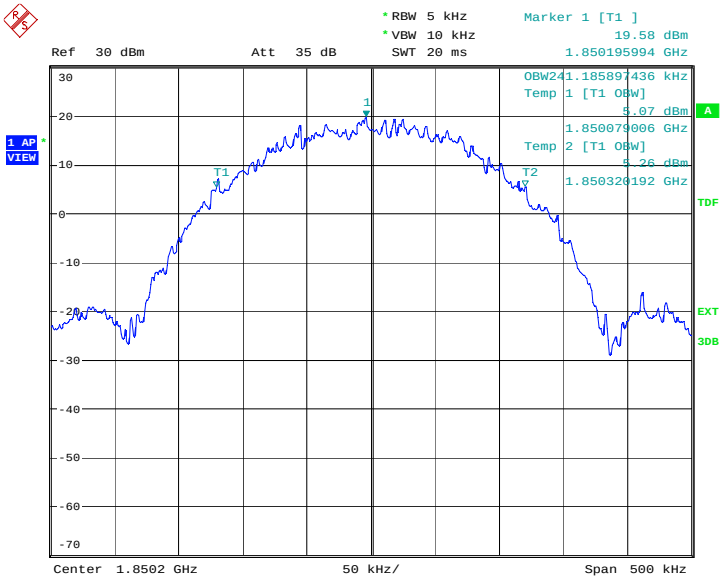
EGPRS 1900(99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
1850.2	241.186
1880.0	244.391
1909.8	241.987

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

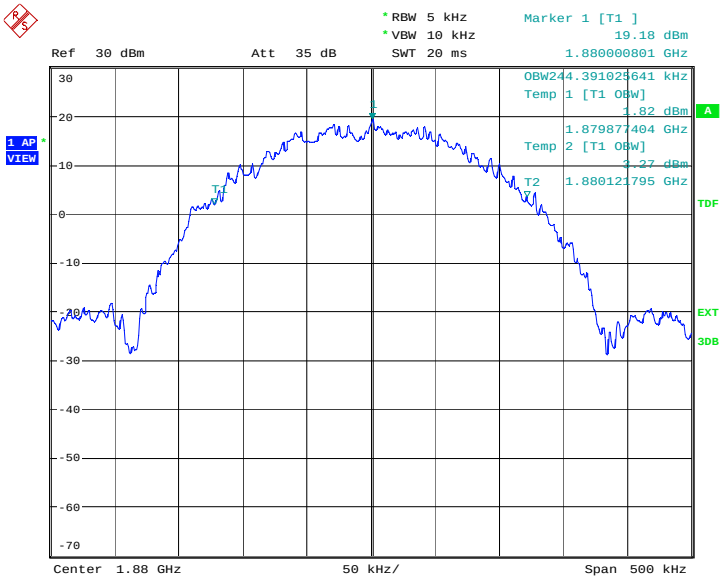
EGPRS 1900

Channel 512-Occupied Bandwidth (-20dBc BW)



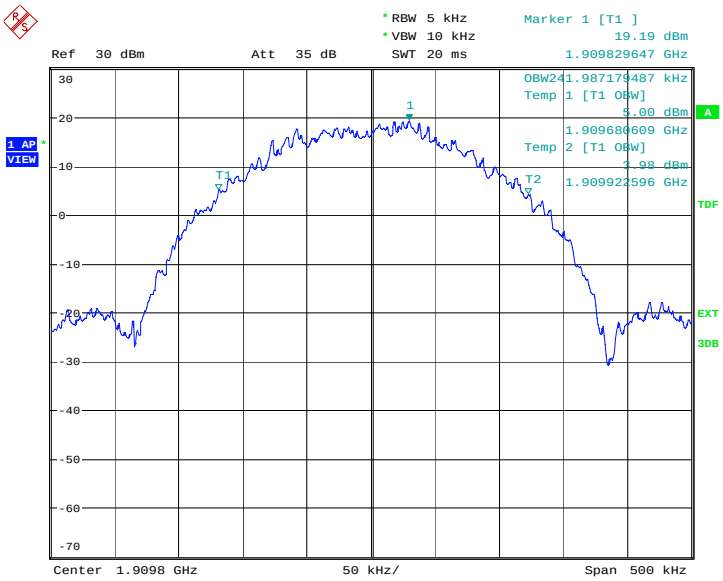
Date: 30.MAY.2012 09:00:51

Channel 661-Occupied Bandwidth (-20dBc BW)



Date: 30.MAY.2012 09:02:10

Channel 810-Occupied Bandwidth (-20dBc BW)



Date: 30.MAY.2012 09:03:41

A.6 EMISSION BANDWIDTH

Reference

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

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

A.6.1Emission Bandwidth Results

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

Measurement Parameters:

RBW = 5 kHz, VBW = 10 kHz

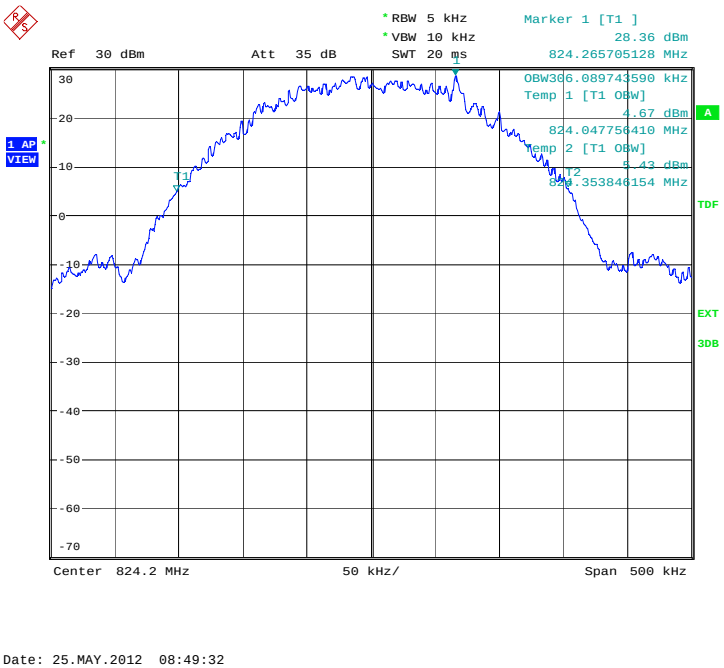
GSM 850(-26dBc)

Frequency(MHz)	Occupied Bandwidth (–26dBc BW)(kHz)
824.2	306.090
836.6	304.487
848.8	306.891

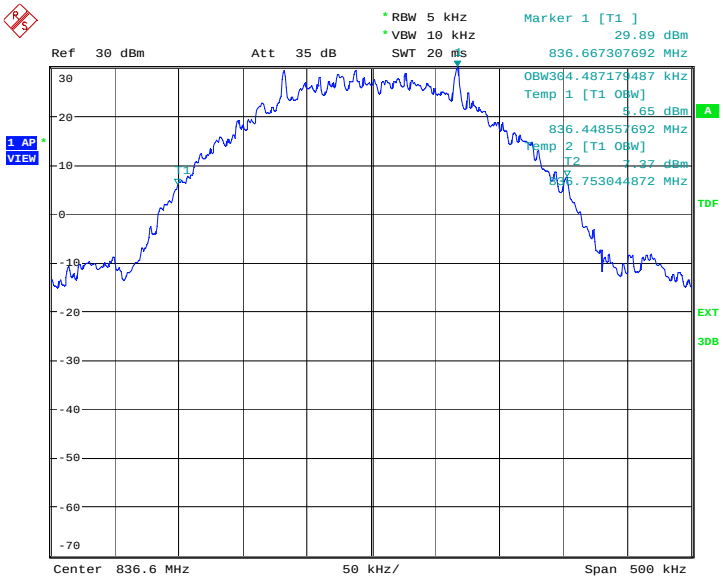
Expanded measurement uncertainty for this test item is 1.1 kHz, k=2

GSM 850

Channel 128-Occupied Bandwidth (-26dBc BW)

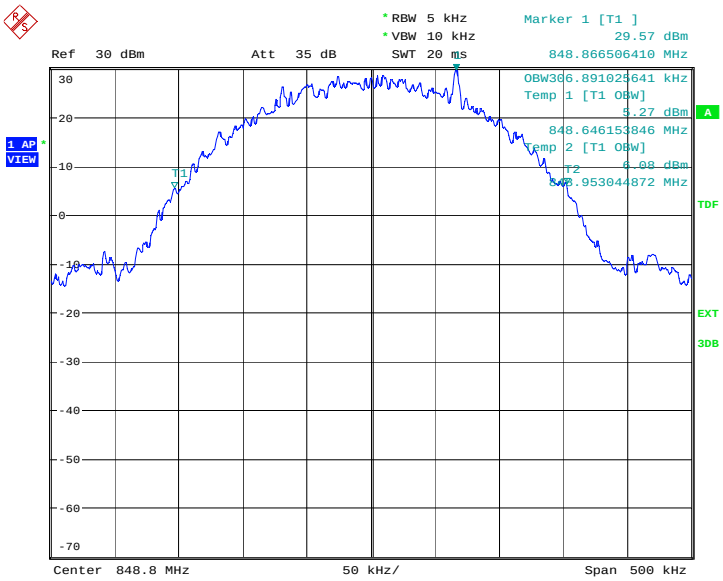


Channel 190-Occupied Bandwidth (-26dBc BW)



Date: 25.MAY.2012 08:50:04

Channel 251-Occupied Bandwidth (-26dBc BW)



Date: 25.MAY.2012 08:50:37

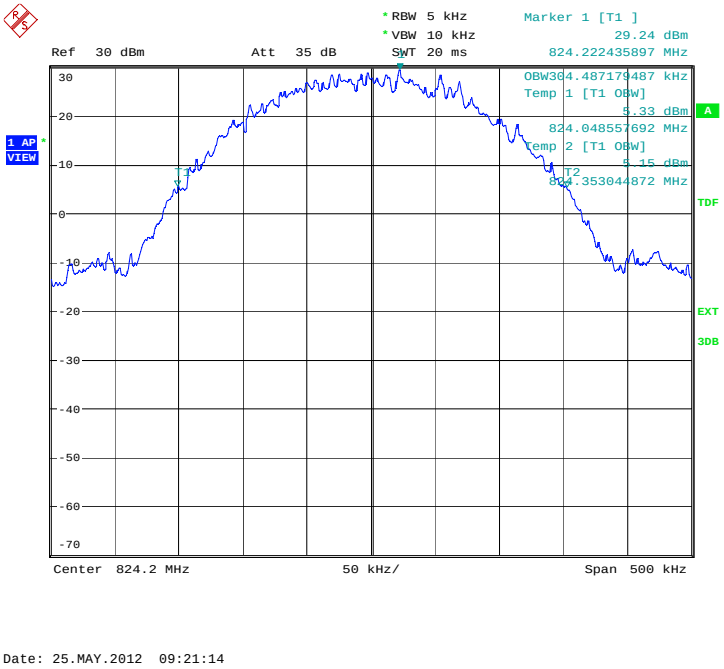
GPRS 850(-26dBc)

Frequency(MHz)	Occupied Bandwidth (–26dBc BW)(kHz)
824.2	304.487
836.6	303.686
848.8	303.686

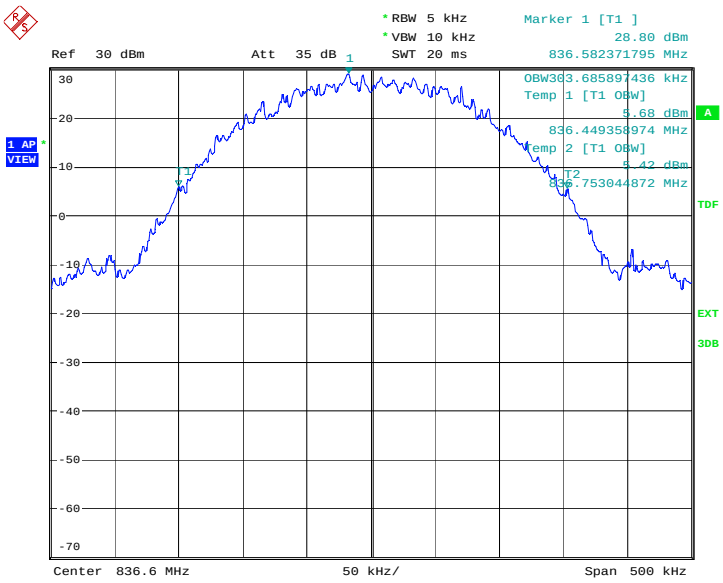
Expanded measurement uncertainty for this test item is 1.1 kHz, k=2

GPRS 850

Channel 128-Occupied Bandwidth (-26dBc BW)

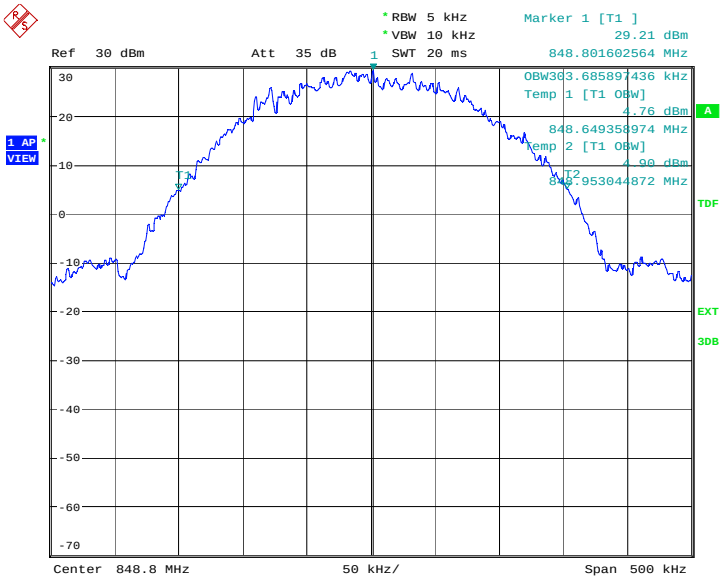


Channel 190-Occupied Bandwidth (-26dBc BW)



Date: 25.MAY.2012 09:21:46

Channel 251-Occupied Bandwidth (-26dBc BW)



Date: 25.MAY.2012 09:22:18

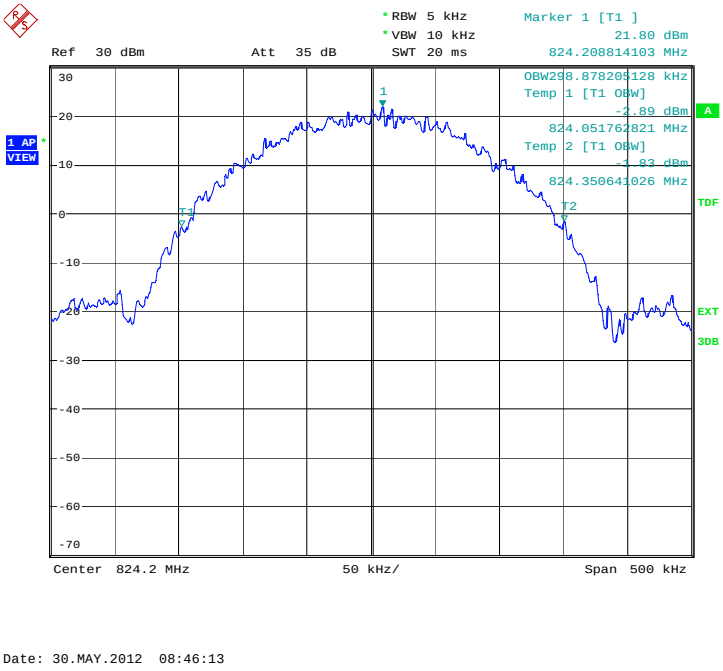
EGPRS 850(-26dBc)

Frequency(MHz)	Occupied Bandwidth (–26dBc BW)(kHz)
824.2	298.878
836.6	299.679
848.8	301.282

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

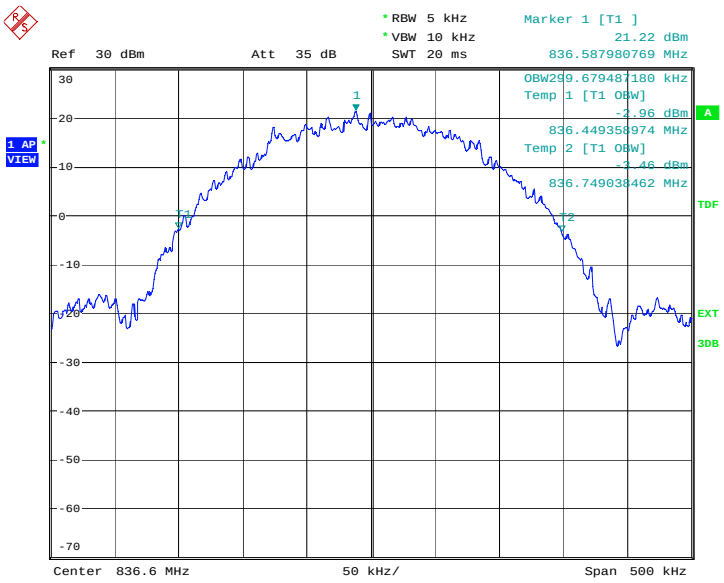
EGPRS 850

Channel 128-Occupied Bandwidth (-26dBc BW)



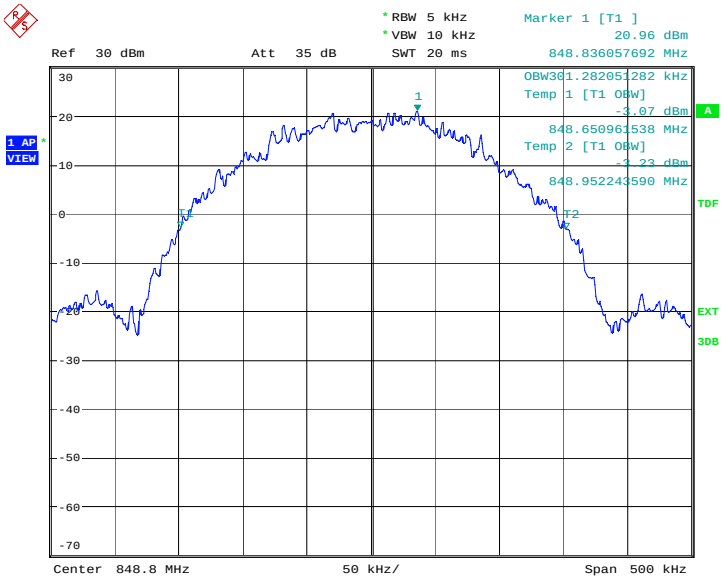
Date: 30.MAY.2012 08:46:13

Channel 190-Occupied Bandwidth (-26dBc BW)



Date: 30.MAY.2012 08:47:29

Channel 251-Occupied Bandwidth (-26dBc BW)



Date: 30.MAY.2012 08:50:24

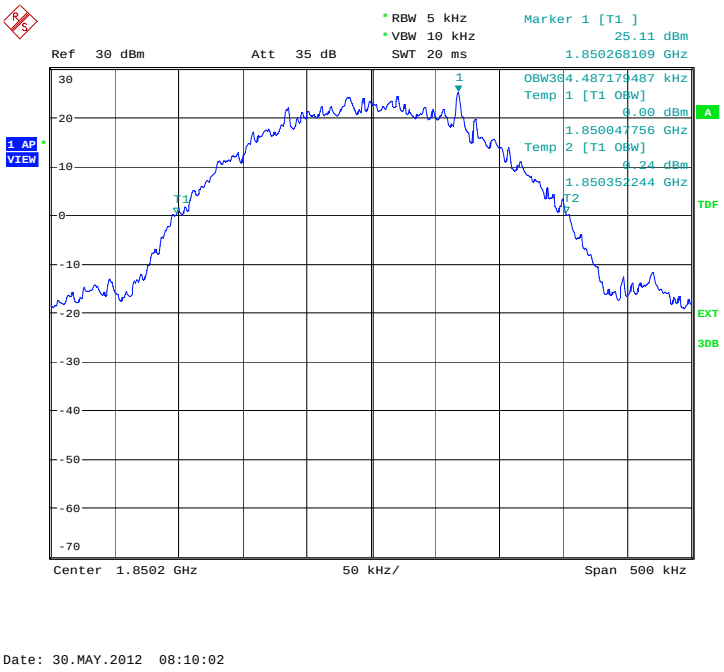
PCS 1900(-26dBc)

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

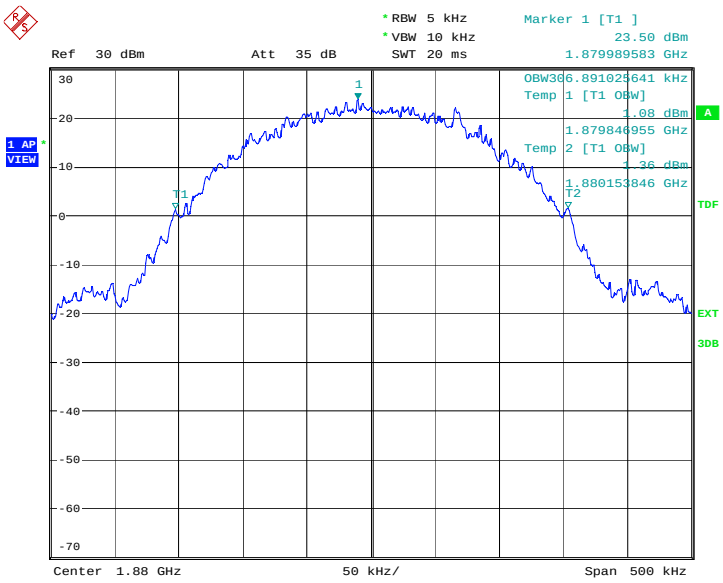
Expanded measurement uncertainty for this test item is 1.1 kHz, k=2

PCS 1900

Channel 512-Occupied Bandwidth (-26dBc BW)

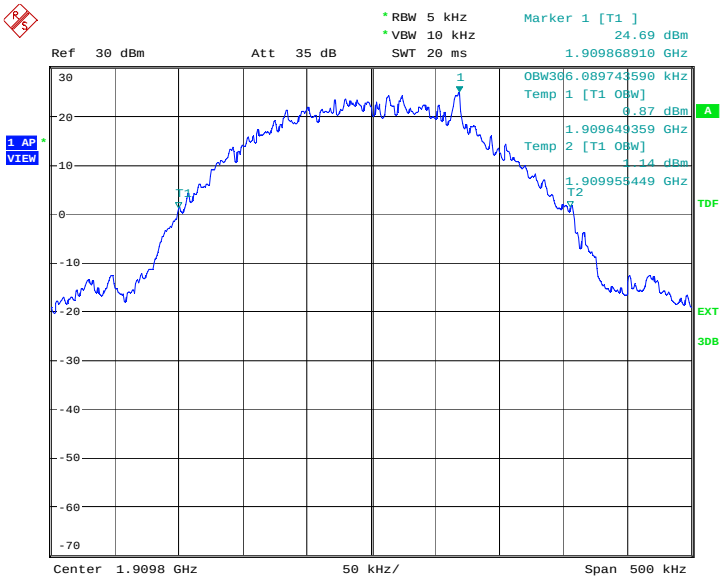


Channel 661-Occupied Bandwidth (-26dBc BW)



Date: 30.MAY.2012 08:10:34

Channel 810-Occupied Bandwidth (-26dBc BW)



Date: 30.MAY.2012 08:11:06

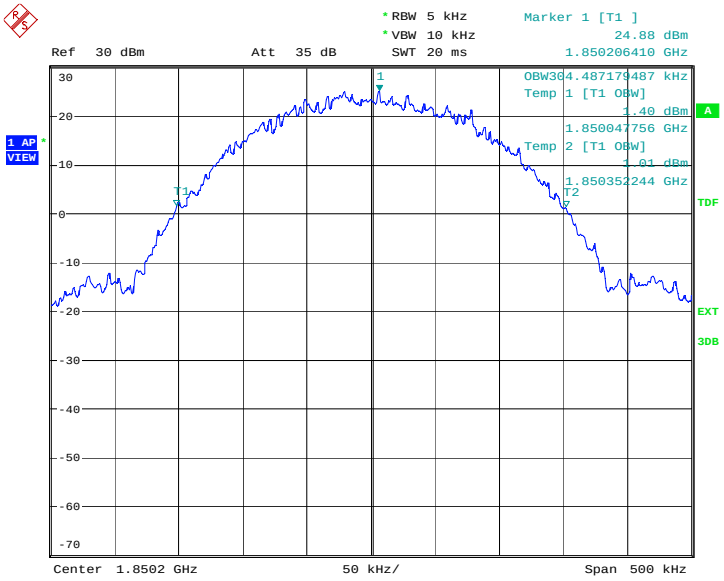
GPRS 1900(-26dBc)

Frequency(MHz)	Occupied Bandwidth (–26dBc BW)(kHz)
1850.2	304.487
1880.0	305.288
1909.8	306.090

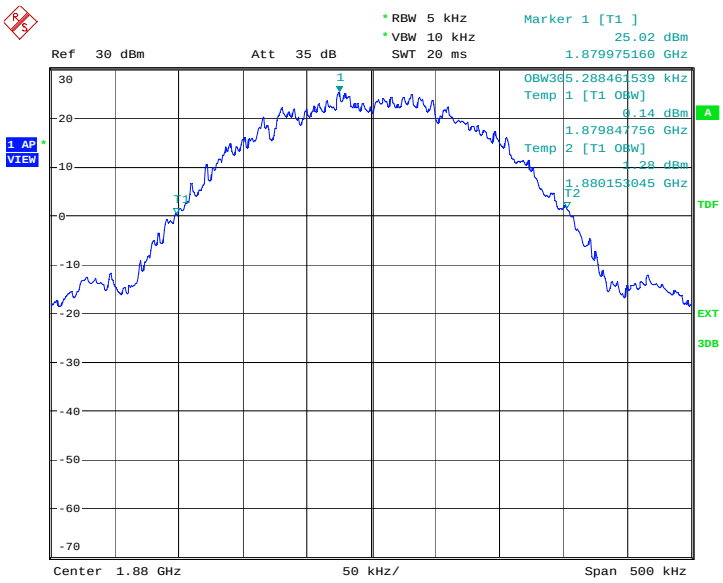
Expanded measurement uncertainty for this test item is 1.1 kHz, k=2

GPRS 1900

Channel 512-Occupied Bandwidth (-26dBc BW)

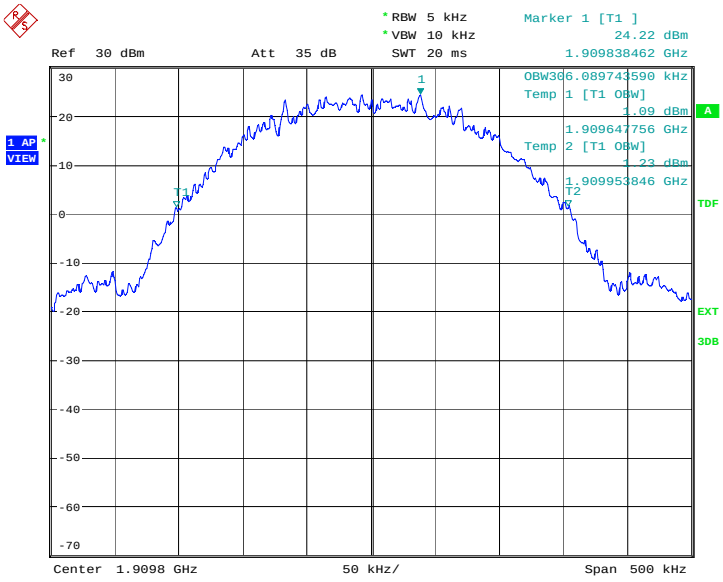


Channel 661-Occupied Bandwidth (-26dBc BW)



Date: 25.MAY.2012 09:26:53

Channel 810-Occupied Bandwidth (-26dBc BW)



Date: 25.MAY.2012 09:27:25

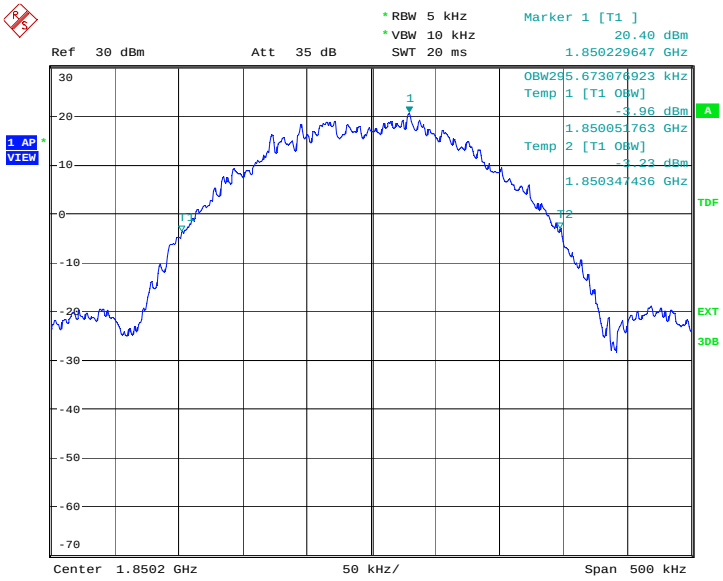
EGPRS 1900(-26dBc)

Frequency(MHz)	Occupied Bandwidth (–26dBc BW)(kHz)
1850.2	295.673
1880.0	296.474
1909.8	298.077

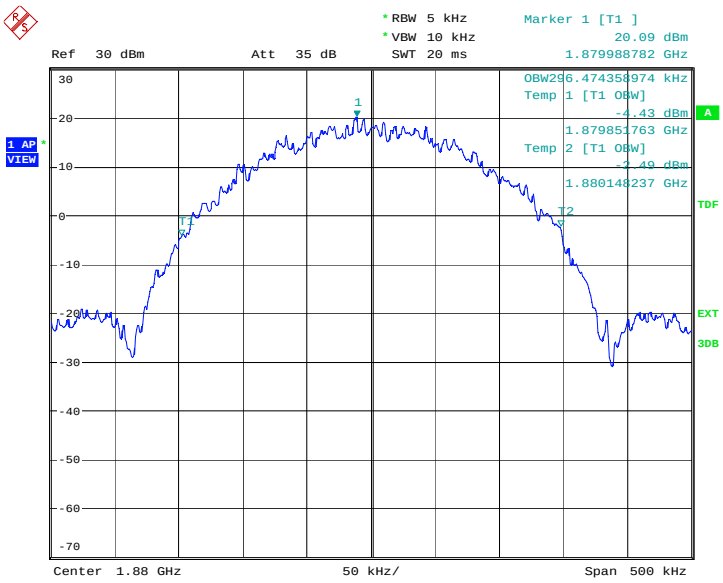
Expanded measurement uncertainty for this test item is 1.1 kHz, k=2

EGPRS 1900

Channel 512-Occupied Bandwidth (-26dBc BW)

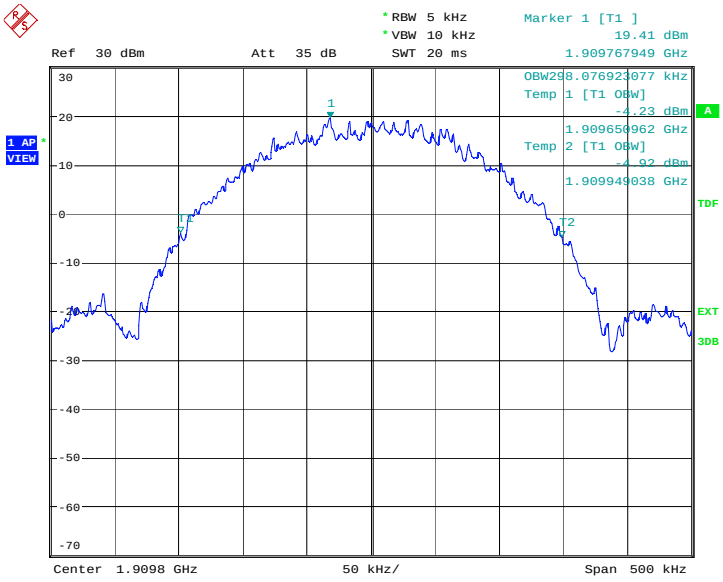


Channel 661-Occupied Bandwidth (-26dBc BW)



Date: 30.MAY.2012 09:08:08

Channel 810-Occupied Bandwidth (-26dBc BW)



Date: 30.MAY.2012 09:09:16

A.7 BAND EDGE COMPLIANCE

Reference

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

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

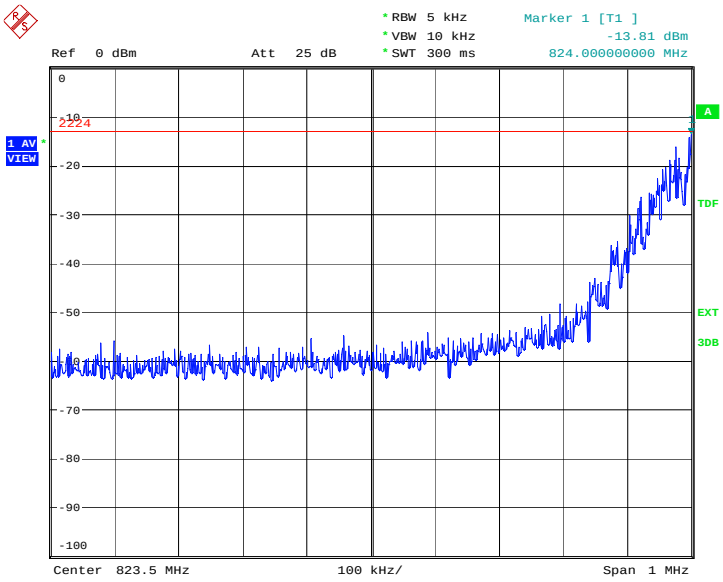
A.7.1 Measurement limit

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

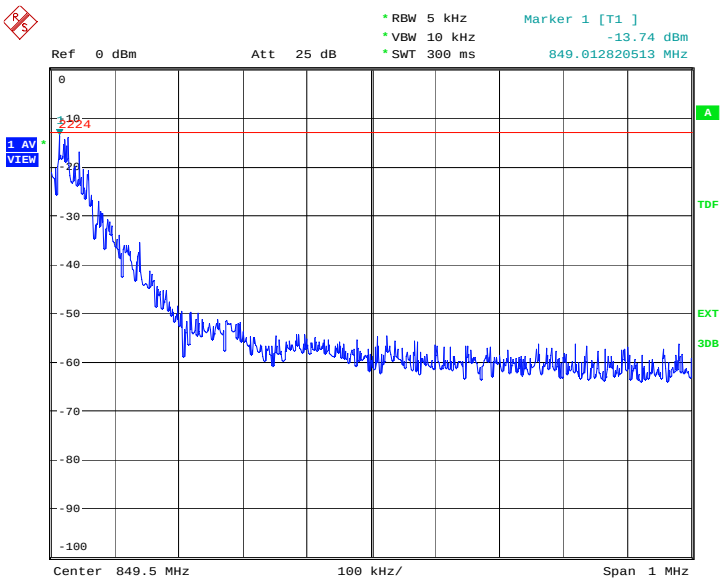
A.7.2 Measurement result

GSM 850

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

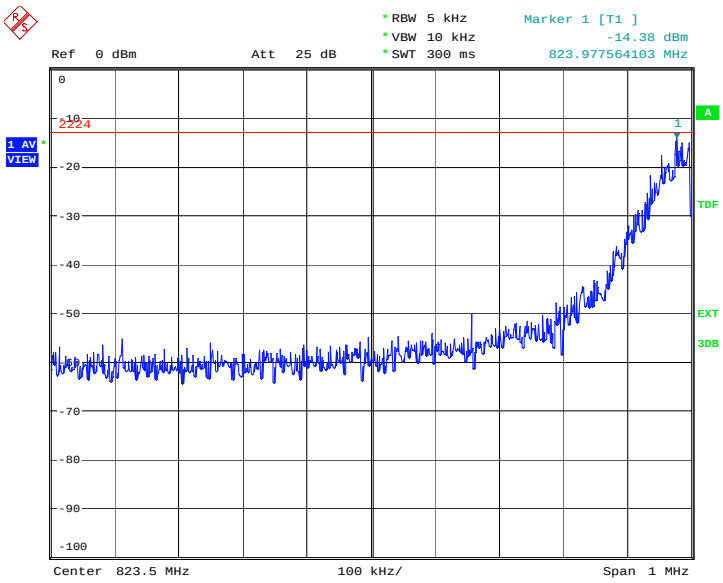


HIGH BAND EDGE BLOCK-C (GSM850) –Channel 251



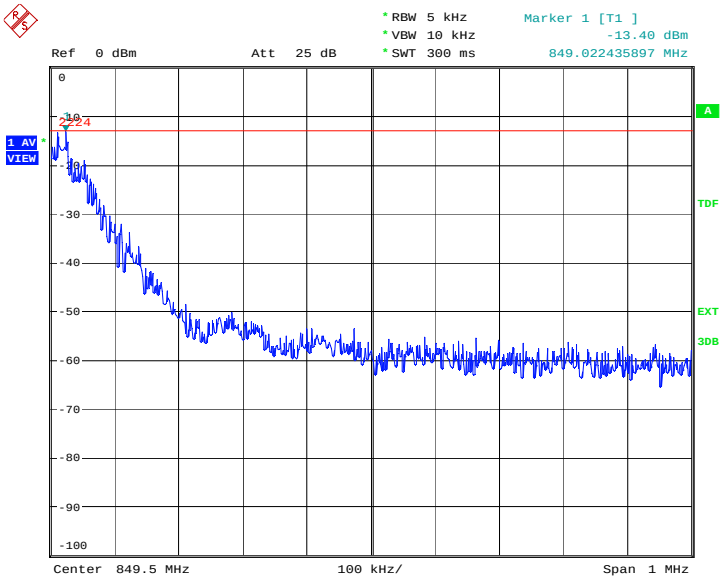
GPRS 850

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



Date: 25.MAY.2012 09:22:27

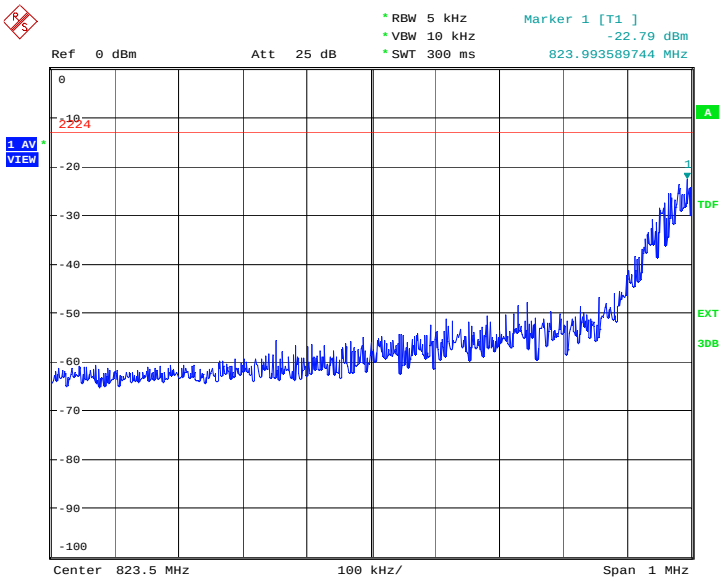
HIGH BAND EDGE BLOCK-C (GSM850) –Channel 251



Date: 25.MAY.2012 09:22:36

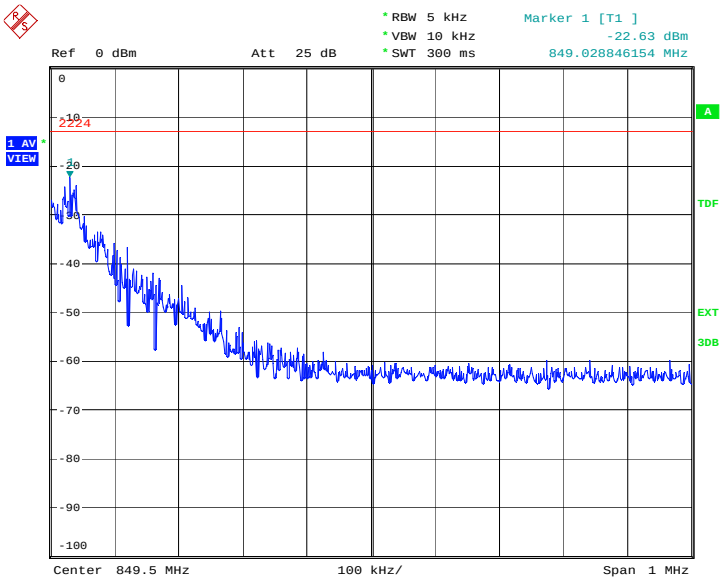
EGPRS 850

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



Date: 30.MAY.2012 08:51:07

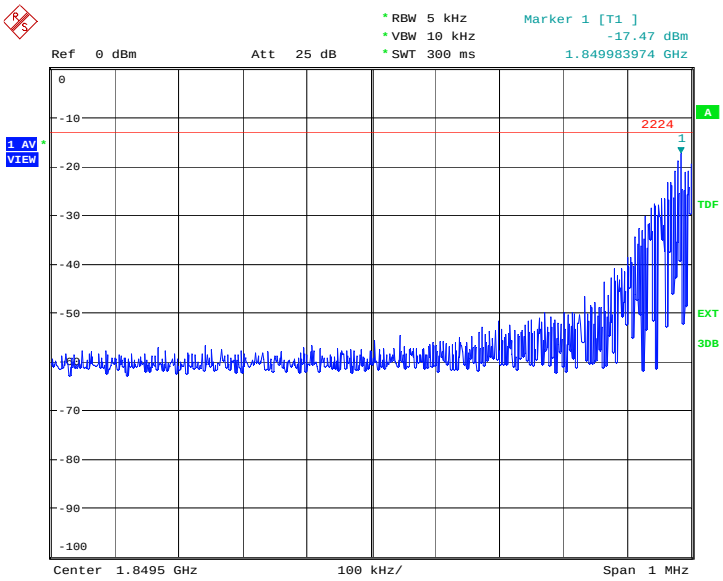
HIGH BAND EDGE BLOCK-C (GSM850) –Channel 251



Date: 30.MAY.2012 08:52:00

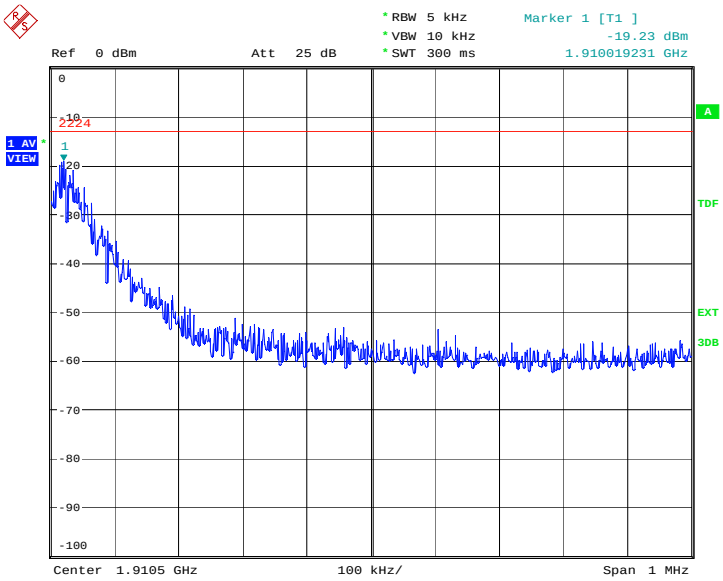
PCS 1900

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



Date: 30.MAY.2012 08:11:15

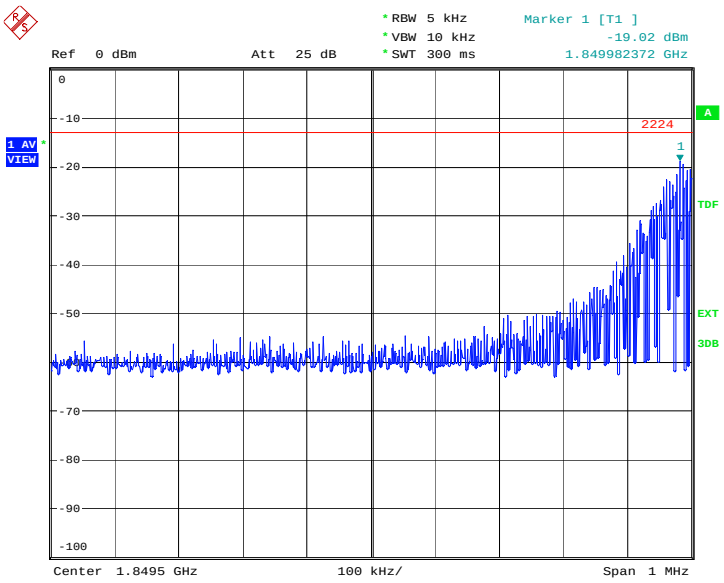
HIGH BAND EDGE BLOCK-C (PCS-1900) –Channel 810



Date: 30.MAY.2012 08:11:24

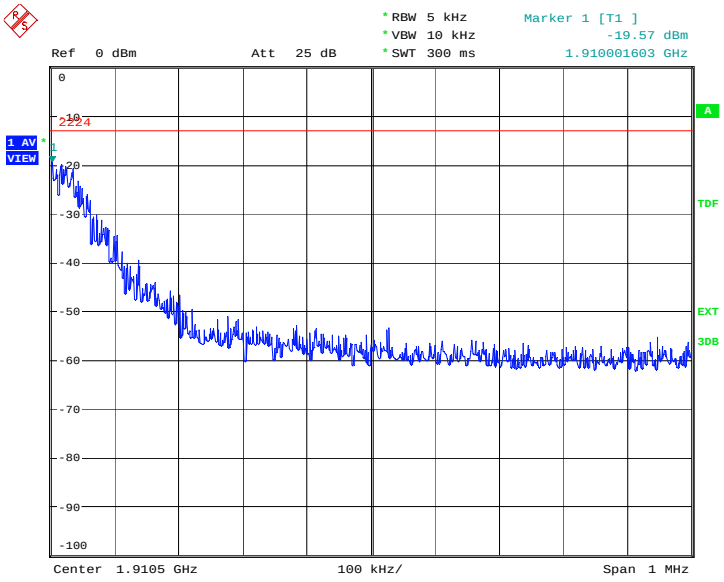
GPRS 1900

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



Date: 25.MAY.2012 09:27:34

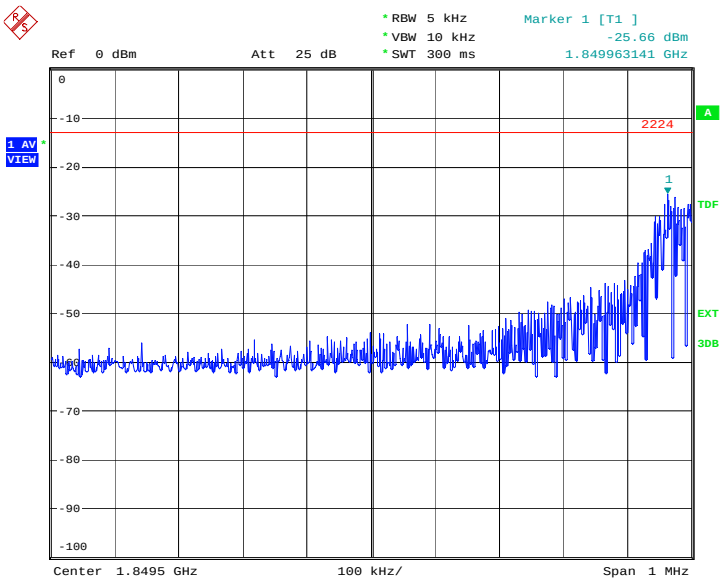
HIGH BAND EDGE BLOCK-C (PCS-1900) –Channel 810



Date: 25.MAY.2012 09:27:43

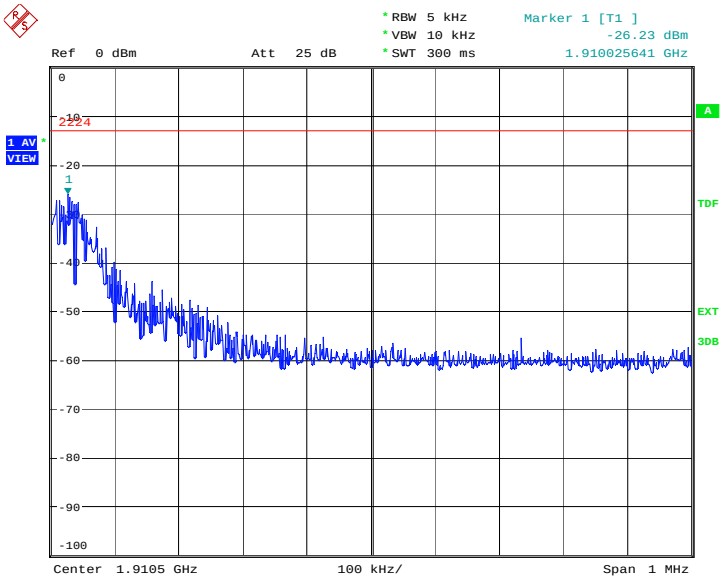
EGPRS 1900

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



Date: 30.MAY.2012 09:10:05

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



Date: 30.MAY.2012 09:10:58

A.8 CONDUCTED SPURIOUS EMISSION

Reference

FCC: CFR Part 2.1057, 22.917, 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 are taken from 30 MHz to 20 GHz. For GSM850, data are taken from 30 MHz to 10 GHz.
2. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

GSM850 Transmitter

Channel	Frequency (MHz)
128	824.2
190	836.6
251	848.8

PCS1900 Transmitter

Channel	Frequency (MHz)
512	1850.2
661	1880.0
810	1909.8

A. 8.2 Measurement Limit

Part 24.238 and Part 22.917 specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

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

A. 8.3 Measurement result

Measurement Uncertainty: 0.3dB

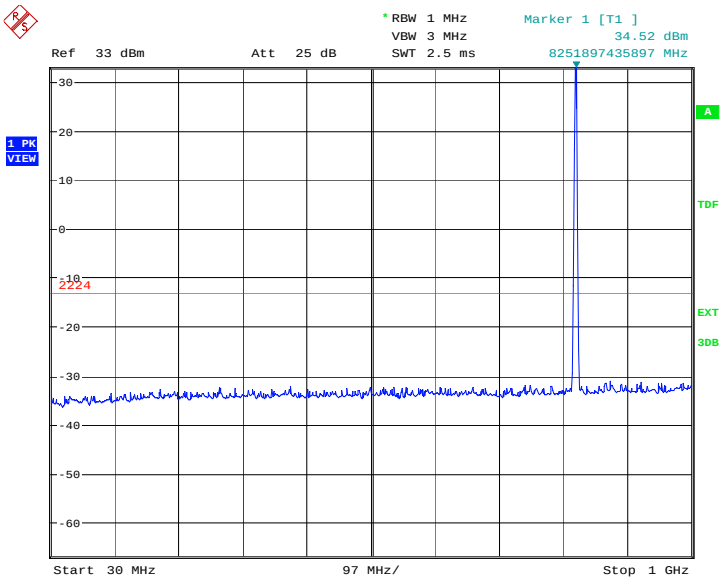
GSM850

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

A.8.3.1 Channel 128: 30MHz – 1GHz

Spurious emission limit –13dBm.

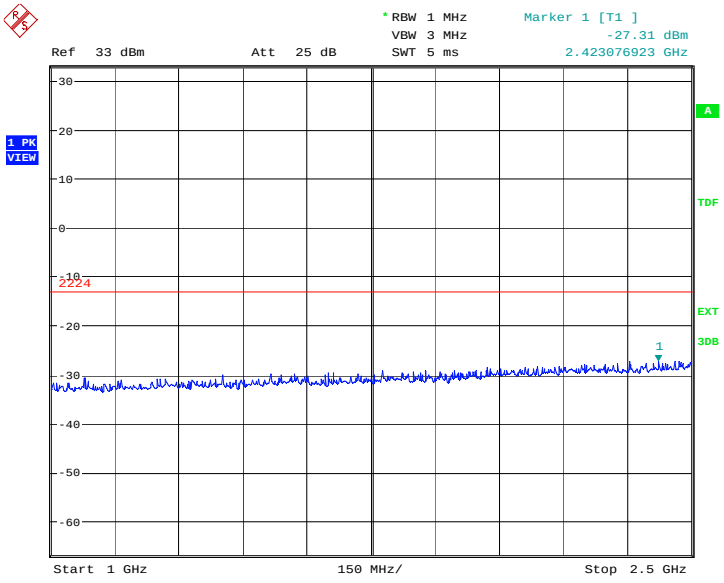
NOTE: peak above the limit line is the carrier frequency.



Date: 25.MAY.2012 08:51:23

A.8.3.2 Channel 128: 1GHz – 2.5GHz

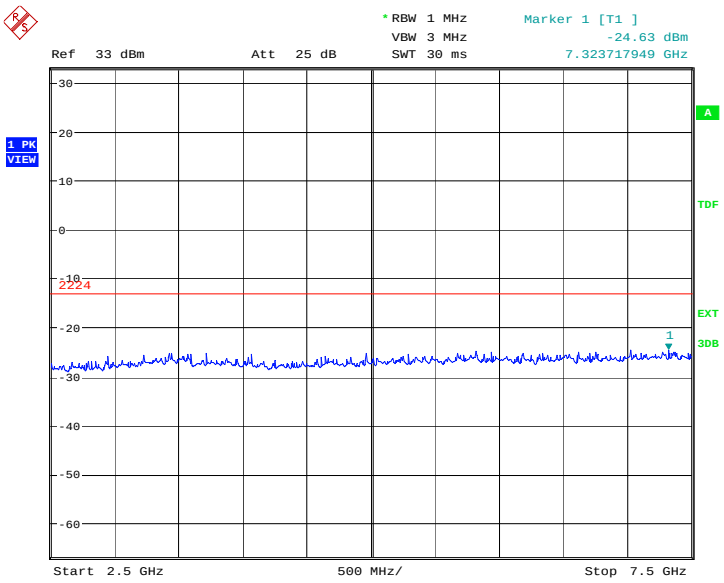
Spurious emission limit –13dBm.



Date: 25.MAY.2012 08:51:51

A.8.3.3 Channel 128: 2.5GHz – 7.5GHz

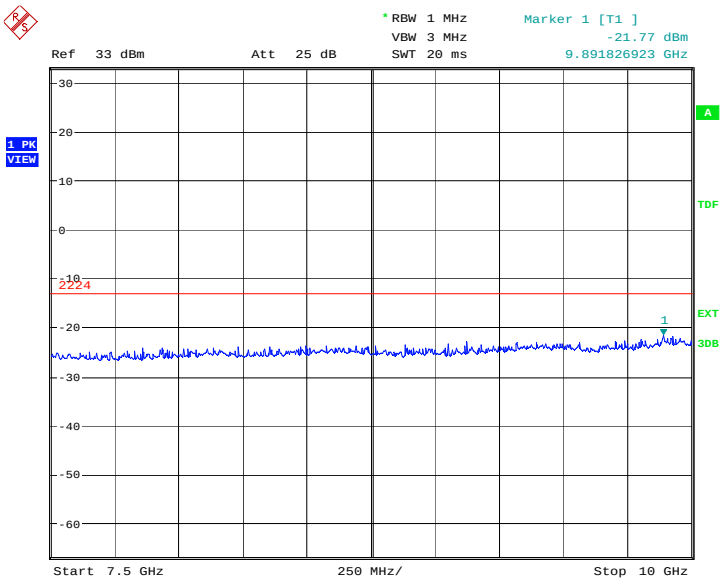
Spurious emission limit –13dBm.



Date: 25.MAY.2012 08:52:20

A.8.3.4 Channel 128: 7.5GHz –10GHz

Spurious emission limit –13dBm.

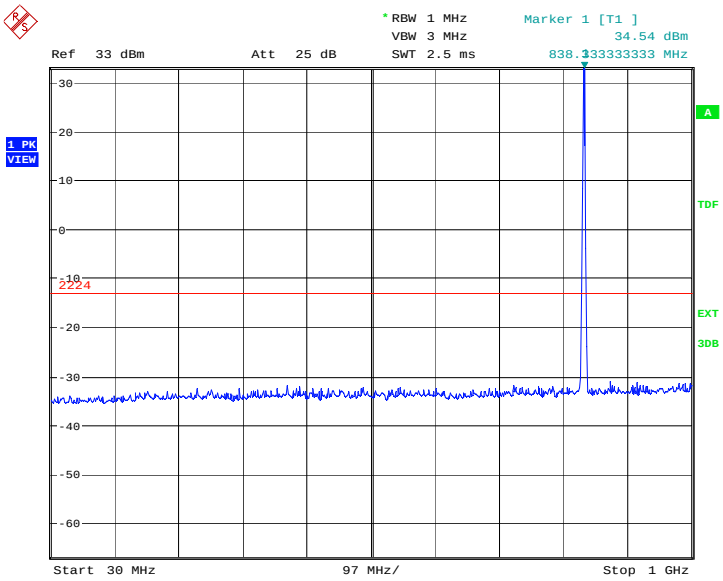


Date: 25.MAY.2012 08:52:48

A.8.3.5 Channel 190: 30MHz – 1GHz

Spurious emission limit –13dBm

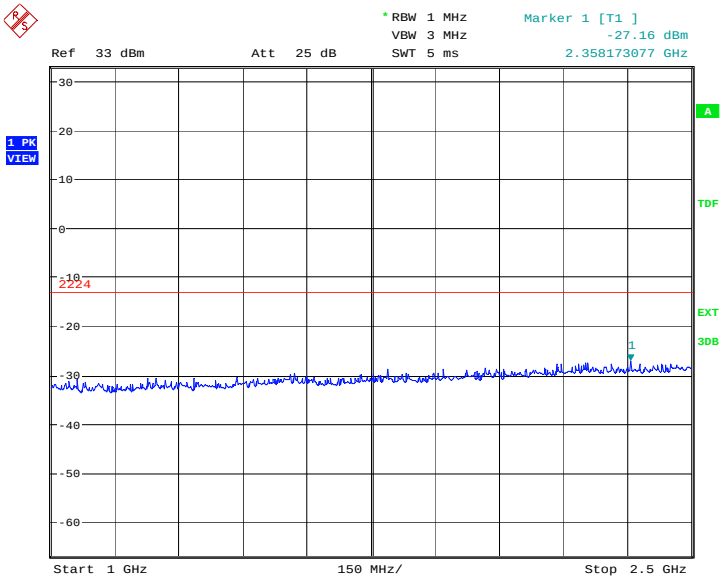
NOTE: peak above the limit line is the carrier frequency.



Date: 25.MAY.2012 08:53:16

A.8.3.6 Channel 190: 1GHz –2.5GHz

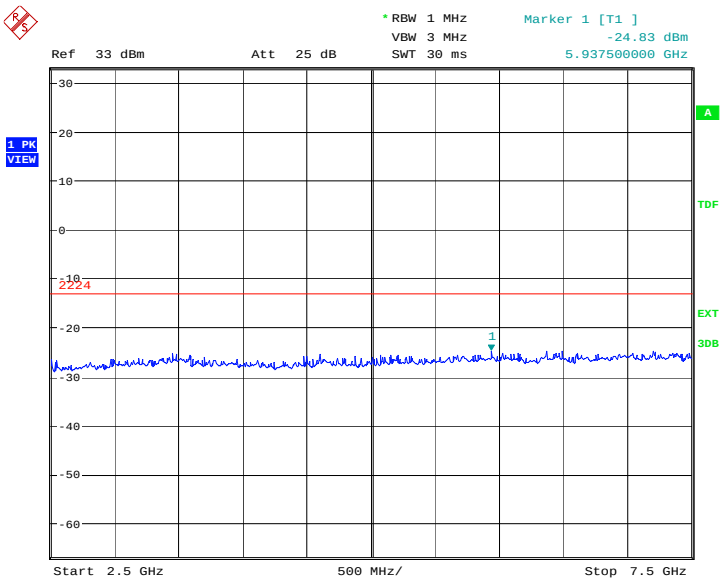
Spurious emission limit –13dBm



Date: 25.MAY.2012 08:53:45

A.8.3.7 Channel 190: 2.5GHz –7.5GHz

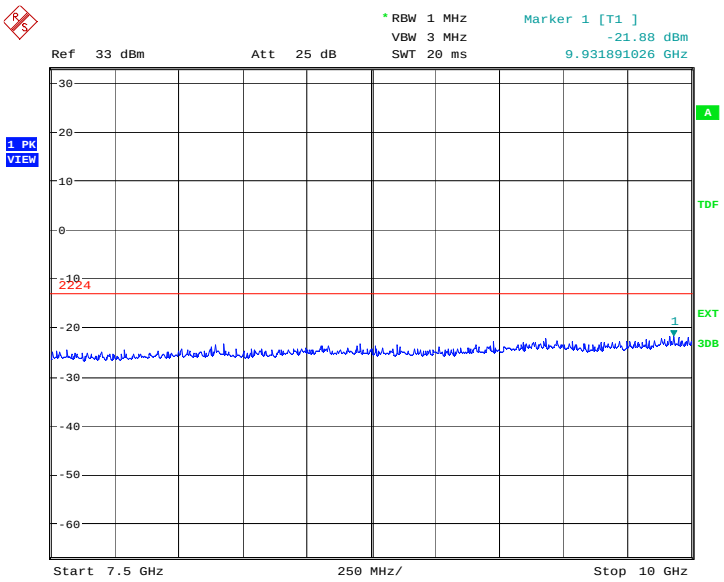
Spurious emission limit –13dBm



Date: 25.MAY.2012 08:54:13

A.8.3.8 Channel 190: 7.5GHz –10GHz

Spurious emission limit –13dBm

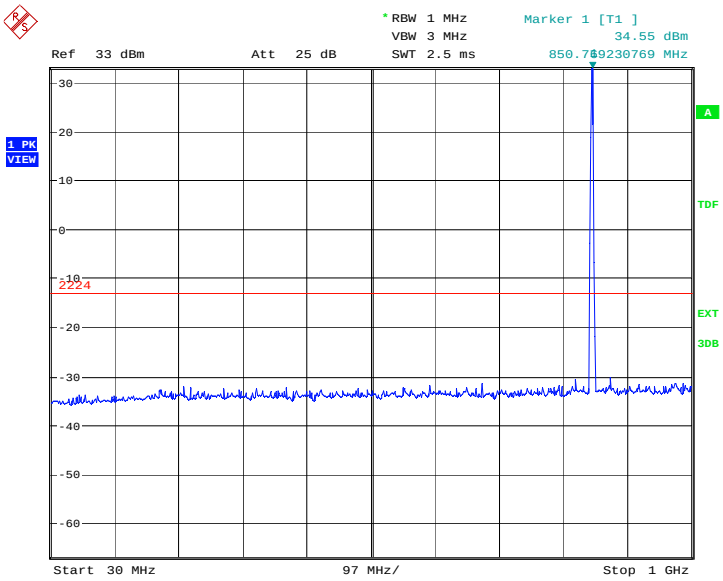


Date: 25.MAY.2012 08:54:41

A.8.3.9 Channel 251: 30MHz – 1GHz

Spurious emission limit –13dBm.

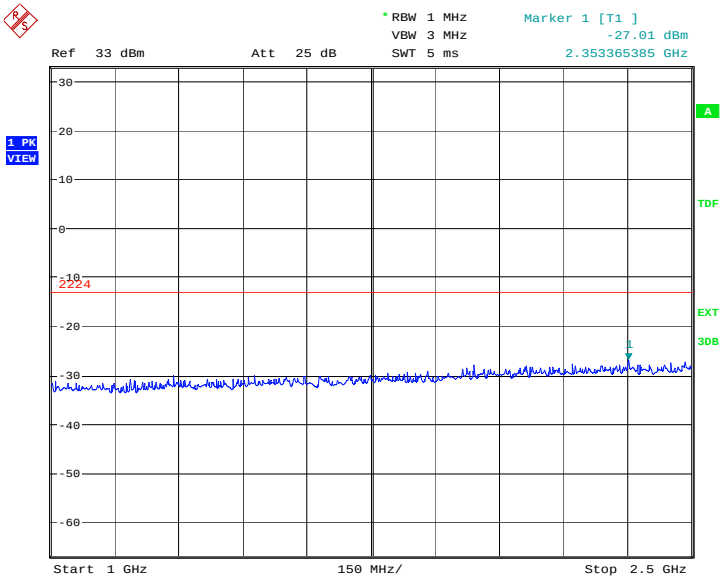
NOTE: peak above the limit line is the carrier frequency.



Date: 25.MAY.2012 08:55:10

A.8.3.10 Channel 251: 1GHz – 2.5GHz

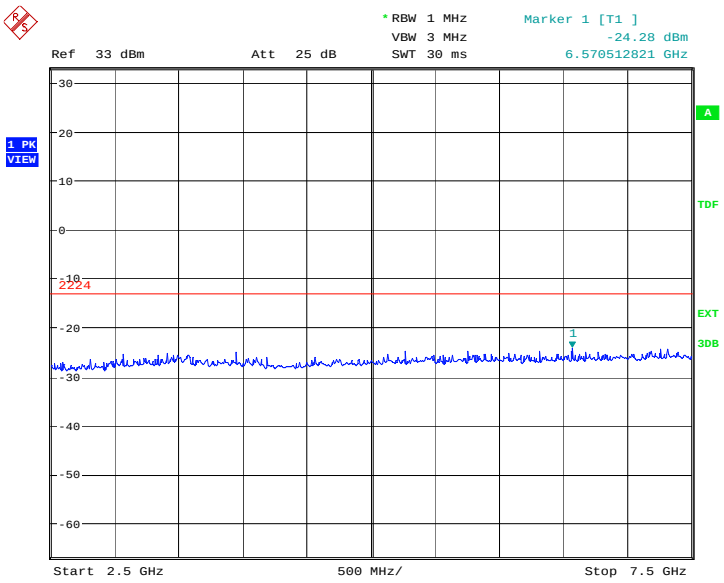
Spurious emission limit –13dBm.



Date: 25.MAY.2012 08:55:38

A.8.3.11 Channel 251:2.5GHz – 7.5GHz

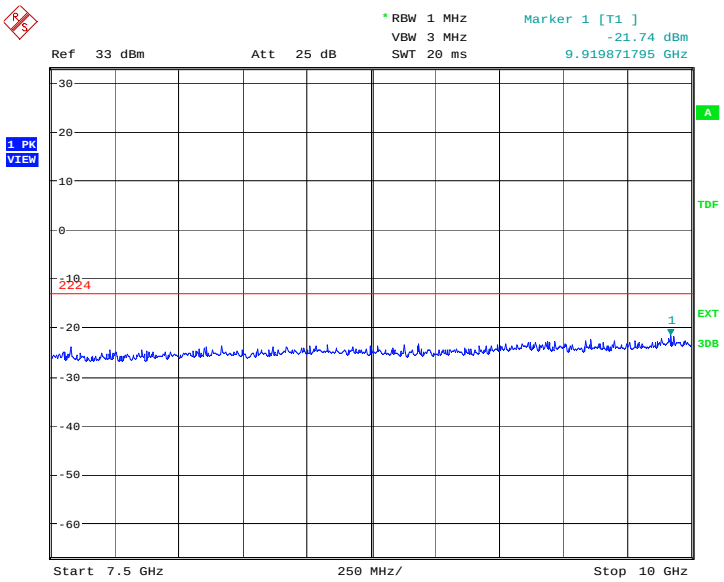
Spurious emission limit –13dBm.



Date: 25.MAY.2012 08:56:06

A.8.3.12 Channel 251: 7.5GHz – 10GHz

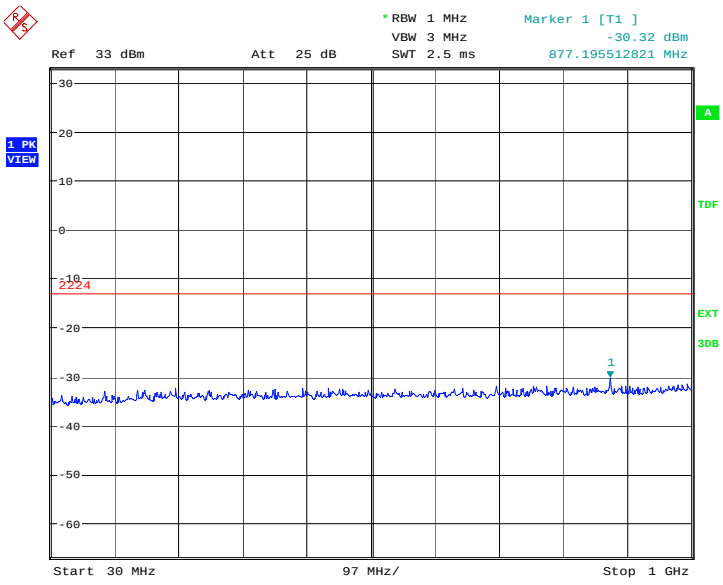
Spurious emission limit –13dBm.



Date: 25.MAY.2012 08:56:34

A.8.3.13 Idle mode: 30MHz – 1GHz

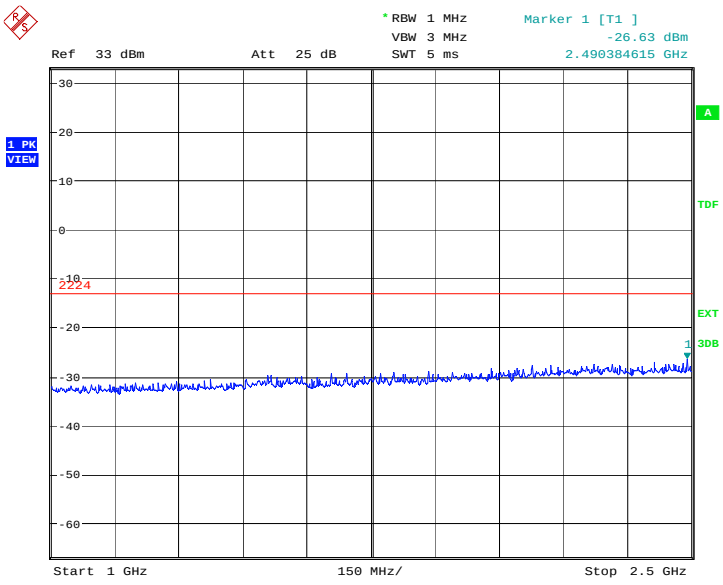
Spurious emission limit –13dBm.



Date: 25.MAY.2012 08:57:03

A.8.3.14 Idle mode: 1GHz – 2.5GHz

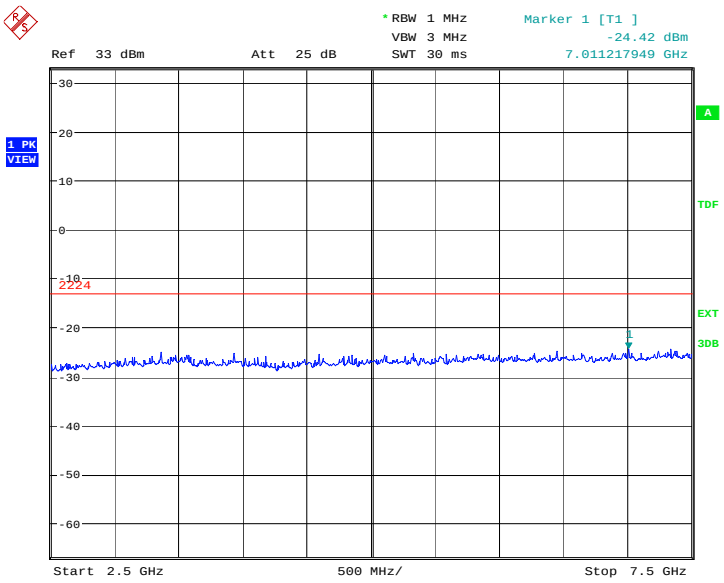
Spurious emission limit –13dBm.



Date: 25.MAY.2012 08:57:31

A.8.3.15 Idle mode: 2.5GHz – 7.5GHz

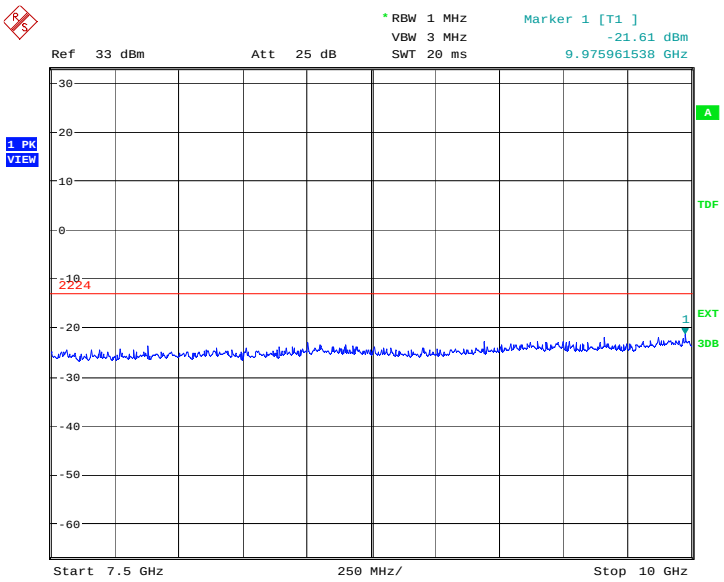
Spurious emission limit –13dBm.



Date: 25.MAY.2012 08:57:59

A.8.3.16 Idle mode: 7.5GHz – 10GHz

Spurious emission limit –13dBm.



Date: 25.MAY.2012 08:58:27

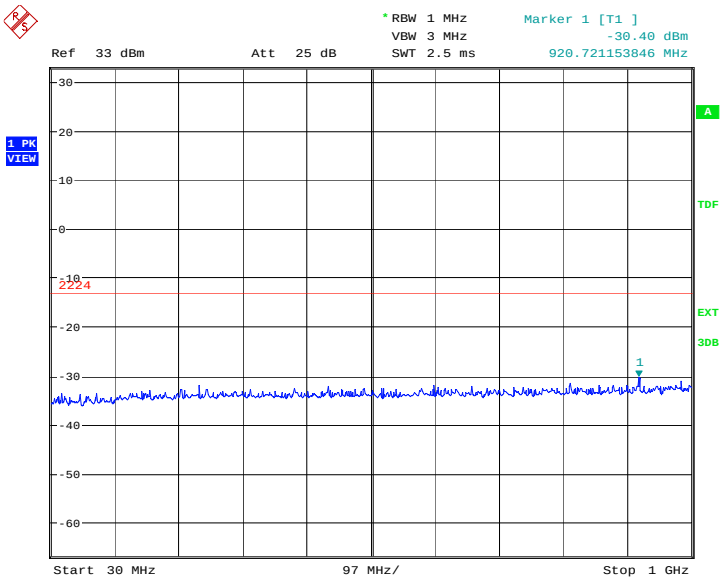
PCS1900

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.

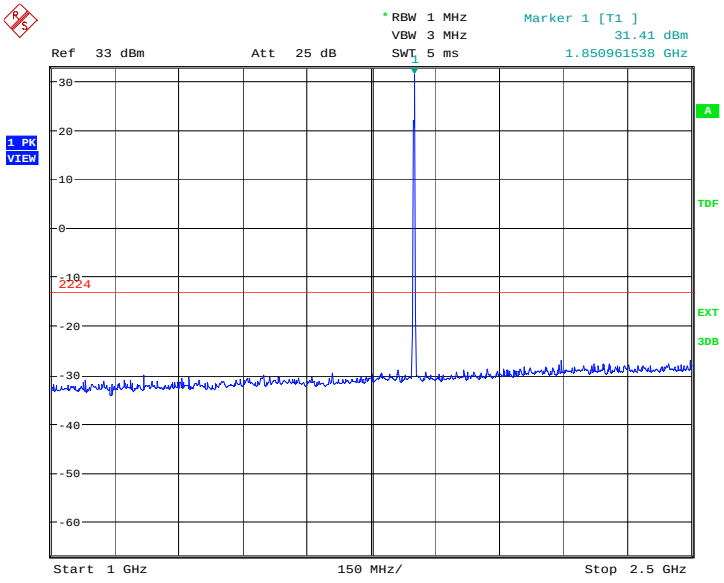


Date: 30.MAY.2012 08:11:53

A.8.3.18 Channel 512: 1GHz – 2.5GHz

Spurious emission limit –13dBm.

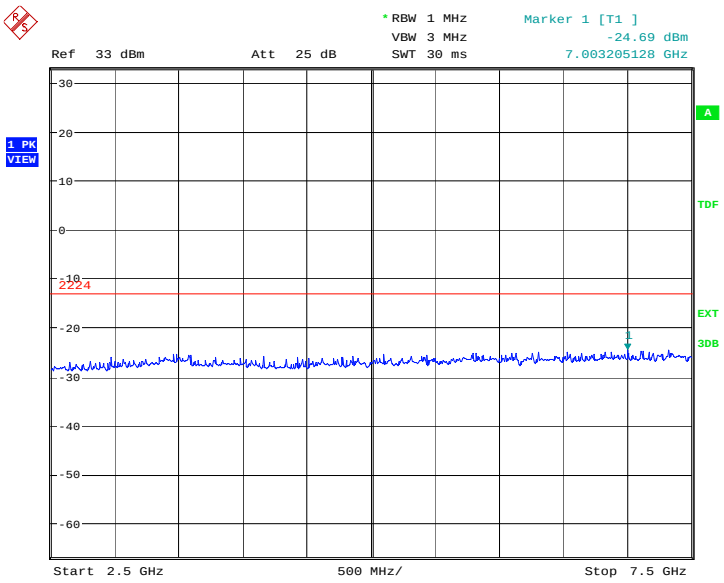
NOTE: peak above the limit line is the carrier frequency.



Date: 30.MAY.2012 08:12:21

A.8.3.19 Channel 512: 2.5GHz – 7.5GHz

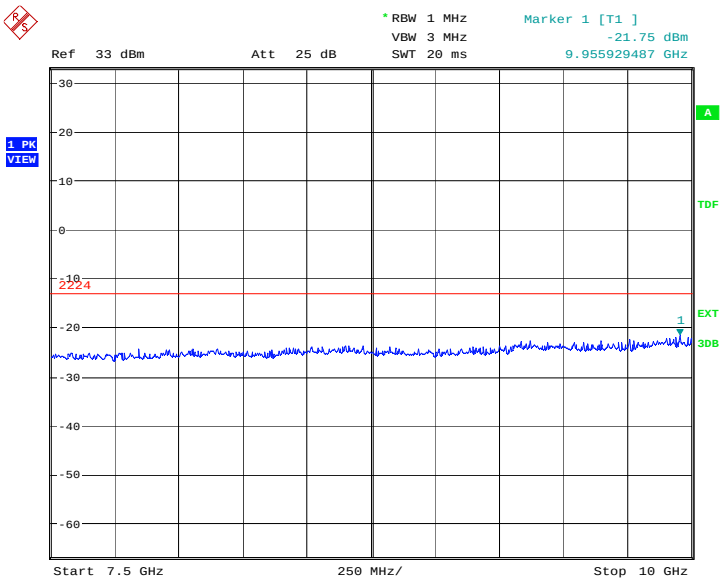
Spurious emission limit –13dBm.



Date: 30.MAY.2012 08:12:49

A.8.3.20 Channel 512: 7.5GHz –10GHz

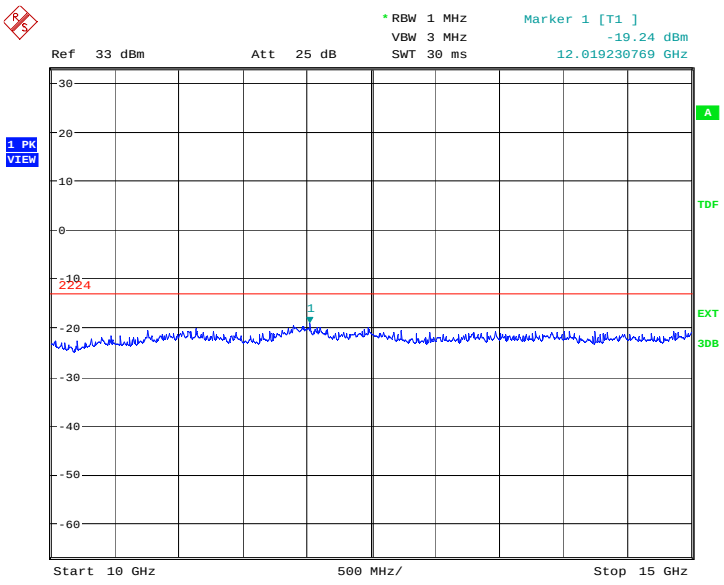
Spurious emission limit –13dBm.



Date: 30.MAY.2012 08:13:17

A.8.3.21 Channel 512: 10GHz –15GHz

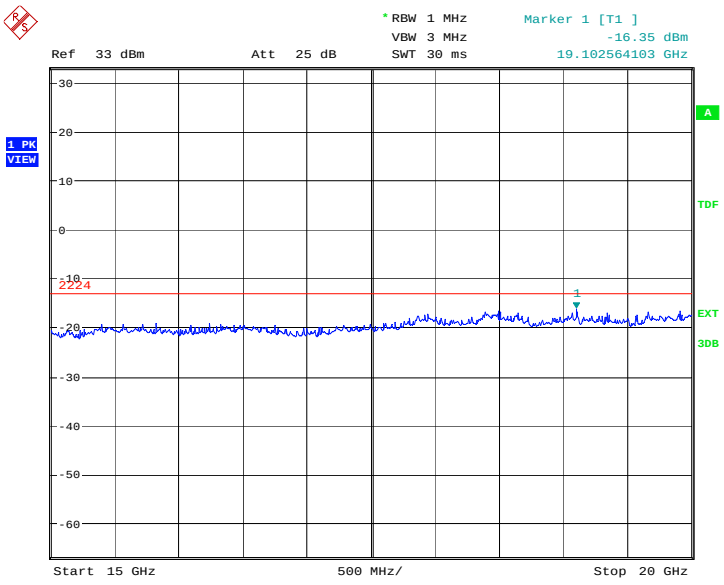
Spurious emission limit –13dBm.



Date: 30.MAY.2012 08:13:45

A.8.3.22 Channel 512: 15GHz –20GHz

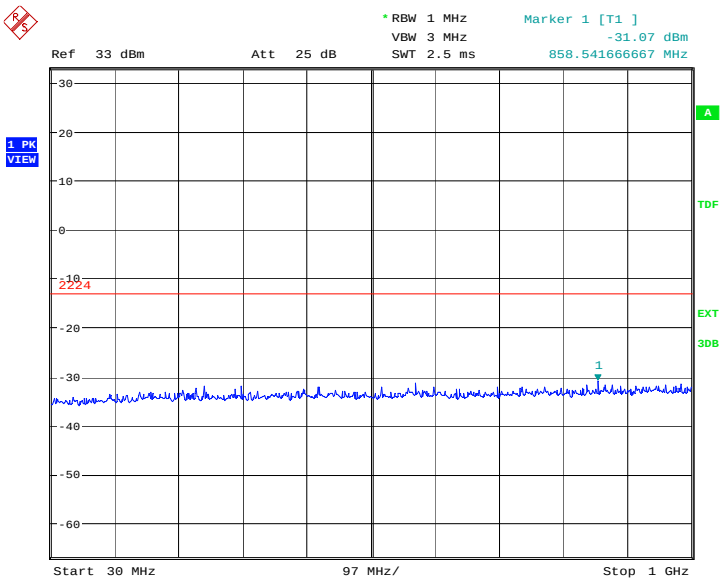
Spurious emission limit –13dBm.



Date: 30.MAY.2012 08:14:14

A.8.3.23 Channel 661: 30MHz – 1GHz

Spurious emission limit –13dBm

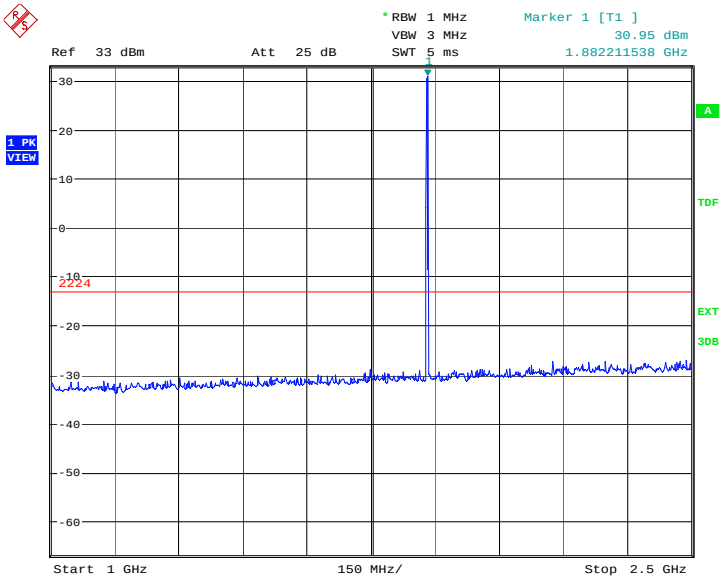


Date: 30.MAY.2012 08:14:42

A.8.3.24 Channel 661: 1GHz –2.5GHz

Spurious emission limit –13dBm

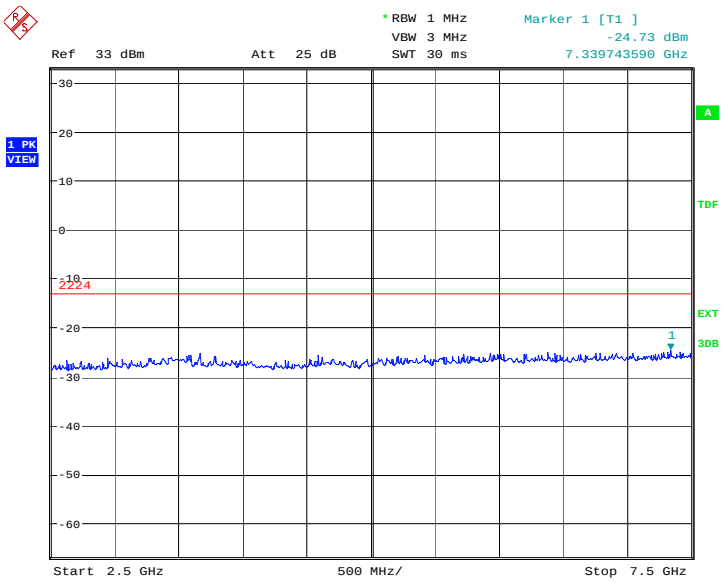
NOTE: peak above the limit line is the carrier frequency.



Date: 30.MAY.2012 08:15:11

A.8.3.25 Channel 661: 2.5GHz –7.5GHz

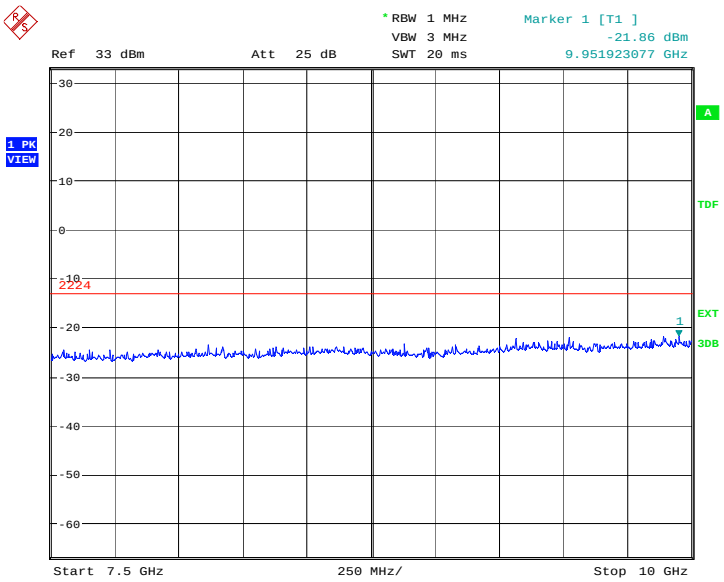
Spurious emission limit –13dBm



Date: 30.MAY.2012 08:15:39

A.8.3.26 Channel 661: 7.5GHz –10GHz

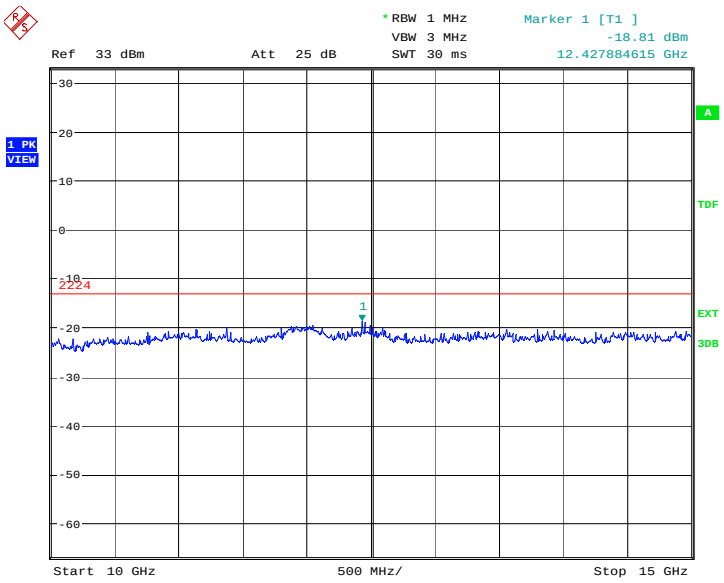
Spurious emission limit –13dBm



Date: 30.MAY.2012 08:16:07

A.8.3.27 Channel 661: 10GHz –15GHz

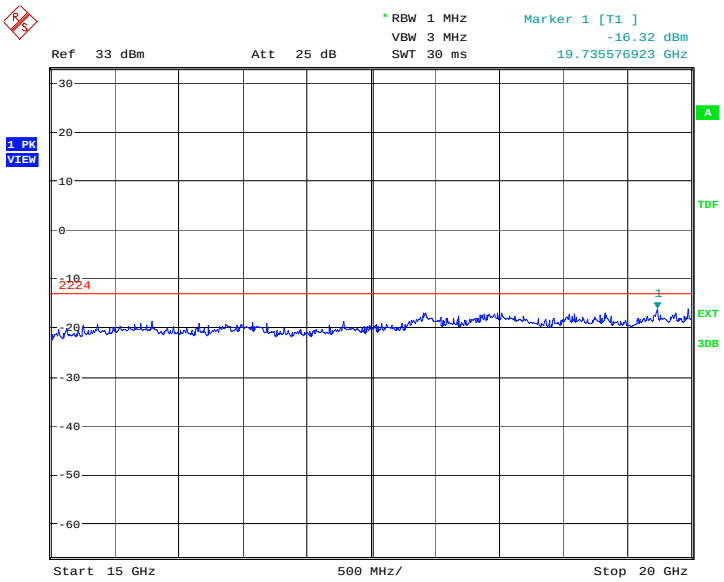
Spurious emission limit –13dBm.



Date: 30.MAY.2012 08:16:35

A.8.3.28 Channel 661: 15GHz –20GHz

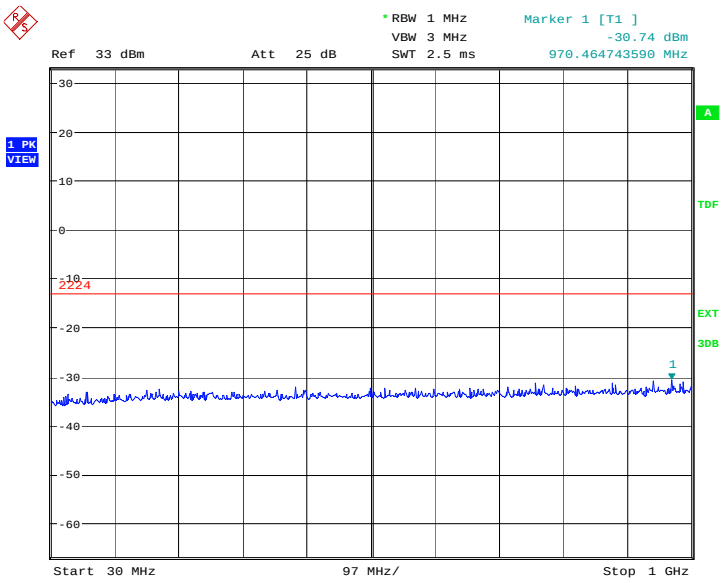
Spurious emission limit –13dBm.



Date: 30.MAY.2012 08:17:03

A.8.3.29 Channel 810: 30MHz – 1GHz

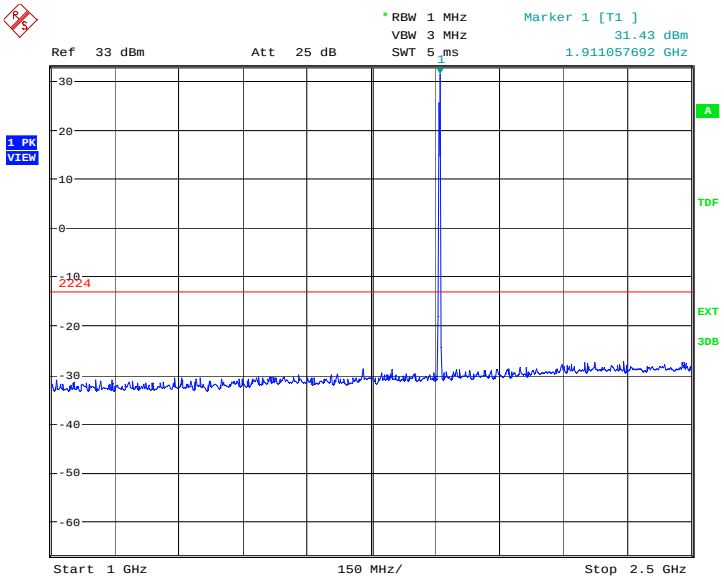
Spurious emission limit –13dBm.



A.8.3.30 Channel 810: 1GHz – 2.5GHz

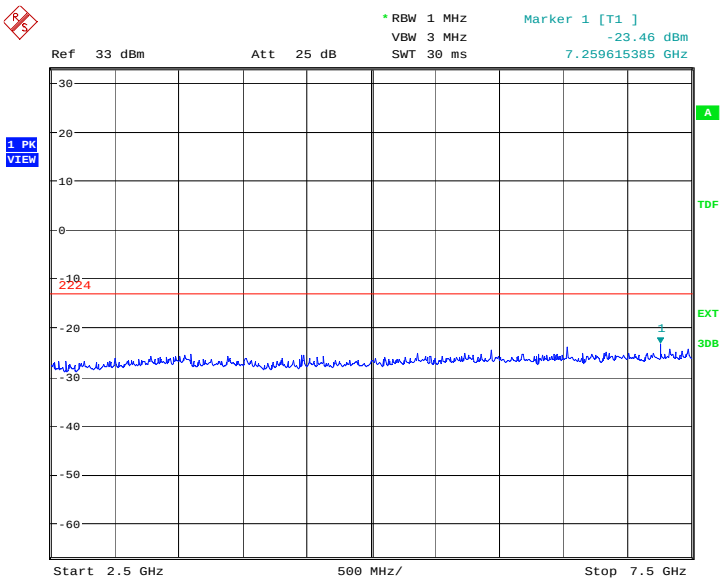
Spurious emission limit –13dBm.

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



A.8.3.31 Channel 810:2.5GHz – 7.5GHz

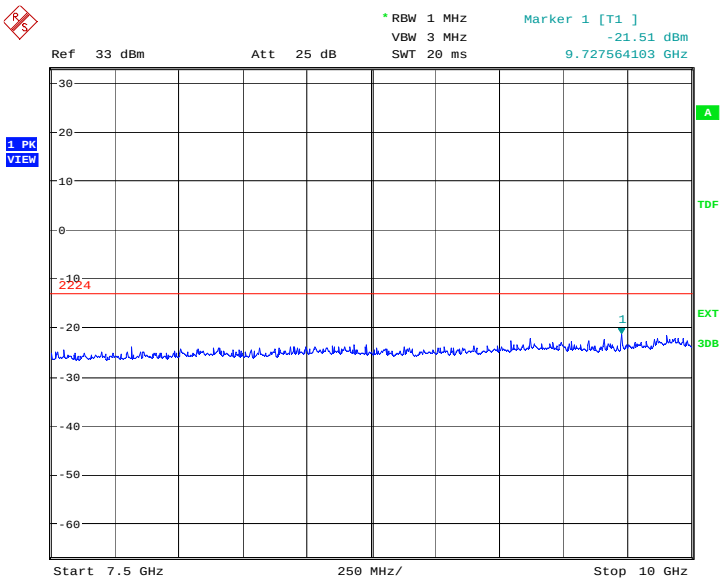
Spurious emission limit –13dBm.



Date: 30.MAY.2012 08:18:29

A.8.3.32 Channel 810: 7.5GHz – 10GHz

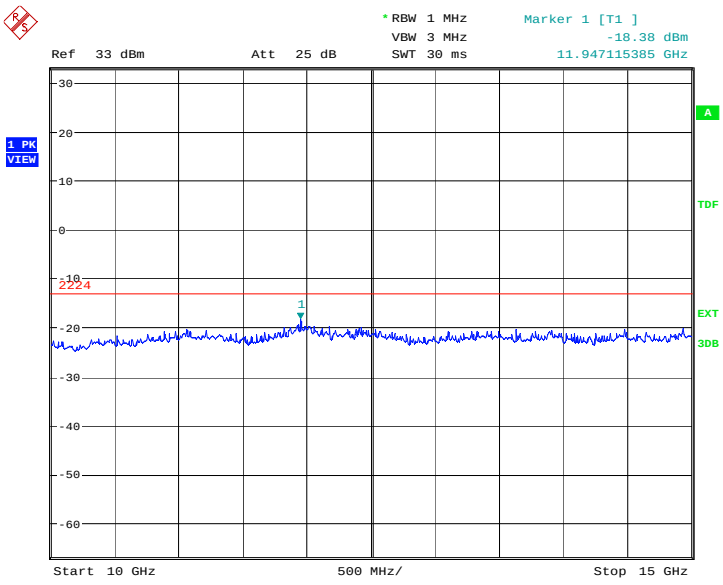
Spurious emission limit –13dBm.



Date: 30.MAY.2012 08:18:57

A.8.3.33 Channel 810: 10GHz –15GHz

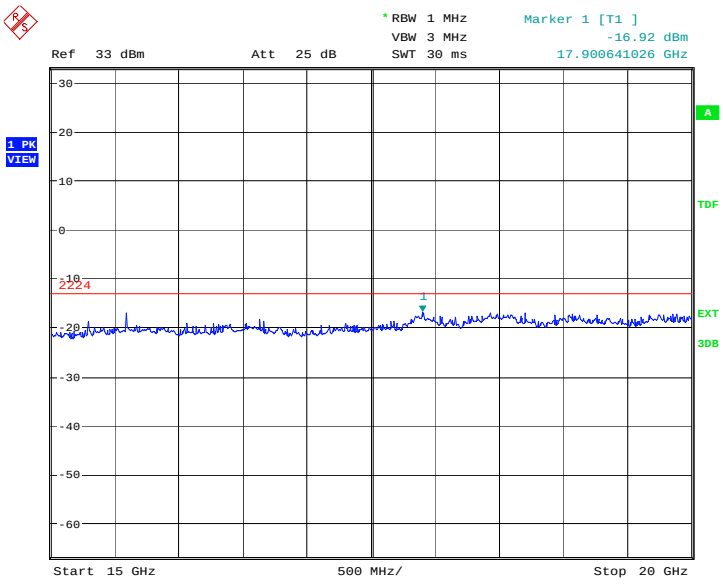
Spurious emission limit –13dBm.



Date: 30.MAY.2012 08:19:25

A.8.3.34 Channel 810: 15GHz –20GHz

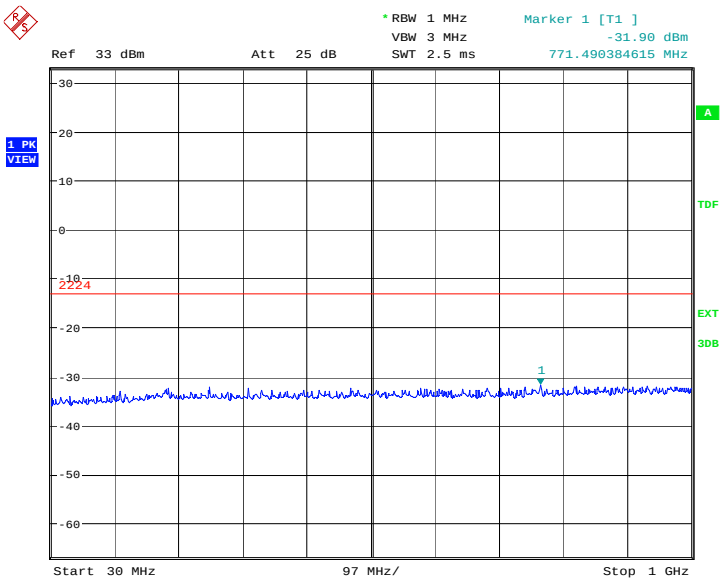
Spurious emission limit –13dBm.



Date: 30.MAY.2012 08:19:53

A.8.3.35 Idle mode: 30MHz – 1GHz

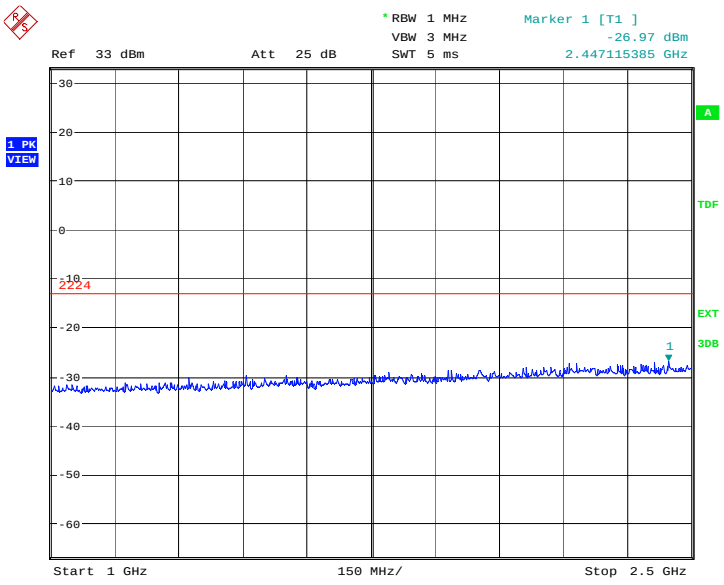
Spurious emission limit –13dBm.



Date: 30.MAY.2012 08:20:22

A.8.3.36 Idle mode: 1GHz – 2.5GHz

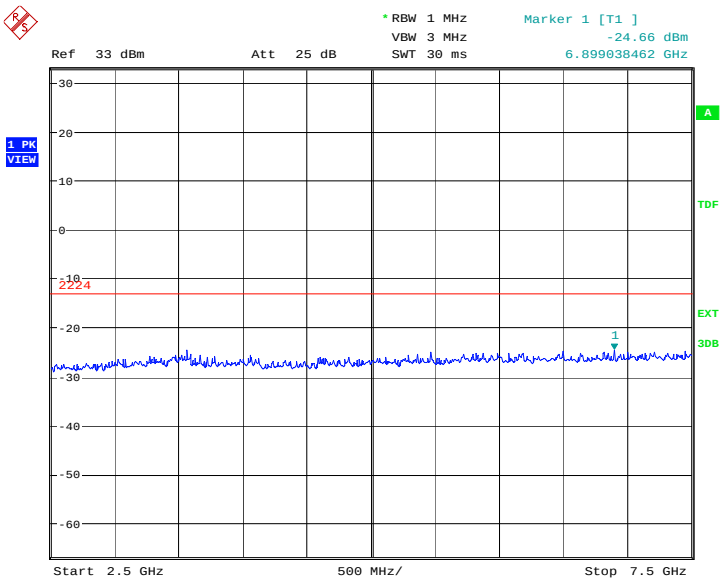
Spurious emission limit –13dBm.



Date: 30.MAY.2012 08:20:50

A.8.3.37 Idle mode: 2.5GHz – 7.5GHz

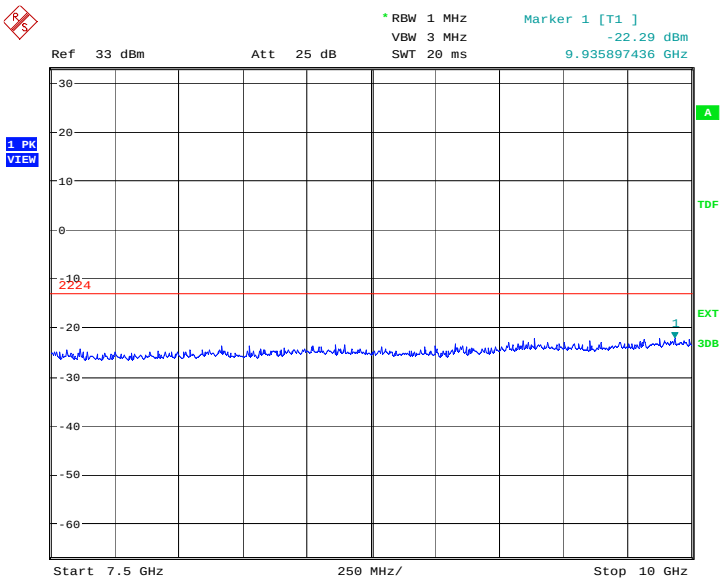
Spurious emission limit –13dBm.



Date: 30.MAY.2012 08:21:18

A.8.3.38 Idle mode: 7.5GHz – 10GHz

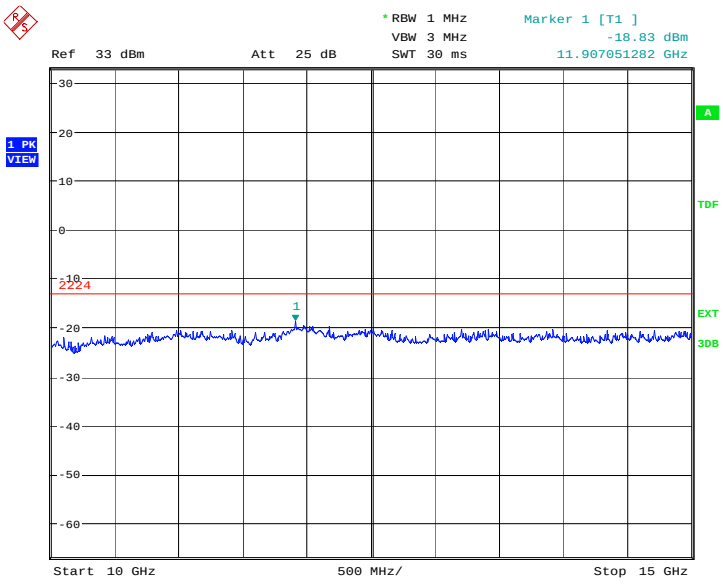
Spurious emission limit –13dBm.



Date: 30.MAY.2012 08:21:47

A.8.3.39 Idle mode: 10GHz –15GHz

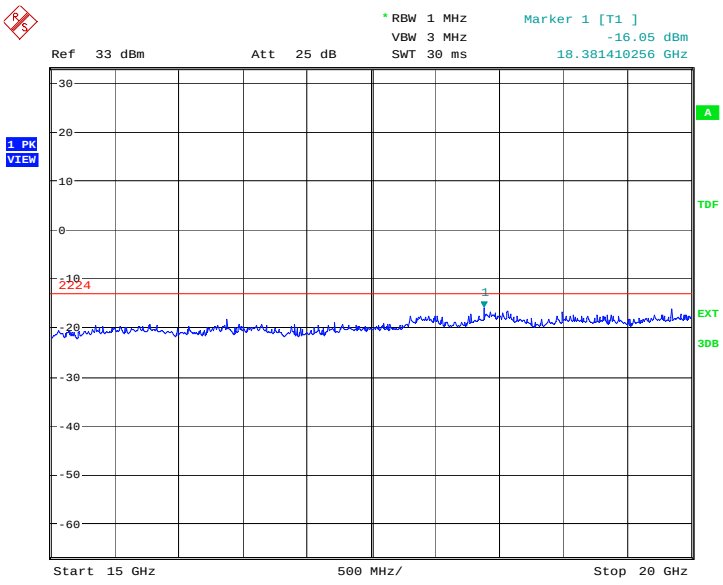
Spurious emission limit –13dBm.



Date: 30.MAY.2012 08:22:15

A.8.3.40 IDLE mode: 15GHz –20GHz

Spurious emission limit –13dBm.



Date: 30.MAY.2012 08:22:43

A.9 RECEIVER RADIATION EMISSION

Reference

FCC: CFR Part 2.1053, 15.109.

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

A.9.1 Method of Measurement

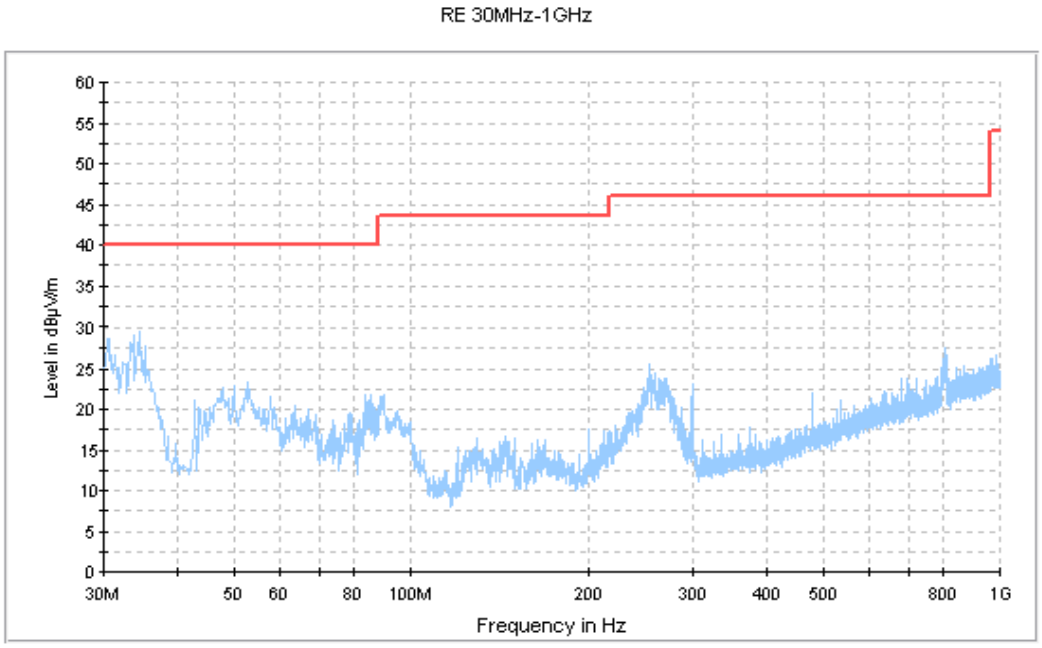
The measurement procedure in ANSI C63.4-2003 is used. The EUT is placed on an 80cm height non-conductive table locating on the center of turntable. From 30MHz-1GHz, the measurement distance is 3 m. For frequency range above 1GHz, the measurement distance is 3 m.

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 (dBμV/m)	Measurement Distance (m)
30-88	40	3
88-216	43.5	3
216-960	46	3
960-1000	54	3
>1000	54	3

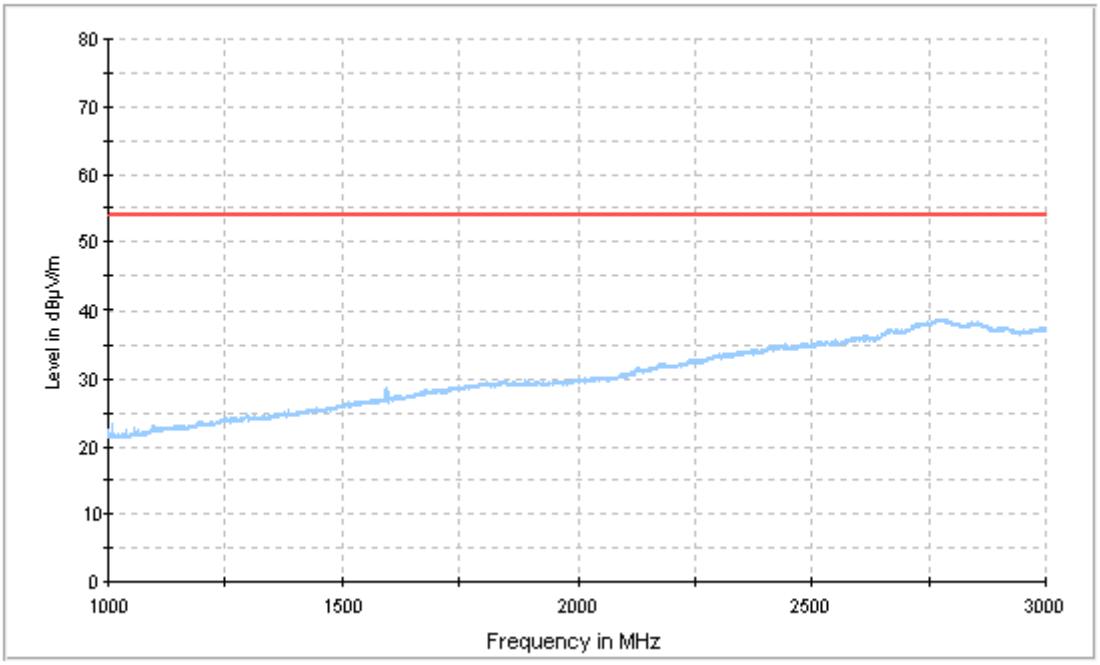
A. 9.3 Measurement results



IF bandwidth: 120 kHz

Idle Mode: 30MHz-1GHz

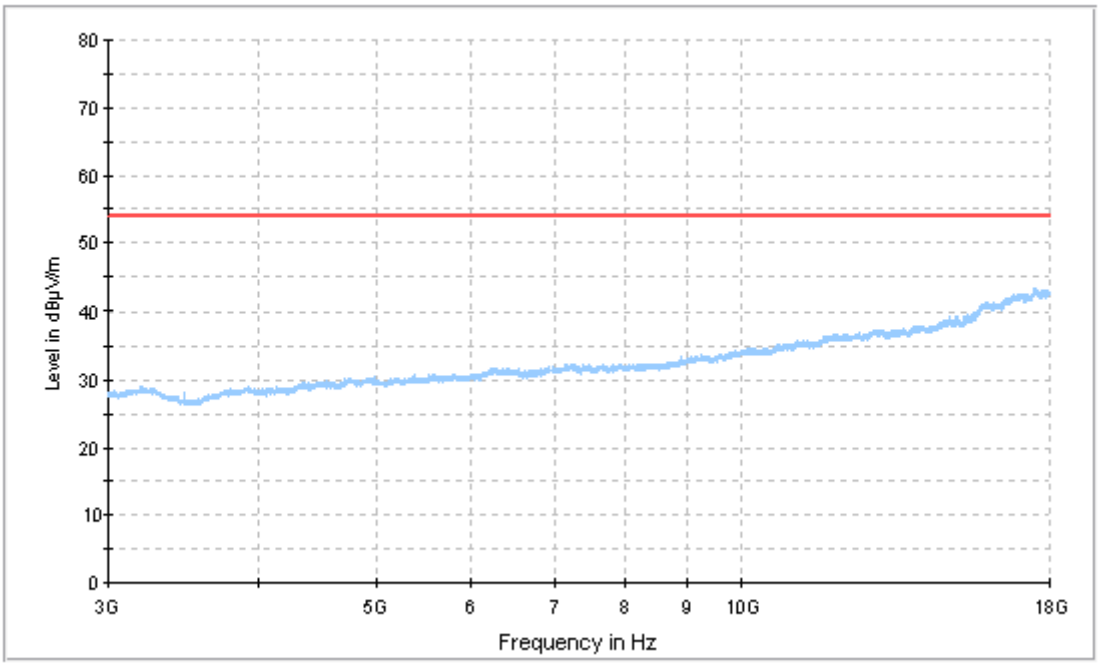
RE - 1GHz-3GHz



RBW / VBW 1 MHz

Idle Mode: 1GHz-4GHz

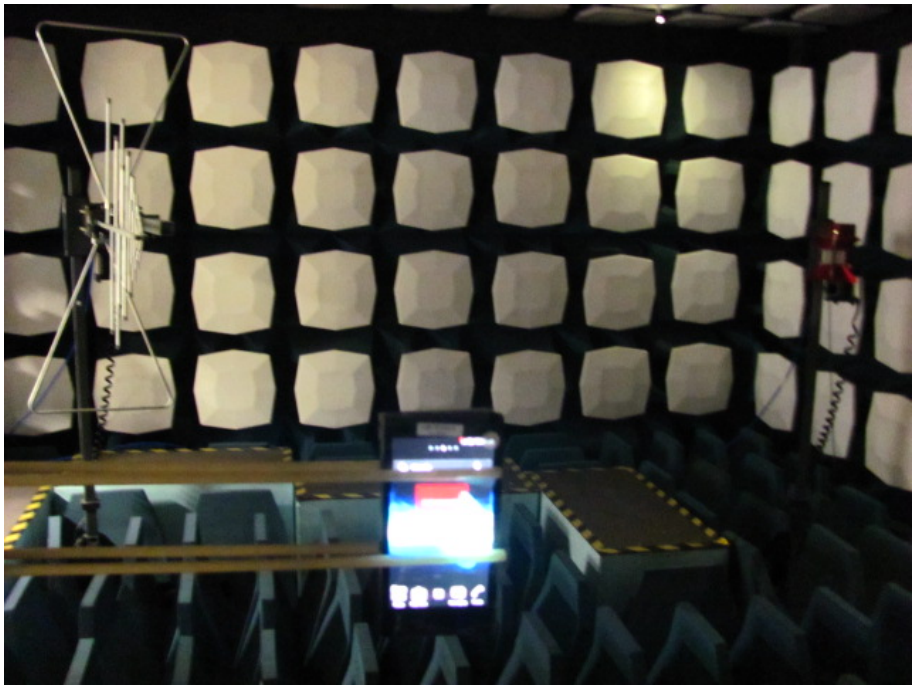
RE - 3GHz-18GHz



RBW / VBW 1 MHz

Idle Mode: 4GHz-18GHz

ANNEX B: TEST LAYOUT



Pic.1 Radiated spurious emission

Note: the charger is not connected to LISN directly since the length of USB cable is less than 80cm.

Pic.2 Conducted emission

ANNEX C: EUT photograph

Mobile Phone

Mobile Phone

Mobile Phone

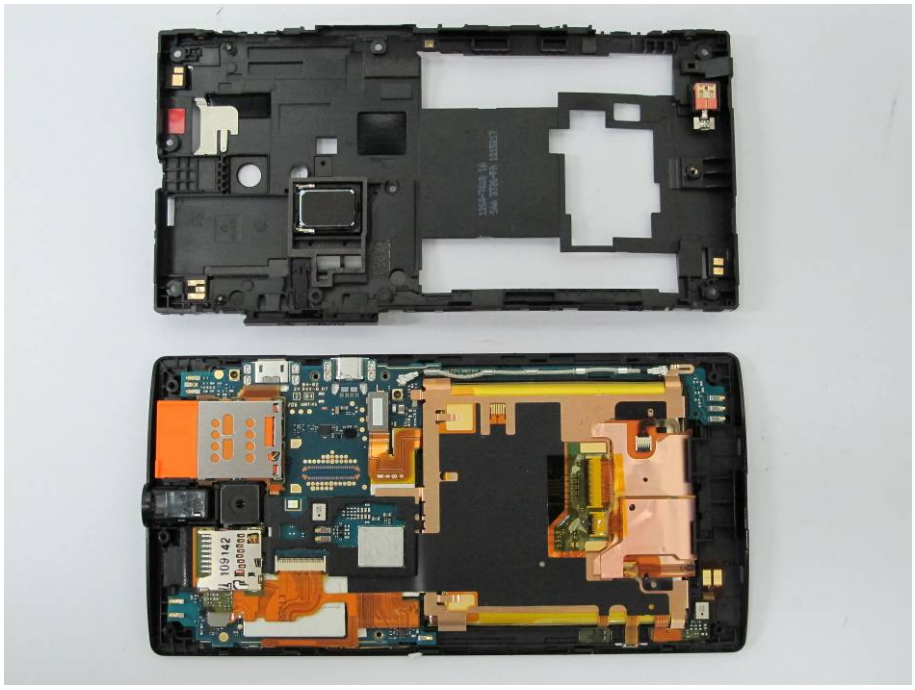
Mobile Phone

Mobile Phone

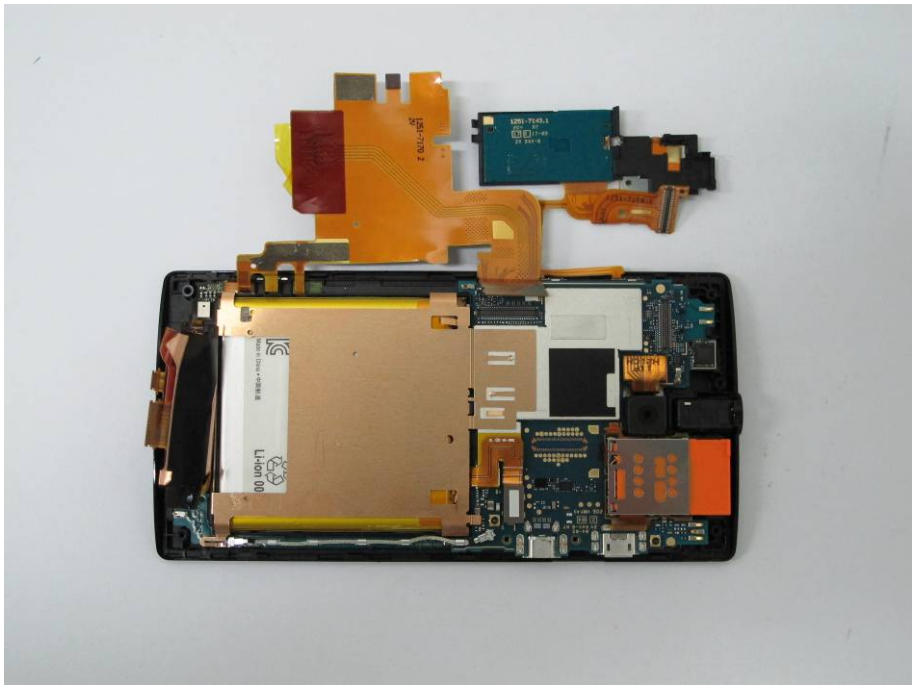
Mobile Phone

Label of Mobile Phone

Mobile Phone Disassembly

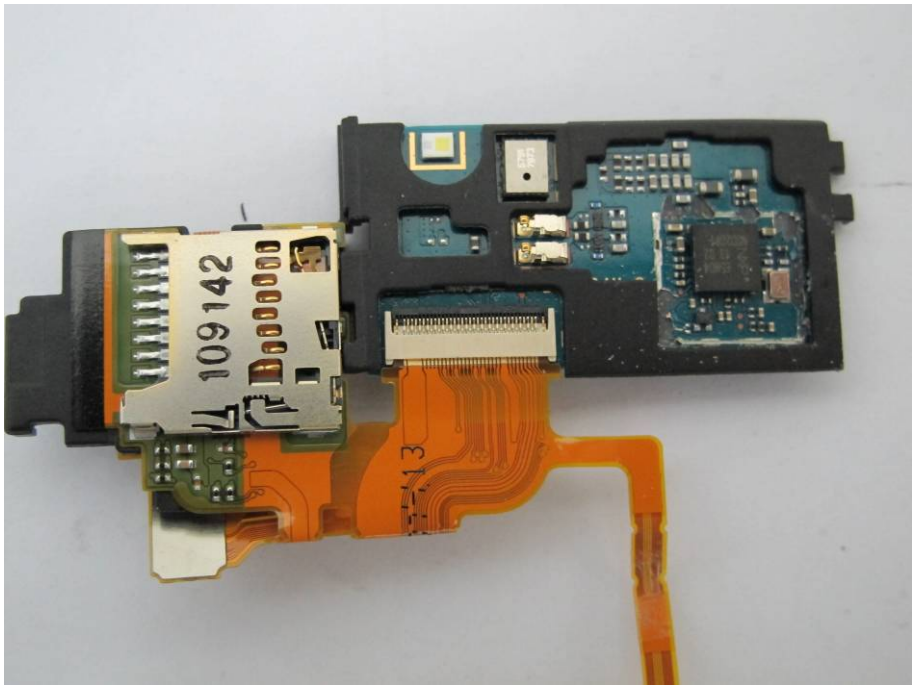


Mobile Phone Disassembly



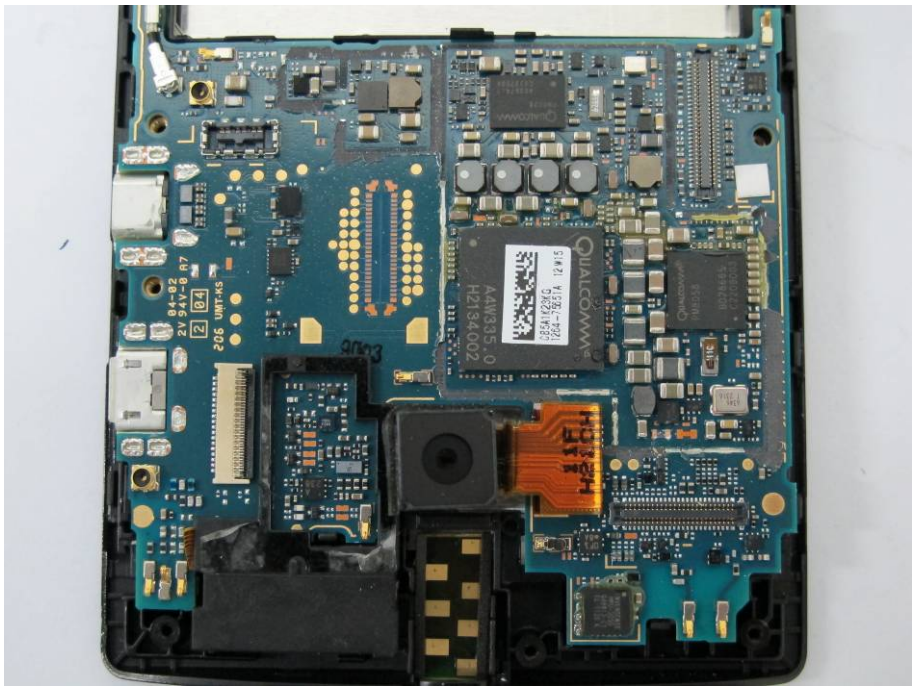
Mobile Phone Disassembly

Mobile Phone Disassembly



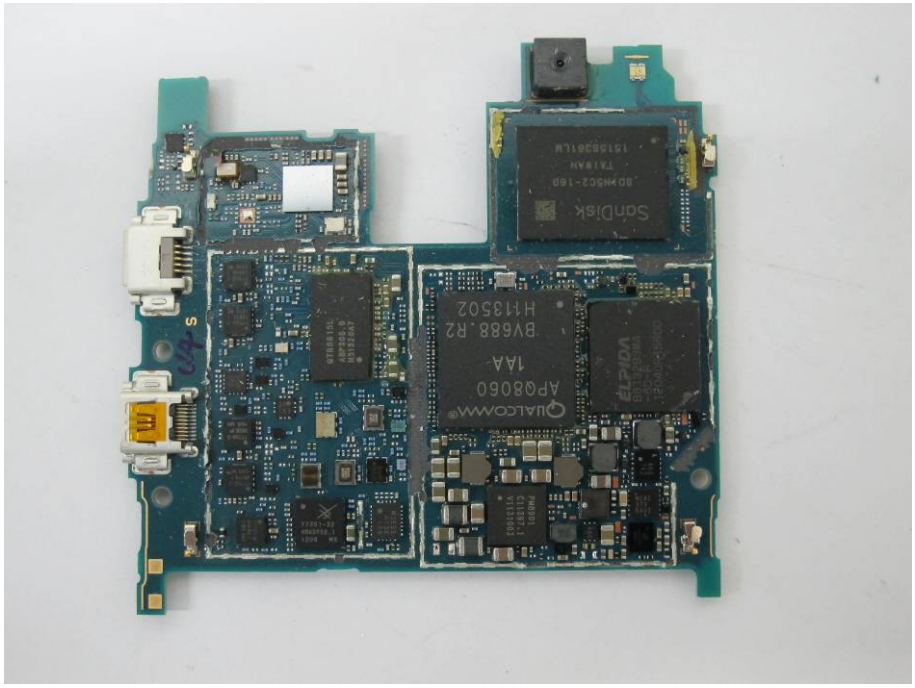
Mobile Phone Disassembly

Mobile Phone Disassembly

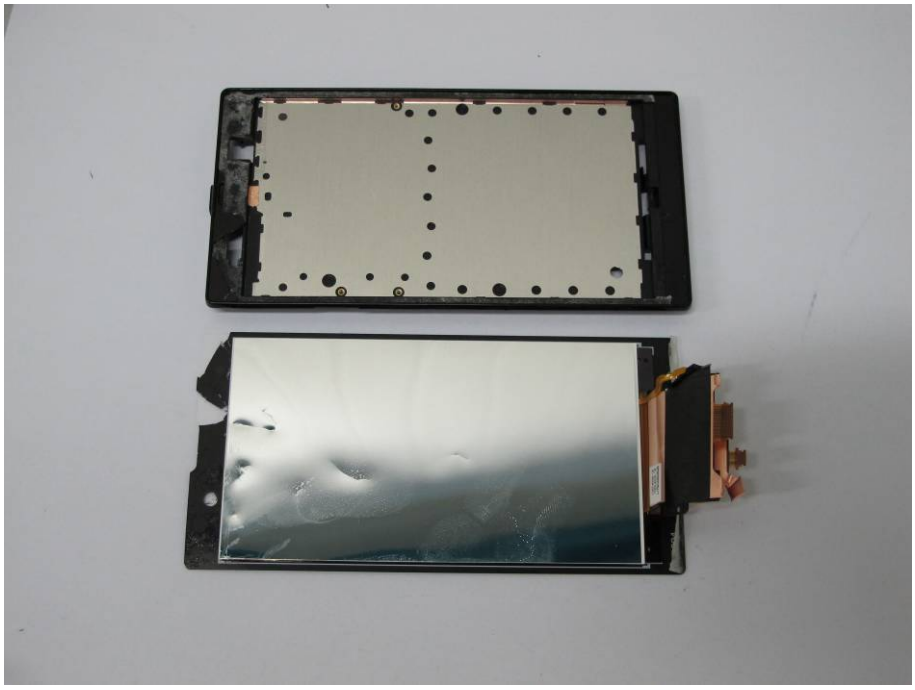


Mobile Phone Disassembly

Mobile Phone Disassembly

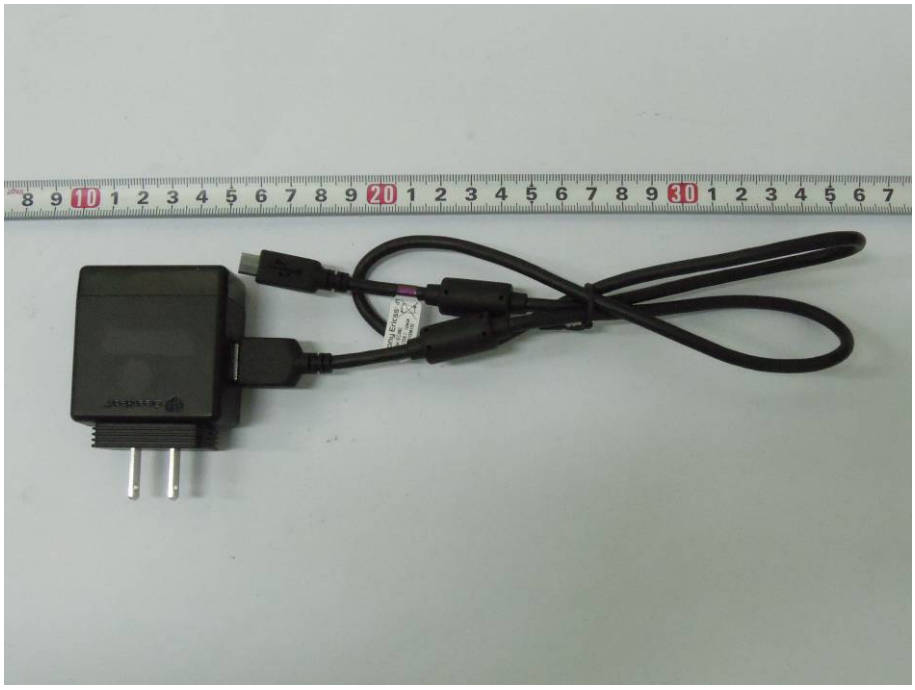


Mobile Phone Disassembly



Mobile Phone Disassembly

Inbuilt Li-Polymer Battery



Travel Charger

Label of Travel Charger

USB Cable

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