



TEST REPORT

No. 2012TAR488

for

Sony Mobile Communications AB

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

bands mobile phone

Type: PM-0150-BV

FCC ID: PY7PM-0150

with

Hardware Version: A

Software Version: 9.0.E.0.32

Issued Date: Sep. 21st, 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.6629B-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

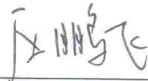
Normal Temperature: 15-35°C
Relative Humidity: 20-75%
Air pressure 980 - 1040 hPa

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 Aug. 22nd, 2012
Testing Start Date: Aug. 28th, 2012
Testing End Date: Sep. 20th, 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
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Chaoyang District
City: Beijing
Postal Code: 100102
Country: China
Contact Person: Ma, Gang
Telephone: +86-10-58656312
Fax: +86-10-58659049

2.2. Manufacturer Information

Company Name: Sony Mobile Communications 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, cdma2000 Band Class 0/1, Bluetooth (EDR and 4.0), WLAN (802.11 b/g/n), FM, GPS receiver mobile phone
Type	PM-0150-BV
FCC ID	PY7PM-0150
Frequency range (Tx)	GSM 850MHz: 824.2 MHz - 848.8 MHz PCS 1900MHz: 1850.2 MHz -1909.8 MHz cdma2000 Band Class 0:824 MHz - 849 MHz cdma2000 Band Class 1:1850 MHz -1910 MHz
Antenna	Internal
Power supply	Battery or charger (travel adapter / vehicle charger)
Output power	33.86 dBm maximum ERP measured for GSM850MHz 28.88 dBm maximum EIRP measured for PCS1900MHz 23.72 dBm maximum ERP measured for cdma2000 Band Class 0 23.98 dBm maximum EIRP measured for cdma2000 Band Class 1
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
#22856	CB5A1KF4J8	004402145893727	A	9.0.E.0.32
#22885	CB5A1KF4JX	004402145893016	A	9.0.E.0.32

*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
#22431	Battery	000806SWSGNS	1C
#22870	Battery	002791SWSGNS	1
#22575	Travel Charger	5800129	1A
#22318	USB Cable	121607D10003C2E	SP1

#22431, #22870

Type	AB-0400
Commercial name	BA800
Manufacturer	Sony Mobile
Minimum Capacitance	1700mAh
Nominal Voltage	3.7V

#22575

Type	AC-0400-CN
Manufacturer	SALCOMP
Length of cable	98 cm (length of USB cable)

#22318

Commercial name	EC801
Manufacturer	Sony Mobile
Length of cable	98 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 CDMA2000 850/1900 dual bands mobile phone with integrated antenna.

The EUT supports GSM 850/900/1800/1900MHz bands and CDMA2000 850/1900MHz bands. 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, Mobile High-Definition Link (MHL), Bluetooth (EDR and Bluetooth 4.0), WLAN (802.11 b/g/n) and Wi-Fi hotspot functions.

It consists of normal option: battery and 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	#22856 + #22431/#22870 + #22575 + #22318	Tests with travel charger
Set. 2	#22856 + #22431/#22870	ERP/EIRP/RSE tests
Set. 3	#22885 + #22431/#22870	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
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

Semi-anechoic chamber SAC-2 (10 meters×6.7meters×6.1meters) 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	< 1Ω
Normalised site attenuation (NSA)	< ±3.5 dB, 3m distance, from 30 to 1000 MHz
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

Fully-anechoic chamber FAC-3 (9 meters×6.5 meters×4 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
Uniformity of field strength	Between 0 and 6 dB, from 80 to 4000 MHz
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 18GHz

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

6. SUMMARY OF TEST RESULTS

6.1. Summary of test results

Abbreviations used in this clause:

P	Pass
NA	Not applicable
F	Fail

cdma2000 Band Class 0

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

cdma2000 Band Class 1

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(a)	A.6	P
7	Band Edge Compliance	24.238(a)	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 cdma2000 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	E5515C	MY48361083	Agilent	2013-03-16
8	Spectrum Analyzer	E4440A	MY48250642	Agilent	2013-03-04
9	EMI Antenna	9117	177	Schwarzbeck	2014-06-29
10	EMI Antenna	VULB 9163	482	Schwarzbeck	2014-02-17
11	EMI Antenna	3117	00119024	ETS-Lindgren	2014-02-02
12	EMI Antenna	3117	00058889	ETS-Lindgren	2014-02-02
13	Signal Generator	N5183A	MY49060052	Agilent	2013-03-19
14	Climatic chamber	PL-2G	343074	ESPEC	2013-05-12
15	Universal Radio Communication Tester	CMU200	114724	R&S	2012-12-10

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 (CMU200) to ensure max power transmission and proper modulation.

This result contains peak output power and ERP/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: 824.7MHz, 836.52MHz and 848.31 MHz for CDMA 800 (cdma2000 Band Class 0); 1851.25 MHz, 1880.0 MHz and 1908.75 MHz for CDMA 1900 (cdma2000 Band Class 1).

A.1.2.2 Measurement result

CDMA 800

	Channel number	Frequency(MHz)	output power(dBm)
CDMA 800 (Band Class 0)	1013	824.70	24.35
	384	836.52	24.24
	777	848.31	24.30

CDMA 1900

	Channel number	Frequency(MHz)	output power(dBm)
CDMA 1900 (Band Class 1)	25	1851.25	24.76
	600	1880.00	24.51
	1175	1908.75	25.10

A.1.3 Radiated

A.1.3.1 Description

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

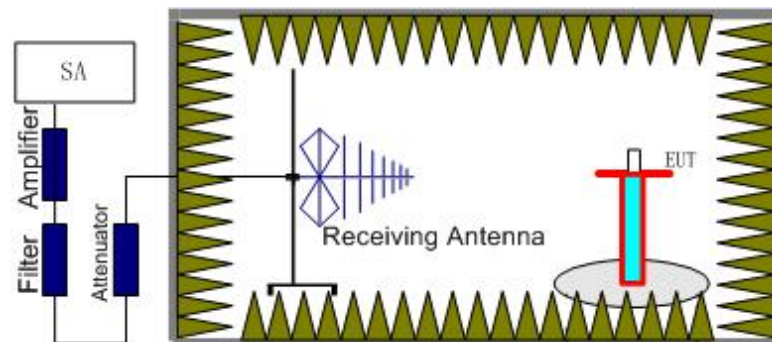
Rule Part 22.913(a) specifies "Maximum ERP. The effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts."

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."

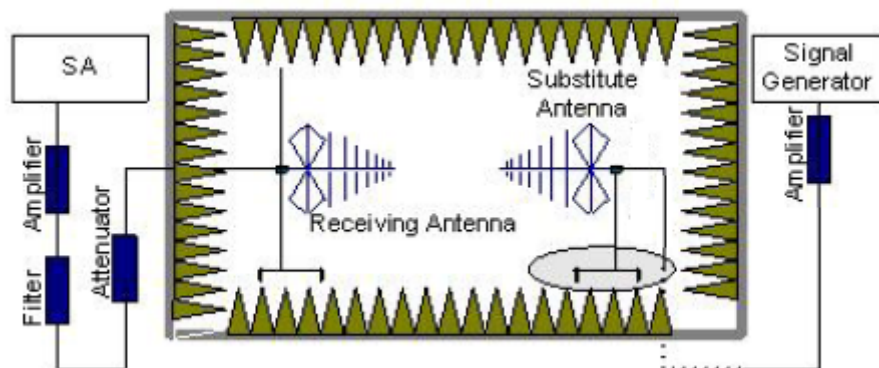
A.1.3.2 Method of Measurement

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.

CDMA 800- ERP

Limits

	Burst Peak ERP (dBm)
CDMA 800	≤38.45dBm

Measurement result

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	Correction (dB)	Peak ERP(dBm)	Polarization
824.70	-25.12	2.26	-53.00	0.84	2.15	22.63	Horizontal
836.52	-23.97	2.26	-53.00	0.90	2.15	23.72	Vertical
848.31	-25.76	2.28	-53.00	0.95	2.15	21.86	Vertical

Sample calculation: 836.52 MHz

$$\begin{aligned} \text{Peak ERP(dBm)} &= P_{Mea}(-23.97 \text{ dBm}) - G_a (0.90 \text{ dBi}) - P_{Ag} (-53.00 \text{ dB}) - P_{cl} (2.26 \text{ dB}) -2.15 \text{ dB} \\ &= 23.72 \text{ dBm} \end{aligned}$$

ANALYZER SETTINGS: RBW = VBW = 3MHz

Note: Expanded measurement uncertainty for CDMA 800 is $U = 0.96\text{dB}$, $k=2$.

CDMA 1900- EIRP

Limits

	Burst Peak EIRP (dBm)
CDMA 1900	≤33dBm (2W)

Measurement result

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a (dBi)	Peak EIRP(dBm)	Polarization
1851.25	-25.74	5.97	-50.00	-4.56	22.85	Horizontal
1880.00	-24.26	7.05	-50.00	-4.43	23.12	Horizontal
1908.75	-21.31	9.01	-50.00	-4.30	23.98	Horizontal

Sample calculation: 1908.75 MHz

$$\begin{aligned} \text{Peak EIRP (dBm)} &= P_{\text{Mea}}(-21.31 \text{ dBm}) - G_a(-4.30 \text{ dBi}) - P_{\text{Ag}}(-50.00 \text{ dB}) - P_{\text{cl}}(9.01 \text{ dB}) \\ &= 23.98 \text{ dBm} \end{aligned}$$

ANALYZER SETTINGS: RBW = VBW = 3MHz

Note: Expanded measurement uncertainty for CDMA 1900 is $U = 1.07\text{dB}$, $k=2$.

A.2 EMISSION LIMIT

Reference

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

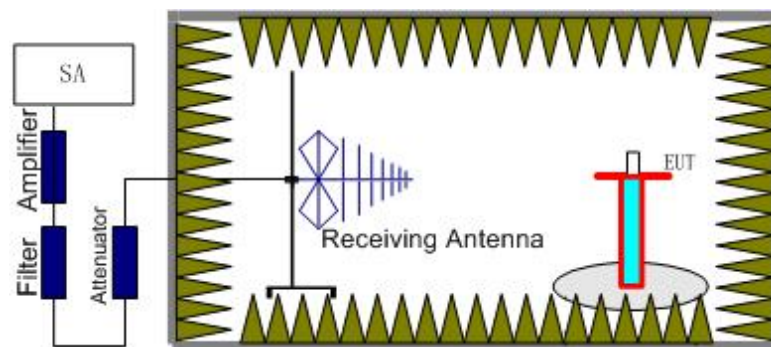
A.2.1 Measurement Method

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

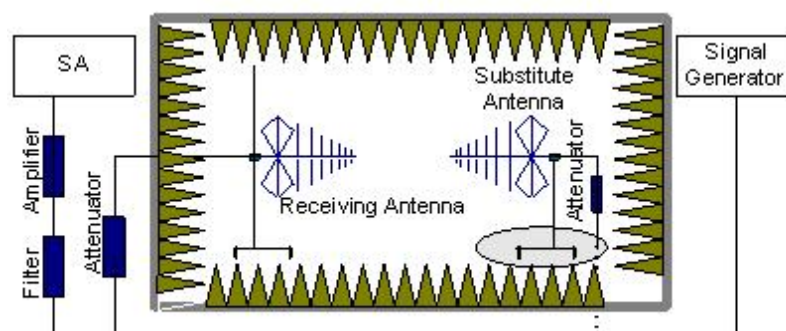
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz. The resolution bandwidth is set 1MHz as outlined in Part 24.238 and Part 22.917. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of CDMA 800 and CDMA 1900.

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

A.2.3 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the CDMA 800 (824.7MHz, 836.52MHz and 848.31 MHz) and CDMA 1900 (1851.25 MHz, 1880.0 MHz and 1908.75). 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 CDMA 800 or CDMA 1900 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.

CDMA 800 Channel 1013/ 824.70MHz

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
1648.57	-43.98	3.57	-5.45	2.15	-44.25	-13.00	Horizontal
2485.49	-58.59	4.18	-5.36	2.15	-59.56	-13.00	Vertical
3505.45	-66.81	5.16	-7.91	2.15	-66.21	-13.00	Vertical
4488.07	-66.16	6.42	-8.79	2.15	-65.94	-13.00	Vertical
5114.52	-67.21	7.25	-9.77	2.15	-66.84	-13.00	Vertical
8695.11	-65.48	7.95	-12.36	2.15	-63.22	-13.00	Horizontal

CDMA 800 Channel 384/ 836.52MHz

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
1672.37	-39.77	3.44	-5.34	2.15	-40.02	-13.00	Horizontal
2509.52	-40.00	4.34	-5.42	2.15	-41.07	-13.00	Horizontal
4070.53	-67.21	6.35	-8.54	2.15	-67.17	-13.00	Horizontal
5976.09	-70.95	13.68	-10.19	2.15	-76.59	-13.00	Vertical
6866.31	-67.37	7.55	-10.97	2.15	-66.10	-13.00	Vertical
8647.76	-65.52	7.73	-12.32	2.15	-63.08	-13.00	Vertical

CDMA 800 Channel 777/ 848.31MHz

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
1697.37	-42.14	3.62	-5.23	2.15	-42.68	-13.00	Horizontal
2625.80	-56.59	4.36	-5.73	2.15	-57.37	-13.00	Vertical
3601.54	-67.72	5.22	-8.02	2.15	-67.07	-13.00	Horizontal
5029.80	-68.49	6.77	-9.72	2.15	-67.69	-13.00	Horizontal
6375.62	-65.42	8.29	-10.50	2.15	-65.36	-13.00	Vertical
7816.69	-67.71	7.60	-11.72	2.15	-65.74	-13.00	Vertical

CDMA 1900 Channel 25/1851.25MHz

Frequency (MHz)	P _{Mea} (dBm)	P _{pl} (dB)	G _a (dBi)	Peak EIRP (dBm)	Limit (dBm)	Polarity
3702.54	-41.17	5.32	-8.14	-38.35	-13.00	Horizontal
5235.66	-66.98	7.51	-9.84	-64.65	-13.00	Horizontal
8590.69	-65.73	7.90	-12.27	-61.36	-13.00	Horizontal
10379.18	-64.22	8.68	-12.48	-60.42	-13.00	Horizontal
12797.76	-62.94	9.90	-13.06	-59.78	-13.00	Vertical
15019.37	-58.37	11.31	-13.50	-56.18	-13.00	Horizontal

CDMA 1900 Channel 600/1880.00MHz

Frequency (MHz)	P _{Mea} (dBm)	P _{pl} (dB)	G _a (dBi)	Peak EIRP (dBm)	Limit (dBm)	Polarity
3759.33	-46.98	5.98	-8.21	-44.75	-13.00	Horizontal
5399.90	-68.17	8.12	-9.94	-66.35	-13.00	Horizontal
7520.07	-60.35	8.11	-11.42	-57.04	-13.00	Horizontal
9048.72	-64.15	8.35	-12.60	-59.90	-13.00	Horizontal
12069.05	-60.75	9.65	-12.53	-57.87	-13.00	Vertical
15040.67	-57.64	11.32	-13.49	-55.47	-13.00	Vertical

CDMA 1900 Channel 1175/1908.75MHz

Frequency (MHz)	P _{Mea} (dBm)	P _{pl} (dB)	G _a (dBi)	Peak EIRP (dBm)	Limit (dBm)	Polarity
3817.03	-51.84	5.60	-8.28	-49.16	-13.00	Horizontal
5726.09	-62.52	10.06	-10.09	-62.49	-13.00	Horizontal
8644.39	-64.39	7.76	-12.32	-59.83	-13.00	Horizontal
10622.77	-62.12	8.82	-12.48	-58.46	-13.00	Horizontal
13169.68	-59.60	10.27	-13.47	-56.40	-13.00	Horizontal
15057.32	-60.86	11.32	-13.49	-58.69	-13.00	Horizontal

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.

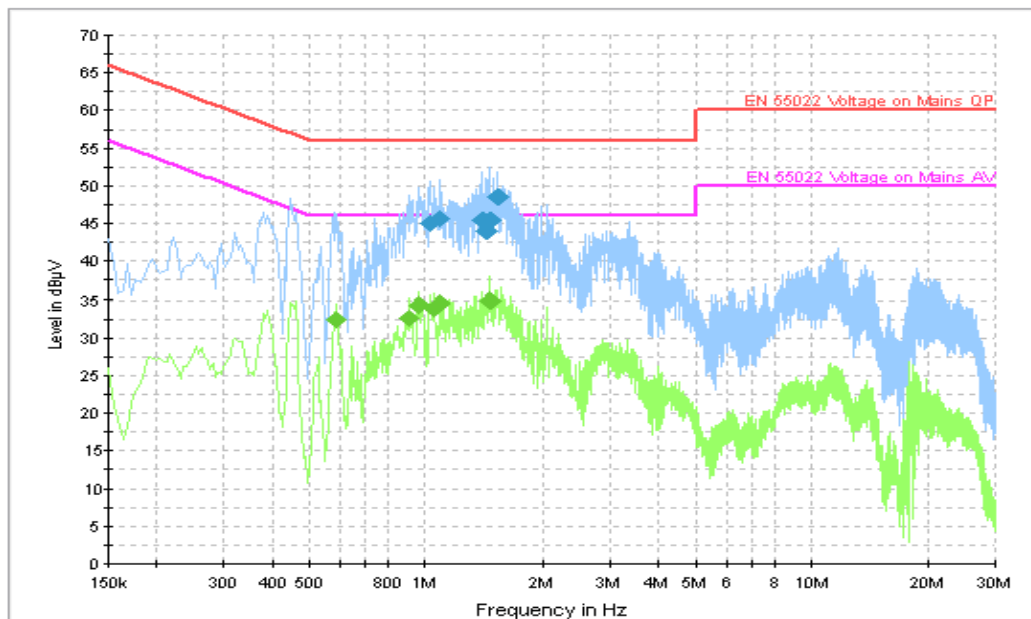
A.3.1 Limit

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

CDMA 800



IF bandwidth 9 kHz

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

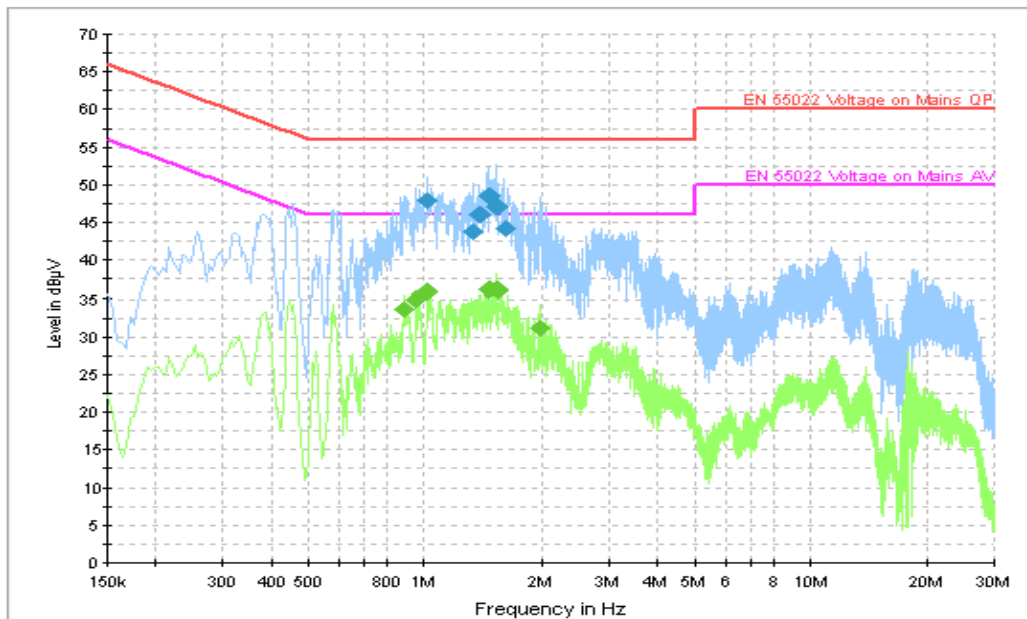
Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
1.027500	45.0	GND	L1	10.0	11.0	56.0
1.090500	45.6	GND	L1	10.0	10.4	56.0
1.405500	45.5	GND	L1	10.0	10.5	56.0
1.437000	44.0	GND	L1	10.0	12.0	56.0
1.473000	45.5	GND	L1	10.0	10.5	56.0
1.531500	48.4	GND	L1	10.0	7.6	56.0

Final Result 2

Frequency (MHz)	CAverage (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.586500	32.5	GND	L1	10.0	13.5	46.0
0.910500	32.7	GND	L1	10.0	13.3	46.0
0.960000	34.2	GND	L1	10.0	11.8	46.0
1.050000	33.9	GND	L1	10.0	12.1	46.0
1.090500	34.5	GND	L1	10.0	11.5	46.0
1.473000	34.8	GND	L1	10.0	11.2	46.0

CDMA 1900



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)
1.018500	47.9	GND	L1	10.0	8.1	56.0
1.342500	43.7	GND	L1	10.0	12.3	56.0
1.387500	46.0	GND	L1	10.0	10.0	56.0
1.464000	48.4	GND	L1	10.0	7.6	56.0
1.531500	47.1	GND	L1	10.0	8.9	56.0
1.608000	44.2	GND	L1	10.0	11.8	56.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.888000	33.7	GND	L1	10.0	12.3	46.0
0.955500	34.8	GND	L1	10.0	11.2	46.0
1.018500	35.9	GND	L1	10.0	10.1	46.0
1.464000	36.2	GND	L1	10.0	9.8	46.0
1.531500	36.0	GND	L1	10.0	10.0	46.0
1.972500	31.2	GND	L1	10.0	14.8	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 mid channel of CDMA 800 and CDMA 1900, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10°C increments from -30°C to +50°C. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1 1/2 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50°C.
7. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 C increments from +50°C to -30°C. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5°C during the measurement procedure.

A.4.2 Measurement Limit

A.4.2.1 For Hand carried battery powered equipment

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

A.4.2.2 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

CDMA 800

Room Temperature: 24 °C

Frequency Error vs Voltage

Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.5	-10	0.012
3.7	-7	0.008
4.1	-12	0.014

Frequency Error vs Temperature

temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
-30	-15	0.018
-20	-14	0.017
-10	-9	0.011
0	-9	0.011
10	-7	0.008
20	-7	0.008
30	-8	0.010
40	-10	0.012
50	-13	0.016

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

CDMA 1900

Room Temperature: 24°C

Frequency Error vs Voltage

Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.5	11	0.006
3.7	7	0.004
4.1	10	0.005

Frequency Error vs Temperature

temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
-30	14	0.007
-20	12	0.006
-10	12	0.006
0	10	0.005
10	8	0.004
20	7	0.004
30	7	0.004
40	9	0.005
50	11	0.006

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 CDMA 800 and CDMA 1900. The table below lists the measured -20dBc BW (99%). Spectrum analyzer plots are included on the following pages.

Measurement Parameters:

RBW = 20 kHz, VBW = 50 kHz

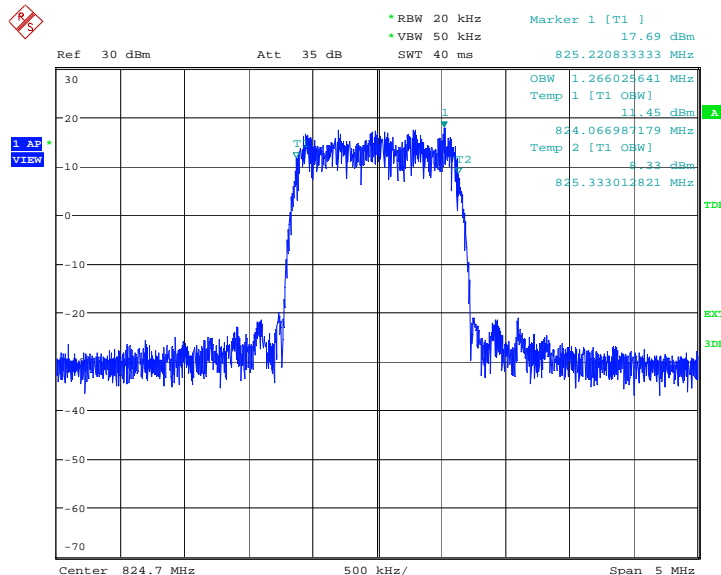
CDMA 800 (-20dBc)

Channel	Occupied Bandwidth (-20dBc BW)(MHz)
1013	1.266
384	1.266
777	1.266

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

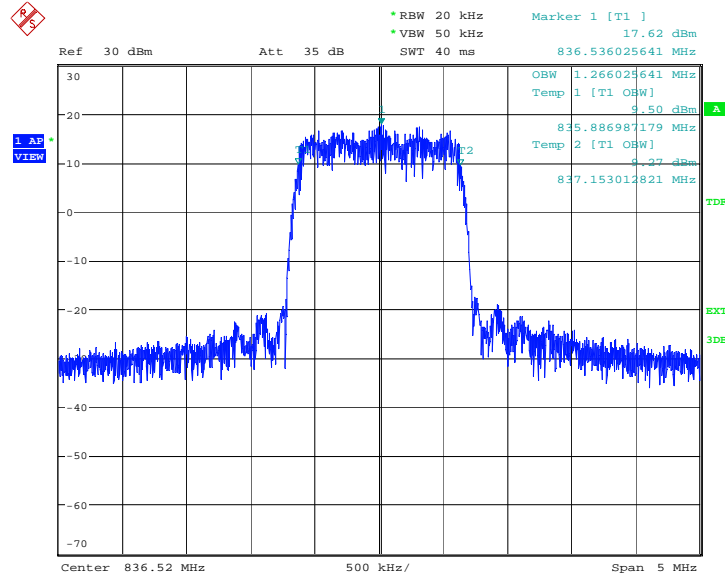
CDMA 800

Channel 1013-Occupied Bandwidth (99% BW)



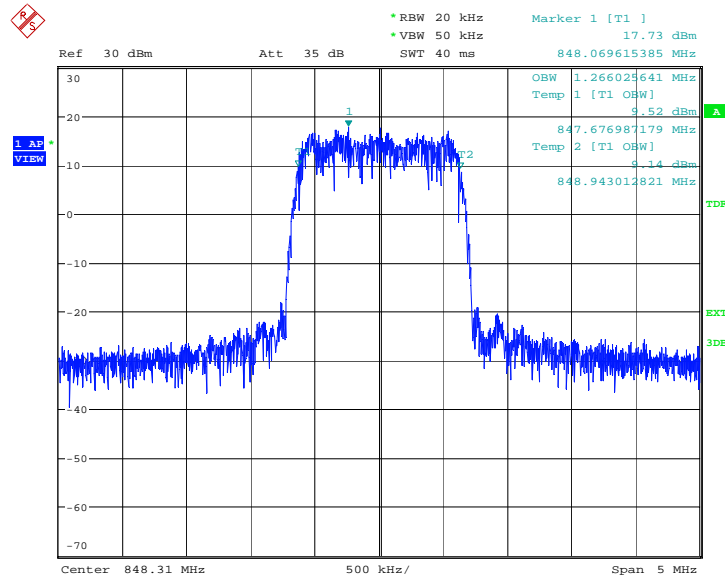
Date: 19.SEP.2012 00:47:42

Channel 384-Occupied Bandwidth (99% BW)



Date: 19.SEP.2012 00:55:44

Channel 777-Occupied Bandwidth (99% BW)



Date: 19.SEP.2012 00:51:48

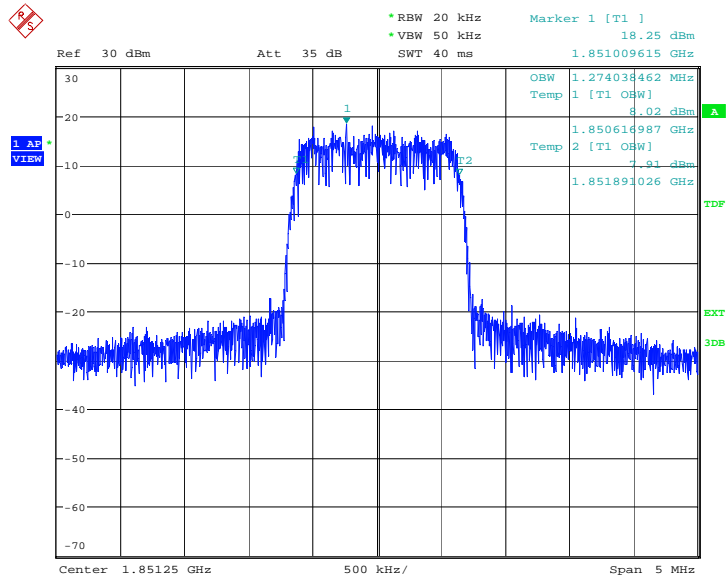
CDMA 1900 (-20dBc)

Channel	Occupied Bandwidth (-20dBc BW)(MHz)
25	1.274
600	1.274
1175	1.282

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

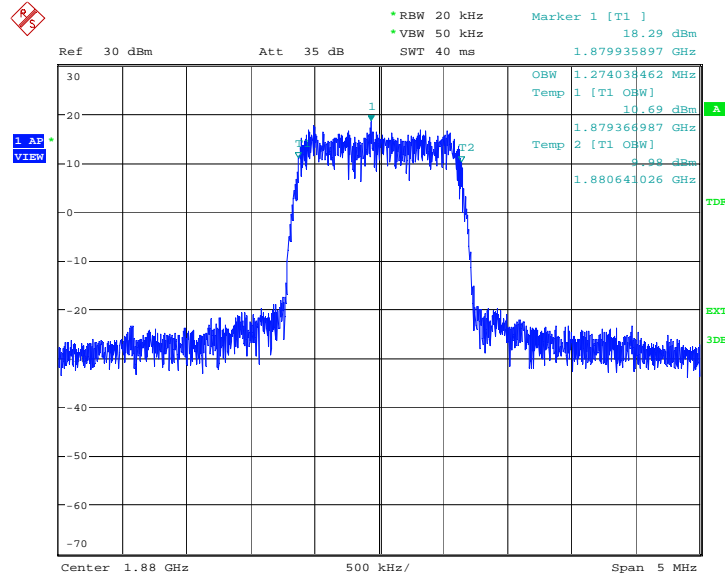
CDMA 1900

Channel 25-Occupied Bandwidth (99% BW)



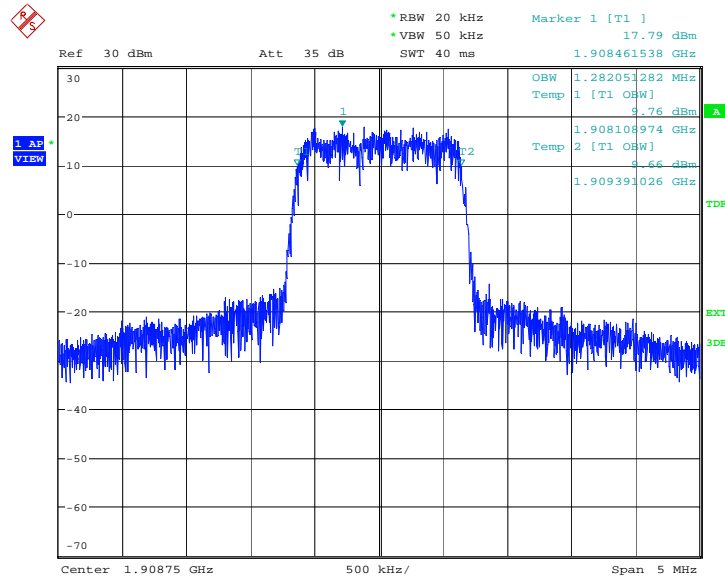
Date: 19.SEP.2012 01:22:56

Channel 600-Occupied Bandwidth (99% BW)



Date: 19.SEP.2012 01:32:14

Channel 1175-Occupied Bandwidth (99% BW)



Date: 19.SEP.2012 01:27:37

A.6 EMISSION BANDWIDTH

Reference

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

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 CDMA 800 and CDMA 1900. Table below lists the measured -26dBc BW. Spectrum analyzer plots are included on the following pages.

Measurement Parameters:

RBW = 20 kHz, VBW = 50 kHz

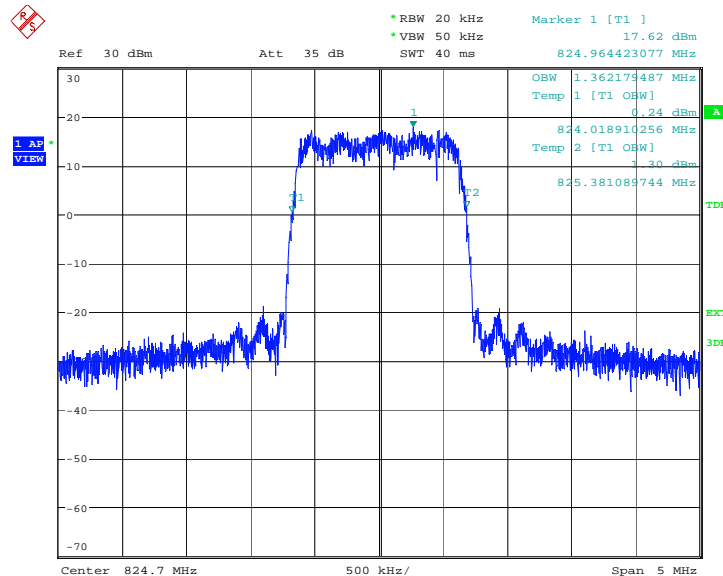
CDMA 800(-26dBc)

Channel	Occupied Bandwidth (-26dBc BW)(MHz)
1013	1.362
384	1.362
777	1.362

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

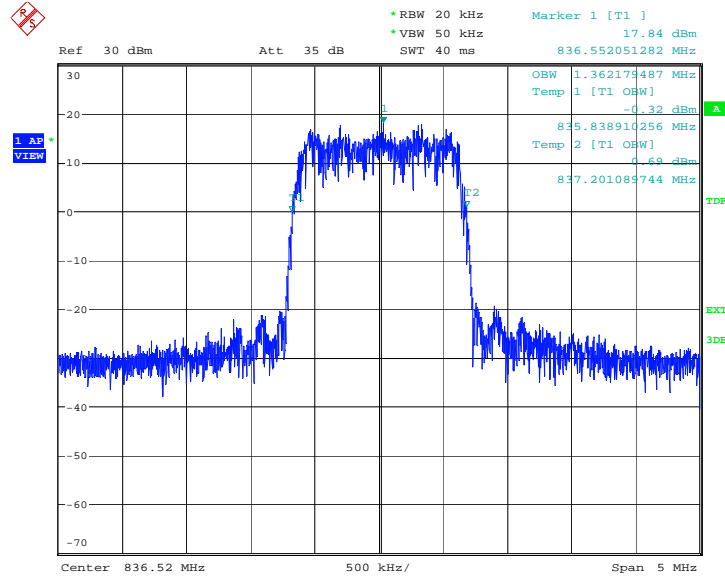
CDMA 800

Channel 1013-Occupied Bandwidth (-26dBc BW)



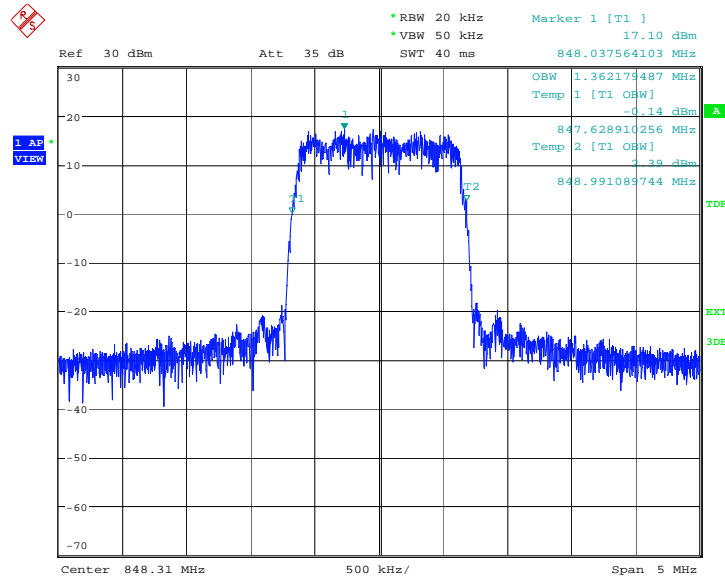
Date: 19.SEP.2012 00:48:21

Channel 384-Occupied Bandwidth (-26dBc BW)



Date: 19.SEP.2012 00:56:23

Channel 777-Occupied Bandwidth (-26dBc BW)



Date: 19.SEP.2012 00:52:26

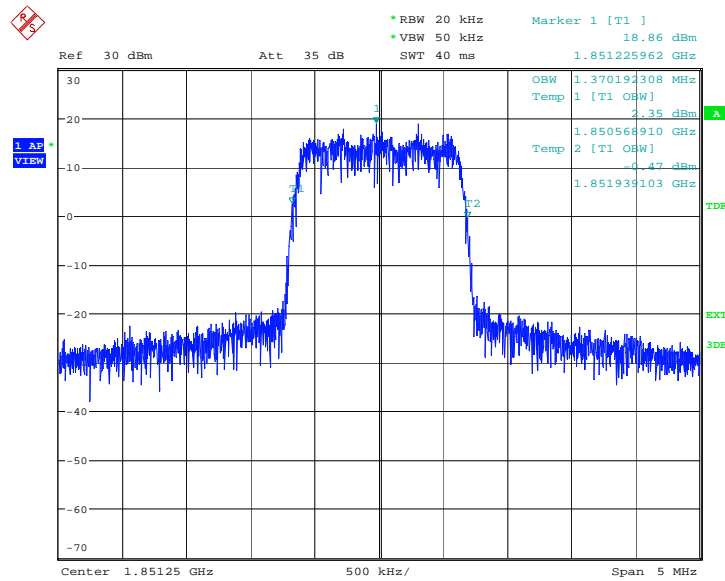
CDMA 1900 (-26dBc)

Channel	Occupied Bandwidth (-26dBc BW)(MHz)
25	1.370
600	1.378
1175	1.386

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

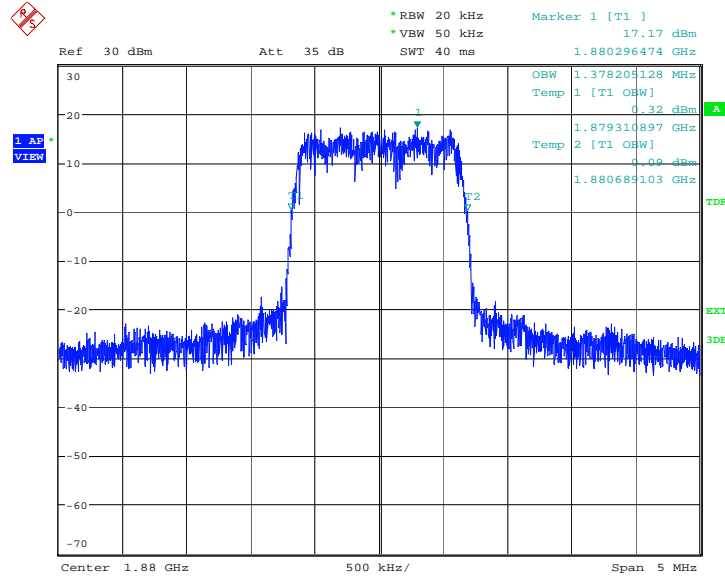
CDMA 1900

Channel 25-Occupied Bandwidth (-26dBc BW)



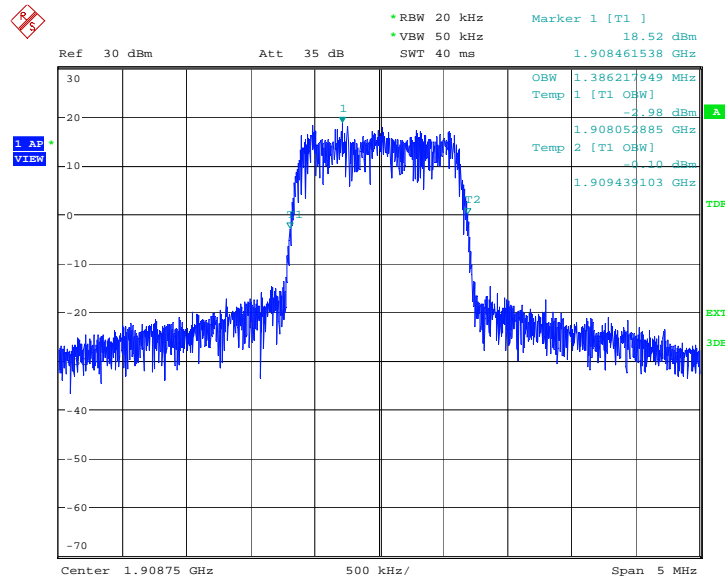
Date: 19.SEP.2012 01:23:34

Channel 600-Occupied Bandwidth (-26dBc BW)



Date: 19.SEP.2012 01:32:52

Channel 1175-Occupied Bandwidth (-26dBc BW)



Date: 19.SEP.2012 01:28:15

A.7 BAND EDGE COMPLIANCE

Reference

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

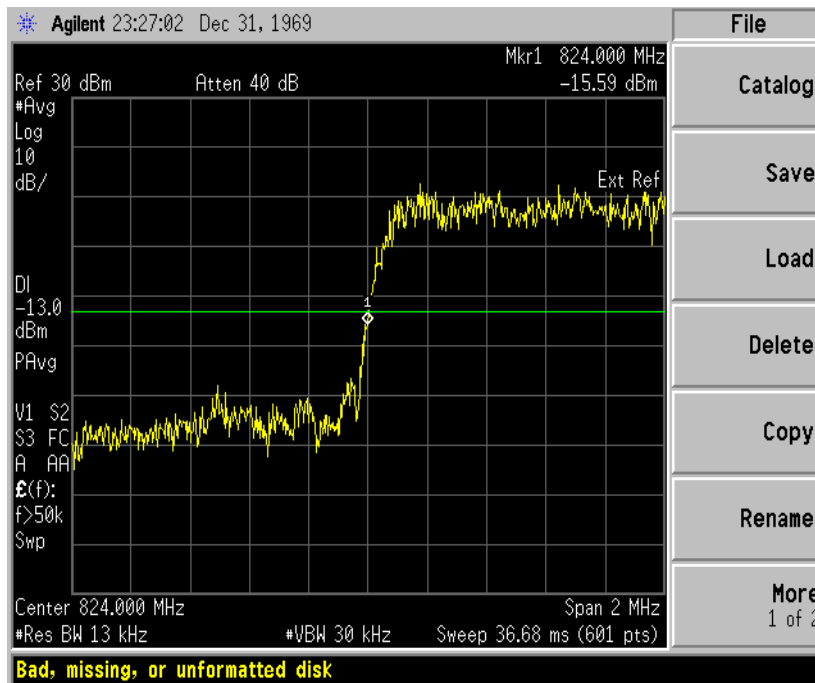
A.7.1 Measurement limit

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

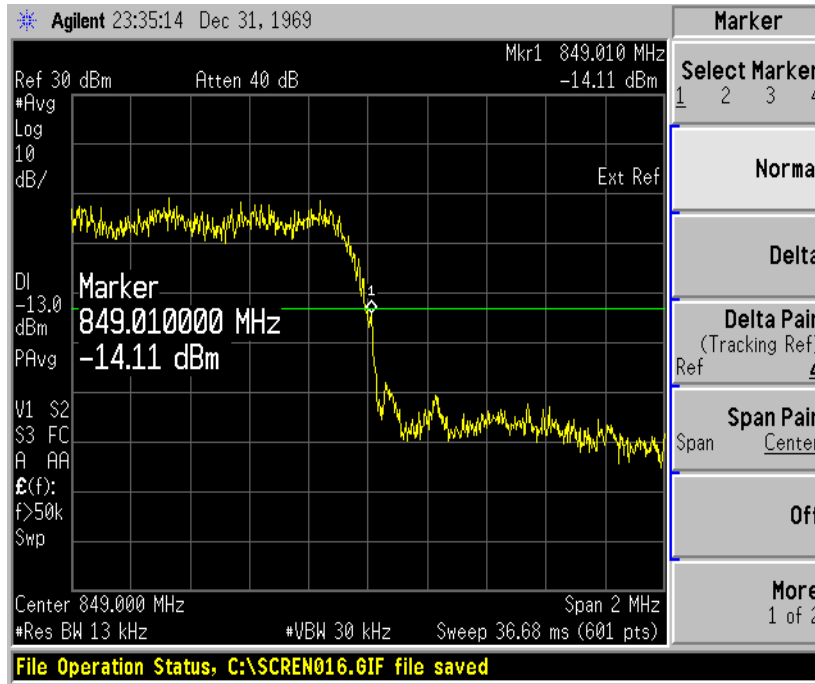
A.7.2 Measurement result

CDMA 800

BAND EDGE BLOCK-Channel 1013



HIGH BAND EDGE BLOCK-Channel 777



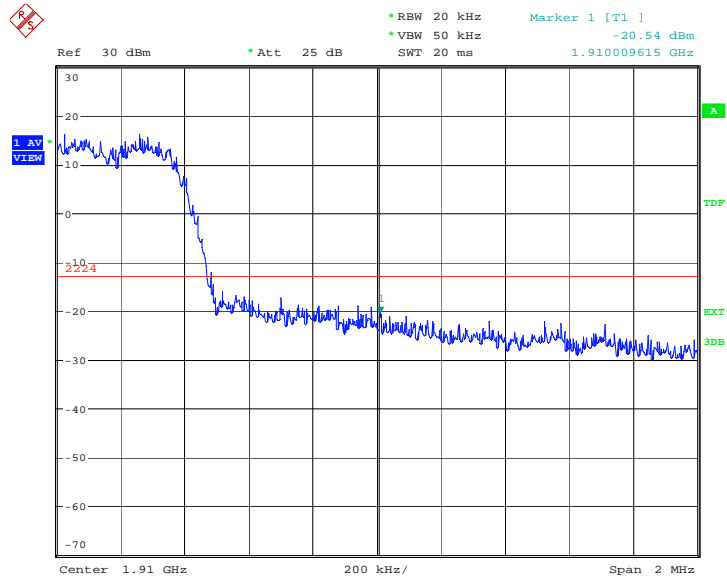
CDMA 1900

BAND EDGE BLOCK-Channel 25



Date: 19.SEP.2012 02:39:16

HIGH BAND EDGE BLOCK-Channel 1175



Date: 19.SEP.2012 02:40:57

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 CDMA 1900, this equates to a frequency range of 30 MHz to 19.1 GHz, data are taken from 30 MHz to 20 GHz. For CDMA 800, 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.

CDMA 800 Transmitter

Channel	Frequency (MHz)
1013	824.70
384	836.52
777	848.31

CDMA 1900 Transmitter

Channel	Frequency (MHz)
25	1851.25
600	1880.00
1175	1908.75

A. 8.2 Measurement Limit

Part 22.917 and Part 24.238 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.

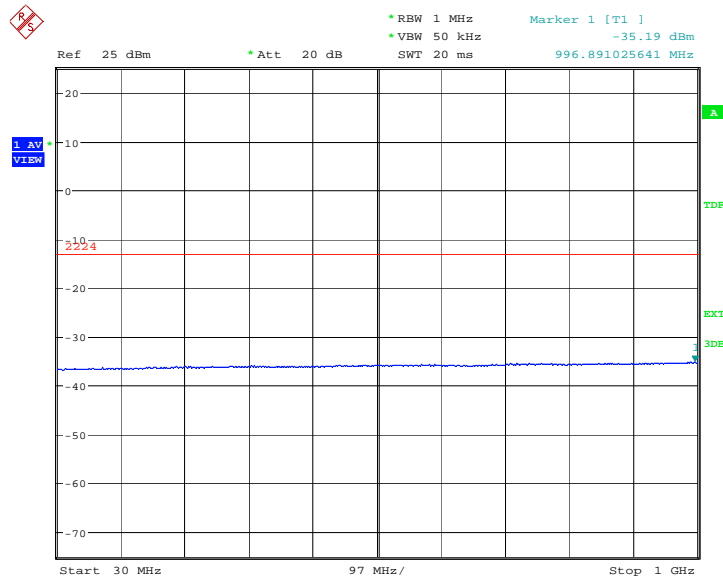
A. 8.3 Measurement result

Measurement Uncertainty: 0.3dB

CDMA 1900

A. 8.3.1 Channel 25: 30MHz –1GHz

Spurious emission limit –13dBm.

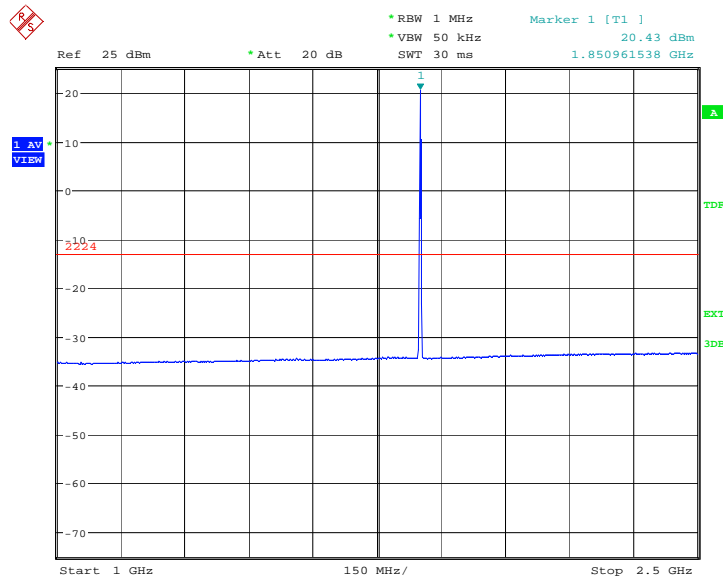


Date: 19.SEP.2012 01:24:08

A.8.3.2 Channel 25: 1GHz –2.5GHz

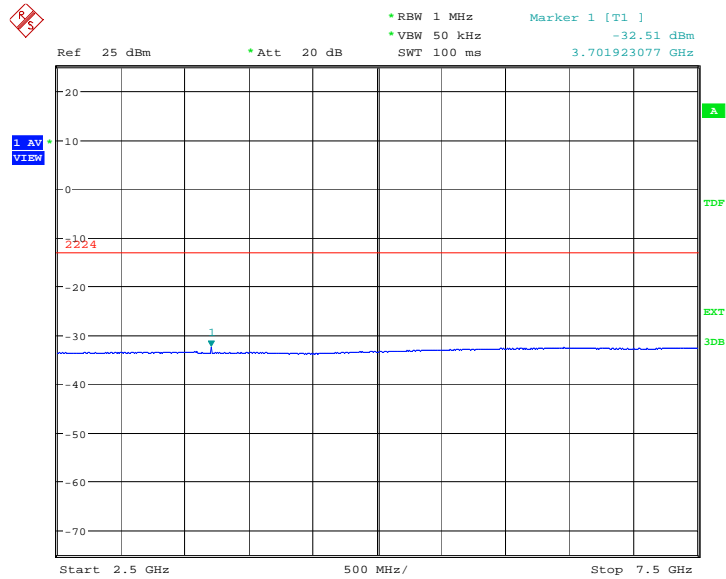
Spurious emission limit –13dBm.

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



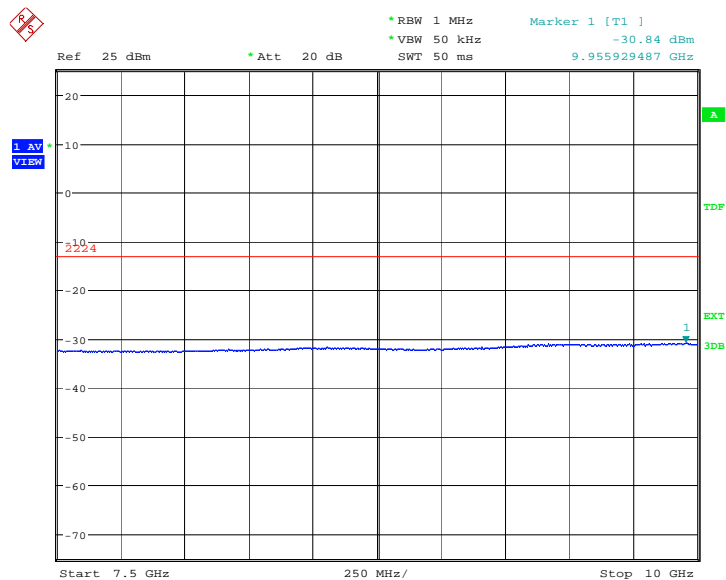
Date: 19.SEP.2012 01:24:35

A.8.3.3 Channel 25: 2.5GHz –7.5GHz
Spurious emission limit –13dBm.



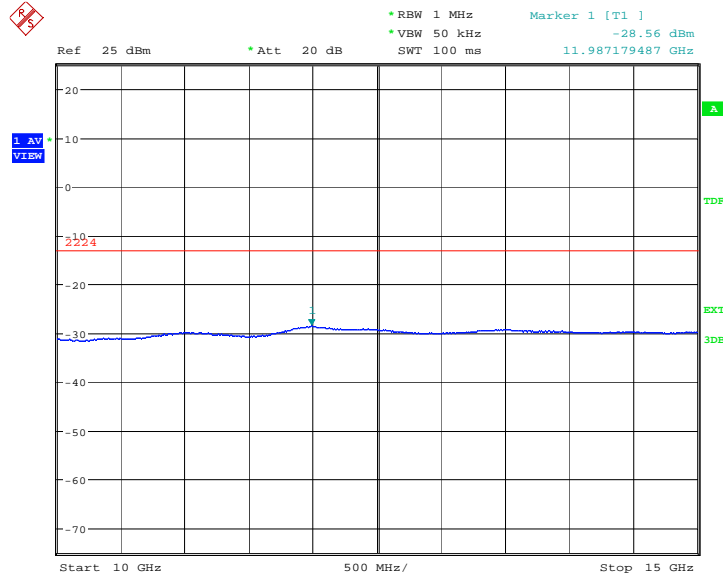
Date: 19.SEP.2012 01:25:02

A.8.3.4 Channel 25: 7.5GHz –10GHz
Spurious emission limit –13dBm.



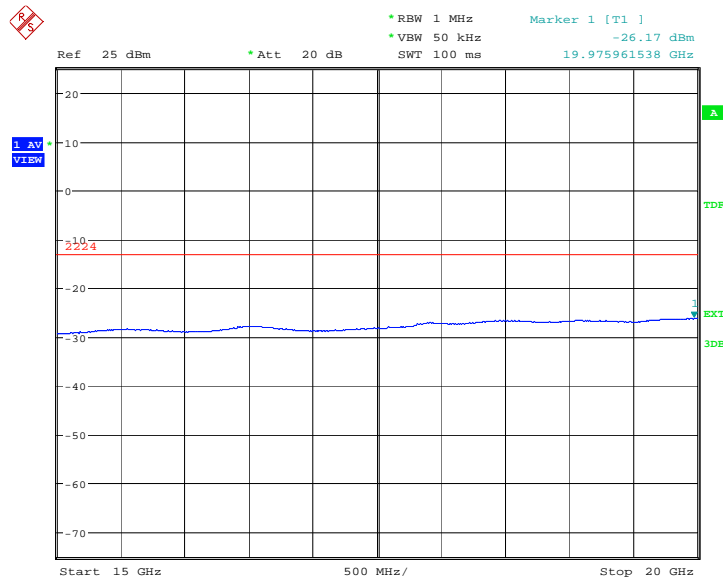
Date: 19.SEP.2012 01:25:29

A.8.3.5 Channel 25: 10GHz –15GHz
Spurious emission limit –13dBm.



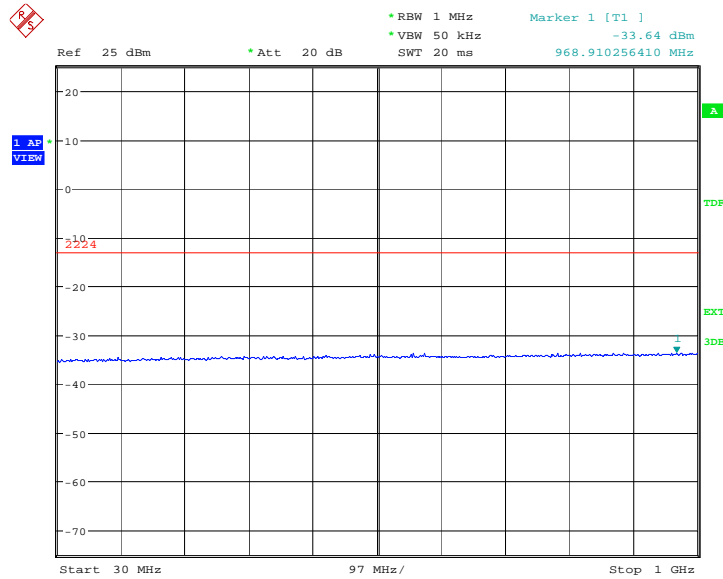
Date: 19.SEP.2012 01:25:56

A.8.3.6 Channel 25: 15GHz –20GHz
Spurious emission limit –13dBm.



Date: 19.SEP.2012 01:26:22

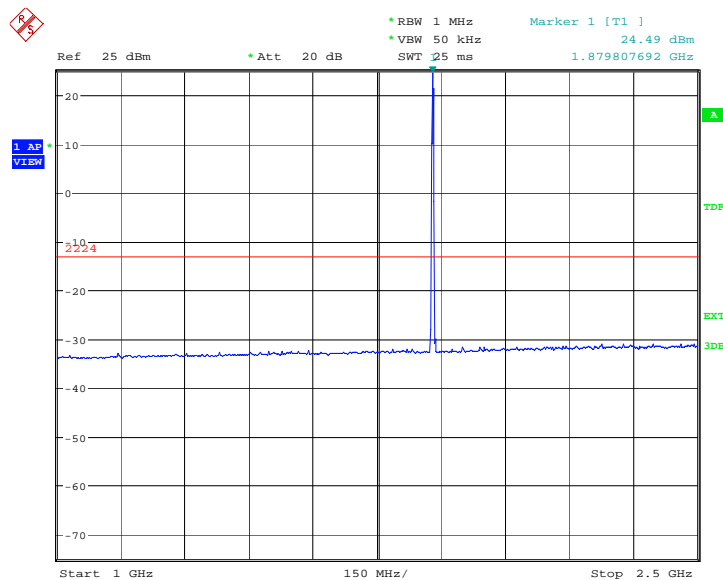
A. 8.3.7 Channel 600: 30MHz –1GHz
Spurious emission limit –13dBm.



Date: 19.SEP.2012 01:33:19

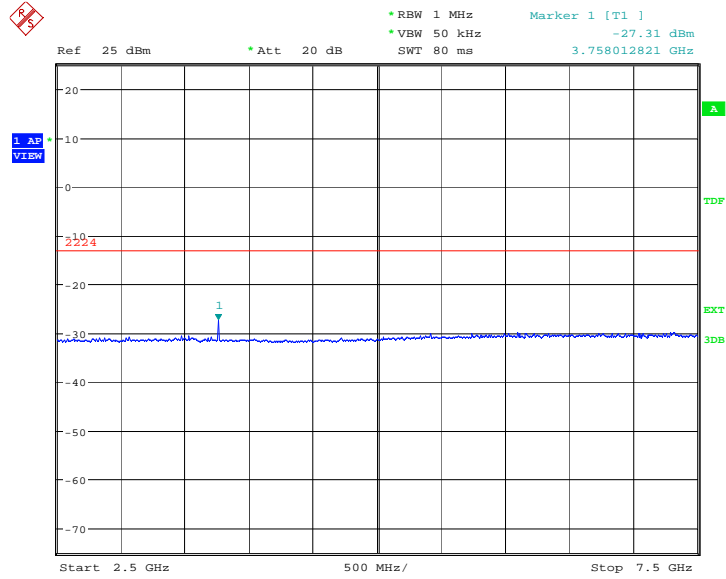
A.8.3.8 Channel 600: 1GHz –2.5GHz
Spurious emission limit –13dBm.

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



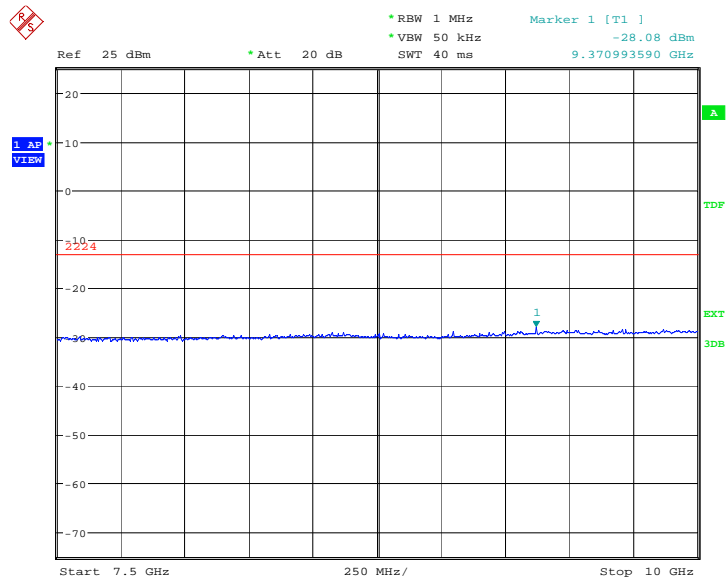
Date: 19.SEP.2012 01:33:46

A.8.3.9 Channel 600: 2.5GHz –7.5GHz
Spurious emission limit –13dBm.



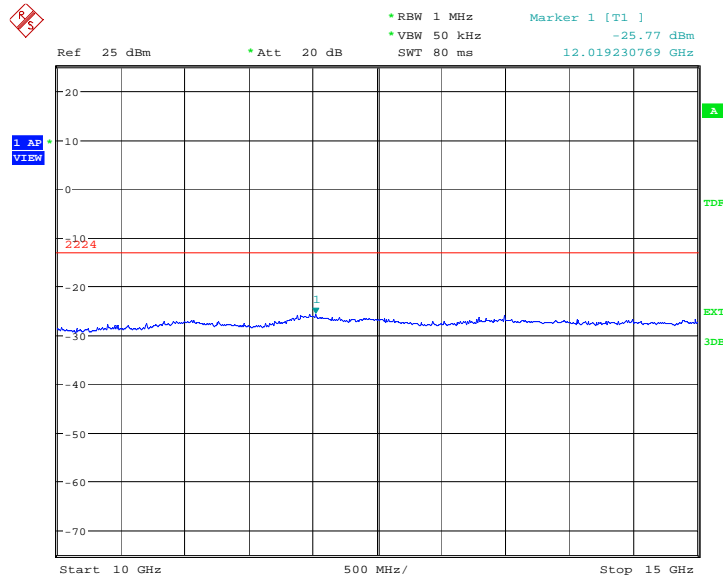
Date: 19.SEP.2012 01:34:13

A.8.3.10 Channel 600: 7.5GHz –10GHz
Spurious emission limit –13dBm.



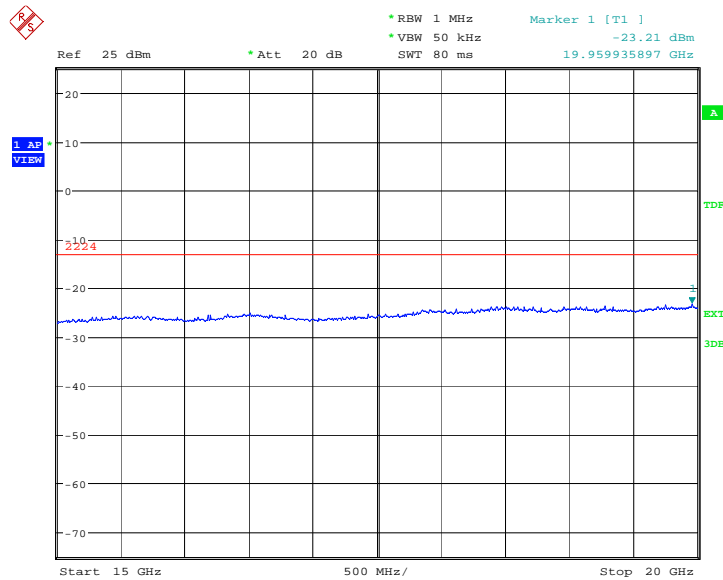
Date: 19.SEP.2012 01:34:40

A.8.3.11 Channel 600: 10GHz –15GHz
Spurious emission limit –13dBm.



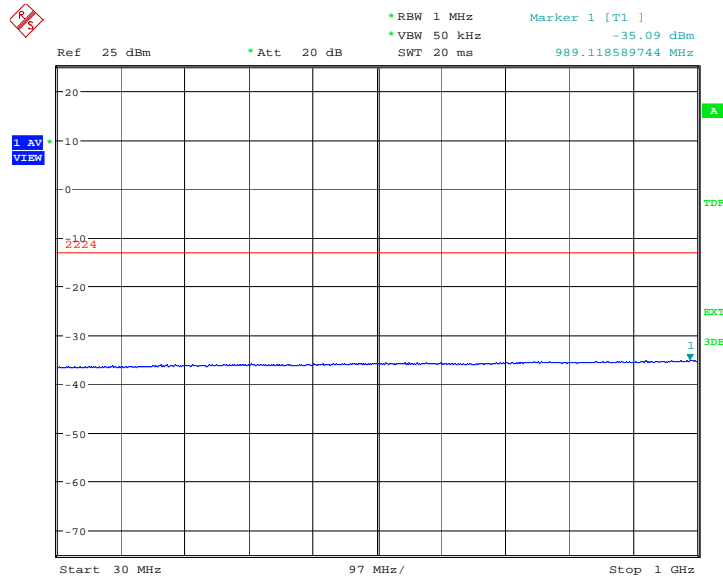
Date: 19.SEP.2012 01:35:07

A.8.3.12 Channel 600: 15GHz –20GHz
Spurious emission limit –13dBm.



Date: 19.SEP.2012 01:35:34

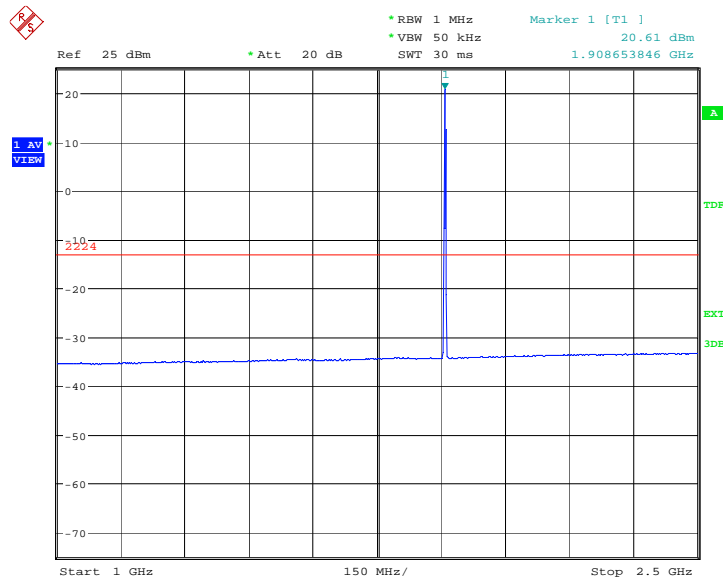
A.8.3.13 Channel 1175: 30MHz –1GHz
Spurious emission limit –13dBm.



Date: 19.SEP.2012 01:28:49

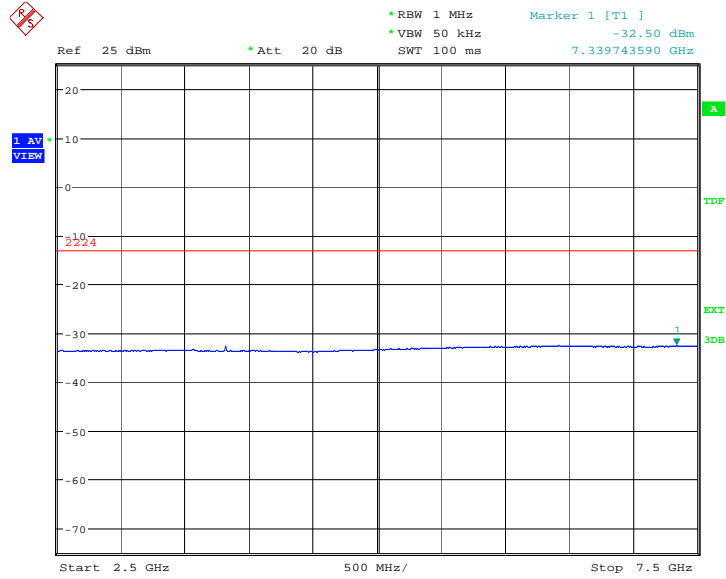
A.8.3.14 Channel 1175: 1GHz –2.5GHz
Spurious emission limit –13dBm.

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



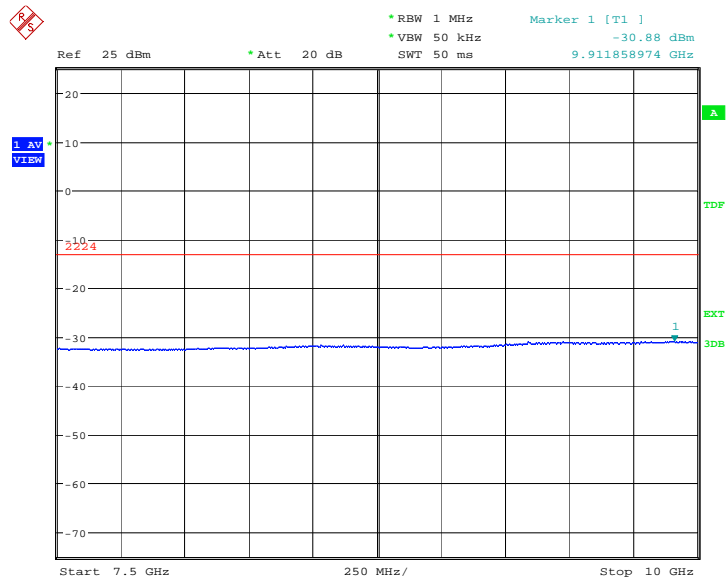
Date: 19.SEP.2012 01:29:16

A.8.3.15 Channel 1175: 2.5GHz –7.5GHz
Spurious emission limit –13dBm.



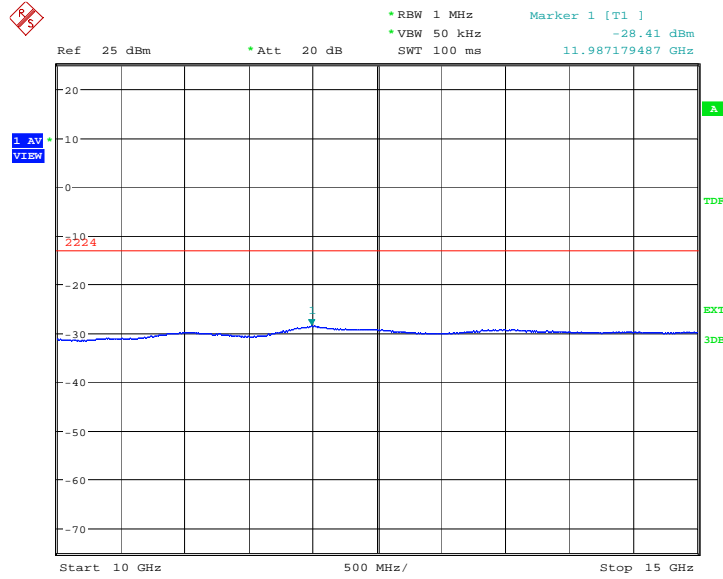
Date: 19.SEP.2012 01:29:43

A.8.3.16 Channel 1175: 7.5GHz –10GHz
Spurious emission limit –13dBm.



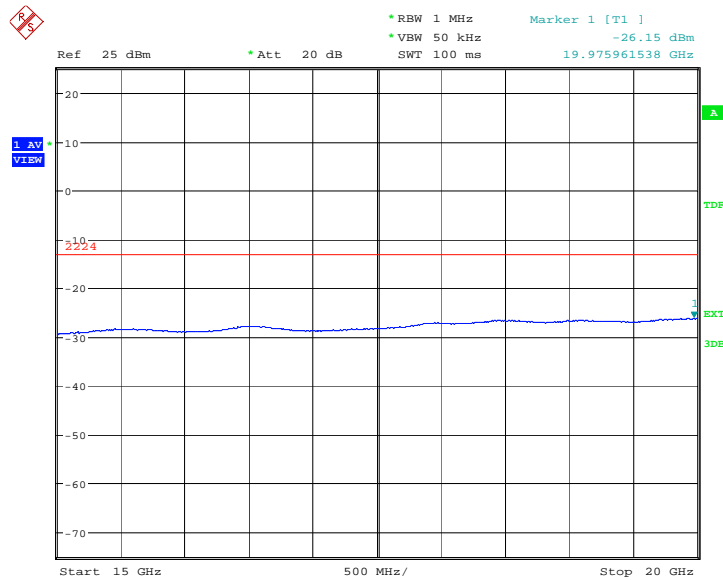
Date: 19.SEP.2012 01:30:10

A.8.3.17 Channel 1175: 10GHz –15GHz
Spurious emission limit –13dBm.



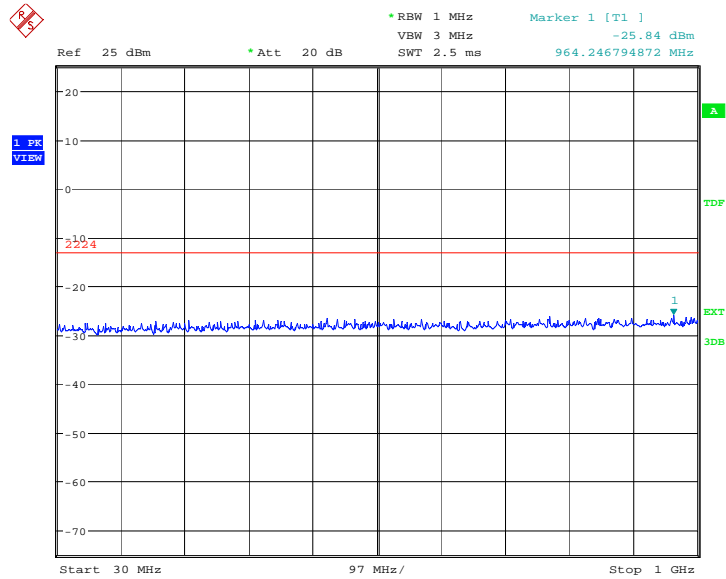
Date: 19.SEP.2012 01:30:37

A.8.3.18 Channel 1175: 15GHz –20GHz
Spurious emission limit –13dBm.



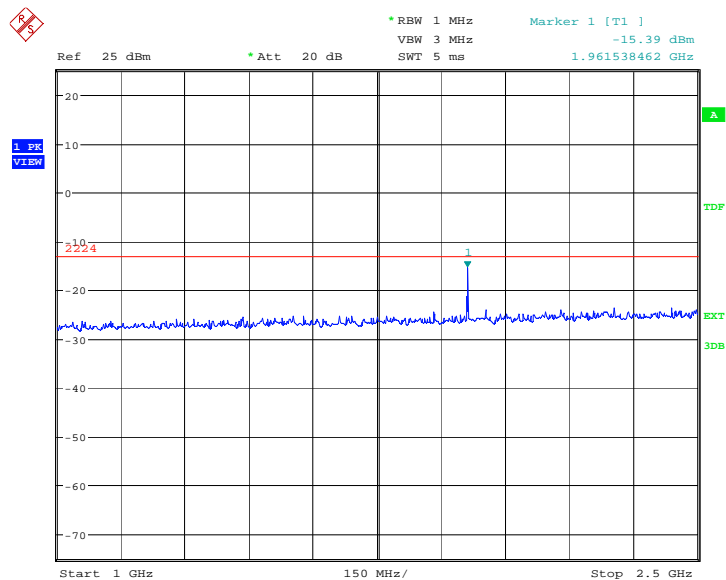
Date: 19.SEP.2012 01:31:04

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



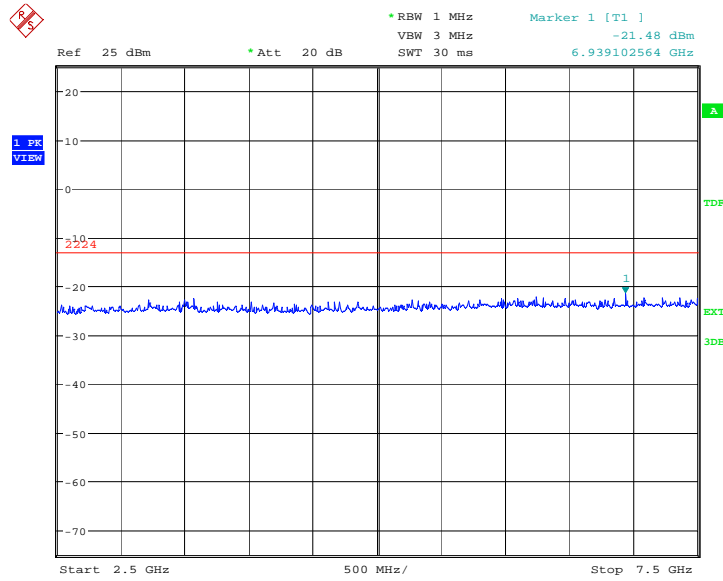
Date: 19.SEP.2012 01:43:00

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



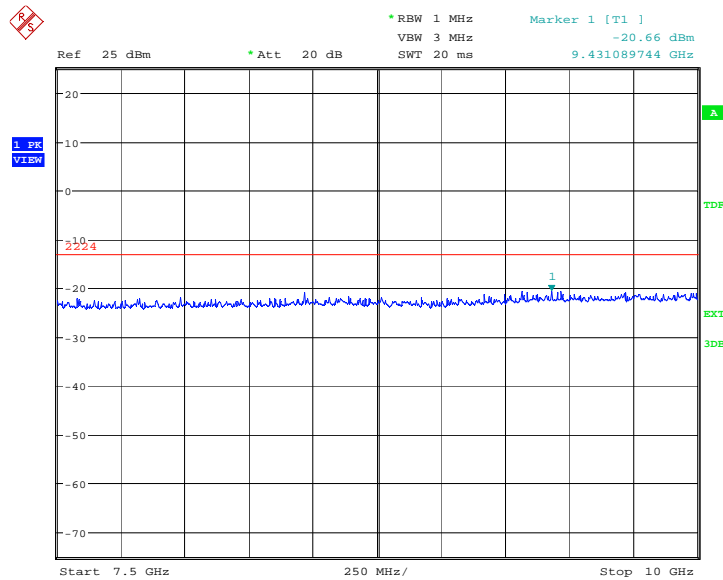
Date: 19.SEP.2012 01:43:27

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



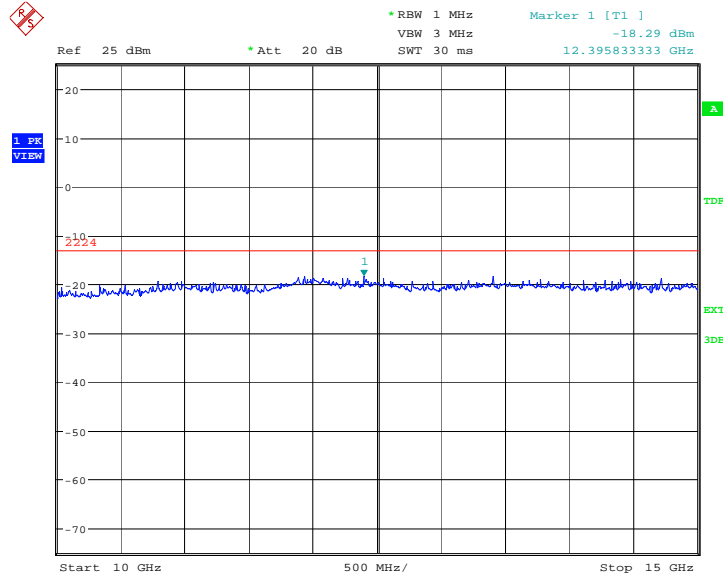
Date: 19.SEP.2012 01:43:54

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



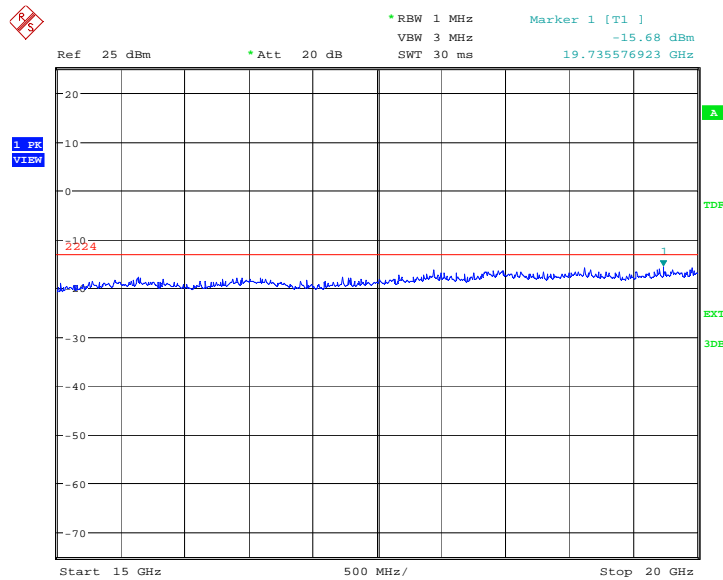
Date: 19.SEP.2012 01:44:21

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



Date: 19.SEP.2012 01:44:48

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



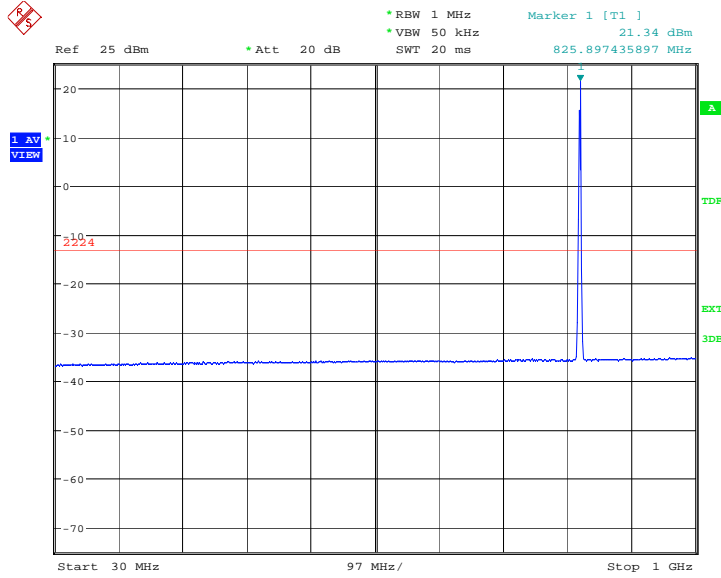
Date: 19.SEP.2012 01:45:14

CDMA 800

A. 8.3.25 Channel 1013: 30MHz –1GHz

Spurious emission limit –13dBm.

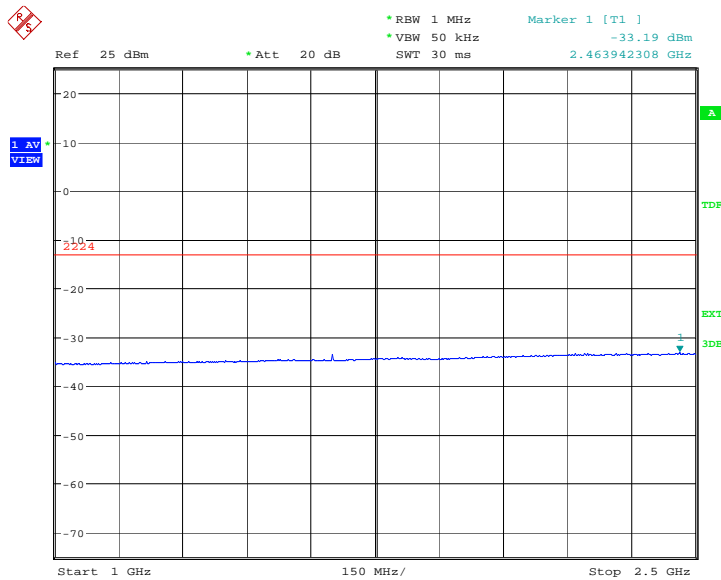
NOTE: peak above the limit line is the carrier frequency.



Date: 19.SEP.2012 00:48:55

A. 8.3.26 Channel 1013: 1GHz – 2.5GHz

Spurious emission limit –13dBm.

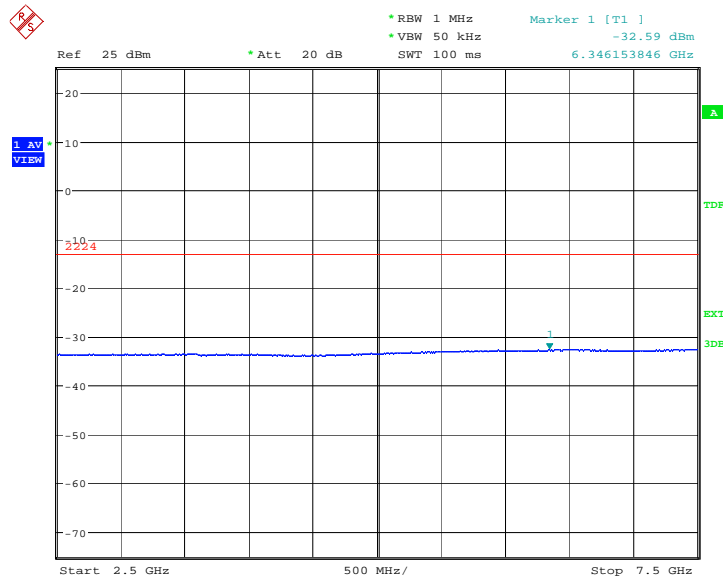


Date: 19.SEP.2012 00:49:22

A. 8.3.27 Channel 1013: 2.5GHz –7.5GHz

Spurious emission limit –13dBm.

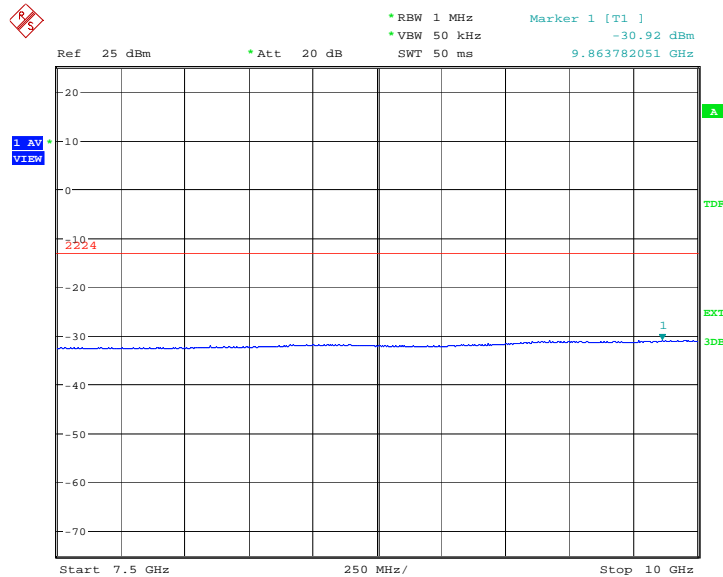
NOTE: peak above the limit line is the carrier frequency.



Date: 19.SEP.2012 00:49:49

A. 8.3.28 Channel 1013: 7.5GHz – 10GHz

Spurious emission limit –13dBm.

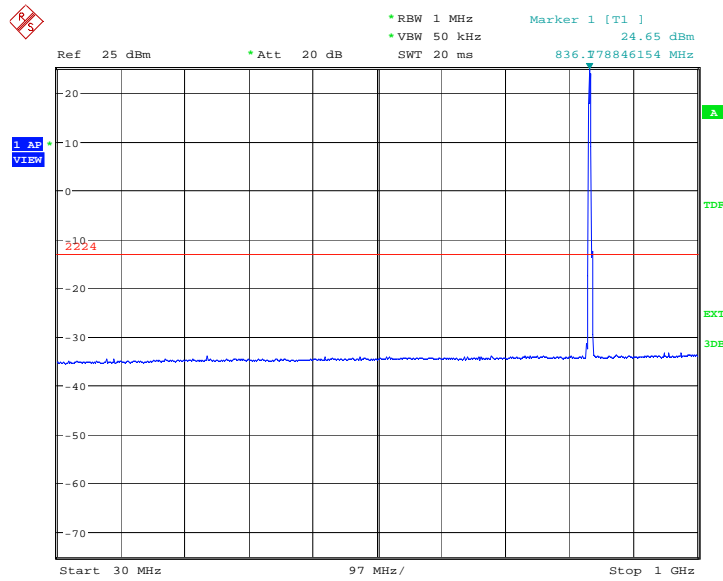


Date: 19.SEP.2012 00:50:16

A. 8.3.29 Channel 384: 30MHz –1GHz

Spurious emission limit –13dBm.

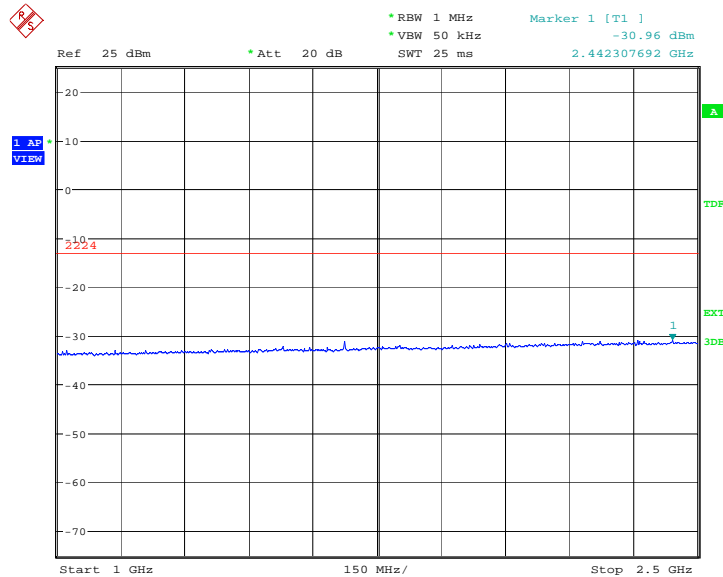
NOTE: peak above the limit line is the carrier frequency.



Date: 19.SEP.2012 00:56:50

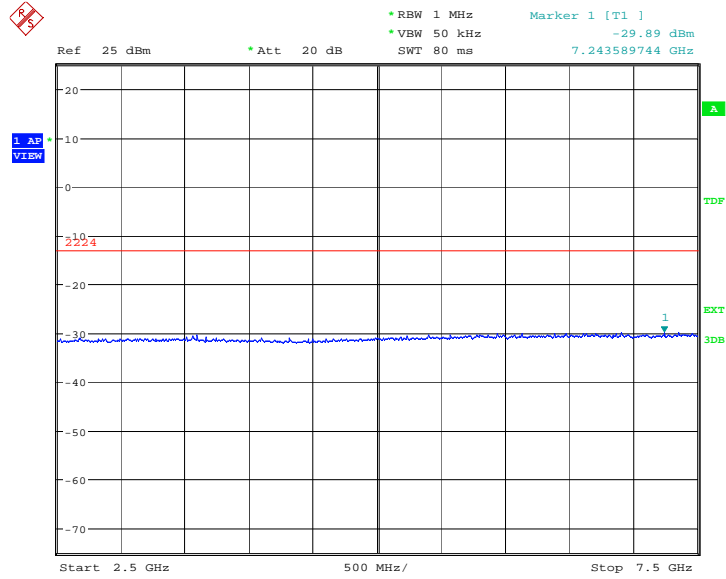
A.8.3.30 Channel 384: 1GHz – 2.5GHz

Spurious emission limit –13dBm.



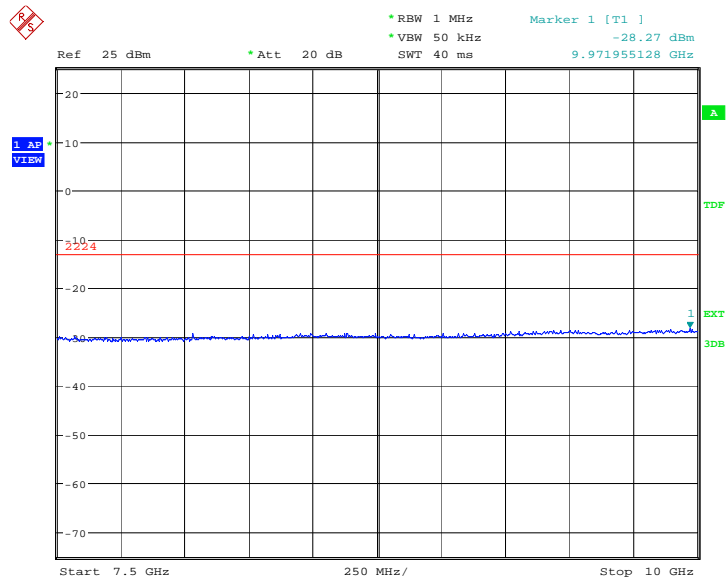
Date: 19.SEP.2012 00:57:17

A. 8.3.31 Channel 384: 2.5GHz –7.5GHz
Spurious emission limit –13dBm.



Date: 19.SEP.2012 00:57:44

A. 8.3.32 Channel 384: 7.5GHz – 10GHz
Spurious emission limit –13dBm.

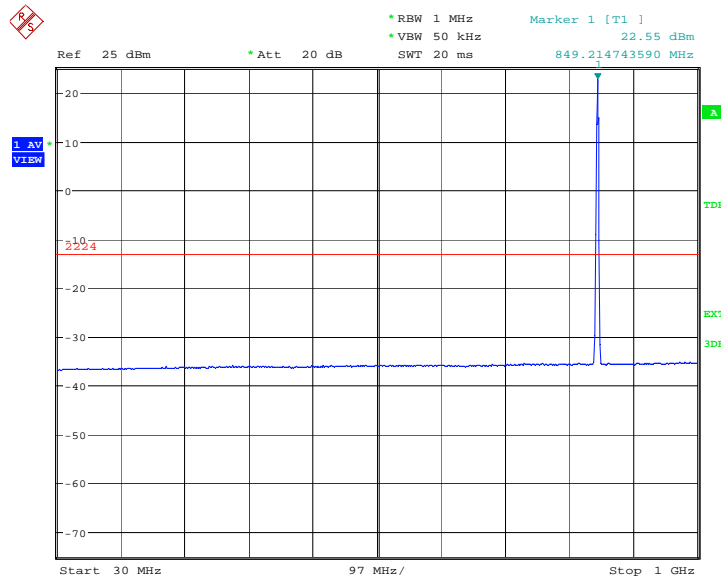


Date: 19.SEP.2012 00:58:10

A. 8.3.33 Channel 777: 30MHz –1GHz

Spurious emission limit –13dBm.

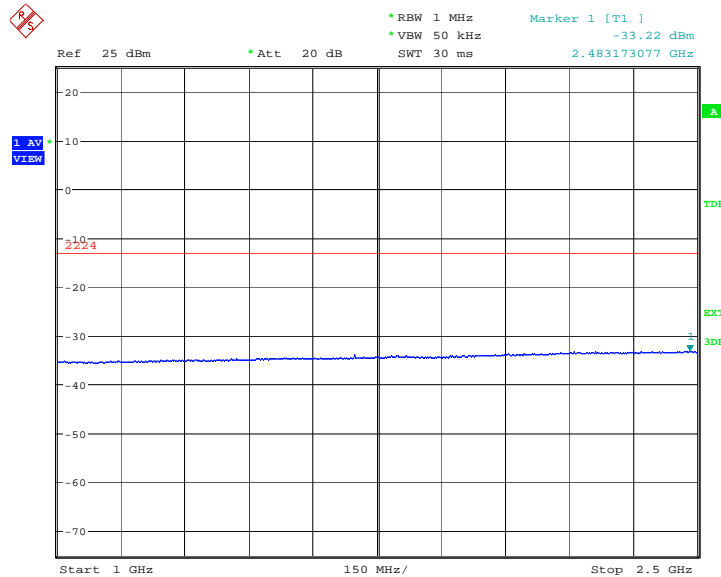
NOTE: peak above the limit line is the carrier frequency.



Date: 19.SEP.2012 00:53:01

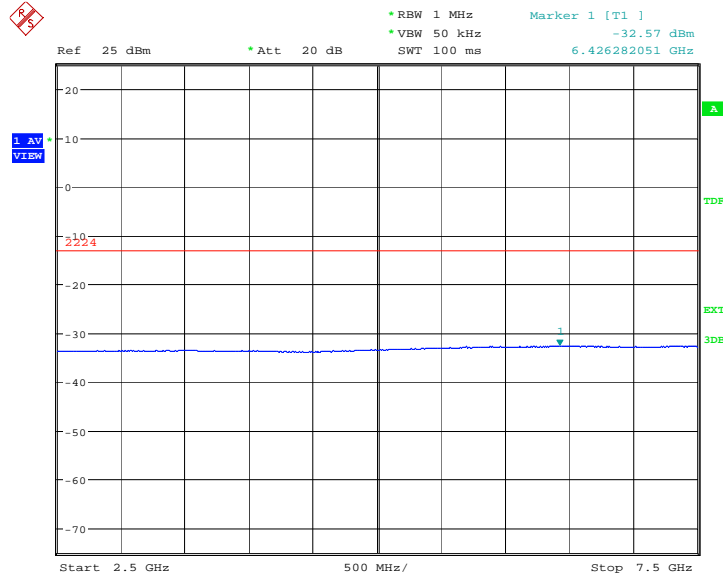
A. 8.3.34 Channel 777: 1GHz – 2.5GHz

Spurious emission limit –13dBm.



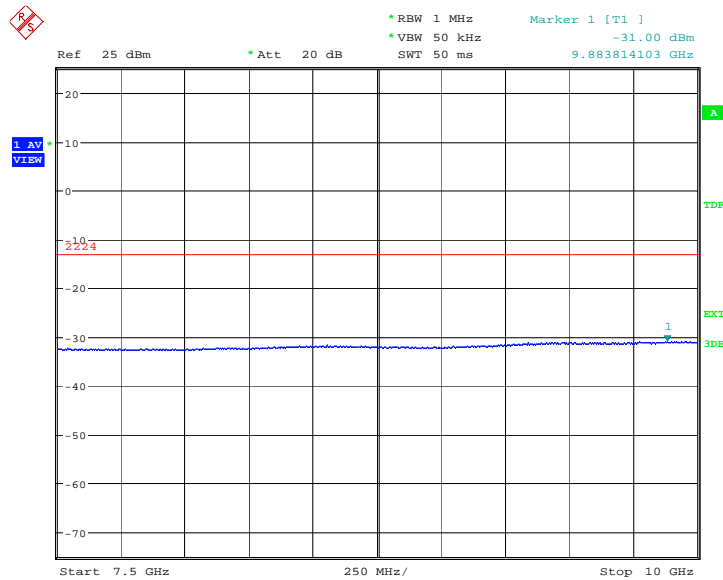
Date: 19.SEP.2012 00:53:28

A. 8.3.35 Channel 777: 2.5GHz –7.5GHz
Spurious emission limit –13dBm.



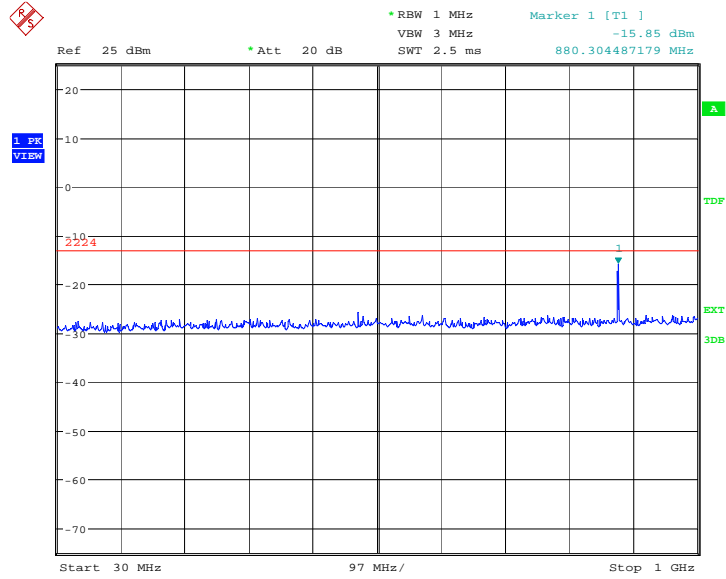
Date: 19.SEP.2012 00:53:55

A. 8.3.36 Channel 777: 7.5GHz – 10GHz
Spurious emission limit –13dBm.



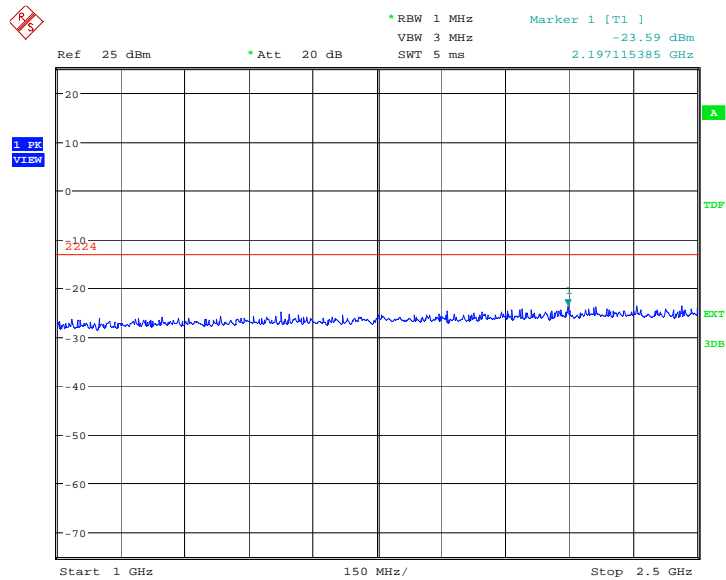
Date: 19.SEP.2012 00:54:22

A. 8.3.37 Idle mode: 30MHz – 1GHz
Spurious emission limit -13dBm.



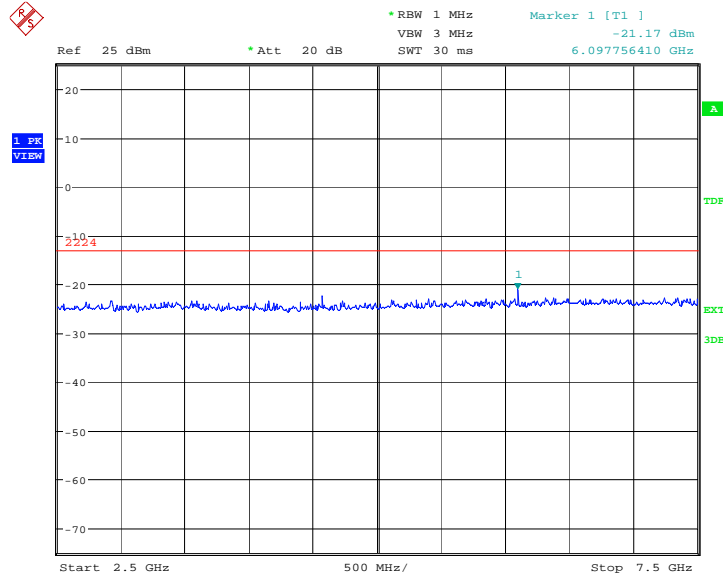
Date: 19.SEP.2012 01:13:22

A.8.3.38 Idle mode: 1GHz – 2.5GHz
Spurious emission limit -13dBm.



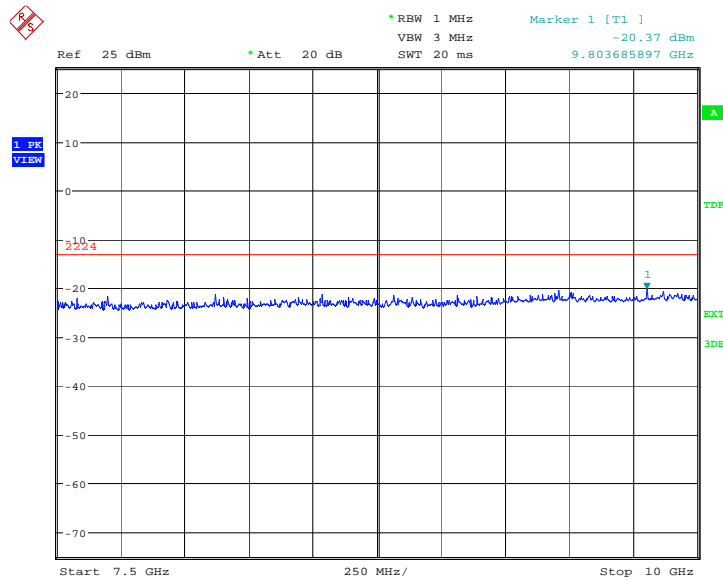
Date: 19.SEP.2012 01:13:49

A.8.3.39 Idle mode: 2.5GHz – 7.5GHz
Spurious emission limit -13dBm.



Date: 19.SEP.2012 01:14:15

A.8.3.40 Idle mode: 7.5GHz – 10GHz
Spurious emission limit -13dBm.



Date: 19.SEP.2012 01:14:42