TEST REPORT

No. 2011TAR574

for

ZTE CORPORATION

GSM Wireless Phone

Model Name: ZTE WP658

FCC ID: Q78-WP658

with

Hardware Version: fd9C

Software Version: LT_WP657+PV1.0.0B03

Issued Date: Oct 27, 2011

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of TMC Beijing.

Test Laboratory:

DAR accreditation (DIN EN ISO/IEC 17025): No. DGA-PL-114/01-02

FCC 2.948 Listed: No.733176

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

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1. Test Laboratory

1.1. Testing Location

Company Name:	TMC Beijing, Telecommunication Metrology Center of MIIT
Address:	3/F Shou Xiang Technology Building, No.51 Xueyuan Road, Hai Dian District, Beijing, P. R. China
Postal Code:	100191
Telephone:	00861062304633
Fax:	00861062304793

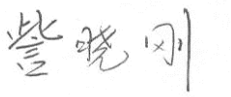
1.2. Testing Environment

Normal Temperature:	15-35℃
Relative Humidity:	20-75%

1.3. Project data

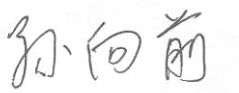
Testing Start Date:	Sep 17, 2011
Testing End Date:	Oct 27, 2011

1.4. Signature



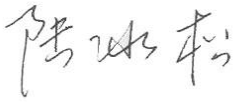
Zi Xiaogang

(Prepared this test report)



Sun Xiangqian

(Reviewed this test report)



Lu Bingsong

Deputy Director of the laboratory

(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	ZTE CORPORATION
Address /Post:	ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China
City:	Shenzhen
Country:	China
Telephone:	0086-21-61460890
Fax:	0086-21-61460602

2.2. Manufacturer Information

Company Name:	ZTE CORPORATION
Address /Post:	ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China
City:	Shenzhen
Country:	China
Telephone:	0086-21-61460890
Fax:	0086-21-61460602

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

3.1. About EUT

Description	GSM Wireless Phone
Model Name	ZTE WP658
FCC ID	Q78-WP658
Frequency	GSM 850MHz; PCS 1900MHz
Antenna	Internal
Power supply	Battery or Charger (AC Adaptor)
Output power	33.10 dBm maximum ERP measured for GSM850
Extreme vol. Limits	3.5VDC to 4.2VDC (nominal: 3.6VDC)
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 or IMEI	HW Version	SW Version
N04	355421040454828	fd9C	LT_WP657+PV1.0.0B03

*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
AE1	Battery	
AE2	Charger	

AE1

Model	Ni3608T30P3S534416
Manufacturer	ZTE
Capacitance	800mAh
Nominal Voltage	3.6V

AE2

Model	STC-A22O50C35-C
Manufacturer	RUIDE
Length of DC line	120cm

*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 Wireless Phone with integrated antenna. It consists of normal options: lithium battery, charger Manual and specifications of the EUT were provided to fulfil the test. Samples undergoing test were selected by the Client.

4. Reference Documents

4.1. Reference Documents for testing

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

Reference	Title	Version
FCC Part 24	PERSONAL COMMUNICATIONS SERVICES	V 10.1.09
FCC Part 22	PUBLIC MOBILE SERVICES	V 10.1.09
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 (23 meters×17meters×10meters) did not exceed following limits along the EMC testing:

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

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

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

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

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

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

Temperature	Min. = 15 ℃, Max. = 30 ℃
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω
Uniformity of field strength	Between 0 and 6 dB, from 80 to 2000 MHz

6. SUMMARY OF TEST RESULTS

Items	List	Clause in FCC rules	Verdict
1	Output Power	22.913(a)/24.232(b)	P
2	Emission Limit	2.1051/22.917/24.238	P
3	Conducted Emission	15.107/15.207	P
4	Frequency Stability	2.1055/24.235	P
5	Occupied Bandwidth	2.1049(h)(i)	P
6	Emission Bandwidth	22.917(b)/24.238(b)	P
7	Band Edge Compliance	22.917(b)/24.238(b)	P
8	Conducted Spurious Emission	2.1057/22.917/24.238	P

7. Test Equipments Utilized

NO.	NAME	TYPE	SERIES NUMBER	PRODUCER	CAL DUE DATE
1	Test Receiver	ESCI	100766	R&S	2011-12-06
2	Test Receiver	ESI40	831564/002	R&S	2011-12-12
3	BiLog Antenna	VULB9163	9163-175	Schwarzbeck	2011-12-05
4	BiLog Antenna	VULB9163	9163-302	Schwarzbeck	2011-12-10
5	Signal Generator	SMB100A	102063	R&S	2011-12-05
7	LISN	ESH2-Z5	829991/012	R&S	2011-12-20
8	Spectrum Analyzer	FSU26	200030	R&S	2011-12-18
9	Spectrum Analyzer	FSU46	100054	R&S	2011-12-14
10	Universal Radio Communication Tester	CMU200	100680	R&S	2011-12-23
11	Universal Radio Communication Tester	CMU200	109914	R&S	2011-12-21
12	Dual-Ridge Waveguide Horn Antenna	3117	00119024	ETS	2012-12-31
13	Dual-Ridge Waveguide Horn Antenna	3117	00119021	ETS	2013-12-09
14	Dual-Ridge Waveguide Horn Antenna	3116	2663	EMCO	2011-12-01
15	Dual-Ridge Waveguide Horn Antenna	3116	2661	EMCO	2011-12-01
16	Climatic chamber	PL-2G	343074	ESPEC	2011-12-15

ANNEX A: MEASUREMENT RESULTS

A.1 OUTPUT POWER (§22.913(a)/§24.232(b))

A.1.1 Summary

During the process of testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication tester (CMU-200) to ensure max power transmission and proper modulation.
This result contains peak output power and EIRP measurements for the EUT.
In all cases, output power is within the specified limits.

A.1.2 Conducted

A.1.2.1 Method of Measurements

The EUT was set up for the max output power with pseudo random data modulation.
The power was measured with Rhode & Schwarz Spectrum Analyzer FSU (peak)
These measurements were done at 3 frequencies, 1850.2 MHz, 1880.0MHz and 1909.8MHz for PCS1900 band;824.4MHz, 836.6MHz and 848.8MHz for GSM850 band. (bottom, middle and top of operational frequency range).

A.1.2.2 Test Condition

RBW	VBW	Sweep Time	Span
1MHz	1MHz	300ms	10MHz

GSM850

Limit

	Power step	Nominal Peak output power (dBm)	Target (dB)
GSM	5	33dBm(2W)	33±2

Measurement result

GSM（GMSK）

Frequency(MHz)	Power Step	Peak output power(dBm)
824.2	5	31.18
836.6	5	31.27
848.8	5	**31.31**

ANALYZER SETTINGS: VBW=RBW=1MHz; SPAN=10MHz;SWT=300ms

PCS1900

Limit

	Power step	Nominal Peak output power (dBm)	Target (dB)
GSM	0	30dBm(1W)	30±1

Measurement result

GSM（GMSK）

Frequency(MHz)	Power Step	Peak output power(dBm)
1850.2	0	29.02
1880.0	0	**29.14**
1909.8	0	29.06

ANALYZER SETTINGS: VBW=RBW=1MHz; SPAN=10MHz;SWT=300ms

A.1.3 Radiated

A.1.3.1 Description

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

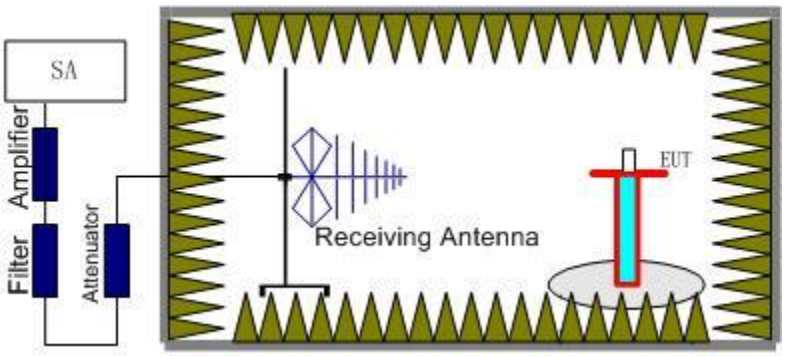
Rule Part 24.232(b) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."

Rule Part 22.913(a) specifies ” The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.”

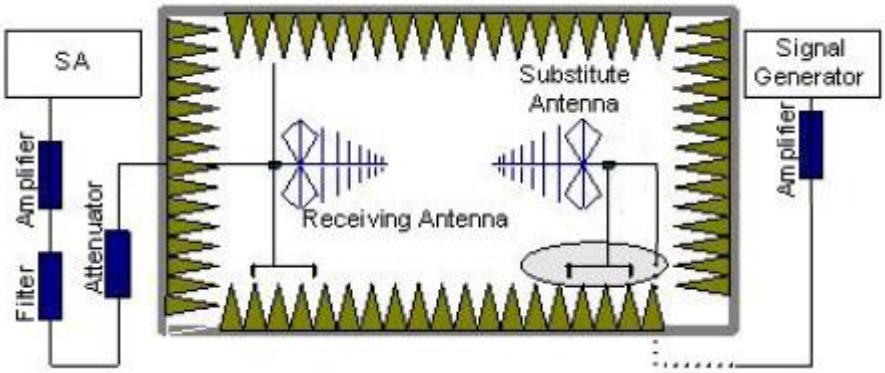
A.1.3.2 Method of Measurement

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

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



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



In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is

connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna.
   The cable loss (P_{cl}) ,the Substitution Antenna Gain (G_a) and the Amplifier Gain (P_{Ag}) should be recorded after test.
   The measurement results are obtained as described below:
   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 -2.15dBi.

GSM 850-ERP 22.913(a)

Limits

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

Measurement result

GSM

Frequency(MHz)	Peak ERP(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dBm)	P_{Mea}(dBm)	Polarization
824.2	31.15	2.27	-53.00	0.84	2.15	-16.59	V
836.6	**33.10**	2.26	-53.00	0.90	2.15	-14.59	V
848.8	32.29	2.32	-53.00	0.95	2.15	-15.29	V

Frequency**:** 836.6MHz

Peak ERP(dBm)= P_{Mea}(-14.59dBm)- P_{cl}(2.26dB)- P_{Ag}(-53.00dB)-G_a (0.90dB)-2.15dBm=33.10dBm

ANALYZER SETTINGS: RBW = VBW = 3MHz

PCS1900-EIRP 24.232(b)

Limits

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

Measurement result

GSM

Frequency(MHz)	Peak EIRP(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	P_{Mea}(dBm)	Polarization
1850.2	31.03	3.92	-50.00	-4.56	-19.61	V
1880	**31.42**	3.64	-50.00	-4.43	-19.37	V
1909.8	30.00	3.61	-50.00	-4.30	-20.69	V

Frequency**:** 1880MHz

Peak EIRP(dBm)= P_{Mea}(-19.37dBm)- P_{cl}(3.64dB)- P_{Ag}(-50.00dB)-G_a (-4.43dB) =31.42dBm

ANALYZER SETTINGS: RBW = VBW = 3MHz

A.2 EMISSION LIMT (§2.1051/§22.917§24.238)

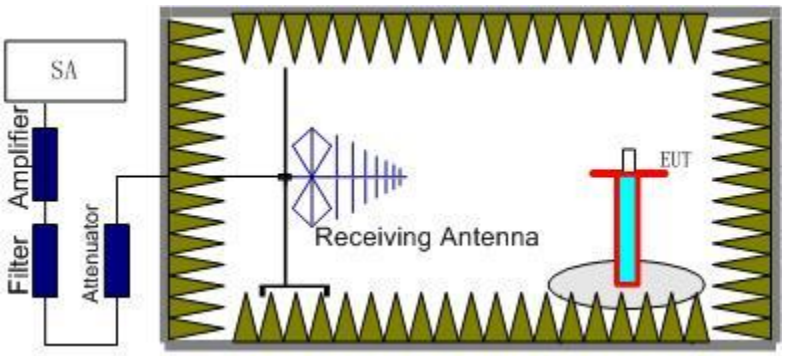
A.2.1 Measurement Method

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

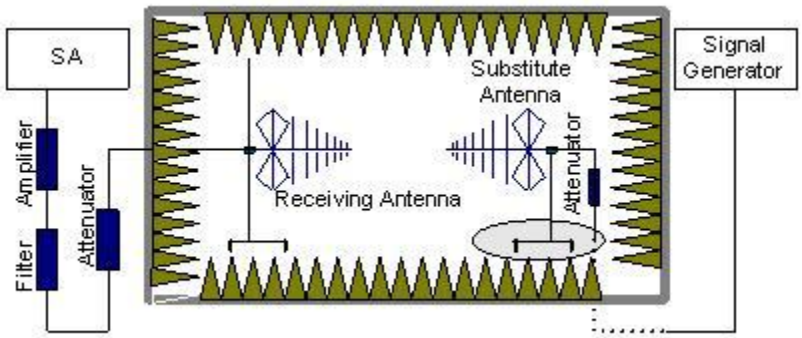
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz. The resolution bandwidth is set as outlined in Part 24.238 and Part 22.917. The spectrum is scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the PCS1900 band and GSM850 band.

The procedure of radiated spurious emissions is as follows:

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



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



In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere

with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. The Path loss (P_{pl}) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain (G_a) should be recorded after test.
   A amplifier should be connected in for the test.
   The Path loss (P_{pl}) is the summation of the cable loss and the gain of the amplifier.
   The measurement results are obtained as described below:
   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 -2.15dBi.

A.2.2 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.2.3 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the PCS1900 band (1850.2 MHz, 1880 MHz and 1909.8 MHz) and GSM850 band (824.2MHz, 836.6MHz, 848.8MHz) . It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the PCS1900 ,GSM850 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.

A.2.4 Measurement Results Table

Frequency	Channel	Frequency Range	Result
GSM 850MHz	Low	30MHz-10GHz	Pass
	Middle	30MHz-10GHz	Pass
	High	30MHz-10GHz	Pass
GSM 1900MHz	Low	30MHz-20GHz	Pass
	Middle	30MHz-20GHz	Pass
	High	30MHz-20GHz	Pass

A.2.5 Sweep Table

Working Frequency	Subrange (GHz)	RBW	VBW	Sweep time (s)
850MHz	0.03~1	100KHz	300KHz	10
	1-2	1 MHz	3 MHz	2
	2~5	1 MHz	3 MHz	3
	5~8	1 MHz	3 MHz	3
	8~10	1 MHz	3 MHz	3
1900MHz	0.03~1	100KHz	300KHz	10
	1-2	1 MHz	3 MHz	2
	2~5	1 MHz	3 MHz	3
	5~8	1 MHz	3 MHz	3
	8~11	1 MHz	3 MHz	3
	11~14	1 MHz	3 MHz	3
	14~18	1 MHz	3 MHz	3
	18~20	1 MHz	3 MHz	2

GSM Mode Channel 128/824.2MHz

Frequency(MHz)	Peak ERP(dBm)	Path Loss	Antenna Gain	Correction (dBm)	P_{Mea}(dBm)	Limit （dBm）	Polarization
1648.63	-40.00	3.40	-5.45	2.15	-40.10	-13.00	V
2472.70	-36.99	4.21	-5.32	2.15	-38.03	-13.00	V
3297.02	-42.31	5.41	-7.41	2.15	-42.46	-13.00	H
4121.18	-46.52	6.76	-8.57	2.15	-46.86	-13.00	H
5769.15	-46.82	6.88	-10.11	2.15	-45.74	-13.00	V
6593.20	-46.94	7.49	-10.69	2.15	-45.89	-13.00	H

GSM Mode Channel 190/836.6MHz

Frequency(MHz)	Peak ERP(dBm)	Path Loss	Antenna Gain	Correction (dBm)	P_{Mea}(dBm)	Limit （dBm）	Polarization
1673.11	-41.61	3.35	-5.34	2.15	-41.77	-13.00	H
2420.10	-49.60	4.30	-5.16	2.15	-50.89	-13.00	V
3526.43	-48.56	5.63	-7.93	2.15	-48.41	-13.00	H
4183.33	-52.65	6.72	-8.61	2.15	-52.91	-13.00	H
5856.48	-41.99	6.77	-10.14	2.15	-40.77	-13.00	V
6692.39	-43.17	8.08	-10.79	2.15	-42.61	-13.00	H

GSM Mode Channel 251/848.8MHz

Frequency(MHz)	Peak ERP(dBm)	Path Loss	Antenna Gain	Correction (dBm)	P_{Mea}(dBm)	Limit （dBm）	Polarization
1697.79	-41.52	3.36	-5.23	2.15	-41.80	-13.00	H
2546.06	-41.87	4.37	-5.52	2.15	-42.87	-13.00	H
3575.27	-48.73	5.74	-7.99	2.15	-48.63	-13.00	V
5941.91	-37.73	6.79	-10.18	2.15	-36.49	-13.00	V
6790.58	-46.02	8.84	-10.89	2.15	-46.12	-13.00	V
7639.16	-54.75	9.36	-11.54	2.15	-54.72	-13.00	V

GSM Mode Channel 512/1850.2MHz

Frequency(MHz)	Peak EIRP(dBm)	Path Loss	Antenna Gain	P_{Mea}(dBm)	Limit （dBm）	Polarization
3392.72	-59.20	5.45	-7.64	-57.01	-13.00	V
3864.91	-46.26	6.55	-8.34	-44.47	-13.00	V
5550.78	-46.45	6.75	-10.02	-43.18	-13.00	V
7400.71	-43.45	8.66	-11.34	-40.77	-13.00	V
10310.27	-64.01	8.31	-12.46	-59.86	-13.00	H
12950.99	-48.74	8.48	-13.24	-43.98	-13.00	H

GSM Mode Channel 661/1880.0MHz

Frequency(MHz)	Peak EIRP(dBm)	Path Loss	Antenna Gain	P_{Mea}(dBm)	Limit （dBm）	Polarization
3760.15	-41.80	6.47	-8.21	-40.06	-13.00	H
5640.20	-42.71	6.79	-10.06	-39.44	-13.00	V
7519.76	-48.02	9.02	-11.42	-45.62	-13.00	H
10245.35	-63.67	8.35	-12.45	-59.57	-13.00	V
13160.20	-42.69	8.57	-13.46	-37.80	-13.00	V
15040.49	-40.51	9.10	-13.49	-36.12	-13.00	H

GSM Mode Channel 810/1909.8MHz

Frequency(MHz)	Peak EIRP(dBm)	Path Loss	Antenna Gain	P_{Mea}(dBm)	Limit （dBm）	Polarization
3393.20	-55.12	5.45	-7.64	-52.93	-13.00	H
3819.73	-38.92	6.22	-8.28	-36.86	-13.00	H
5729.33	-41.88	6.84	-10.09	-38.63	-13.00	V
7639.12	-53.65	9.36	-11.54	-51.47	-13.00	H
9548.65	-49.37	8.58	-12.58	-45.37	-13.00	V
13367.92	-42.38	8.38	-13.67	-37.09	-13.00	H

A.3 CONDUCTED EMISSION (§15.107§15.207)

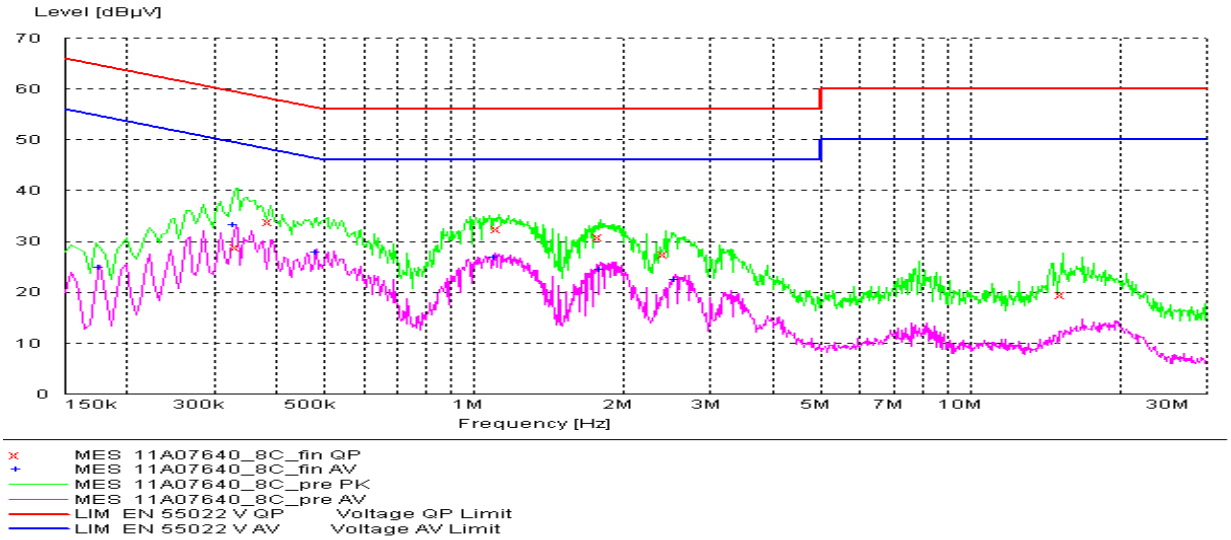
The measurement procedure in ANSI C63.4-1003 is used. Conducted Emission is measured with travel charger.

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



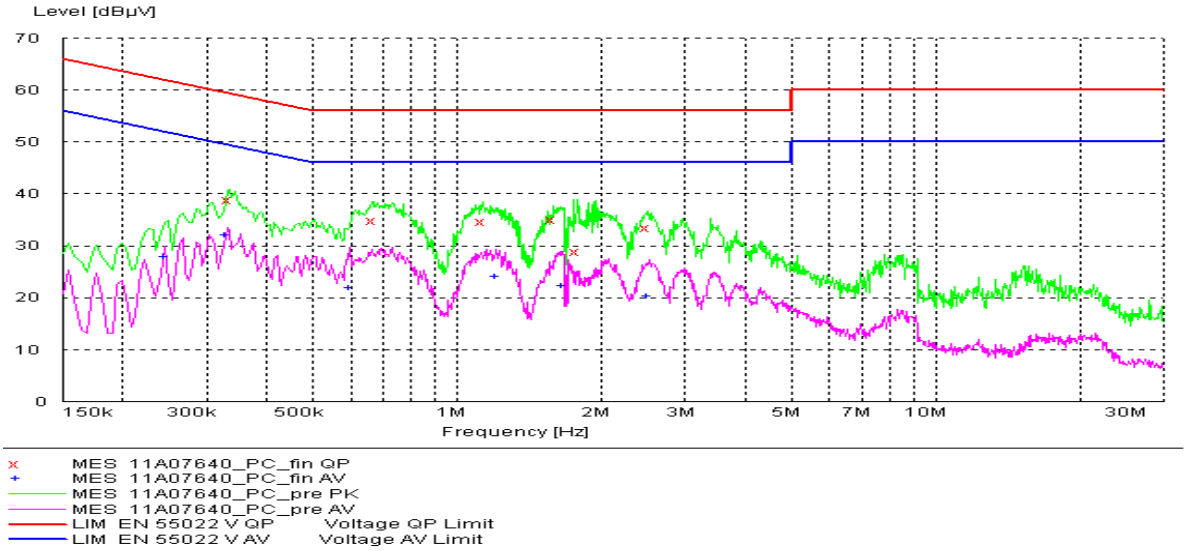
MEASUREMENT RESULT: "11A07640_8C_fin QP"

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.334500	28.90	10.1	59	30.5	N	GND
0.388500	33.80	10.1	58	24.2	L1	GND
1.126500	32.40	10.1	56	23.6	L1	GND
1.797000	30.80	10.1	56	25.2	L1	GND
2.429441	27.40	10.1	56	28.6	L1	GND
15.303233	19.40	10.2	60	40.6	L1	GND

MEASUREMENT RESULT: "11A07640_8C_fin AV"

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.177000	24.90	10.1	55	29.7	L1	GND
0.330000	33.20	10.1	50	16.2	L1	GND
0.483000	27.80	10.1	46	18.5	L1	GND
1.104000	26.80	10.1	46	19.2	L1	GND
1.797000	24.50	10.1	46	21.5	L1	GND
2.540978	22.40	10.1	46	23.6	L1	GND

PCS1900MHz



MEASUREMENT RESULT: "11A07640_PC_fin QP"

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.334500	38.70	10.1	59	20.6	L1	GND
0.672000	34.80	10.1	56	21.2	L1	GND
1.135500	34.60	10.1	56	21.4	L1	GND
1.590000	35.00	10.1	56	21.0	L1	GND
1.779000	28.80	10.1	56	27.2	L1	GND
2.503242	33.50	10.1	56	22.5	L1	GND

MEASUREMENT RESULT: "11A07640_PC_fin AV"

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.244500	27.80	10.1	52	24.1	L1	GND
0.330000	32.00	10.1	50	17.4	L1	GND
0.595500	21.80	10.1	46	24.2	L1	GND
1.207500	24.00	10.1	46	22.0	L1	GND
1.662000	22.20	10.1	46	23.8	L1	GND
2.515758	20.30	10.1	46	25.7	L1	GND

A.4 FREQUENCY STABILITY (§2.1055/§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℃.
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. Remeasure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments remeasuring 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 4.2VDC, with a nominal voltage of 3.6VDC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance of -10 % and +12.5 %. For the purposes of measuring frequency stability these voltage limits are to be used.

A.4.2.2 For equipment powered by primary supply voltage

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the

fundamental emission stays within the authorized frequency block. For this EUT section 2.1055(d)(1) applies. This requires varying primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

A.4.3 Measurement results

GSM 850

Frequency Error vs Voltage

Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.5	-31	0.040
3.6	-30	0.039
4.2	-33	0.043

Frequency Error vs Temperature

temperature(℃)	Frequency error(Hz)	Frequency error(ppm)
-30	-33	0.043
-20	-31	0.040
-10	-31	0.040
0	-30	0.039
10	-30	0.039
20	-30	0.039
30	-31	0.040
40	-31	0.040
50	-33	0.043

PCS 1900

Frequency Error vs Voltage

Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.5	-17	0.027
3.6	-17	0.027
4.2	-18	0.029

Frequency Error vs Temperature

temperature(℃)	Frequency error(Hz)	Frequency error(ppm)
-30	-20	0.032
-20	-18	0.029
-10	-18	0.029
0	-17	0.027
10	-17	0.027
20	-17	0.027
30	-18	0.029
40	-18	0.029
50	-20	0.032

A.5 OCCUPIED BANDWIDTH (§2.1049(h)(i))

A.5.1 Occupied Bandwidth Results

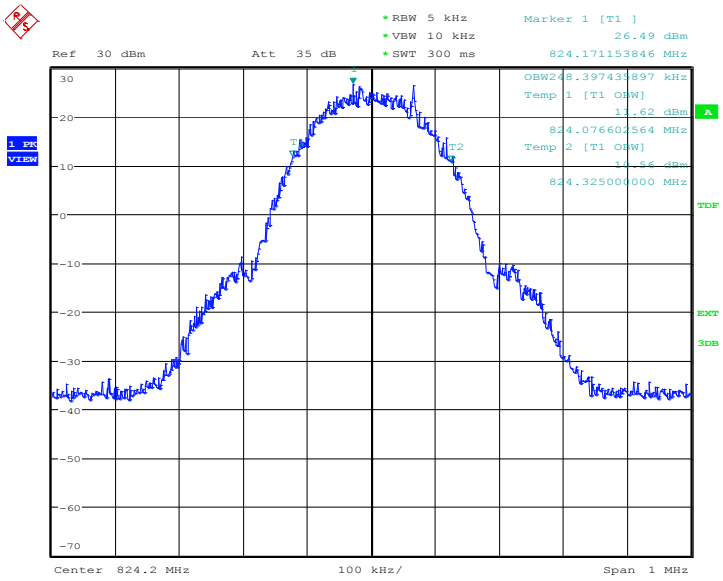
Similar to conducted emissions; occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of PCS1900 band and GSM850 band. The table below lists the measured -20dBc BW. Spectrum analyzer plots are included on the following pages.

GSM 850(-20dBc)

Frequency(MHz)	Occupied Bandwidth (-20dBc BW)(kHz)
824.2	269.230
836.6	275.641
848.8	275.641

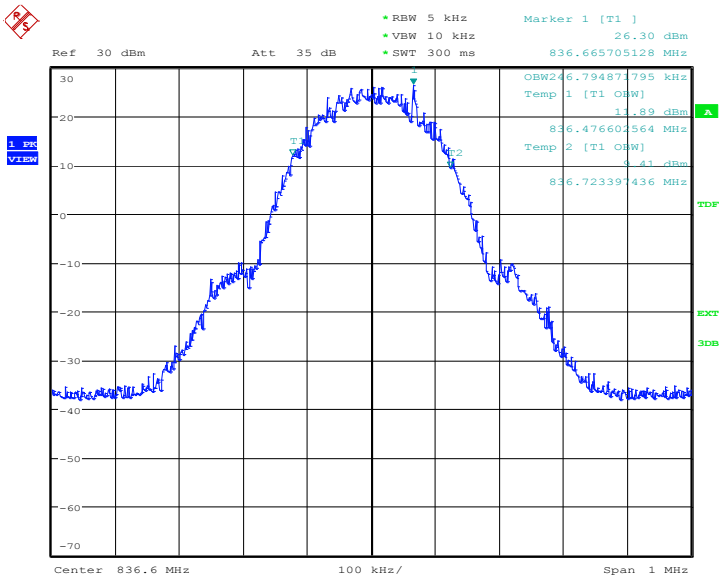
GSM 850

Channel 128-Occupied Bandwidth (-20dBc BW)



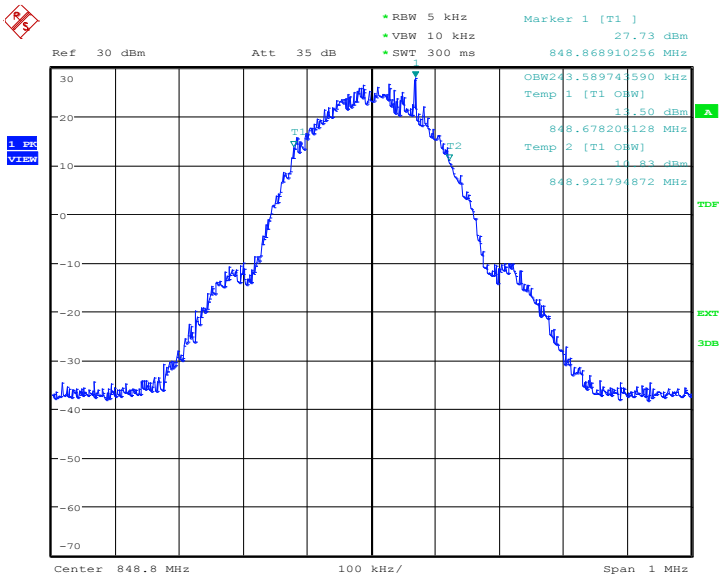
Date: 26.OCT.2011 06:24:13

Channel 190-Occupied Bandwidth (-20dBc BW)



Date: 26.OCT.2011 06:24:45

Channel 251-Occupied Bandwidth (-20dBc BW)



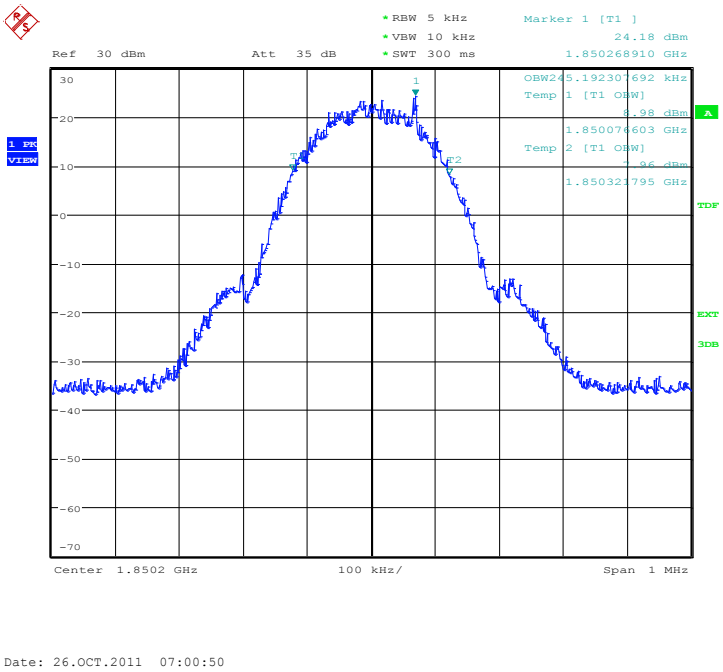
Date: 26.OCT.2011 06:25:17

PCS 1900(-20dBc)

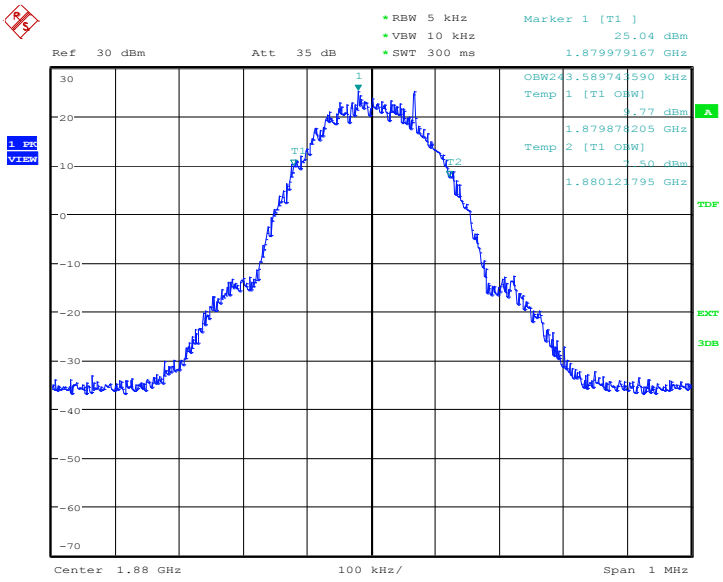
Frequency(MHz)	Occupied Bandwidth (-20dBc BW)(kHz)
1850.2	270.833
1880.0	282.051
1909.8	275.641

PCS 1900

Channel 512-Occupied Bandwidth (-20dBc BW)

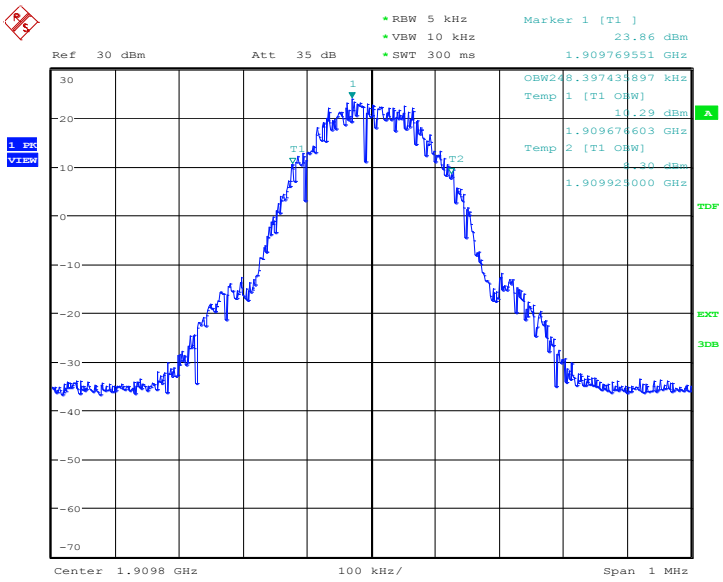


Channel 661-Occupied Bandwidth (-20dBc BW)



Date: 26.OCT.2011 07:01:23

Channel 810-Occupied Bandwidth (-20dBc BW)



Date: 26.OCT.2011 07:01:55

A.6 EMISSION BANDWIDTH (§22.917(b)/§24.238(b))

A.6.1Emission Bandwidth Results

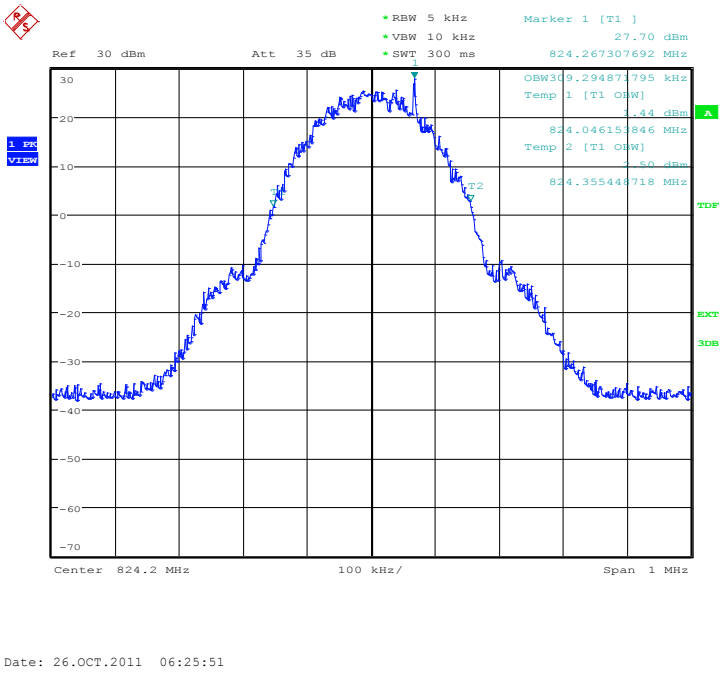
Similar to conducted emissions; Emission bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of PCS1900 band and GSM850 band. Table below lists the measured -26dBc BW. Spectrum analyzer plots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

GSM 850(-26dBc)

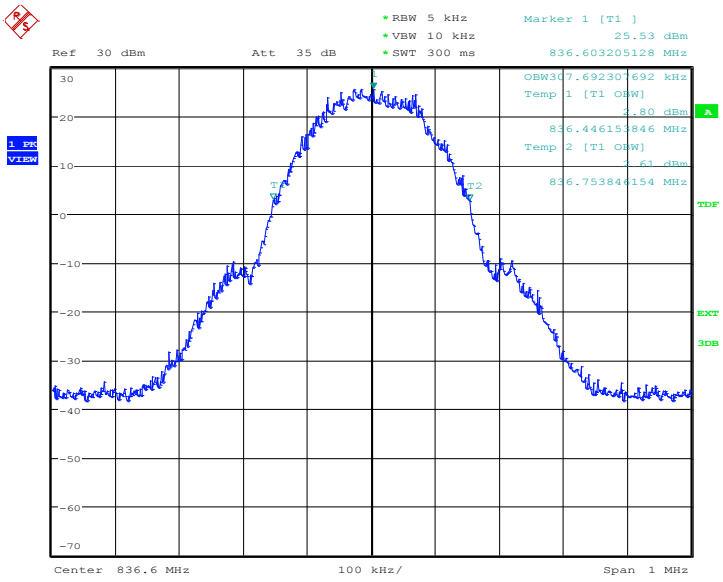
Frequency(MHz)	Occupied Bandwidth (–26dBc BW)(kHz)
824.2	314.102
836.6	310.897
848.8	306.089

GSM 850

Channel 128-Occupied Bandwidth (-26dBc BW)

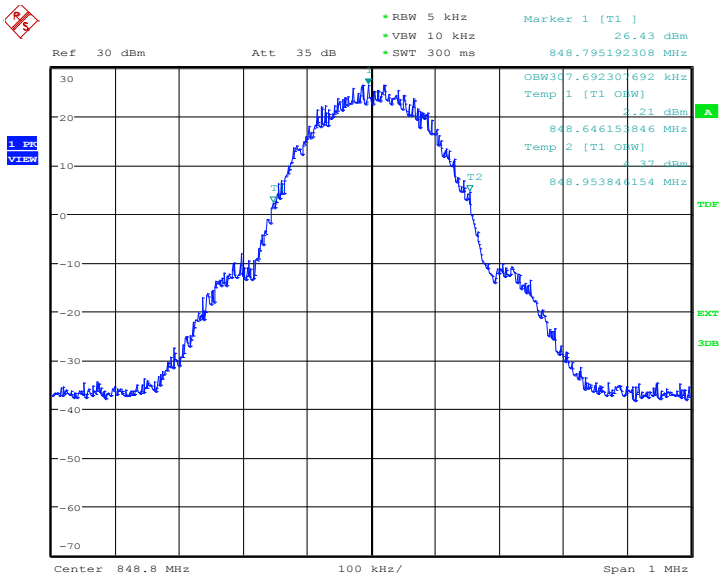


Channel 190-Occupied Bandwidth (-26dBc BW)



Date: 26.OCT.2011 06:26:24

Channel 251-Occupied Bandwidth (-26dBc BW)



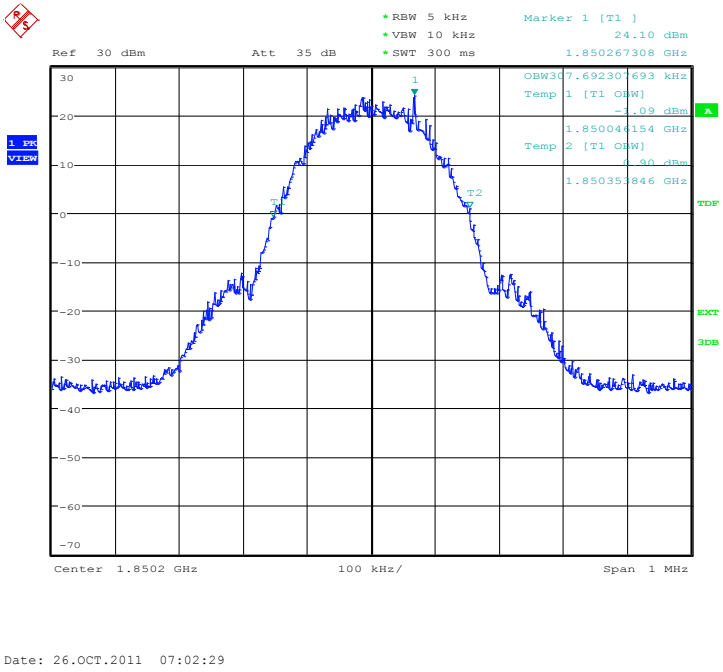
Date: 26.OCT.2011 06:26:56

PCS 1900(-26dBc)

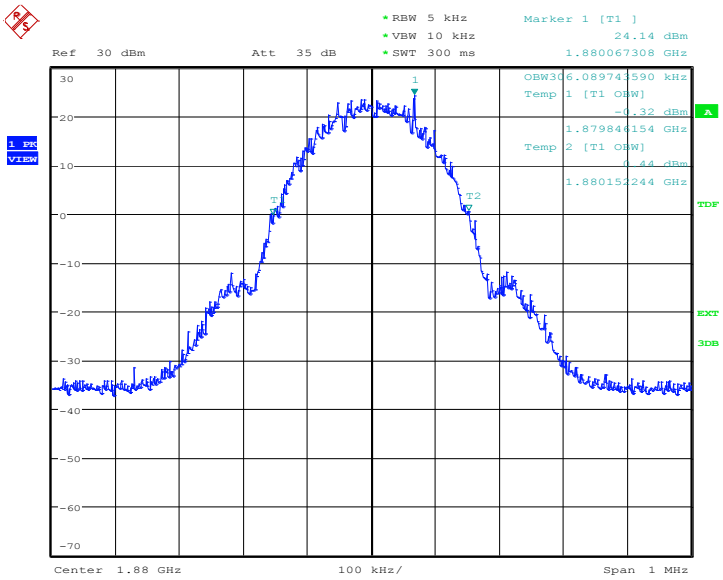
Frequency(MHz)	Occupied Bandwidth (–26dBc BW)(kHz)
1850.2	317.307
1880.0	314.102
1909.8	317.307

PCS 1900

Channel 512-Occupied Bandwidth (-26dBc BW)

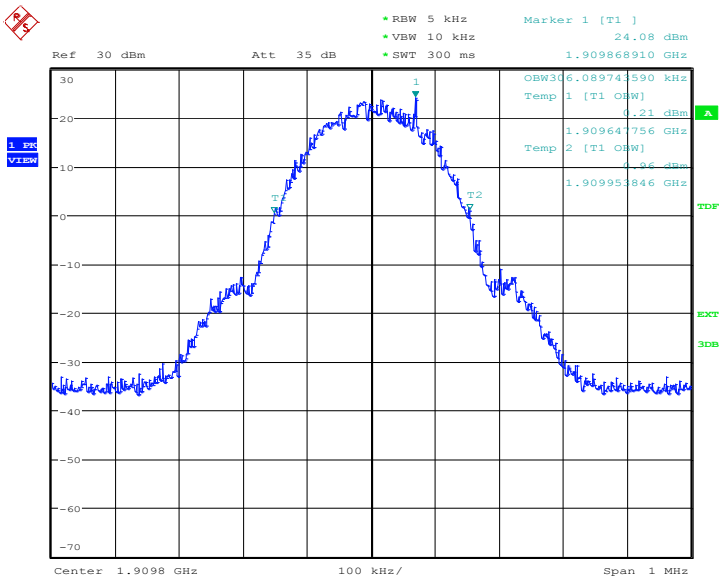


Channel 661-Occupied Bandwidth (-26dBc BW)



Date: 26.OCT.2011 07:03:01

Channel 810-Occupied Bandwidth (-26dBc BW)

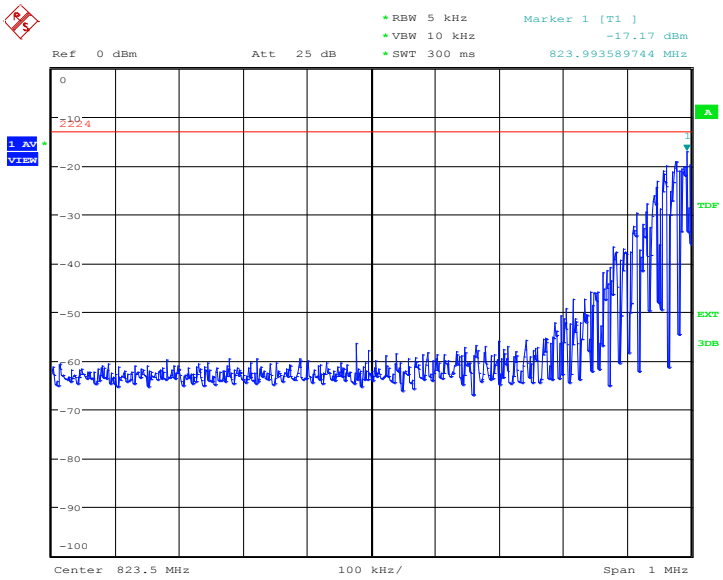


Date: 26.OCT.2011 07:03:33

A.7 BAND EDGE COMPLIANCE (§22.917(b)/§24.238(b))

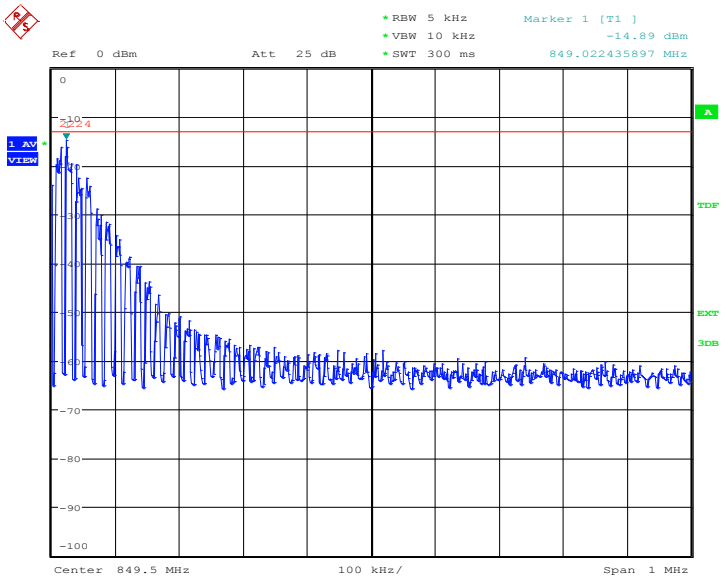
GSM 850

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



Date: 26.OCT.2011 06:33:54

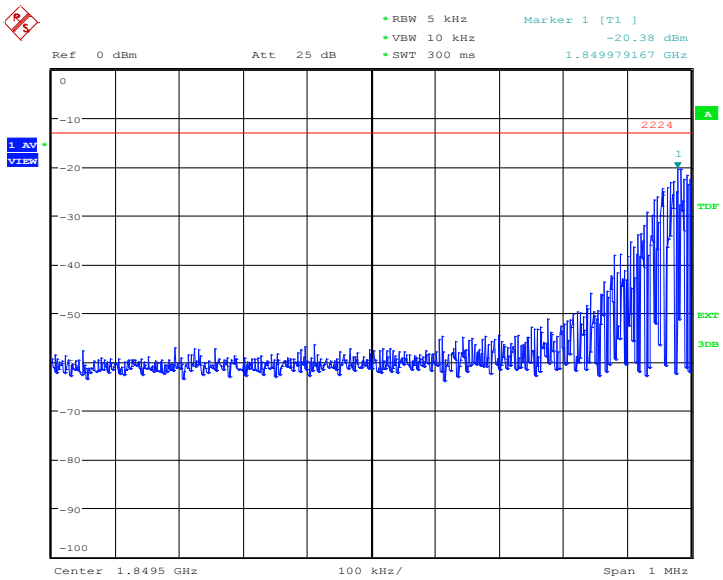
HIGH BAND EDGE BLOCK-C (GSM850) –Channel 251



Date: 26.OCT.2011 06:34:03

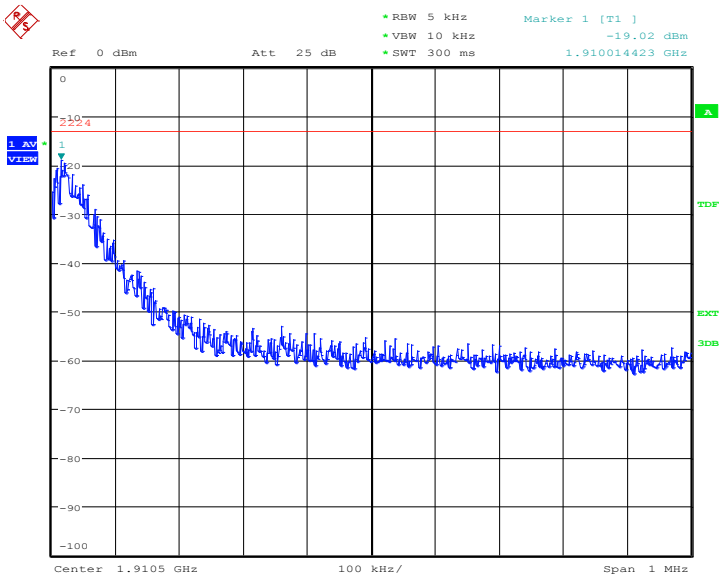
PCS 1900

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



Date: 26.OCT.2011 07:10:31

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



Date: 26.OCT.2011 07:10:40

A.8 CONDUCTED SPURIOUS EMISSION (§2.1057/§22.917/§24.238)

A.8.1 Measurement Method

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the equipment of PCS1900 band, this equates to a frequency range of 30 MHz to 19.1 GHz, data taken from 30 MHz to 20 GHz. For GSM850, data 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.

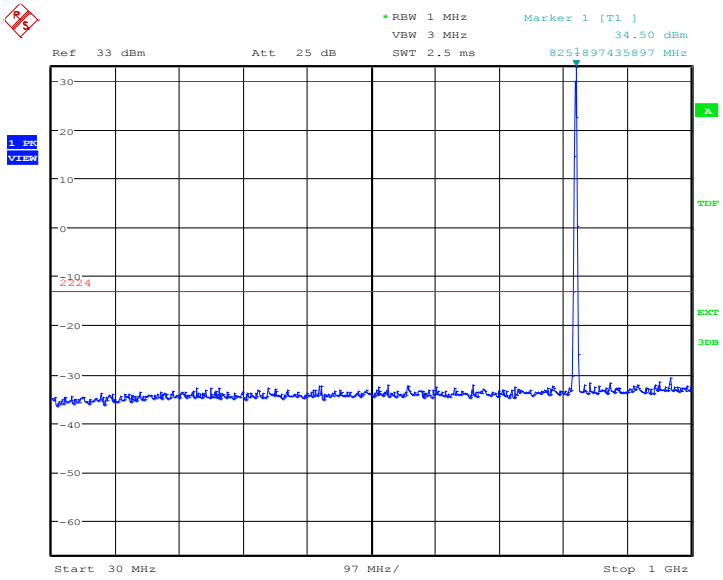
A. 8.3 Measurement result

GSM850

A.8.3.1 Channel 128: 30MHz – 1GHz

Spurious emission limit –13dBm.

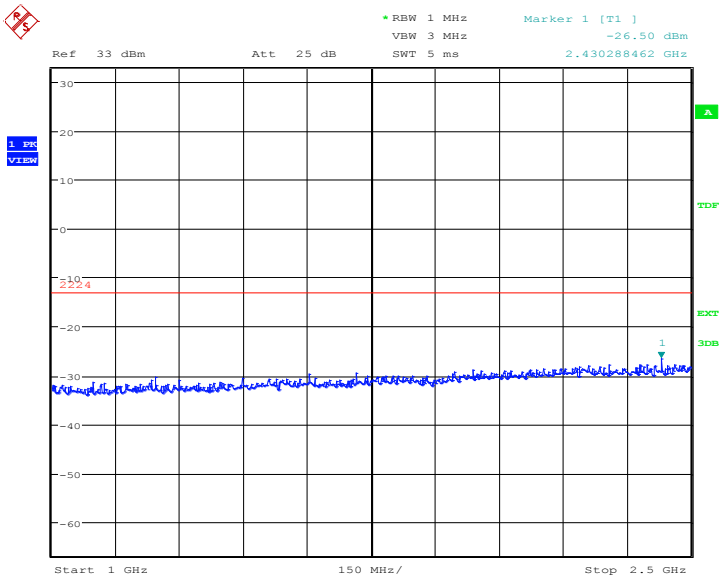
NOTE: peak above the limit line is the carrier frequency.



Date: 26.OCT.2011 06:34:32

A.8.3.2 Channel 128: 1GHz – 2.5GHz

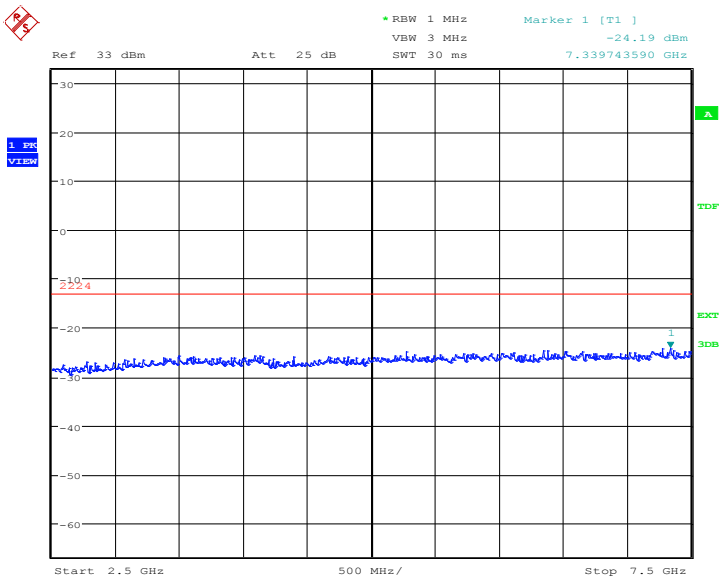
Spurious emission limit –13dBm.



Date: 26.OCT.2011 06:35:01

A.8.3.3 Channel 128: 2.5GHz – 7.5GHz

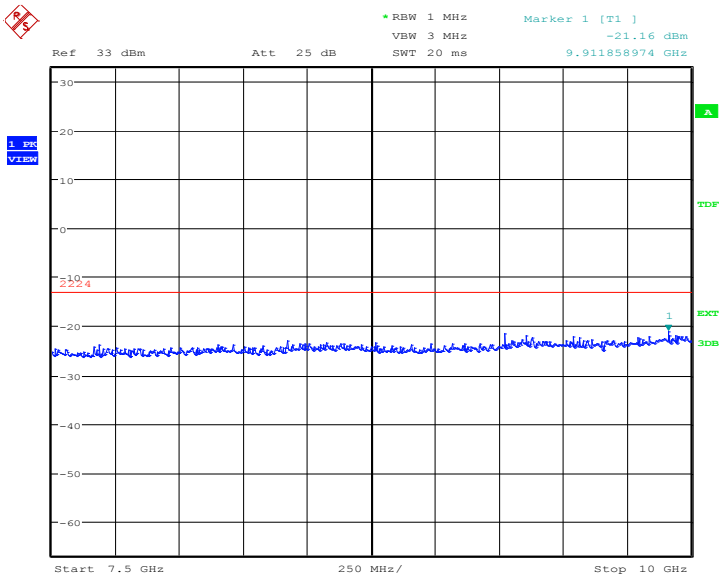
Spurious emission limit –13dBm.



Date: 26.OCT.2011 06:35:29

A.8.3.4 Channel 128: 7.5GHz –10GHz

Spurious emission limit –13dBm.

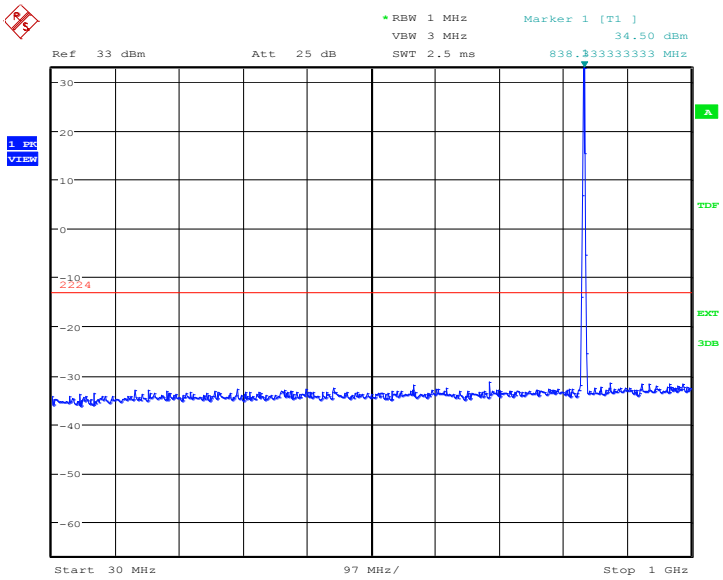


Date: 26.OCT.2011 06:35:58

A.8.3.5 Channel 190: 30MHz – 1GHz

Spurious emission limit –13dBm

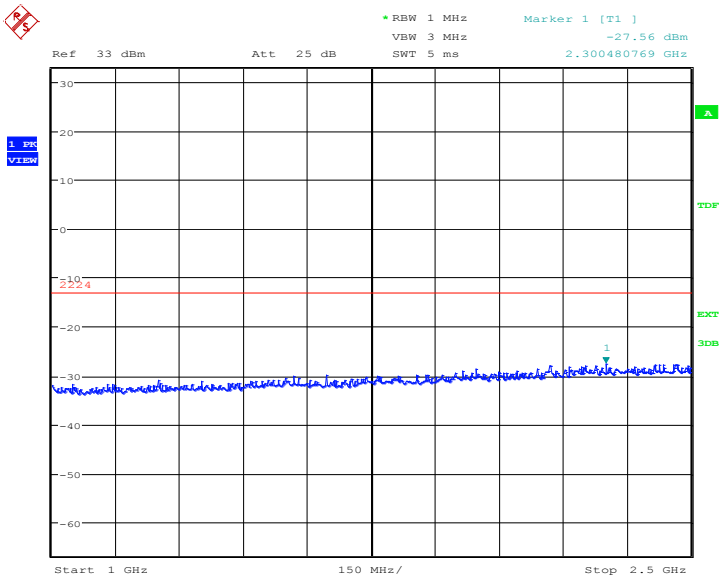
NOTE: peak above the limit line is the carrier frequency.



Date: 26.OCT.2011 06:36:27

A.8.3.6 Channel 190: 1GHz –2.5GHz

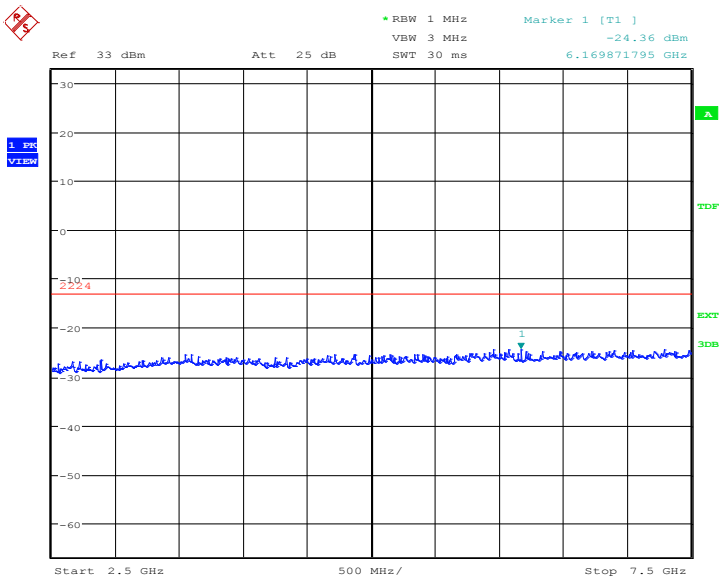
Spurious emission limit –13dBm



Date: 26.OCT.2011 06:36:55

A.8.3.7 Channel 190: 2.5GHz –7.5GHz

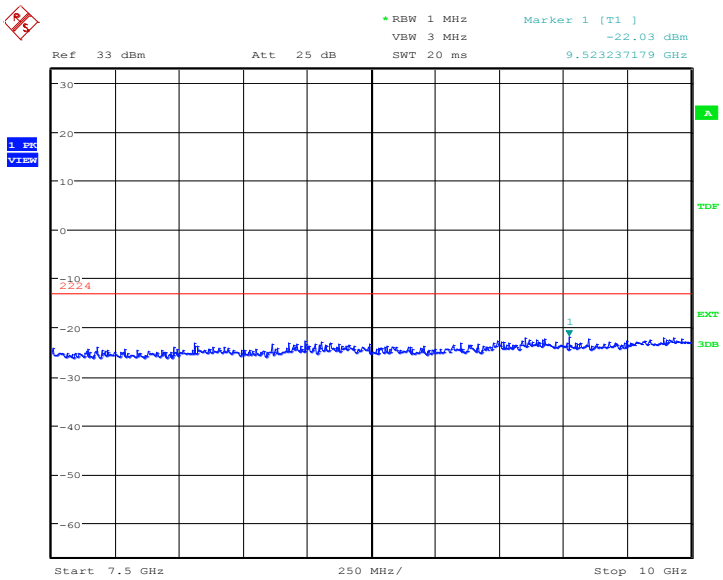
Spurious emission limit –13dBm



Date: 26.OCT.2011 06:37:23

A.8.3.8 Channel 190: 7.5GHz –10GHz

Spurious emission limit –13dBm

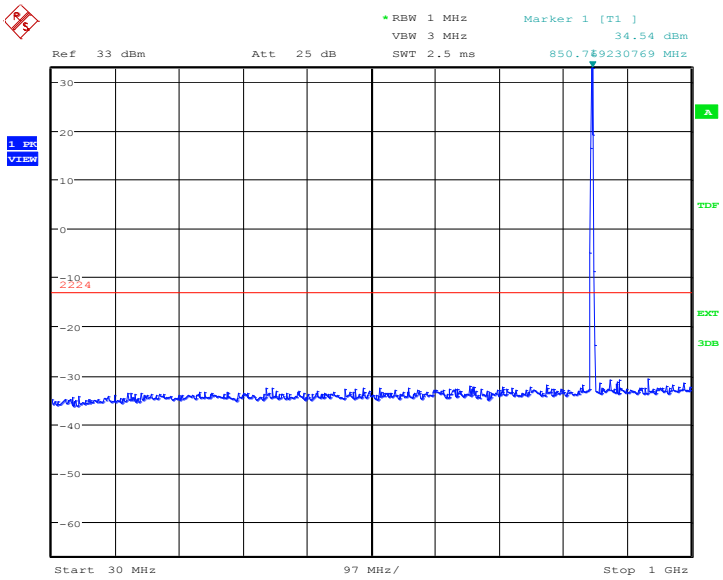


Date: 26.OCT.2011 06:37:52

A.8.3.9 Channel 251: 30MHz – 1GHz

Spurious emission limit –13dBm.

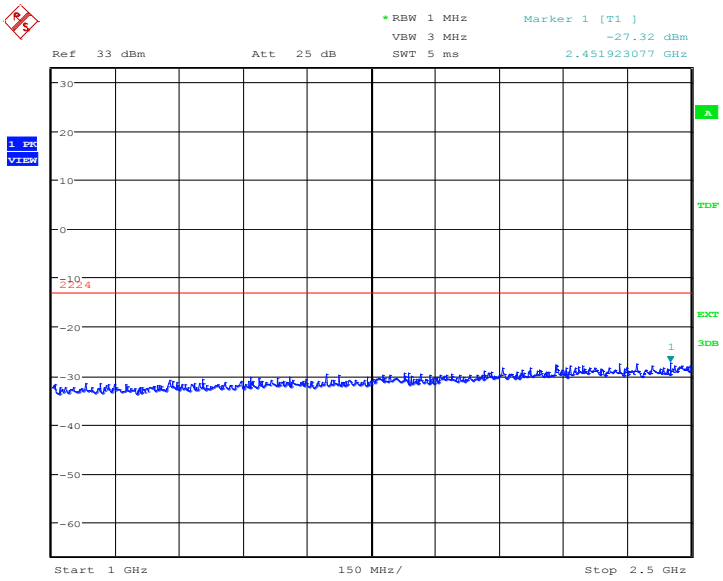
NOTE: peak above the limit line is the carrier frequency.



Date: 26.OCT.2011 06:38:21

A.8.3.10 Channel 251: 1GHz – 2.5GHz

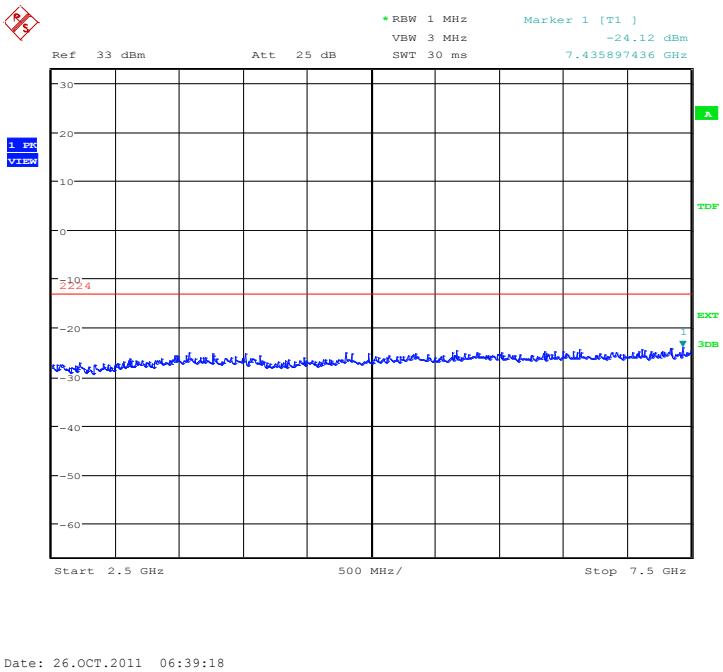
Spurious emission limit –13dBm.



Date: 26.OCT.2011 06:38:49

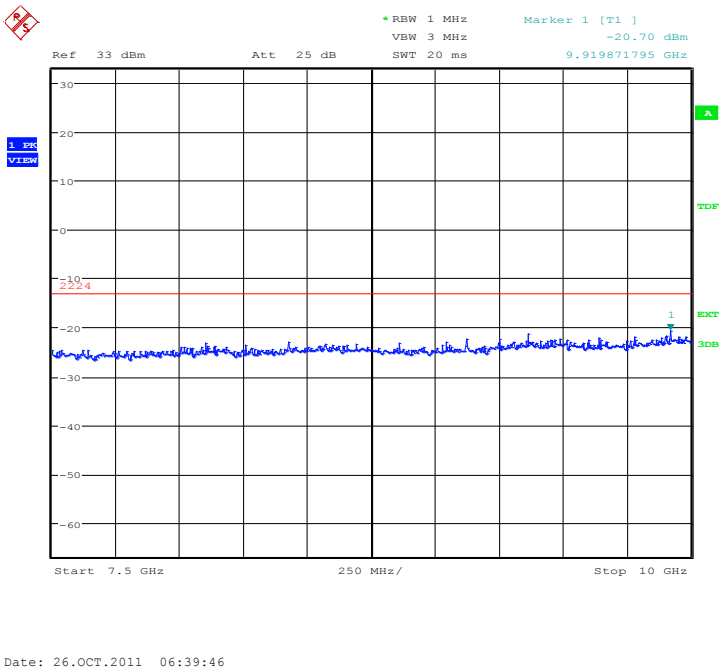
A.8.3.11 Channel 251:2.5GHz – 7.5GHz

Spurious emission limit –13dBm.



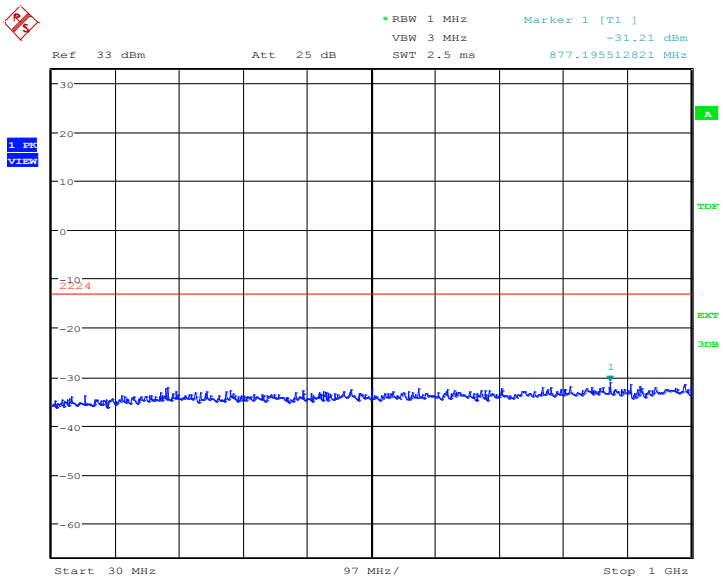
A.8.3.12 Channel 251: 7.5GHz – 10GHz

Spurious emission limit –13dBm.



A.8.3.13 Idle mode: 30MHz – 1GHz

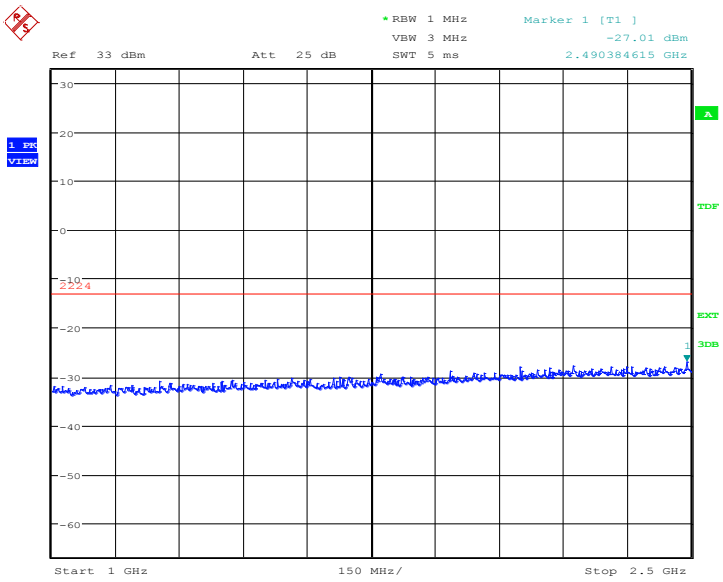
Spurious emission limit –13dBm.



Date: 26.OCT.2011 06:40:15

A.8.3.14 Idle mode: 1GHz – 2.5GHz

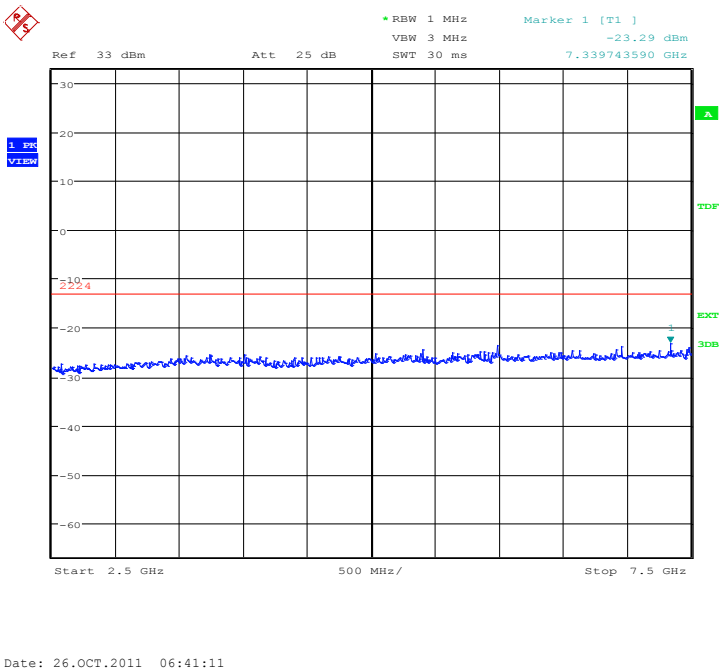
Spurious emission limit –13dBm.



Date: 26.OCT.2011 06:40:43

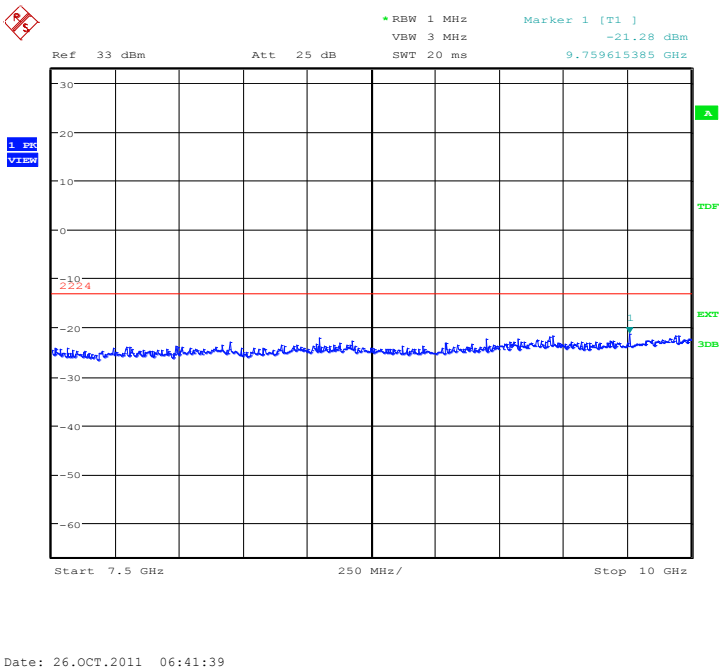
A.8.3.15 Idle mode: 2.5GHz – 7.5GHz

Spurious emission limit –13dBm.



A.8.3.16 Idle mode: 7.5GHz – 10GHz

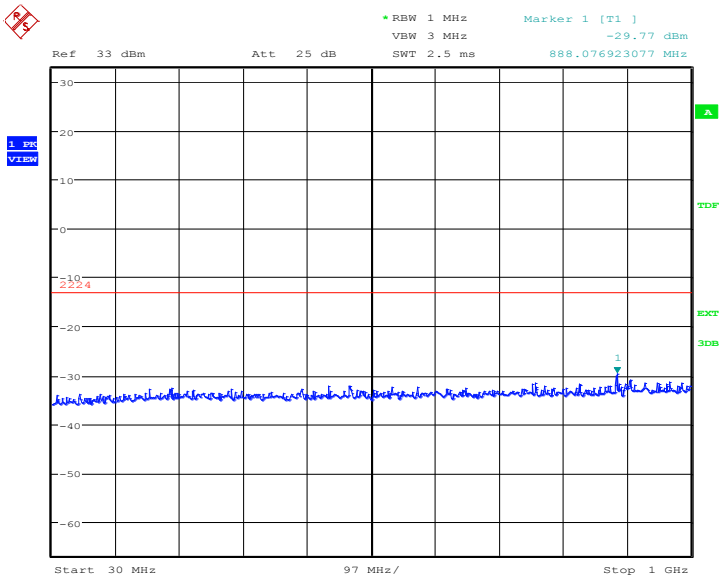
Spurious emission limit –13dBm.



PCS1900

A.8.3.17 Channel 512: 30MHz – 1GHz

Spurious emission limit –13dBm.

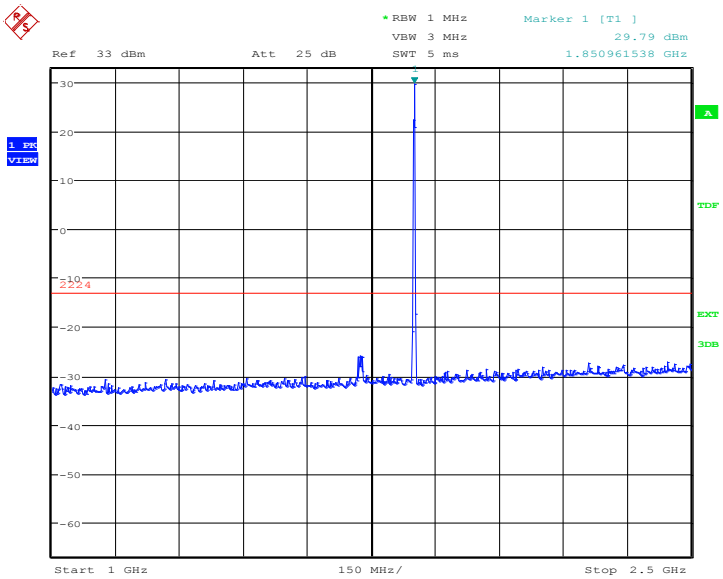


Date: 26.OCT.2011 07:11:08

A.8.3.18 Channel 512: 1GHz – 2.5GHz

Spurious emission limit –13dBm.

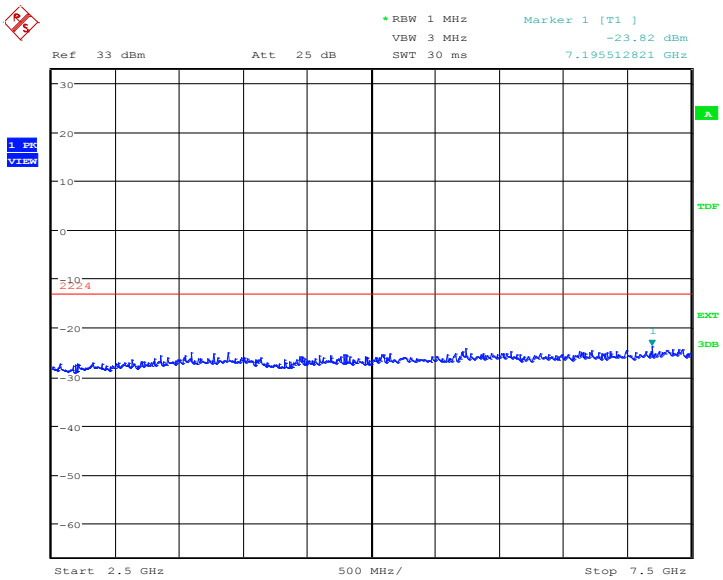
NOTE: peak above the limit line is the carrier frequency.



Date: 26.OCT.2011 07:11:37

A.8.3.19 Channel 512: 2.5GHz – 7.5GHz

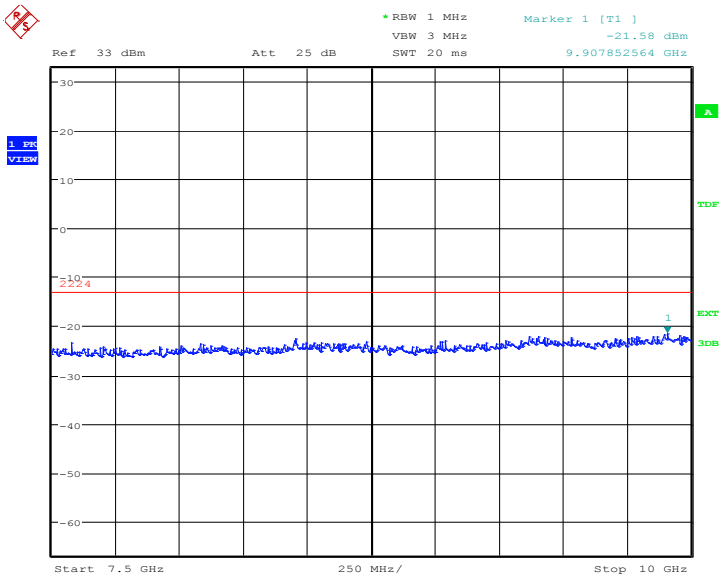
Spurious emission limit –13dBm.



Date: 26.OCT.2011 07:12:05

A.8.3.20 Channel 512: 7.5GHz –10GHz

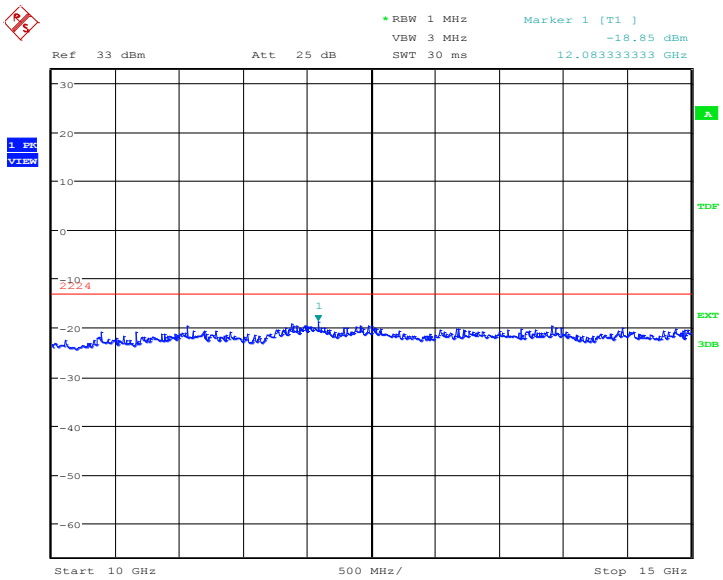
Spurious emission limit –13dBm.



Date: 26.OCT.2011 07:12:33

A.8.3.21 Channel 512: 10GHz –15GHz

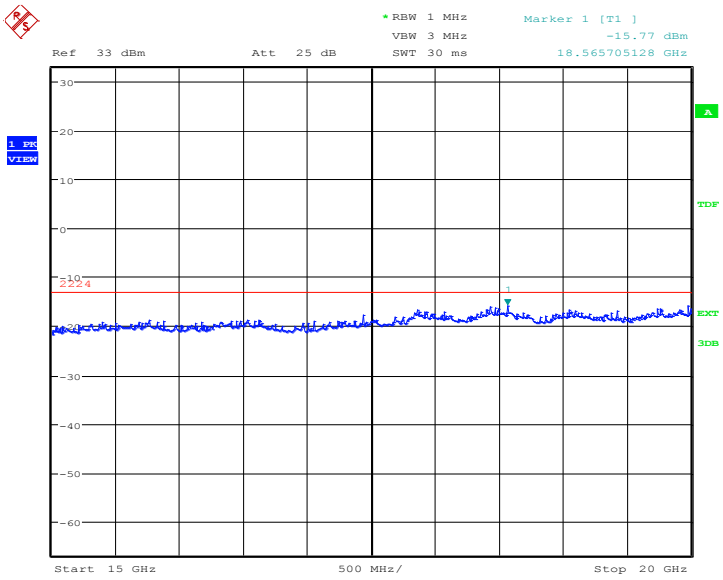
Spurious emission limit –13dBm.



Date: 26.OCT.2011 07:13:01

A.8.3.22 Channel 512: 15GHz –20GHz

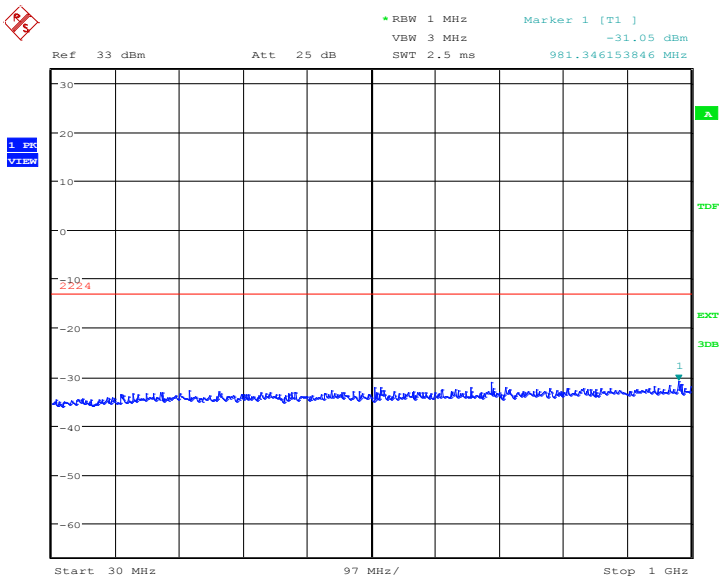
Spurious emission limit –13dBm.



Date: 26.OCT.2011 07:13:29

A.8.3.23 Channel 661: 30MHz – 1GHz

Spurious emission limit –13dBm

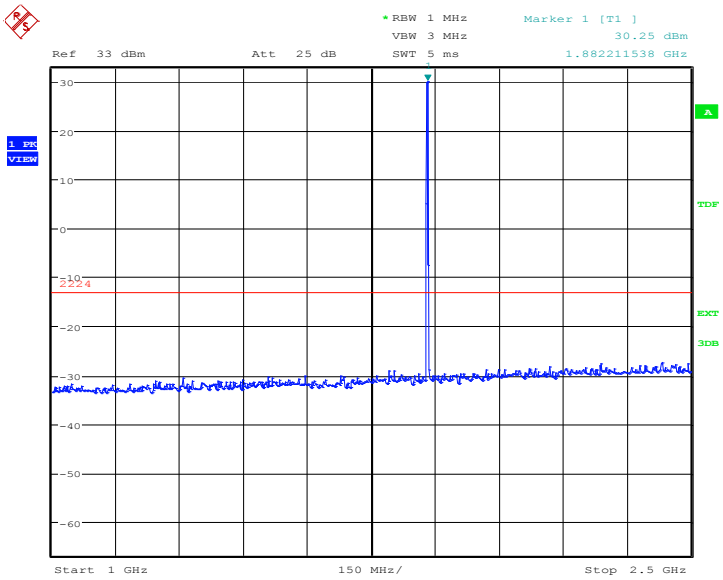


Date: 26.OCT.2011 07:13:58

A.8.3.24 Channel 661: 1GHz –2.5GHz

Spurious emission limit –13dBm

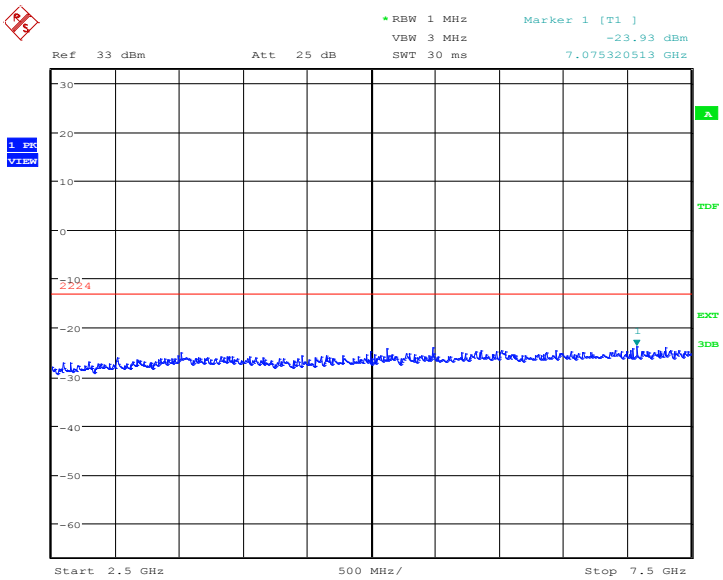
NOTE: peak above the limit line is the carrier frequency.



Date: 26.OCT.2011 07:14:26

A.8.3.25 Channel 661: 2.5GHz –7.5GHz

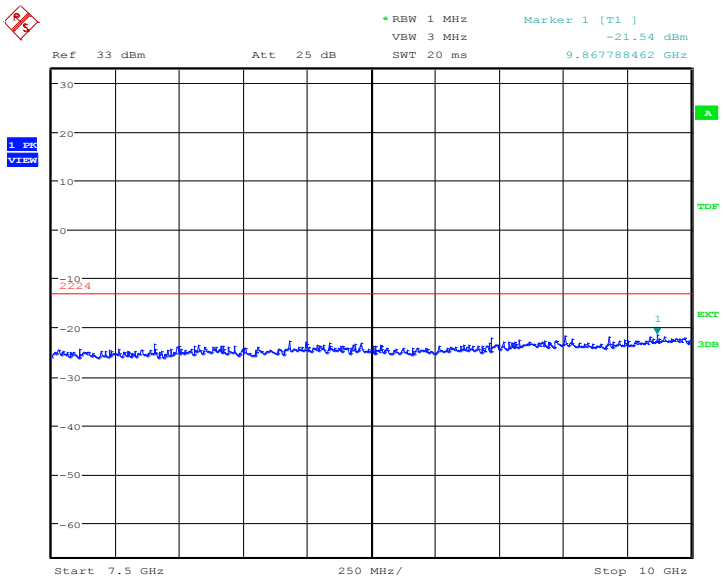
Spurious emission limit –13dBm



Date: 26.OCT.2011 07:14:55

A.8.3.26 Channel 661: 7.5GHz –10GHz

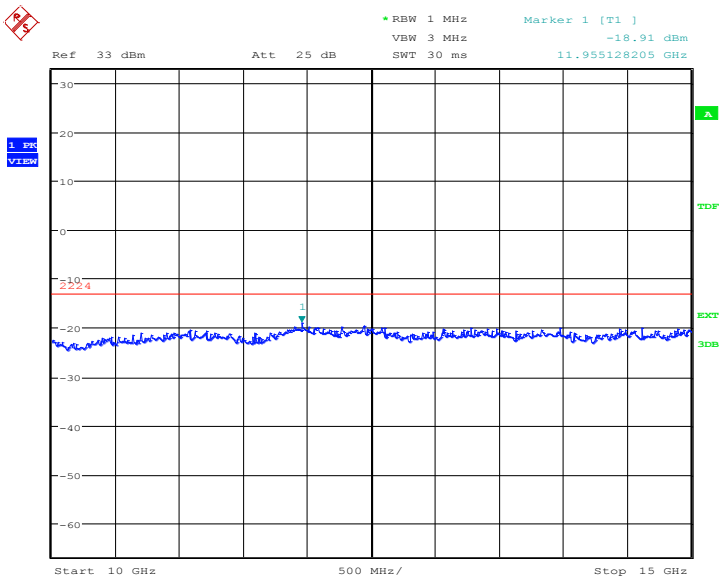
Spurious emission limit –13dBm



Date: 26.OCT.2011 07:15:23

A.8.3.27 Channel 661: 10GHz –15GHz

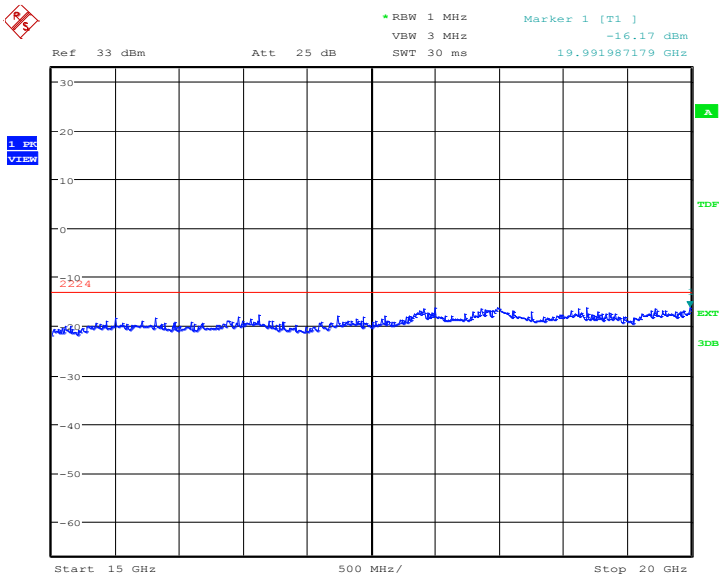
Spurious emission limit –13dBm.



Date: 26.OCT.2011 07:15:51

A.8.3.28 Channel 661: 15GHz –20GHz

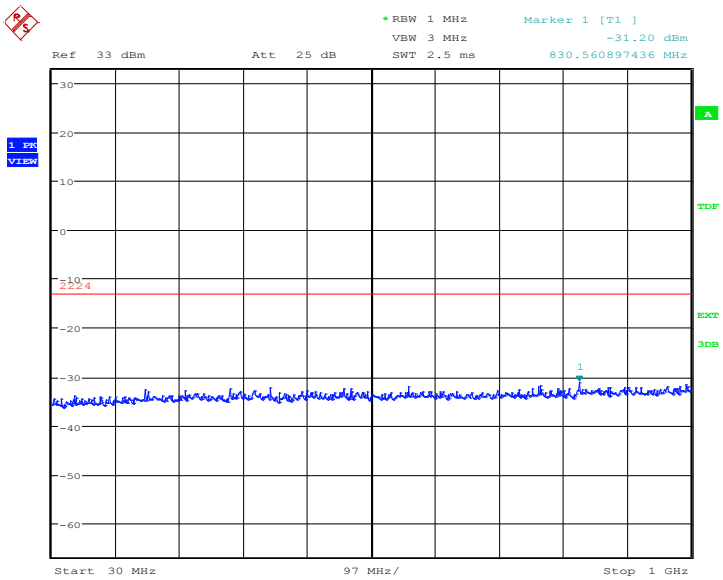
Spurious emission limit –13dBm.



Date: 26.OCT.2011 07:16:19

A.8.3.29 Channel 810: 30MHz – 1GHz

Spurious emission limit –13dBm.

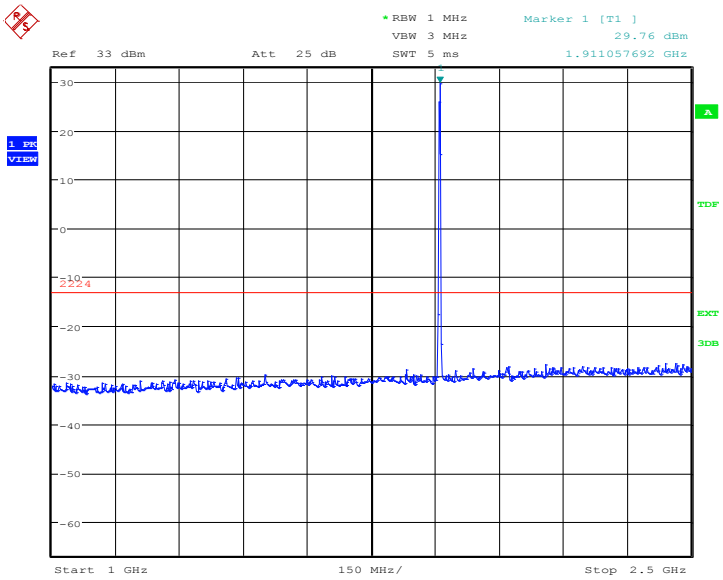


Date: 26.OCT.2011 07:16:48

A.8.3.30 Channel 810: 1GHz – 2.5GHz

Spurious emission limit –13dBm.

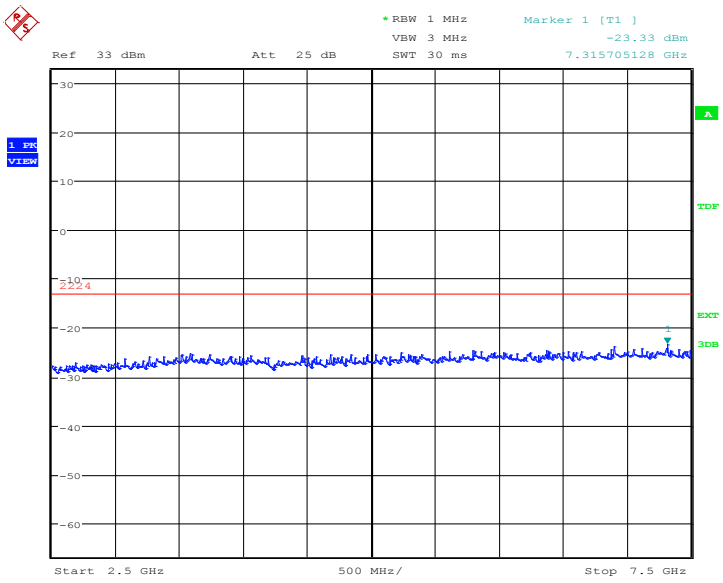
NOTE: peak above the limit line is the carrier frequency.



Date: 26.OCT.2011 07:17:16

A.8.3.31 Channel 810:2.5GHz – 7.5GHz

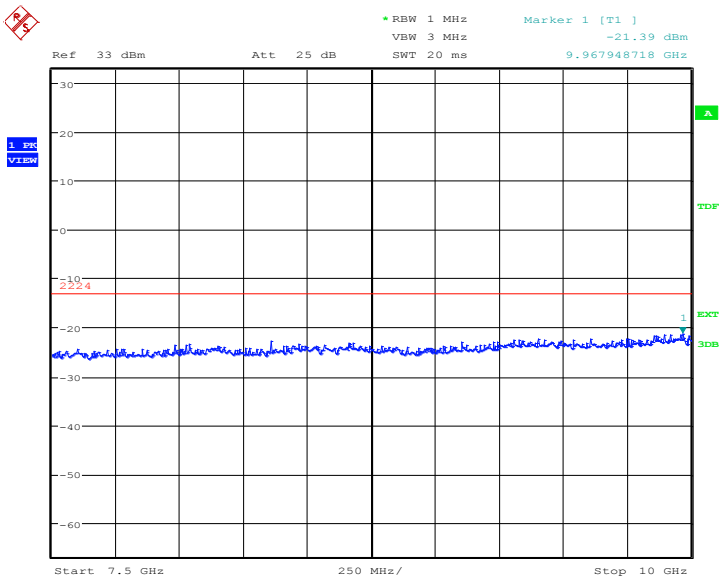
Spurious emission limit –13dBm.



Date: 26.OCT.2011 07:17:44

A.8.3.32 Channel 810: 7.5GHz – 10GHz

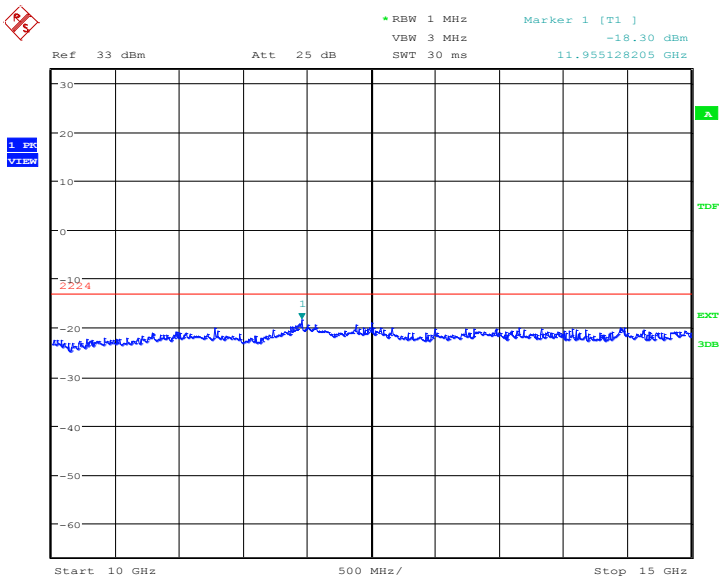
Spurious emission limit –13dBm.



Date: 26.OCT.2011 07:18:13

A.8.3.33 Channel 810: 10GHz –15GHz

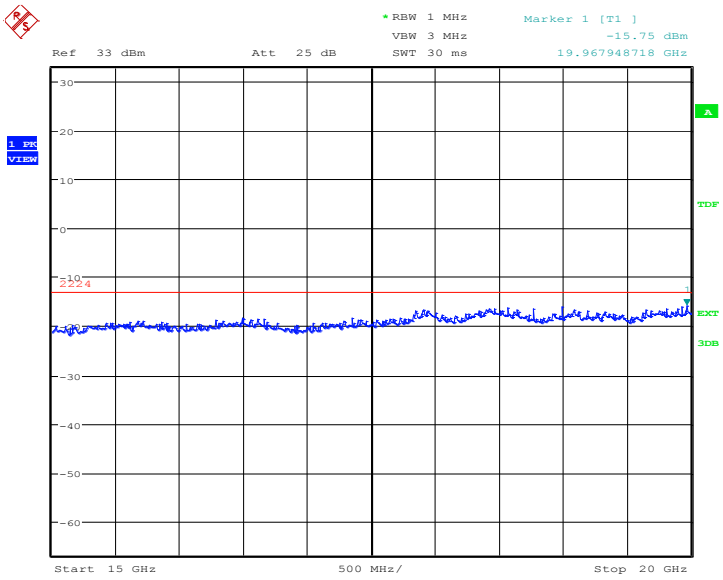
Spurious emission limit –13dBm.



Date: 26.OCT.2011 07:18:41

A.8.3.34 Channel 810: 15GHz –20GHz

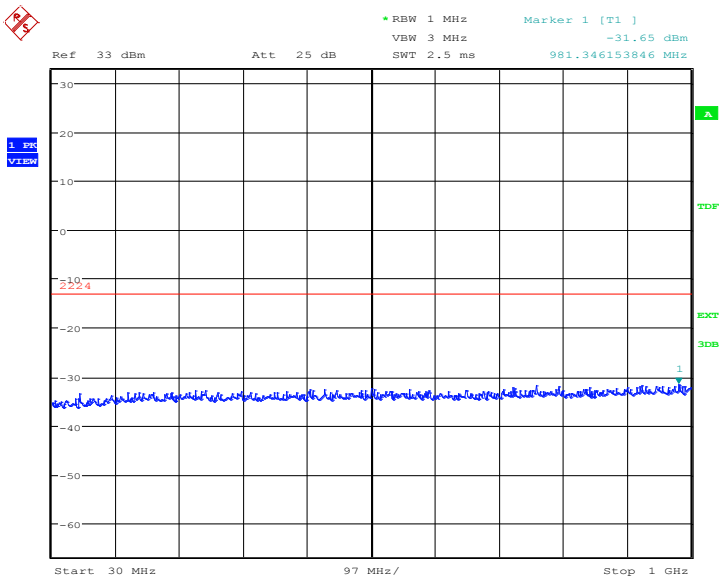
Spurious emission limit –13dBm.



Date: 26.OCT.2011 07:19:09

A.8.3.35 Idle mode: 30MHz – 1GHz

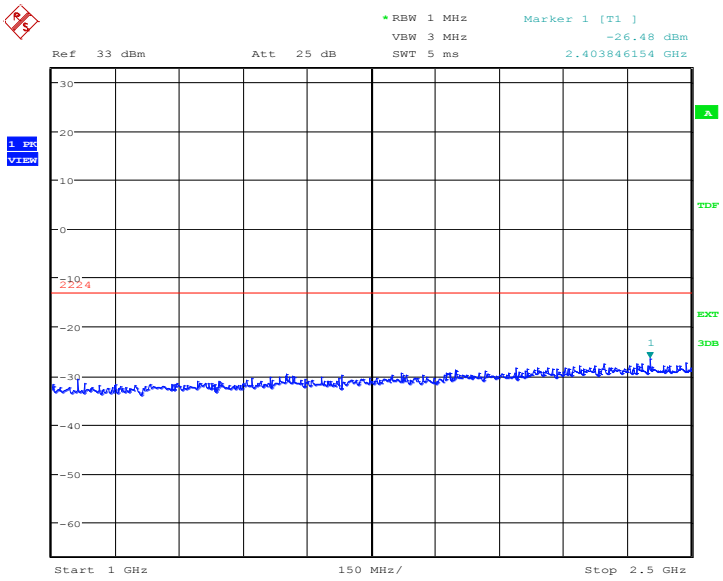
Spurious emission limit –13dBm.



Date: 26.OCT.2011 07:19:38

A.8.3.36 Idle mode: 1GHz – 2.5GHz

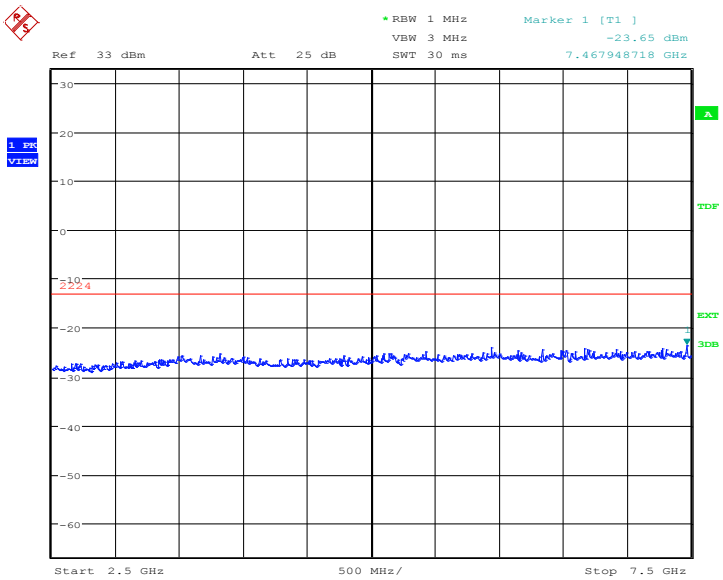
Spurious emission limit –13dBm.



Date: 26.OCT.2011 07:20:06

A.8.3.37 Idle mode: 2.5GHz – 7.5GHz

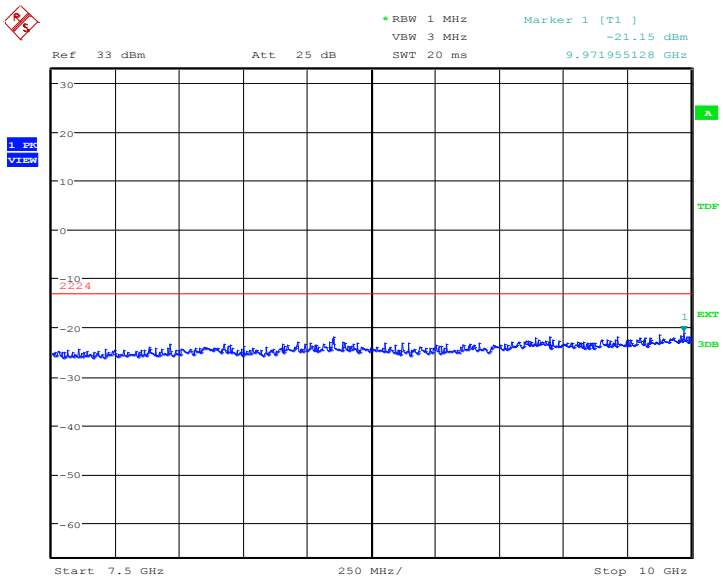
Spurious emission limit –13dBm.



Date: 26.OCT.2011 07:20:34

A.8.3.38 Idle mode: 7.5GHz – 10GHz

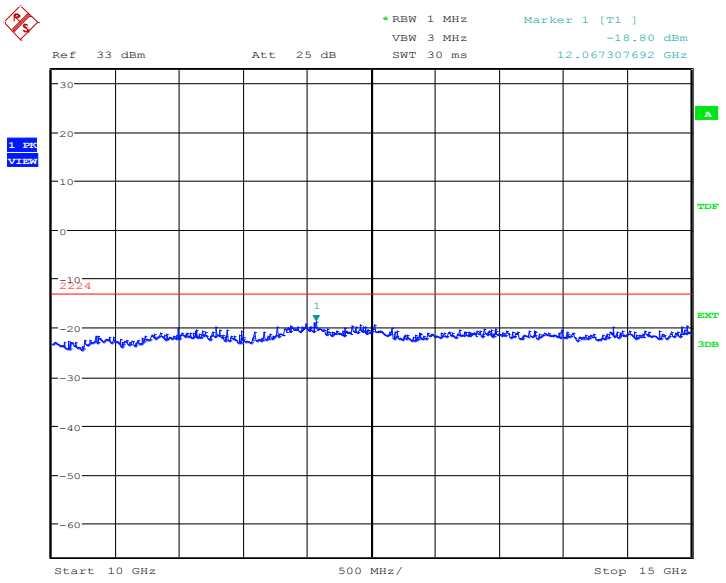
Spurious emission limit –13dBm.



Date: 26.OCT.2011 07:21:02

A.8.3.39 Idle mode: 10GHz –15GHz

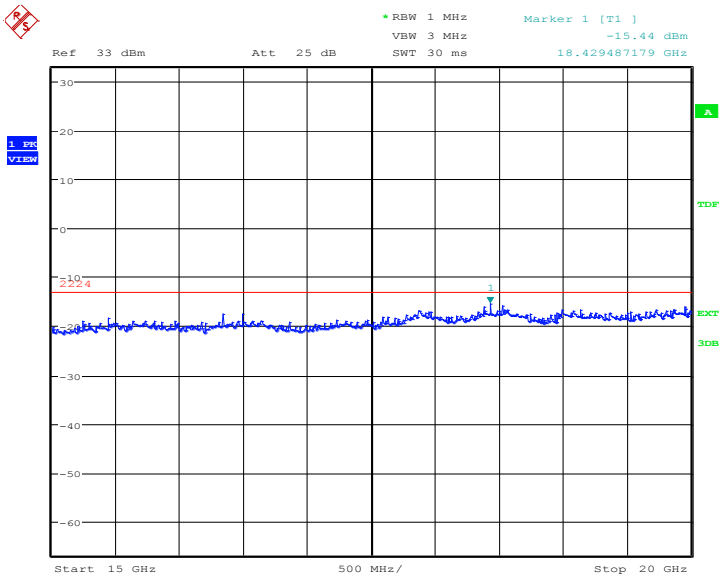
Spurious emission limit –13dBm.



Date: 26.OCT.2011 07:21:30

A.8.3.40 IDLE mode: 15GHz –20GHz

Spurious emission limit –13dBm.



Date: 26.OCT.2011 07:21:59

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