



TEST REPORT

No. 2010TAR372

for

ZTE CORPORATION

HSDPA USB MODEM

Model Name: MF631

FCC ID : Q78-ZTEMF631

with

Hardware Version: dg1B

Software Version: BD_MF631F3V1.0.0B01

Issued Date: 2010-09-07

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: Shou Xiang Technology Building, No.51 Xueyuan Road, Hai Dian District, Beijing, P. R. China
Postal Code: 100191
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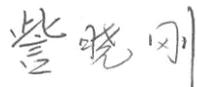
1.2. Testing Environment

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

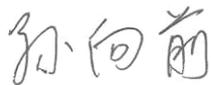
1.3. Project data

Testing Start Date: 2010-08-10
Testing End Date: 2010-09-07

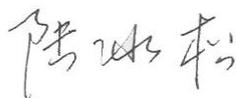
1.4. Signature



Zi Xiaogang
(Prepared this test report)



Sun Xiangqian
(Reviewed this test report)



Lu Bingsong
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(Approved this test report)

2. Client Information

2.1. Applicant Information

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2.2. Manufacturer Information

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

3.1. About EUT

Description	HSDPA USB MODEM
Model Name	MF631
FCC ID	Q78-ZTEMF631
Frequency	GSM 850MHz; PCS 1900MHz; WCDMA Band II,V
Antenna	Internal
Power supply	USB
Output power	25.58 dBm maximum EIRP measured for GSM1900
Extreme vol. Limits	4.8VDC to 5.2VDC (nominal: 5.0VDC)
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
N02	/	dg1B	BD_MF631F3V1.0.0B01

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

3.3. General Description

The Equipment Under Test (EUT) is a model of HSDPA USB MODEM.

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

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

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

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

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

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

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω
Uniformity of field strength	Between 0 and 6 dB, from 80 to 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	15.107/207	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	ESS	847151/015	R&S	2010-10-30
2	Test Receiver	ESI40	831564/002	R&S	2011-2-10
3	BiLog Antenna	3142B	9908-1403	EMCO	2011-1-15
4	BiLog Antenna	3142B	9908-1405	EMCO	2010-9-19
5	Signal Generator	SMT06	831285/005	R&S	2010-12-25
6	Signal Generator	SMP04	100070	R&S	2011-4-19
7	LISN	ESH2-Z5	829991/012	R&S	2011-8
8	Spectrum Analyzer	FSU26	200030	R&S	2011-6-17
9	Universal Radio Communication Tester	CMU200	100680	R&S	2011-8-22
10	Dual-Ridge Waveguide Horn Antenna	3115	9906-5827	EMCO	2011-3
11	Dual-Ridge Waveguide Horn Antenna	3115	9906-5831	EMCO	2011-3
12	Dual-Ridge Waveguide Horn Antenna	3116	2663	EMCO	2011-3
13	Dual-Ridge Waveguide Horn Antenna	3116	2661	EMCO	2011-3
14	Climatic chamber	PL-2G	343074	ESPEC	2011-5-14

ANNEX A: MEASUREMENT RESULTS

A.1 OUTPUT POWER

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).

GSM850

Limit

	Power step	Nominal Peak output power (dBm)	Target (dB)
GSM	5	33dBm(2W)	32±1
GPRS	3	33dBm(2W)	32±1
EGPRS	6	27dBm(0.5W)	27±1

Measurement result

GSM

Frequency(MHz)	Power Step	Peak output power(dBm)
824.2	5	32.10
836.6	5	32.30
848.8	5	32.20

GPRS

Frequency(MHz)	Power Step	Peak output power(dBm)
824.2	3	32.16
836.6	3	32.31
848.8	3	32.27

EGPRS

Frequency(MHz)	Power Step	Peak output power(dBm)
824.2	6	26.48
836.6	6	26.49
848.8	6	26.51

PCS1900

Limit

	Power step	Nominal Peak output power (dBm)	Target (dB)
GSM	0	30dBm(1W)	29±1
GPRS	3	30dBm(1W)	29±1
EGPRS	5	26 dBm(0.4W)	26±1

Measurement result

GSM

Frequency(MHz)	Power Step	Peak output power(dBm)
1850.2	0	28.95
1880.0	0	29.18
1909.8	0	28.96

GPRS

Frequency(MHz)	Power Step	Peak output power(dBm)
1850.2	3	28.67
1880.0	3	28.91
1909.8	3	28.71

EGPRS

Frequency(MHz)	Power Step	Peak output power(dBm)
1850.2	5	25.96
1880.0	5	26.13
1909.8	5	25.93

A.1.3 Radiated

A.1.3.1 Description

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

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

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

A.1.3.2 Method of Measurement

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

1. In an anechoic antenna test chamber, a half-wave dipole antenna for the frequency band of interest is placed at the reference centre of the chamber. An RF Signal source for the frequency band of interest is connected to the dipole with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A known (measured) power (P_{in}) is applied to the input of the dipole, and the power received (P_r) at the chamber's probe antenna is recorded.
2. The substitution method is used. Substitution values at each frequency are measured before and saved to the test software. A "reference path loss" is established as $A_{Rpl}=P_{in} - P_r$. The A_{Rpl} is the attenuation of "reference path loss", and including the gain of receive antenna, the cable loss and the air loss.

The measurement results are obtained as described below:

$$\text{Power(EIRP)}=P_{\text{Mea}}+A_{\text{Rpl}}$$

3. The EUT is substituted for the dipole at the reference centre of the chamber and a scan is performed to obtain the radiation pattern.
4. From the radiation pattern, the co-ordinates where the maximum antenna gain occurs are identified.
5. The EUT is then put into continuously transmitting mode at its maximum power level.
6. Power mode measurements are performed with the receiving antenna placed at the coordinates determined in Step 3 to determine the output power as defined in Rule 24.232 (b) and (c). The "reference path loss" from Step1 is added to this result.
7. This value is EIRP since the measurement is calibrated using a half-wave dipole antenna of known gain (2.15 dBi) and known input power (P_{in}).
8. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15\text{dBi}$.
9. The test system should be checked before test by a standard comb signal source. The signal source put on the position, instead of the EUT. The test result should be compared with the test result before. If the test result is similar with the initial one, then the test system can work stably.

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)	Power Step	Peak ERP(dBm)	A _{Rpl} (dBm)	Correction (dBm)	P _{Mea} (dBm)	Polarization
824.2	5	21.67	45.95	2.15	-22.13	Horizontal
836.6	5	23.57	45.98	2.15	-20.26	Horizontal
848.8	5	24.5	45.82	2.15	-19.17	Horizontal

GPRS

Frequency(MHz)	Power Step	Peak ERP(dBm)	A _{Rpl} (dBm)	Correction (dBm)	P _{Mea} (dBm)	Polarization
824.2	3	22.08	45.95	2.15	-21.72	Horizontal
836.6	3	22.94	45.98	2.15	-20.89	Horizontal
848.8	3	22.63	45.82	2.15	-21.04	Horizontal

EGPRS

Frequency(MHz)	Power Step	Peak ERP(dBm)	A _{Rpl} (dBm)	Correction (dBm)	P _{Mea} (dBm)	Polarization
824.2	6	20.14	45.95	2.15	-23.66	Horizontal
836.6	6	21.88	45.98	2.15	-21.95	Horizontal
848.8	6	22.15	45.82	2.15	-21.52	Horizontal

Frequency: 848.8MHz

Peak ERP(dBm)= P_{Mea}(-19.17dBm)+ A_{Rpl}(45.82dBm)-2.15dBm= 24.5dBm

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)	Power Step	Peak EIRP(dBm)	A _{Rpl} (dBm)	P _{Mea} (dBm)	Polarization
1850.2	0	25.58	47.11	-21.53	Horizontal
1880.0	0	24.86	47.37	-22.51	Horizontal
1909.8	0	22.42	47.54	-25.12	Horizontal

GPRS

Frequency(MHz)	Power Step	Peak EIRP(dBm)	A _{Rpl} (dBm)	P _{Mea} (dBm)	Polarization
1850.2	3	24.52	47.11	-22.59	Horizontal
1880.0	3	24.47	47.37	-22.9	Horizontal
1909.8	3	23.7	47.54	-23.84	Horizontal

EGPRS

Frequency(MHz)	Power Step	Peak EIRP(dBm)	A _{Rpl} (dBm)	P _{Mea} (dBm)	Polarization
1850.2	5	20.88	47.11	-26.23	Horizontal
1880.0	5	20.73	47.37	-26.64	Horizontal
1909.8	5	20.39	47.54	-27.15	Horizontal

Frequency: 1850.2MHz

Peak EIRP(dBm)= P_{Mea}(-21.53dBm)+ A_{Rpl}(47.11dBm) = 25.58 dBm

ANALYZER SETTINGS: RBW = VBW = 3MHz

A.2 EMISSION LIMIT

A.2.1 Measurement Method

The measurements 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 1MHz as outlined in Part 24.238. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the PCS1900 band ,GSM850 band.

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

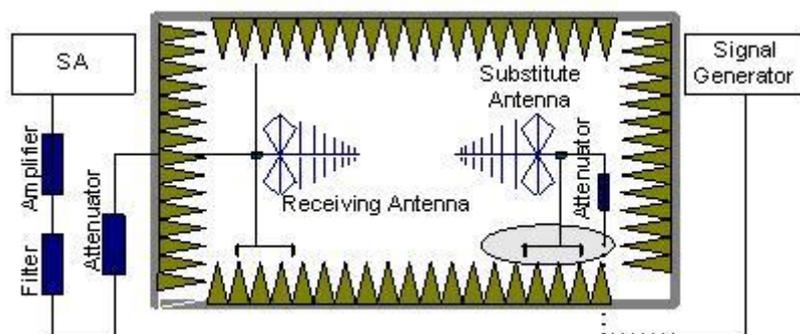
The procedure of radiated spurious emissions is as follows:

a) Pre-calibration

With pre-calibration method, the Radiated Spurious Emissions(RSE) is calculated as,

$$RSE = R_x \text{ (dBuV)} + CL \text{ (dB)} + SA \text{ (dB)} + \text{Gain (dBi)} - 107 \text{ (dBuV to dBm)}$$

The SA is calibrated using following setup.

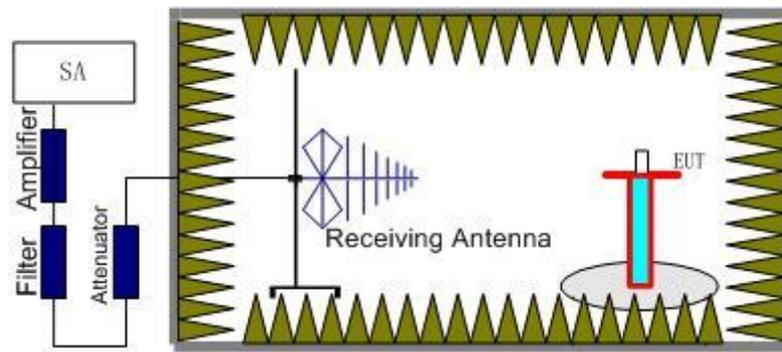


b) System check

The test system was checked before test by a standard comb signal source. The signal source put on the position, instead of the EUT. The test result should be compared with the test result before. If the test result is similar with the initial one, then the test system can work stably.

c) EUT test

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 test item 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 test item 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 and 1MHz bandwidth.



A.2.2 Measurement Limit

Sec. 24.238 Emission Limits.

(a) On any frequency outside a licensee's frequency block (e.g. A, D, B, etc.) within the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P , in Watts) by at least $43+10\log(P)$ dB. The specification that emissions shall be attenuated below the transmitter power (P) by at least $43 + 10 \log (P)$ dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

A.2.3 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the PCS band (1850.2 MHz, 1880 MHz and 1909.8 MHz), GSM850 band (824.2MHz, 836.6MHz, 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.

The substitution method is used. Substitution values at each frequency are measured before and saved to the test software. A "reference path loss" is established and the A_{Rpl} is the attenuation of "reference path loss", and including the gain of receive antenna, the gain of the preamplifier, the cable loss and the air loss.

The measurement results are obtained as described below:

$$\text{Power} = P_{\text{Mea}} + A_{\text{Rpl}}$$

A.2.4 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)	Power(dBm)	A _{Rpl} (dBm)	P _{Mea} (dBm)	Limit (dBm)	Polarity
1294.95	-55.80276257	-3.65	-52.15276257	-13	Horizontal
2490.9	-52.92584367	0.15	-53.07584367	-13	Vertical
8155.6	-48.03406646	7.75	-55.78406646	-13	Horizontal
9647.5	-44.72076988	10.35	-55.07076988	-13	Horizontal

GSM Mode Channel 190/836.6MHz

Frequency(MHz)	Power(dBm)	A _{Rpl} (dBm)	P _{Mea} (dBm)	Limit (dBm)	Polarity
1151	-57.65859073	-1.25	-56.40859073	-13	Vertical
1299.35	-57.43041864	-3.65	-53.78041864	-13	Horizontal
2494.5	-52.10487267	0.15	-52.25487267	-13	Vertical
7930.6	-47.79372225	8.15	-55.94372225	-13	Vertical
9927.4	-45.77523392	10.55	-56.32523392	-13	Horizontal

GSM Mode Channel 251/848.8MHz

Frequency(MHz)	Power(dBm)	A _{Rpl} (dBm)	P _{Mea} (dBm)	Limit (dBm)	Polarity
1294.5	-57.34812782	-3.65	-53.69812782	-13	Horizontal
2495.7	-52.9686885	0.15	-53.1186885	-13	Vertical
7929.7	-48.16455664	8.15	-56.31455664	-13	Vertical
9771.4	-45.33916129	10.05	-55.38916129	-13	Horizontal

GSM Mode Channel 512/1850.2MHz

Frequency(MHz)	Power(dBm)	A _{Rpl} (dBm)	P _{Mea} (dBm)	Limit (dBm)	Polarity
2000.2	-47.52352246	9.8	-57.32352246	-13	Vertical
2495.4	-50.16578246	3.5	-53.66578246	-13	Vertical
3860.2	-48.91946644	3.6	-52.51946644	-13	Horizontal
3895.4	-43.48956718	4.1	-47.58956718	-13	Horizontal
8162	-46.60493238	9.9	-56.50493238	-13	Horizontal
9683.3	-45.62552335	12.6	-58.22552335	-13	Vertical

GSM Mode Channel 661/1880.0MHz

Frequency(MHz)	Power(dBm)	A _{Rpl} (dBm)	P _{Mea} (dBm)	Limit (dBm)	Polarity
17762.8	-32.15390739	17.1	-49.25390739	-13	Vertical
15717.6	-38.69716276	13.1	-51.79716276	-13	Vertical
12693.8	-42.89876823	14.1	-56.99876823	-13	Vertical
3895.8	-43.41055204	4.1	-47.51055204	-13	Horizontal
9975.8	-45.88904892	12.5	-58.38904892	-13	Vertical
2001.2	-46.91998711	9.8	-56.71998711	-13	Vertical

GSM Mode Channel 810/1909.8MHz

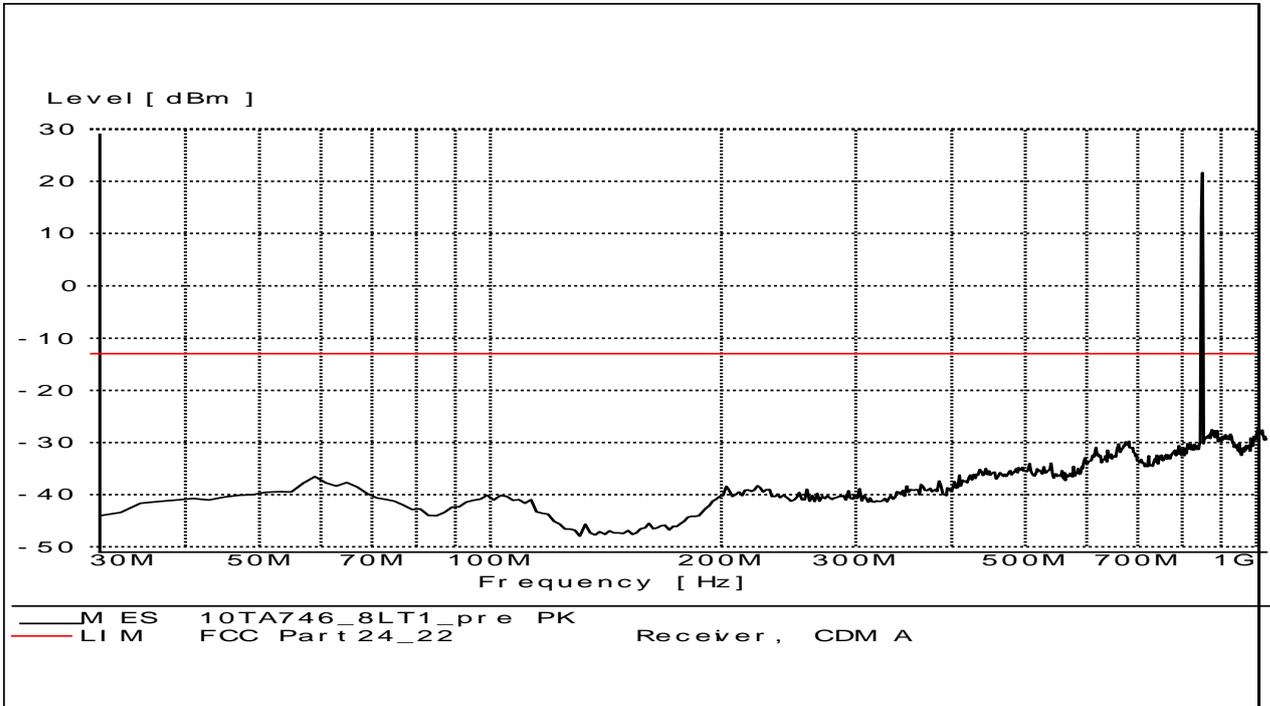
Frequency(MHz)	Power(dBm)	A _{Rpl} (dBm)	P _{Mea} (dBm)	Limit (dBm)	Polarity
17762.4	-32.06755357	17.5	-49.56755357	-13	Horizontal
2000	-39.03093729	9.6	-48.63093729	-13	Horizontal
2000.3	-39.10225723	9.6	-48.70225723	-13	Horizontal
2001	-39.22702403	9.8	-49.02702403	-13	Vertical
15707.2	-39.25679202	13.2	-52.45679202	-13	Horizontal
2001.5	-39.88853226	9.6	-49.48853226	-13	Horizontal

GSM 850

A.2.3.1 RADIATED SPURIOUS EMISSIONS-Channel 128: 30MHz –1GHz

Radiated spurious emission limit :-13dBm.

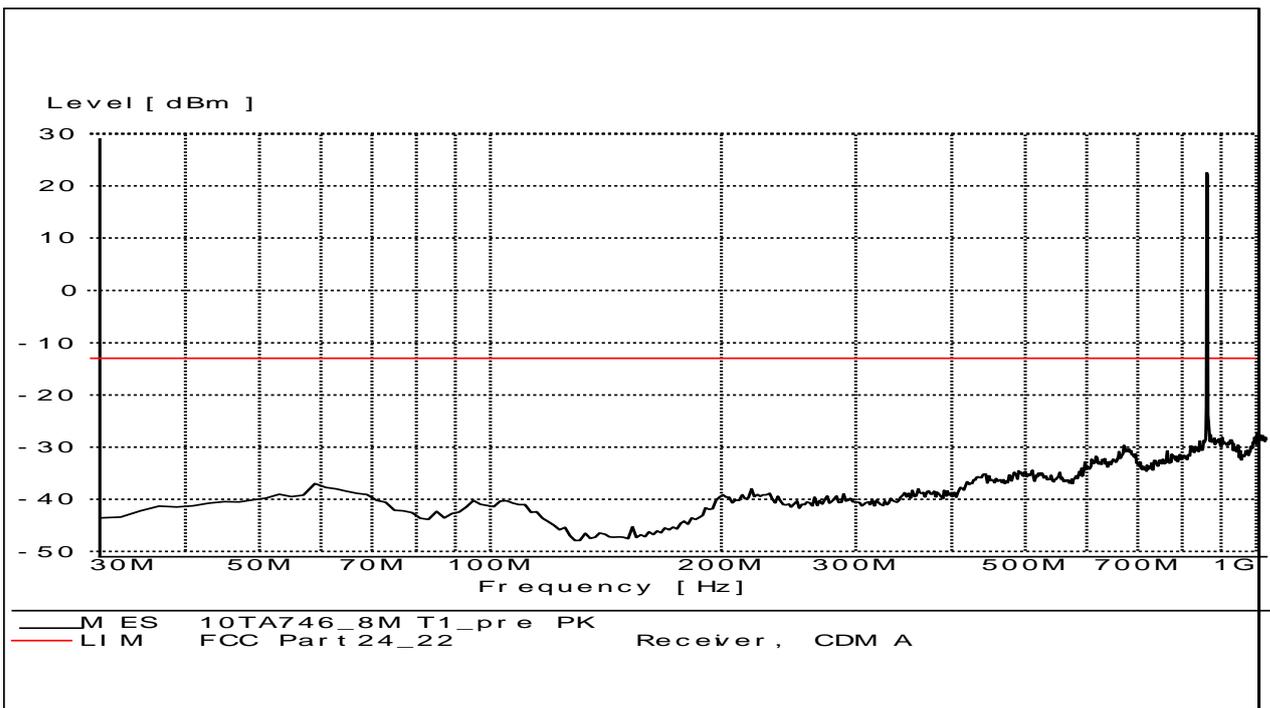
NOTE: peak above the limit line is the Carrier frequency @ ch-128



A.2.3.2 RADIATED SPURIOUS EMISSIONS-Channel 190: 30MHz – 1GHz

Radiated spurious emission limit :-13dBm.

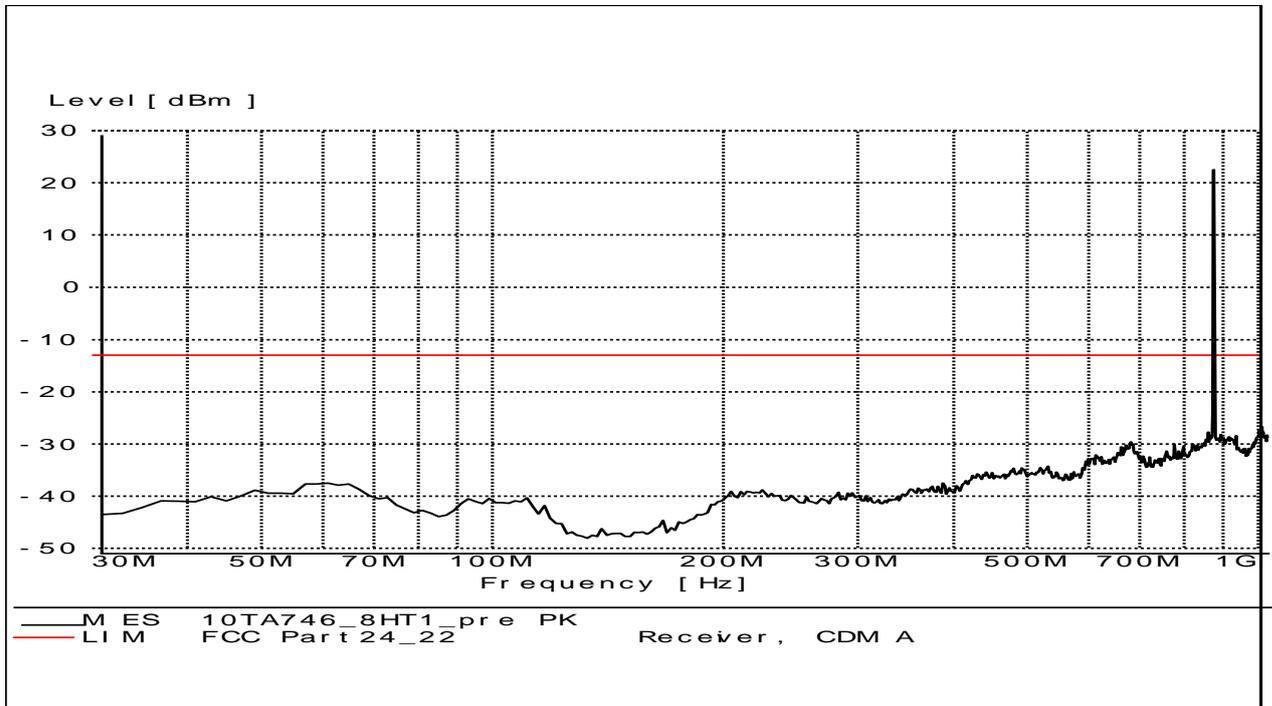
NOTE: peak above the limit line is the Carrier frequency @ ch-190



A.2.3.3 RADIATED SPURIOUS EMISSIONS-Channel 251: 30MHz – 1GHz

Radiated spurious emission limit :-13dBm.

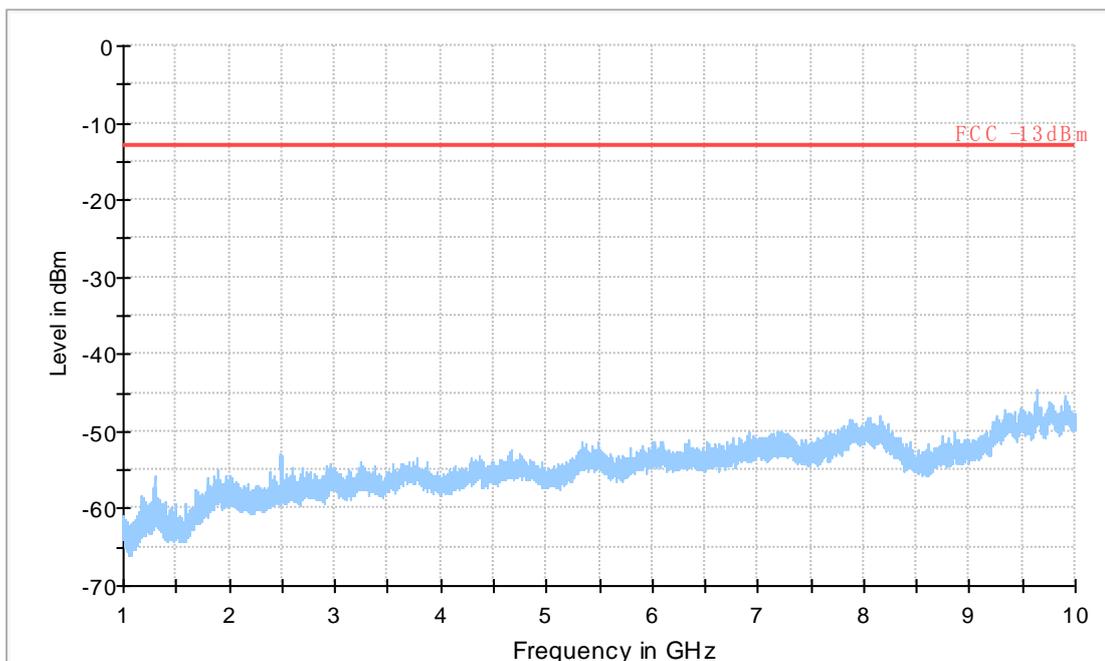
NOTE: peak above the limit line is the Carrier frequency @ ch-251



A.2.3.4 RADIATED SPURIOUS EMISSIONS-Channel 128: 1GHz – 10GHz

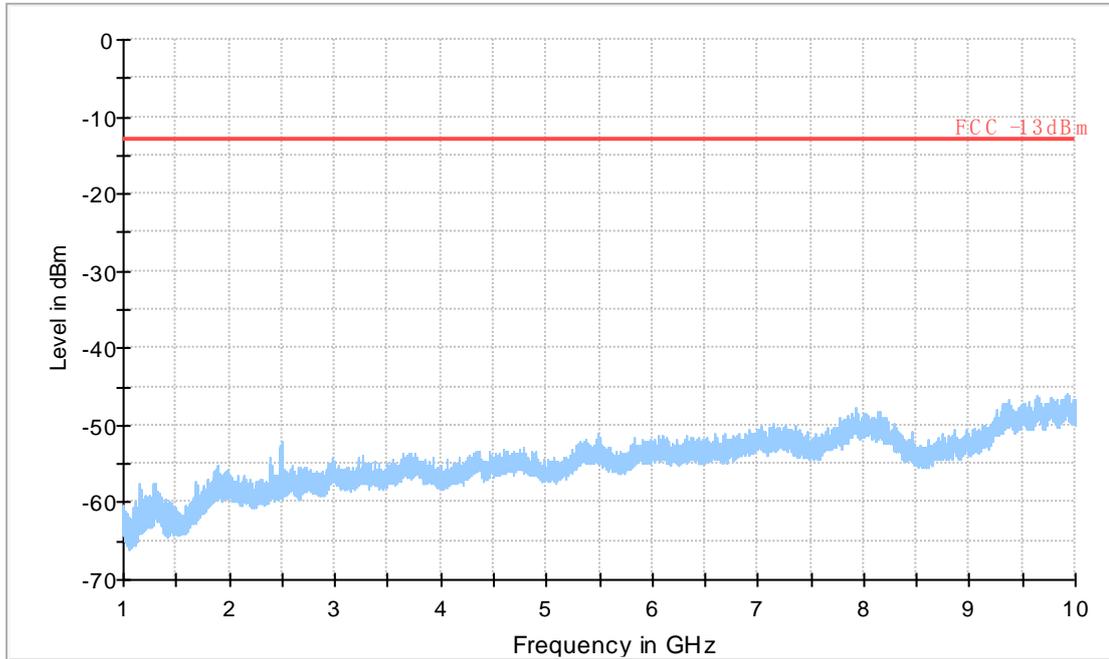
Radiated spurious emission limit :-13dBm.

FCC22 1-10 GHz



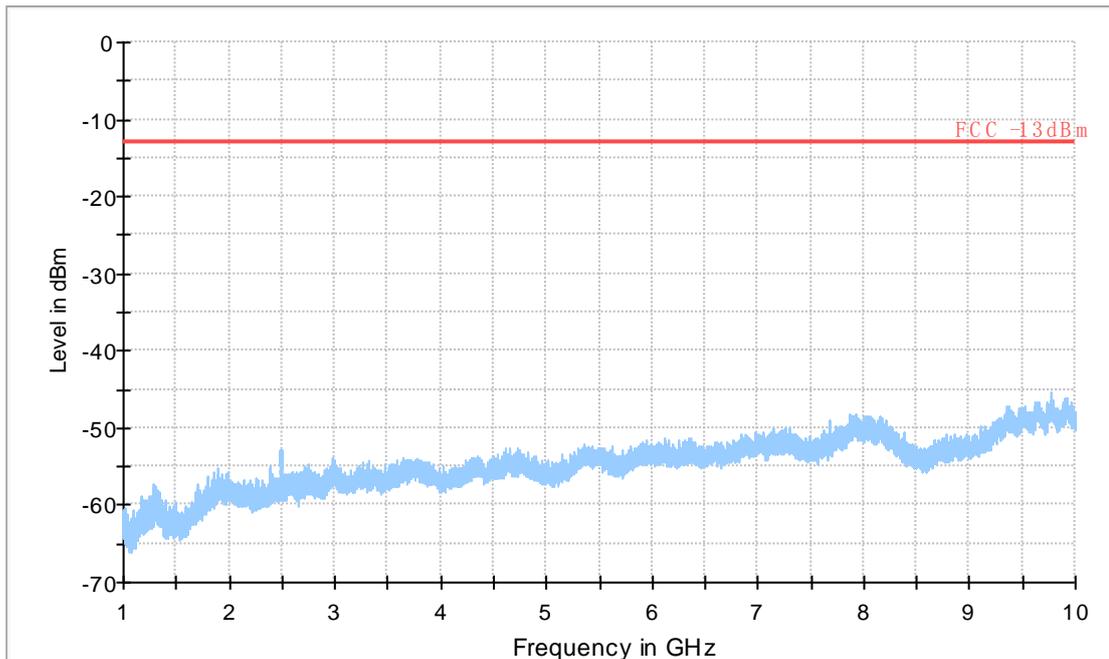
A.2.3.5 RADIATED SPURIOUS EMISSIONS-Channel 190: 1GHz – 10GHz
Radiated spurious emission limit :-13dBm.

FCC22 1-10 GHz

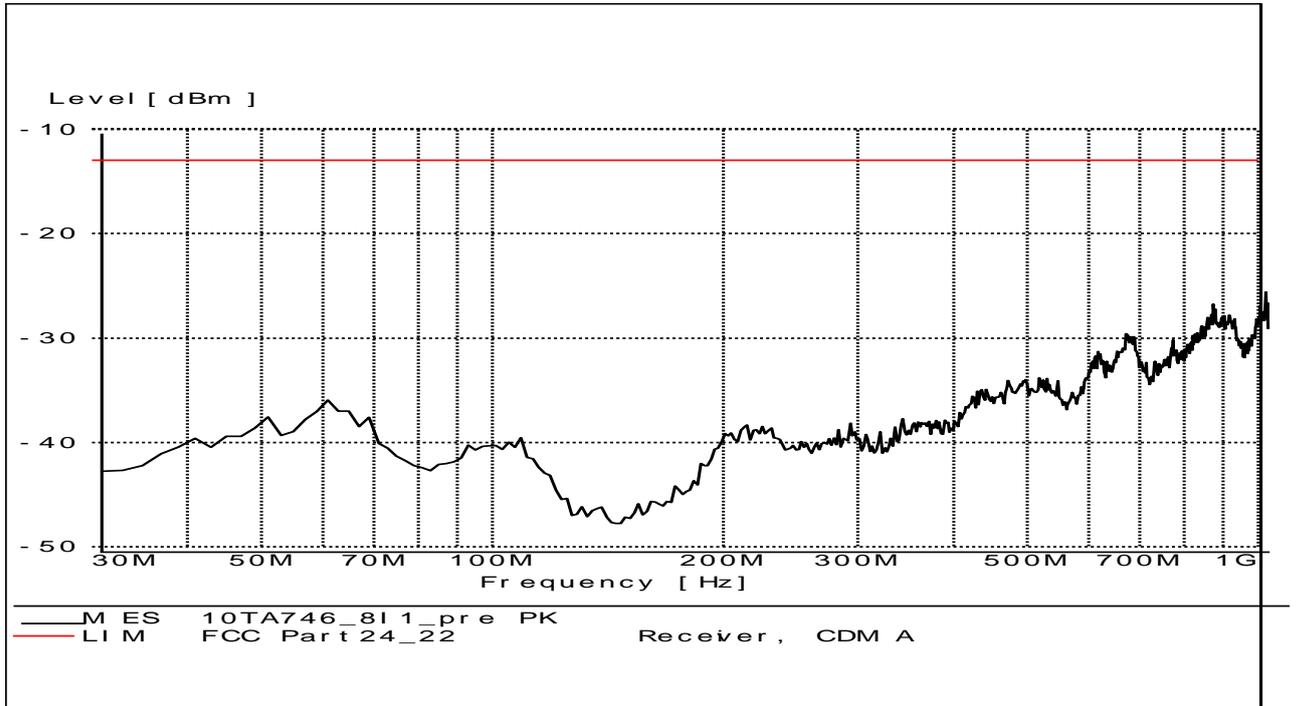


A.2.3.6 RADIATED SPURIOUS EMISSIONS-Channel 251: 1GHz – 10GHz
Radiated spurious emission limit :-13dBm.

FCC22 1-10 GHz

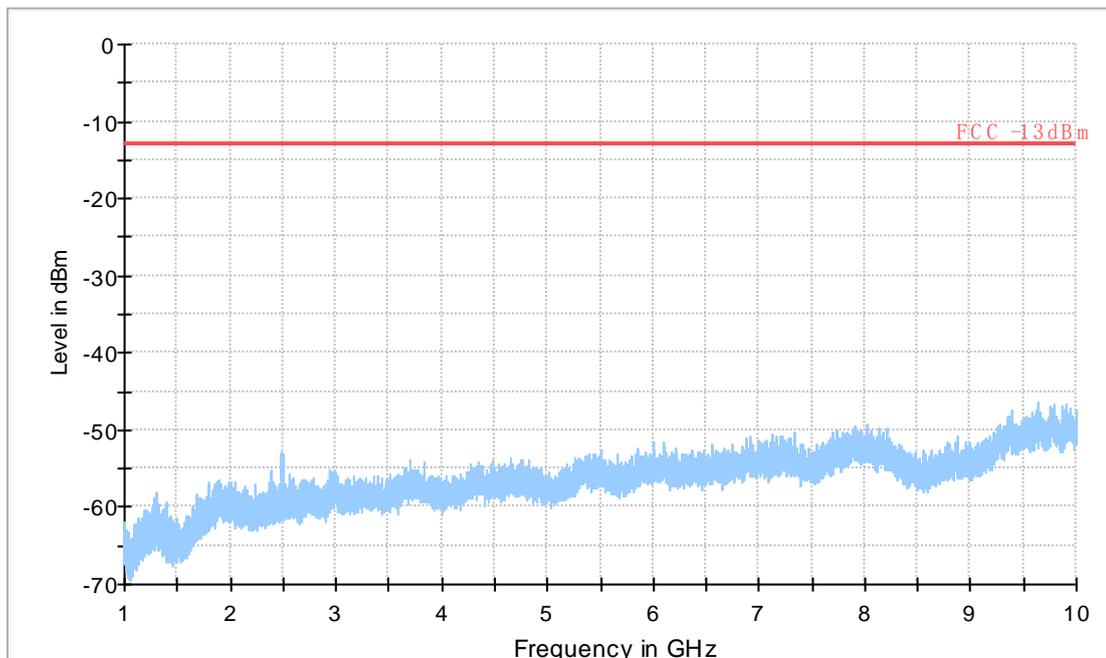


A.2.3.7 RADIATED SPURIOUS EMISSIONS-EUT in Idle Mode: 30MHz – 1GHz
Radiated spurious emission limit :-13dBm.



A.2.3.8 RADIATED SPURIOUS EMISSIONS-EUT in Idle Mode: 1GHz – 10GHz
Radiated spurious emission limit :-13dBm.

FCC22 1-10 GHz

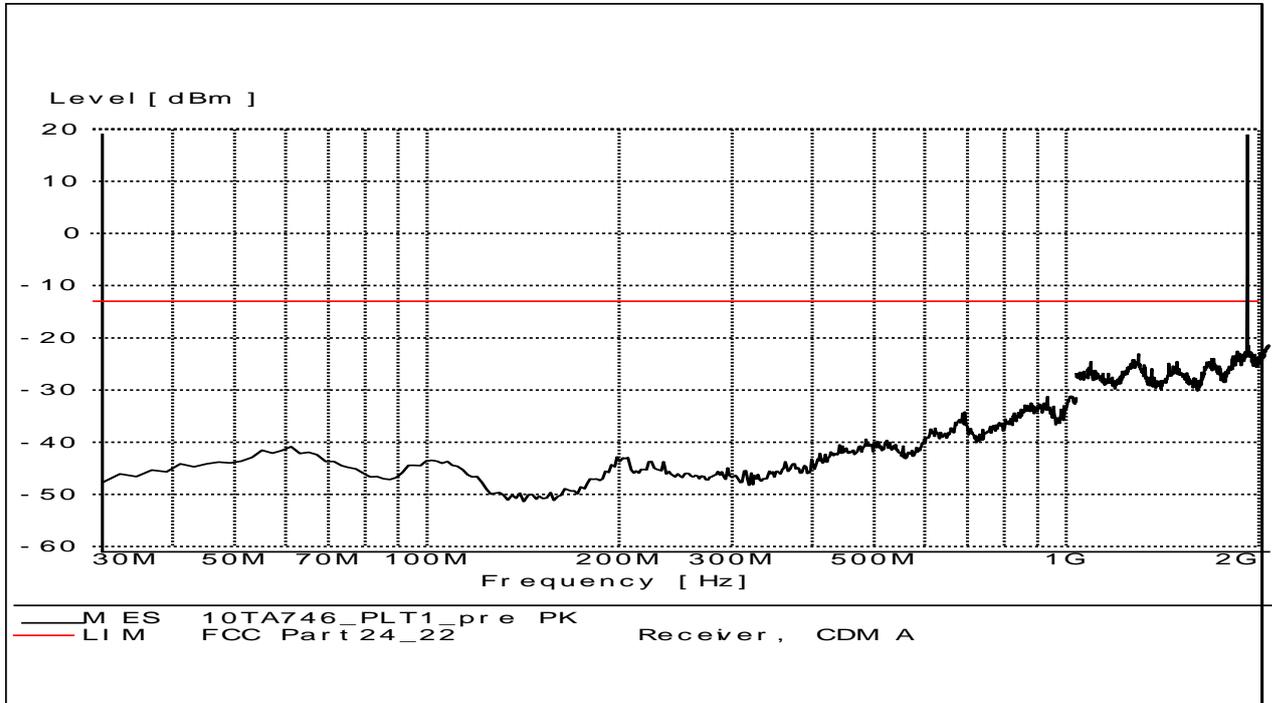


PCS 1900

A.2.3.9 RADIATED SPURIOUS EMISSIONS-Channel 512: 30MHz – 2GHz

Radiated spurious emission limit :-13dBm.

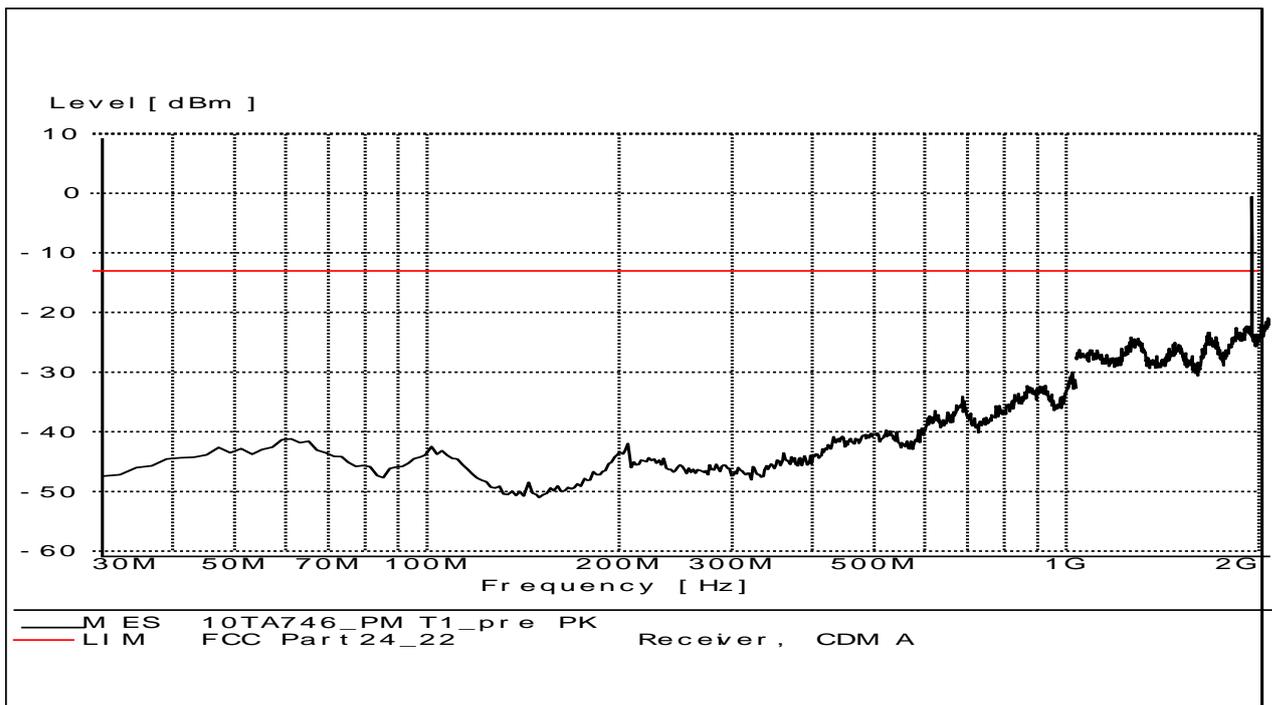
NOTE: peak above the limit line is the Carrier frequency @ ch-512



A.2.3.10 RADIATED SPURIOUS EMISSIONS-Channel 661: 30MHz – 2GHz

Radiated spurious emission limit :-13dBm.

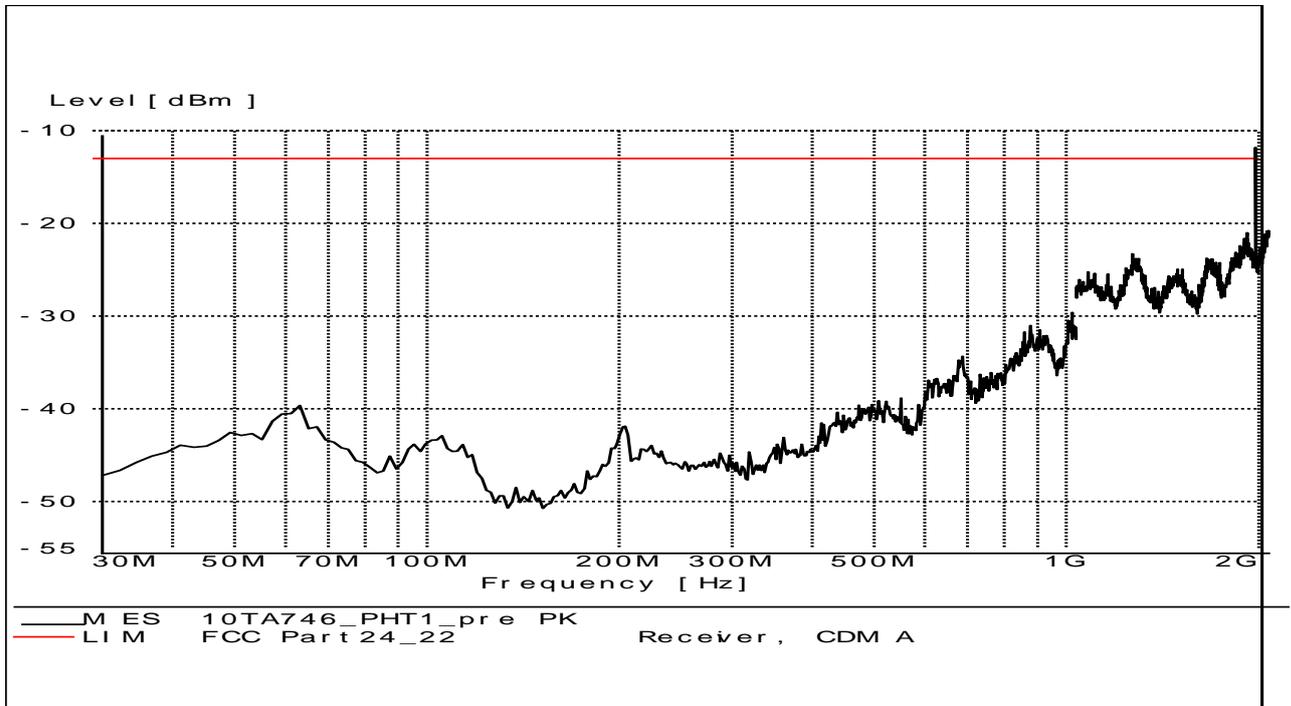
NOTE: peak above the limit line is the Carrier frequency @ ch-661



A.2.3.11 RADIATED SPURIOUS EMISSIONS-Channel 810: 30MHz – 2GHz

Radiated spurious emission limit :-13dBm.

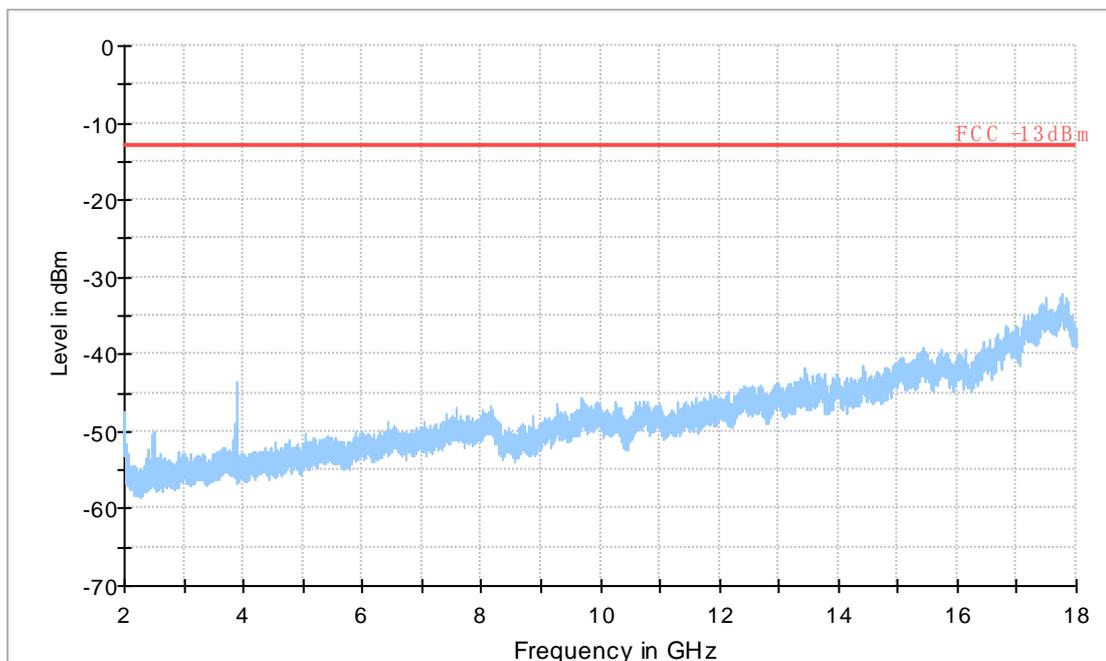
NOTE: peak above the limit line is the Carrier frequency @ ch-810



A.2.3.12 RADIATED SPURIOUS EMISSIONS-Channel 512: 2GHz – 18GHz

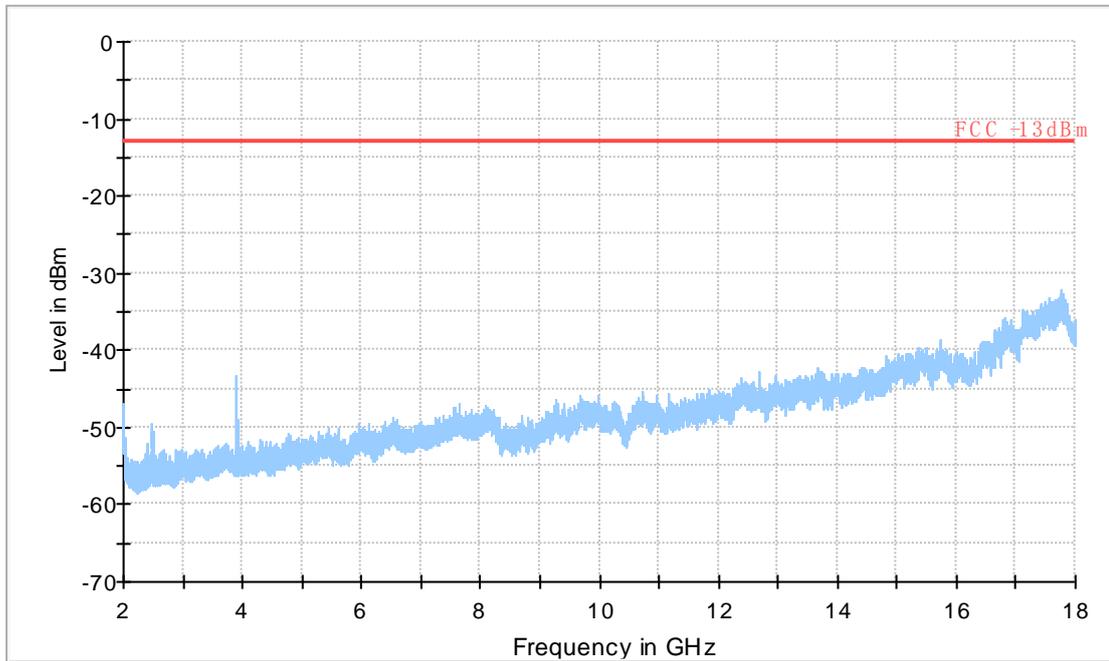
Radiated spurious emission limit :-13dBm.

FCC24 2-18 GHz



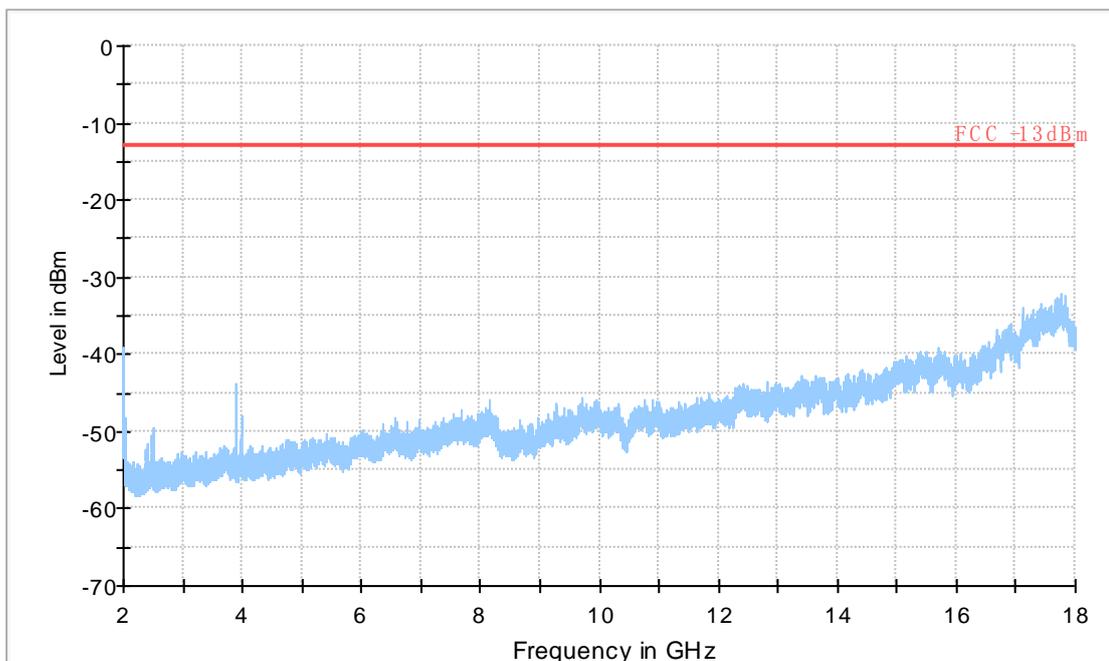
A.2.3.13 RADIATED SPURIOUS EMISSIONS-Channel 661: 2GHz – 18GHz
Radiated spurious emission limit :-13dBm.

FCC24 2-18 GHz



A.2.3.14 RADIATED SPURIOUS EMISSIONS-Channel 810: 2GHz – 18GHz
Radiated spurious emission limit :-13dBm.

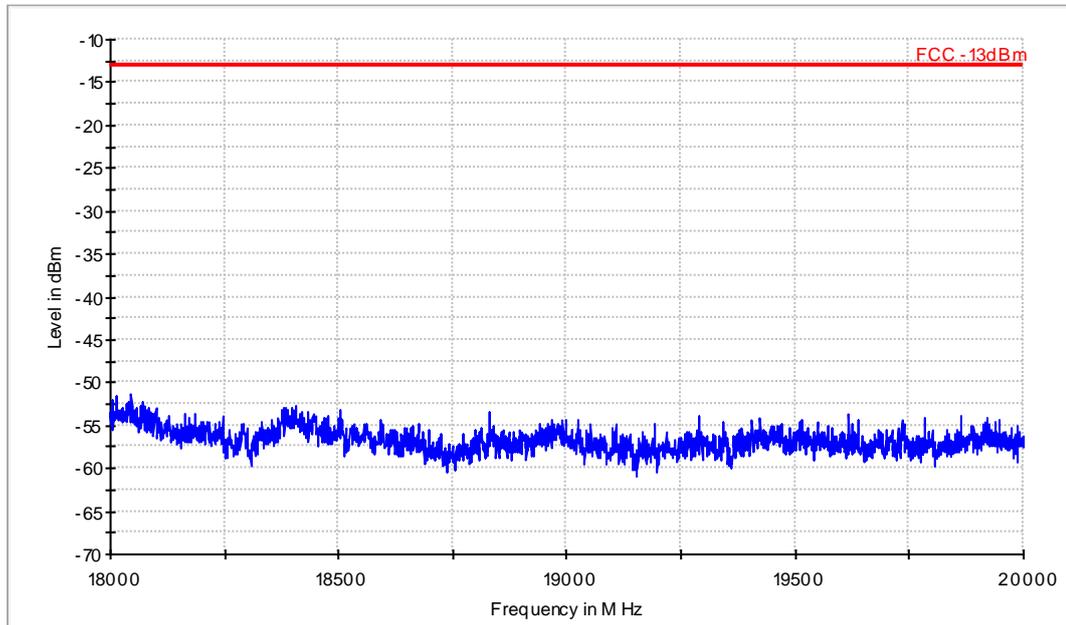
FCC24 2-18 GHz



A.2.3.15 Radiated spurious emission (18GHz-20GHz)

Radiated spurious emission limit :-13dBm.

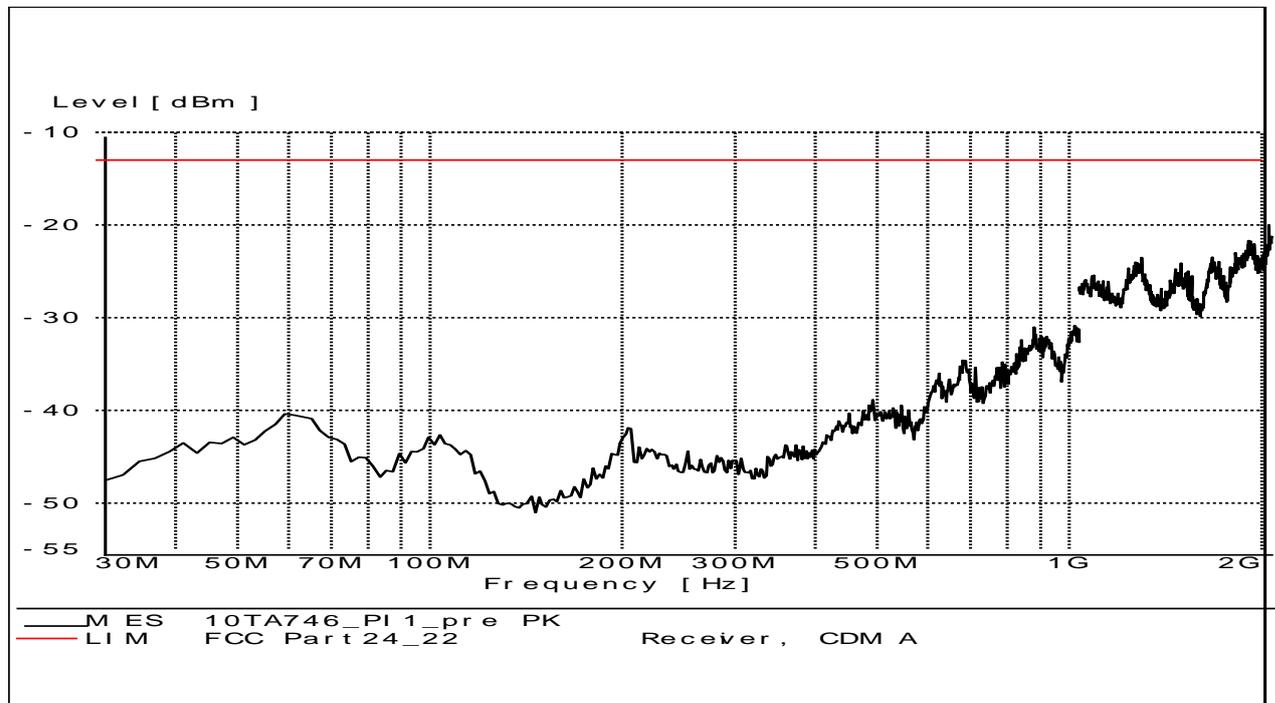
Note: This plot is valid for low, mid & high channels. It is same as the floor noise.



— Preview Measurement Detector 1 — FCC -13dBm

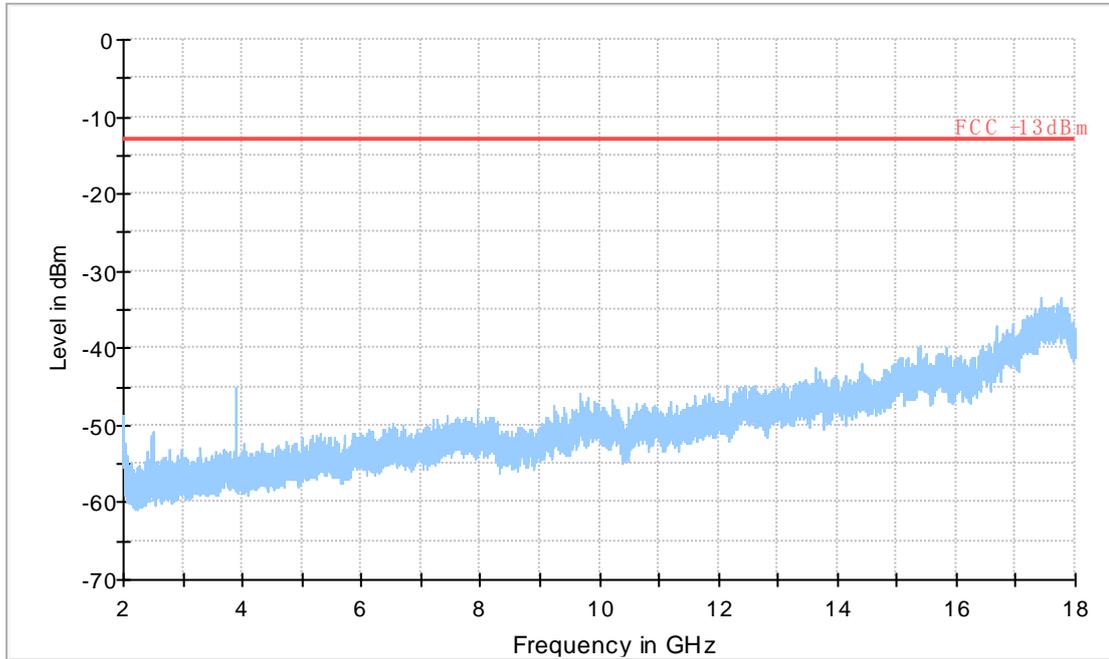
A.2.3.16 RADIATED SPURIOUS EMISSIONS-EUT in Idle Mode: 30MHz – 2GHz

Radiated spurious emission limit :-13dBm.

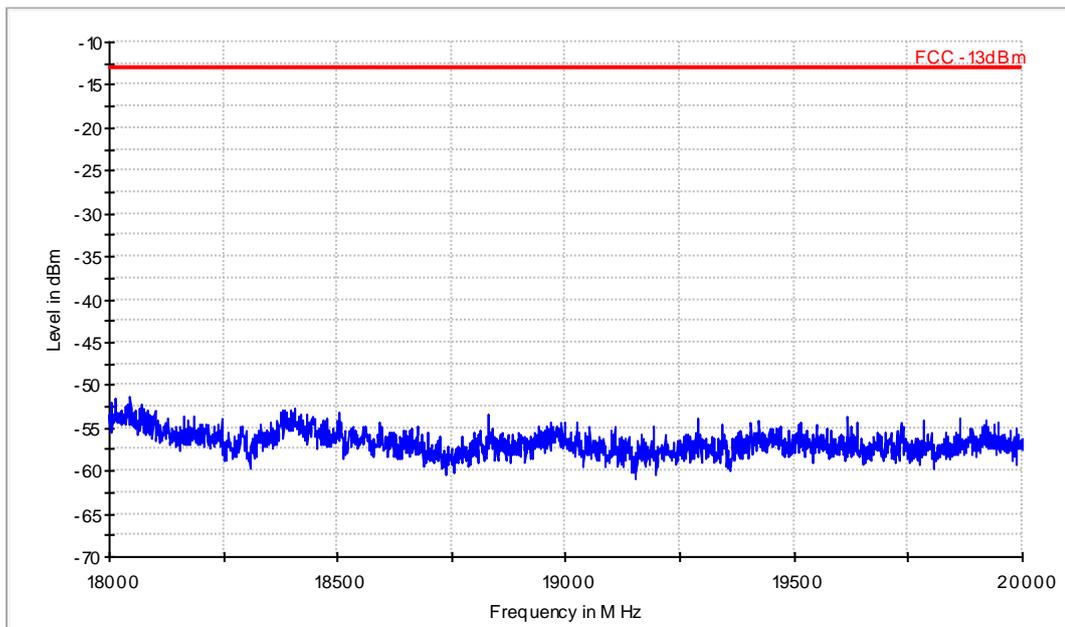


A.2.3.17 RADIATED SPURIOUS EMISSIONS-EUT in Idle Mode: 2GHz – 18GHz
Radiated spurious emission limit :-13dBm.

FCC24 2-18 GHz



A.2.3.18 RADIATED SPURIOUS EMISSIONS-EUT in Idle Mode: 18GHz – 20GHz
Radiated spurious emission limit :-13dBm.
Note: It is same as the floor noise.



— Preview Measurement Detector 1 — FCC -13dBm

A.3 FREQUENCY STABILITY

A.3.1 Method of Measurement

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a "call mode". This is accomplished with the use of R&S CMU200 DIGITAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30°C.
3. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on channel 661 for PCS 1900 , channel 190 for GSM850 measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10°C increments from -30°C to +50°C. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.
5. 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°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.3.2 Measurement Limit

A.3.2.1 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 4.8VDC and 5.2VDC, with a nominal voltage of 5.0VDC. 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.3.2.2 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.3.3 Measurement results

GSM 850

Frequency Error vs Voltage

Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
4.8	16	0.019
5.0	12	0.014
5.2	15	0.018

Frequency Error vs Temperature

temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
-30	18	0.022
-20	23	0.027
-10	25	0.030
0	19	0.023
10	18	0.022
20	18	0.022
30	22	0.026
40	16	0.019
50	24	0.029

PCS 1900

Frequency Error vs Voltage

Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
4.8	23	0.012
5.0	21	0.011
5.2	24	0.013

Frequency Error vs Temperature

temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
-30	26	0.014
-20	24	0.013
-10	24	0.013
0	27	0.014
10	22	0.012
20	20	0.011
30	28	0.015
40	25	0.013
50	26	0.014

A.4 OCCUPIED BANDWIDTH (§2.1049(h)(i))

A.4.1 Occupied Bandwidth Results

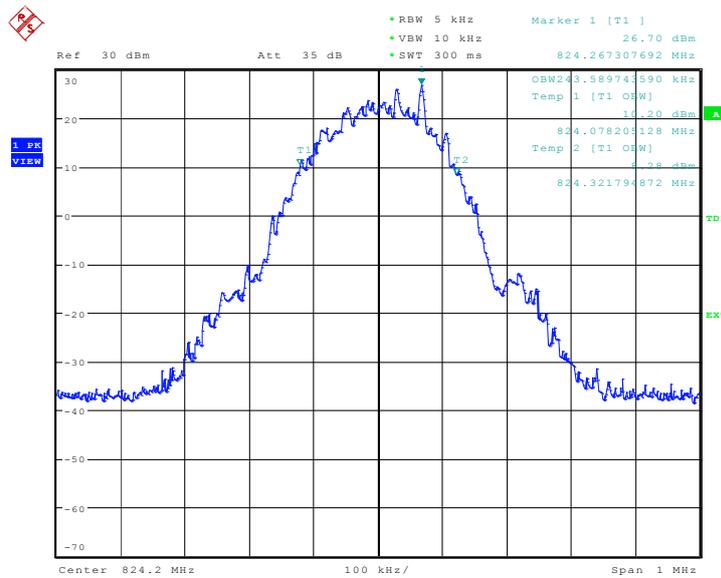
Similar to conducted emissions; occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the USPCS frequency band. The table below lists the measured -20dBc BW (99%). Spectrum analyzer plots are included on the following pages.

GSM 850(99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
824.2	243.589
836.6	240.384
848.8	241.987

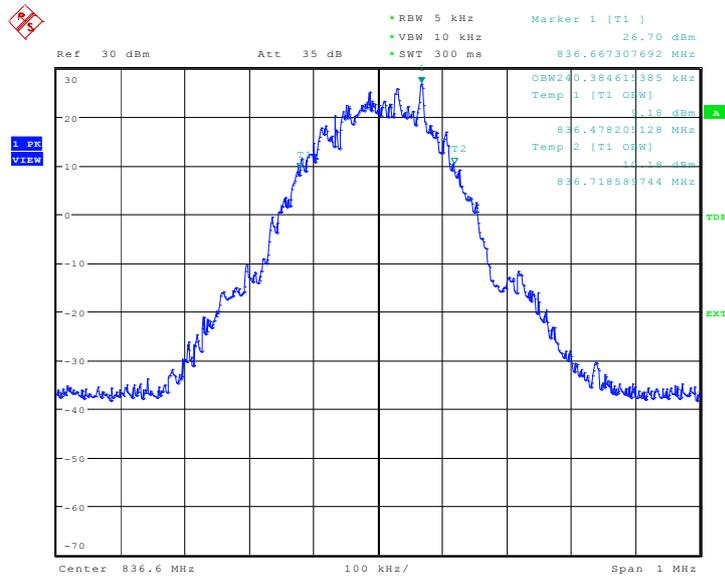
GSM 850

Channel 128-Occupied Bandwidth (99%)



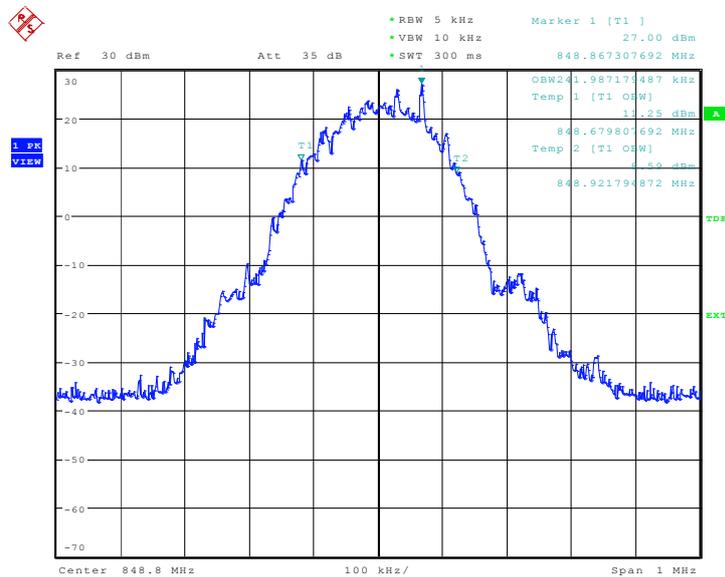
Date: 11.AUG.2010 03:19:32

Channel 190-Occupied Bandwidth (99%)



Date: 11.AUG.2010 03:19:59

Channel 251-Occupied Bandwidth (99%)



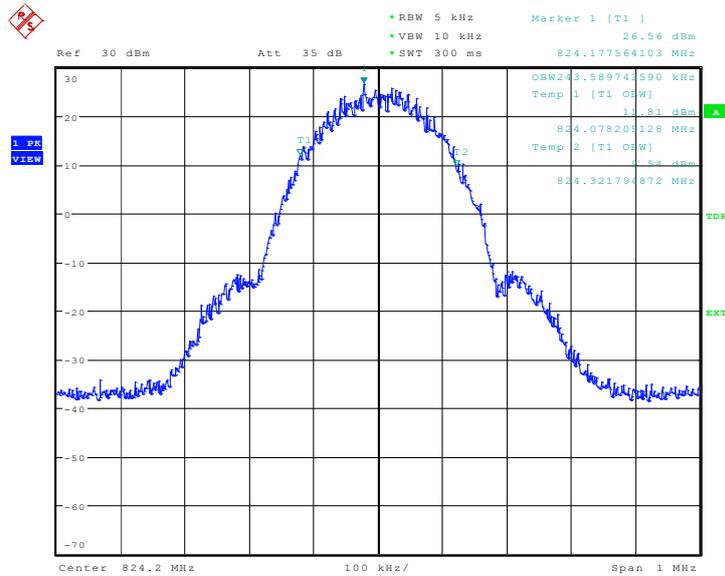
Date: 11.AUG.2010 03:20:26

GPRS 850(99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
824.2	243.589
836.6	243.589
848.8	245.192

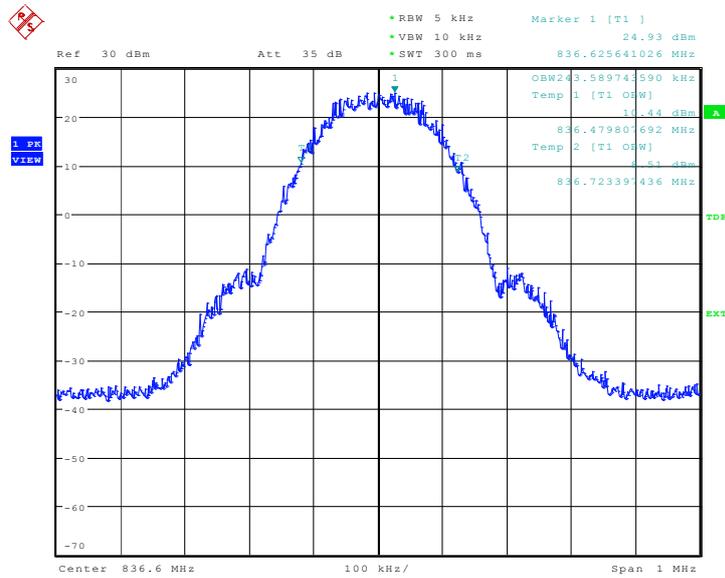
GPRS 850

Channel 128-Occupied Bandwidth (99%)



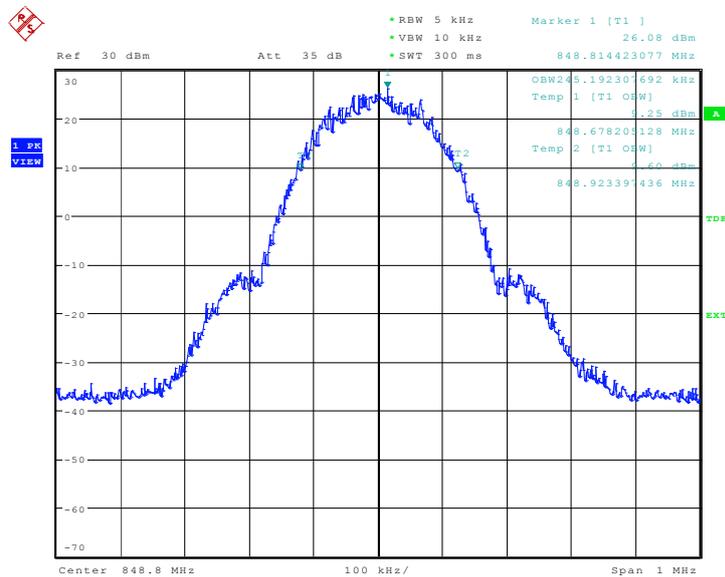
Date: 11.AUG.2010 02:10:32

Channel 190-Occupied Bandwidth (99%)



Date: 11.AUG.2010 02:10:59

Channel 251-Occupied Bandwidth (99%)



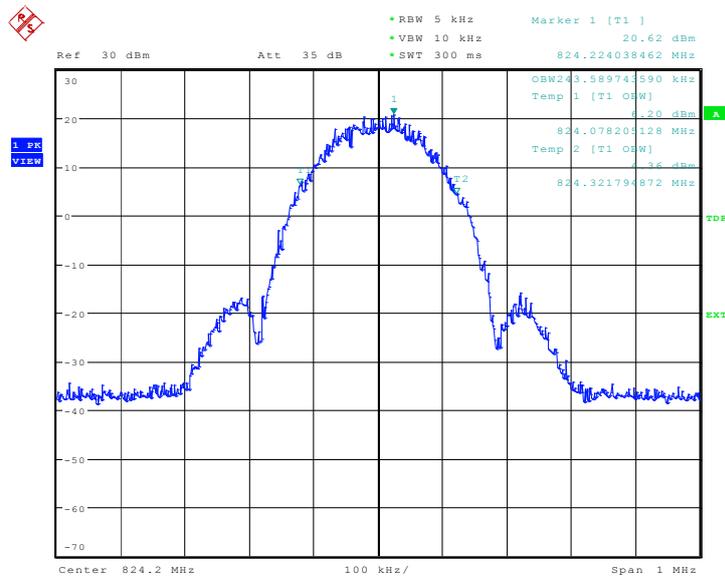
Date: 11.AUG.2010 02:11:26

EGPRS 850(99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
824.2	243.589
836.6	243.589
848.8	245.192

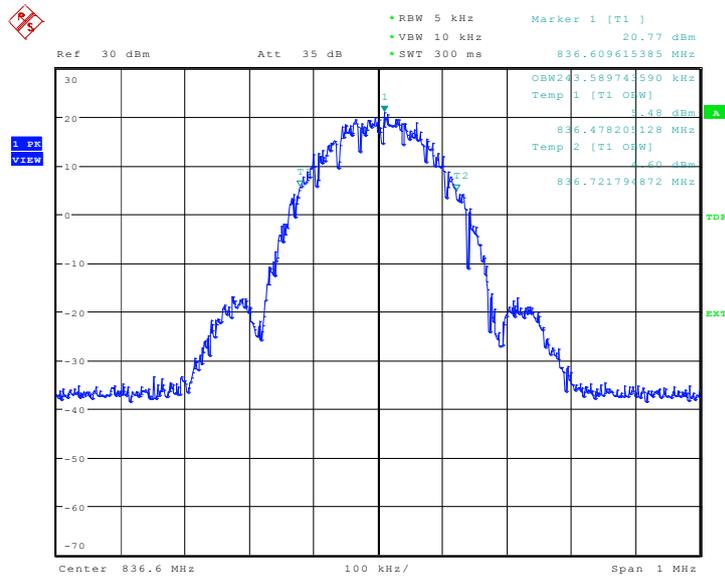
EGPRS 850

Channel 128-Occupied Bandwidth (99%)



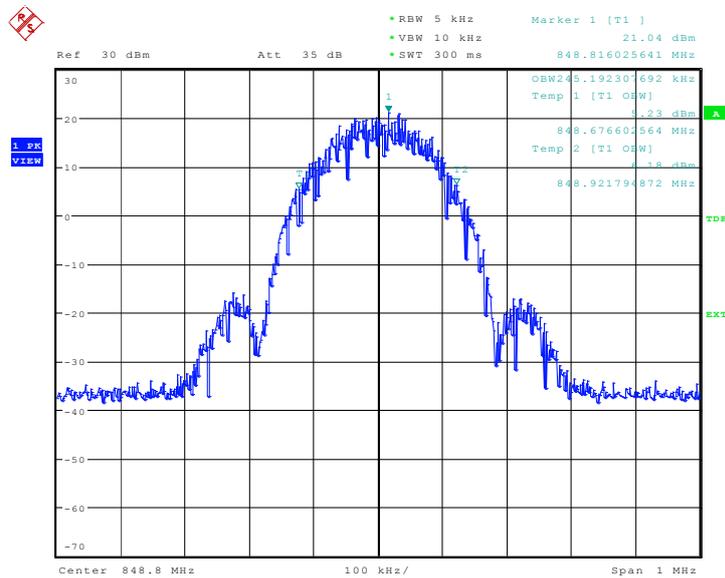
Date: 11.AUG.2010 02:25:08

Channel 190-Occupied Bandwidth (99%)



Date: 11.AUG.2010 02:25:34

Channel 251-Occupied Bandwidth (99%)

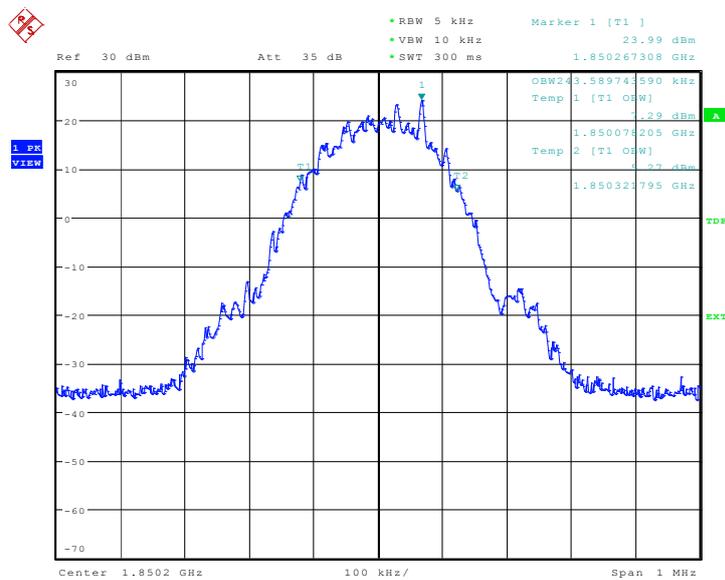


Date: 11.AUG.2010 02:26:01

PCS 1900(99%)

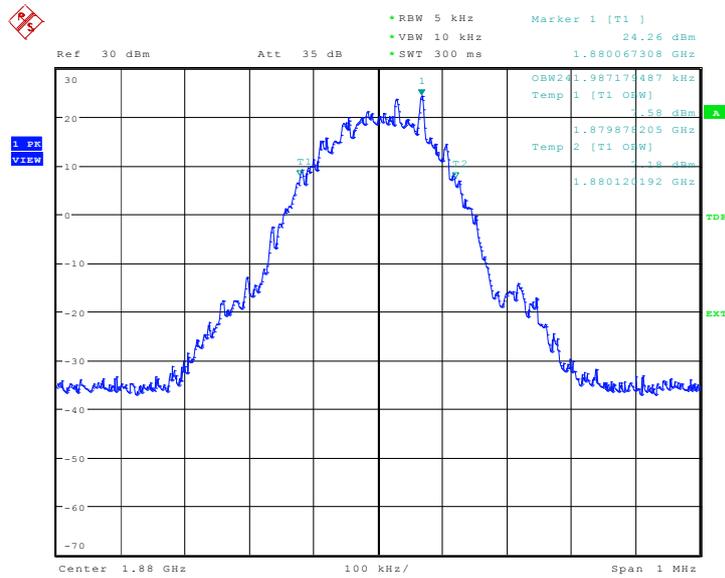
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
1850.2	243.589
1880.0	241.987
1909.8	243.589

**PCS 1900
Channel 512-Occupied Bandwidth (99%)**



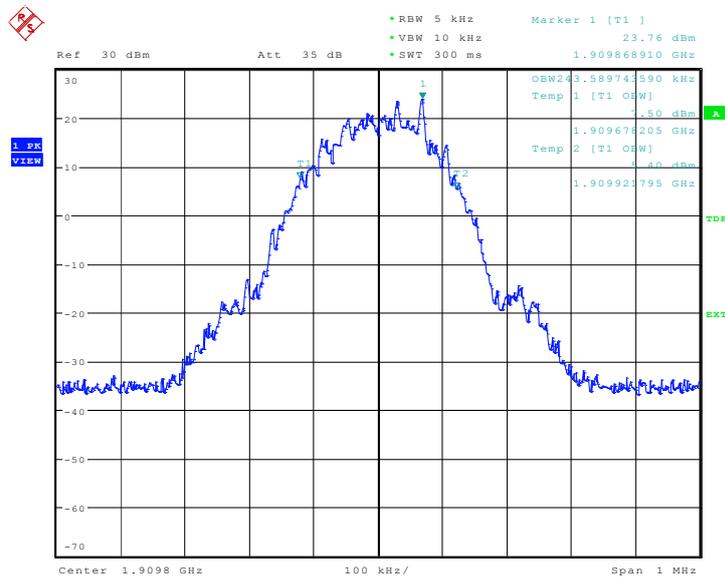
Date: 11.AUG.2010 03:28:42

Channel 661-Occupied Bandwidth (99%)



Date: 11.AUG.2010 03:29:09

Channel 810-Occupied Bandwidth (99%)



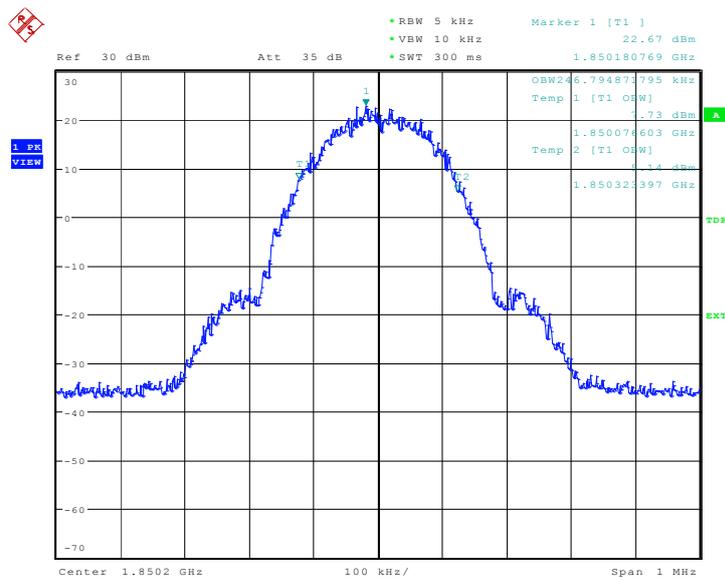
Date: 11.AUG.2010 03:29:36

GPRS 1900(99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
1850.2	246.794
1880.0	243.589
1909.8	246.794

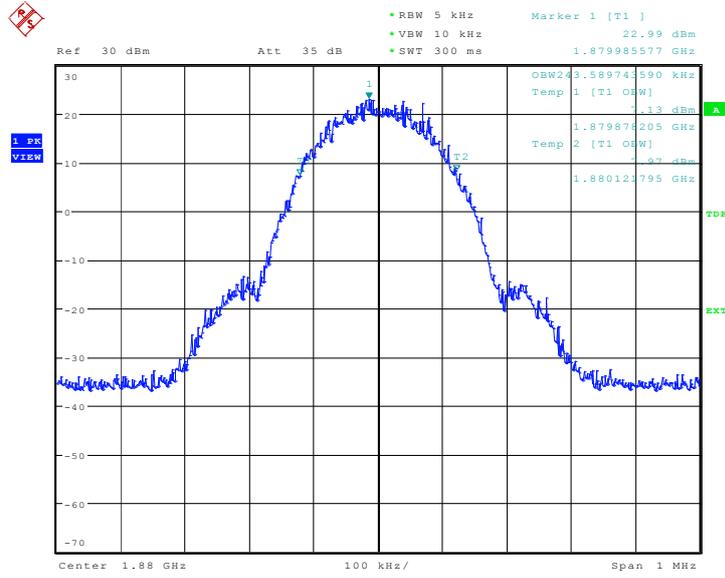
GPRS 1900

Channel 512-Occupied Bandwidth (99%)



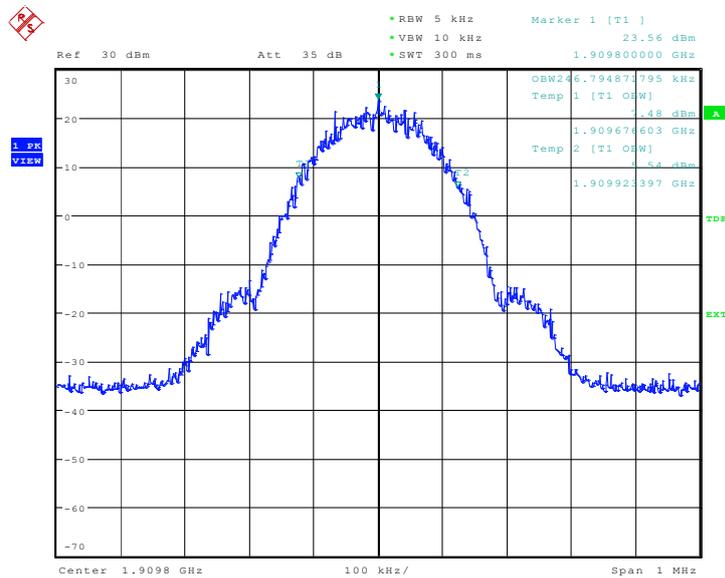
Date: 11.AUG.2010 02:16:36

Channel 661-Occupied Bandwidth (99%)



Date: 11.AUG.2010 02:17:03

Channel 810-Occupied Bandwidth (99%)



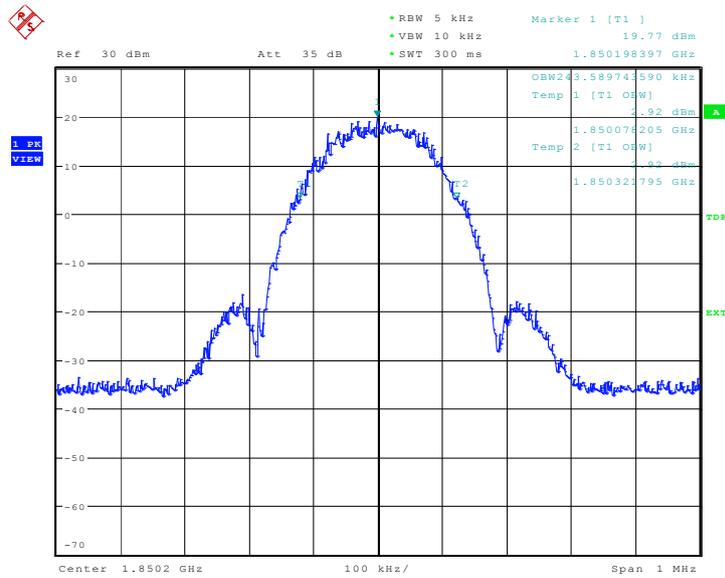
Date: 11.AUG.2010 02:17:30

EGPRS 1900(99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
1850.2	243.589
1880.0	246.794
1909.8	246.794

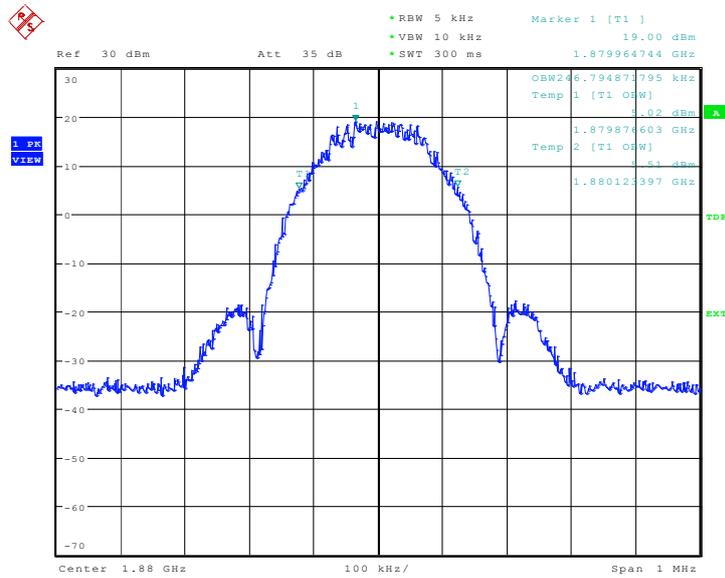
EGPRS 1900

Channel 512-Occupied Bandwidth (99%)



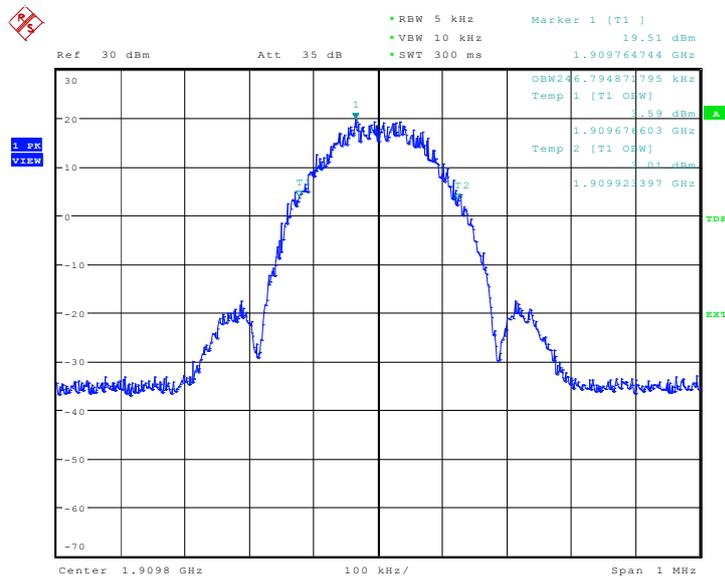
Date: 11.AUG.2010 02:32:34

Channel 661-Occupied Bandwidth (99%)



Date: 11.AUG.2010 02:33:01

Channel 810-Occupied Bandwidth (99%)



Date: 11.AUG.2010 02:33:27

A.5 EMISSION BANDWIDTH (§22.917(b)/§24.238(b))

A.5.1 Emission Bandwidth Results

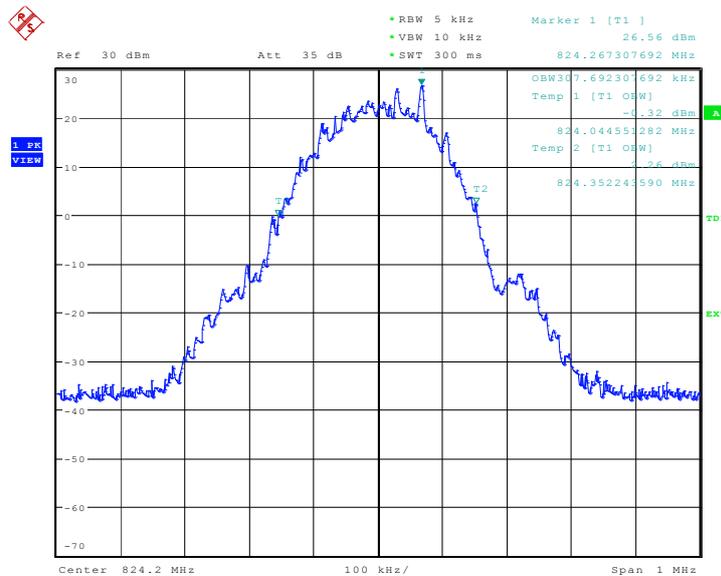
Similar to conducted emissions; Emission bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the PCS1900 band and GSM850 band. Table below lists the measured -26dBc BW. Spectrum analyzer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

GSM 850(-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc BW)(kHz)
824.2	307.692
836.6	309.294
848.8	307.692

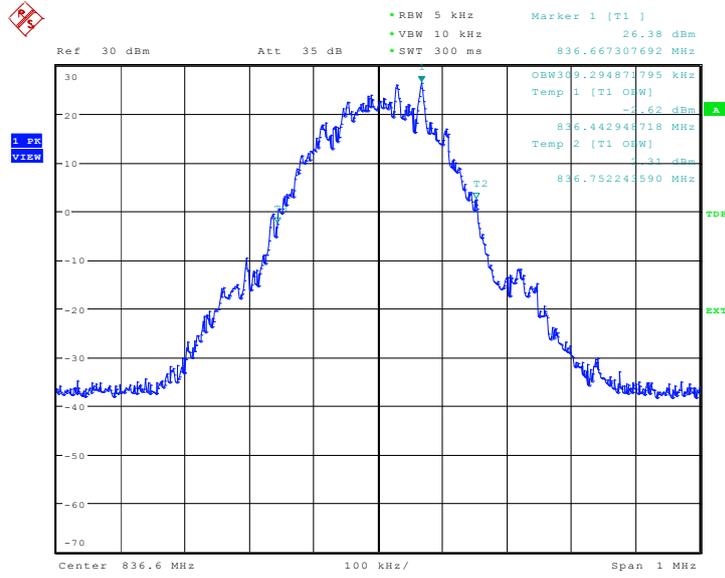
GSM 850

Channel 128-Occupied Bandwidth (-26dBc BW)



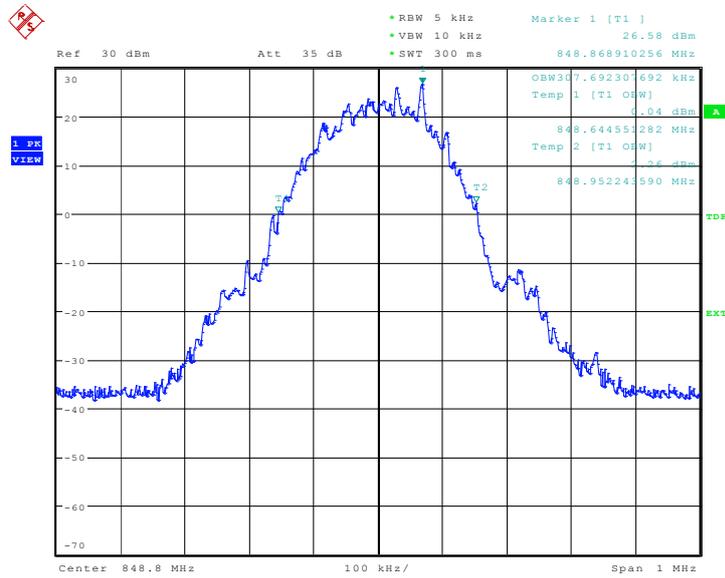
Date: 11.AUG.2010 03:20:55

Channel 190-Occupied Bandwidth (-26dBc BW)



Date: 11.AUG.2010 03:21:22

Channel 251-Occupied Bandwidth (-26dBc BW)



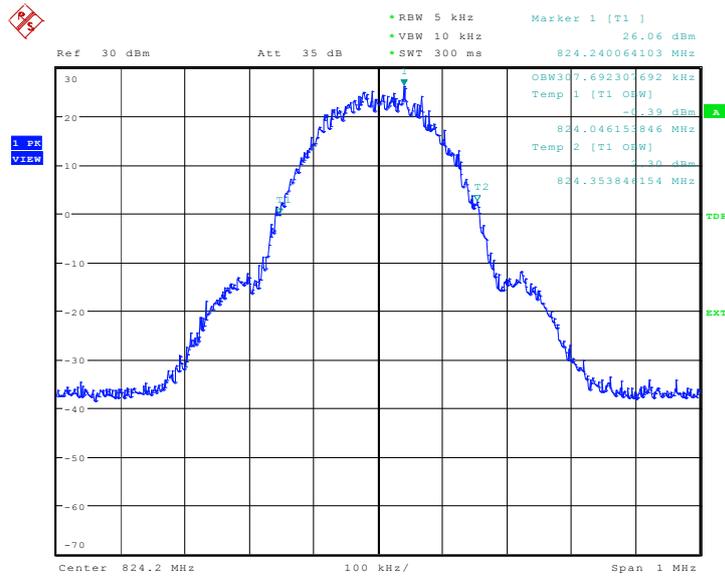
Date: 11.AUG.2010 03:21:49

GPRS 850(-26dBc)

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

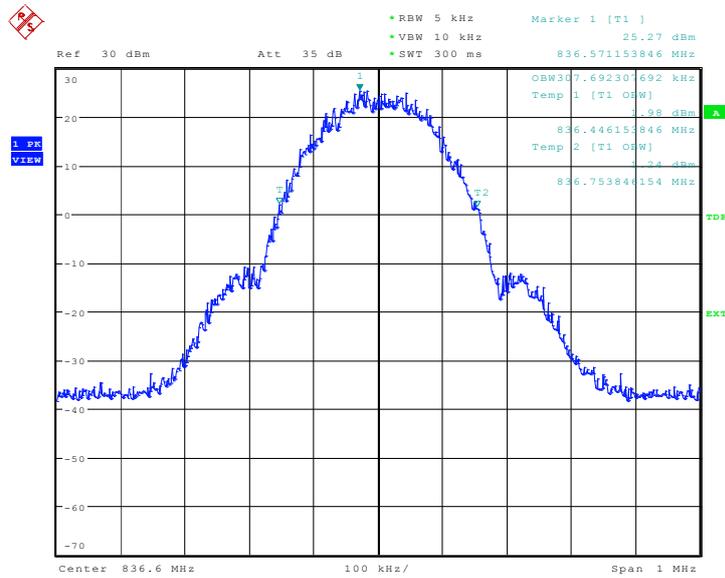
GPRS 850

Channel 128-Occupied Bandwidth (-26dBc BW)



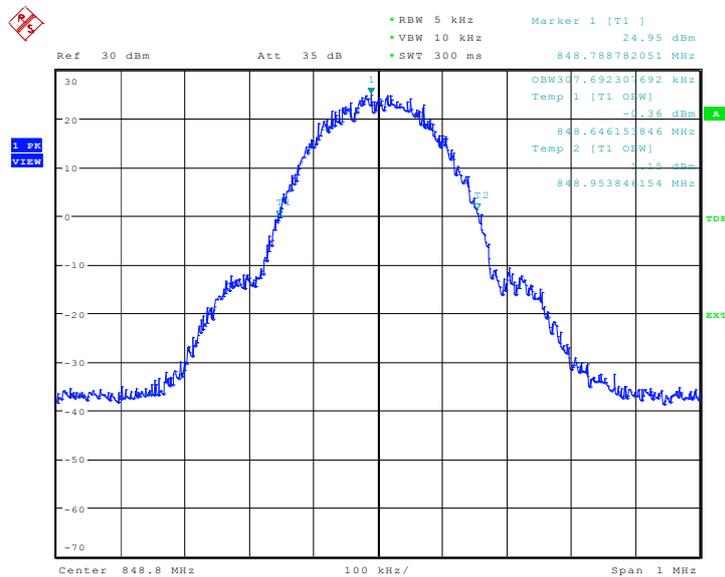
Date: 11.AUG.2010 02:11:54

Channel 190-Occupied Bandwidth (-26dBc BW)



Date: 11.AUG.2010 02:12:21

Channel 251-Occupied Bandwidth (-26dBc BW)



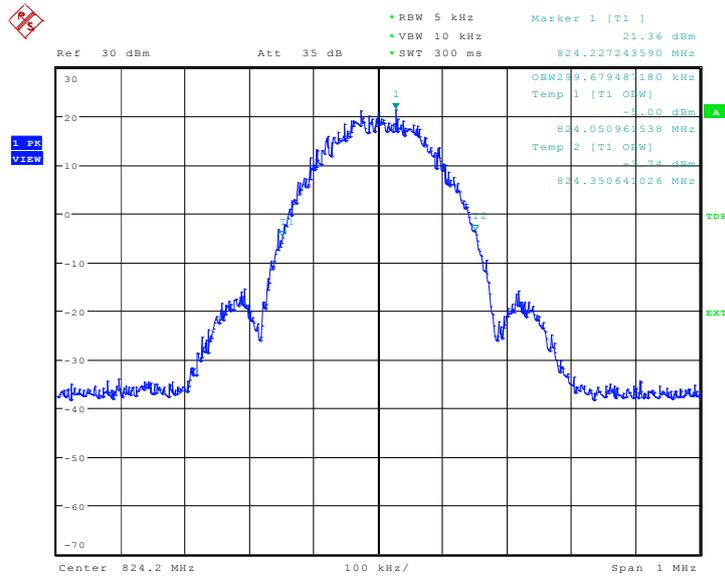
Date: 11.AUG.2010 02:12:48

EGPRS 850(-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc BW)(kHz)
824.2	299.679
836.6	299.679
848.8	298.076

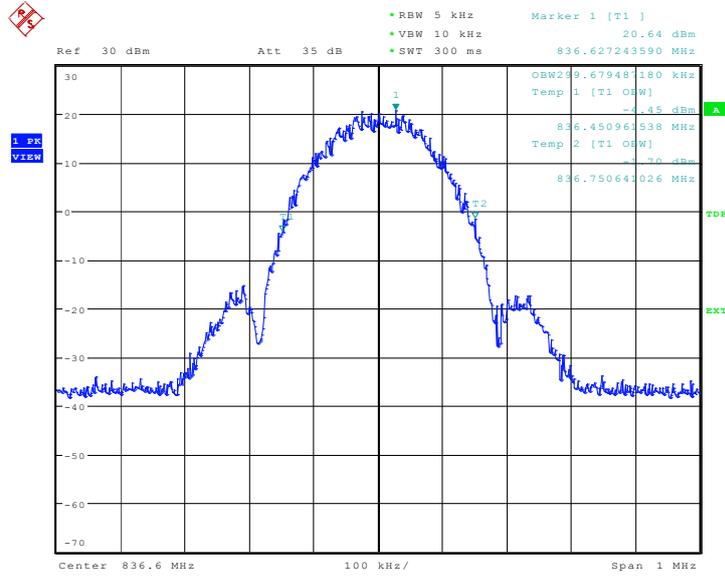
EGPRS 850

Channel 128-Occupied Bandwidth (-26dBc BW)



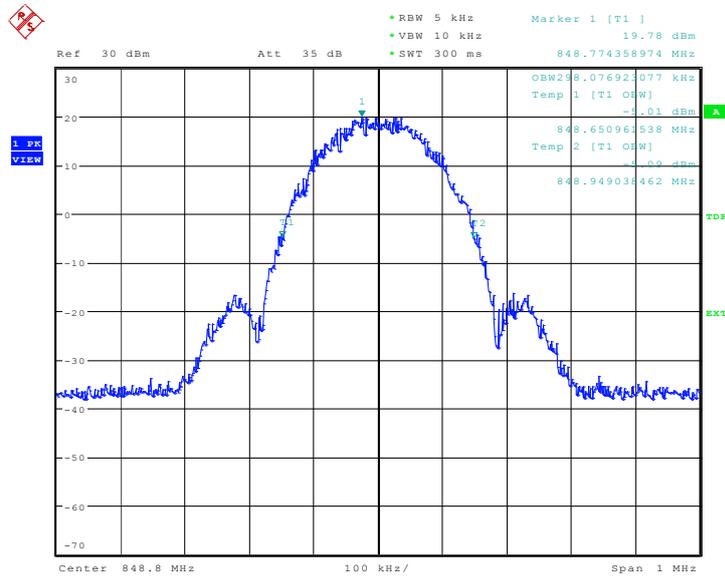
Date: 11.AUG.2010 02:26:28

Channel 190-Occupied Bandwidth (-26dBc BW)



Date: 11.AUG.2010 02:26:54

Channel 251-Occupied Bandwidth (-26dBc BW)



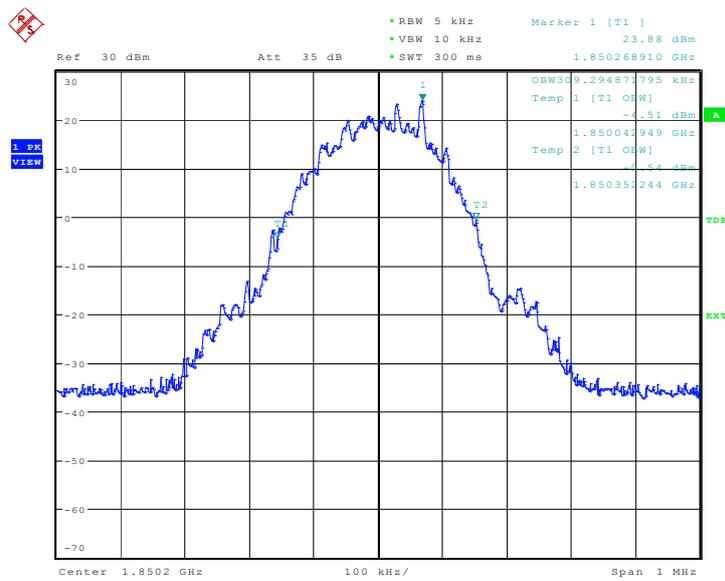
Date: 11.AUG.2010 02:27:21

PCS 1900(-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc BW)(kHz)
1850.2	309.294
1880.0	309.294
1909.8	309.294

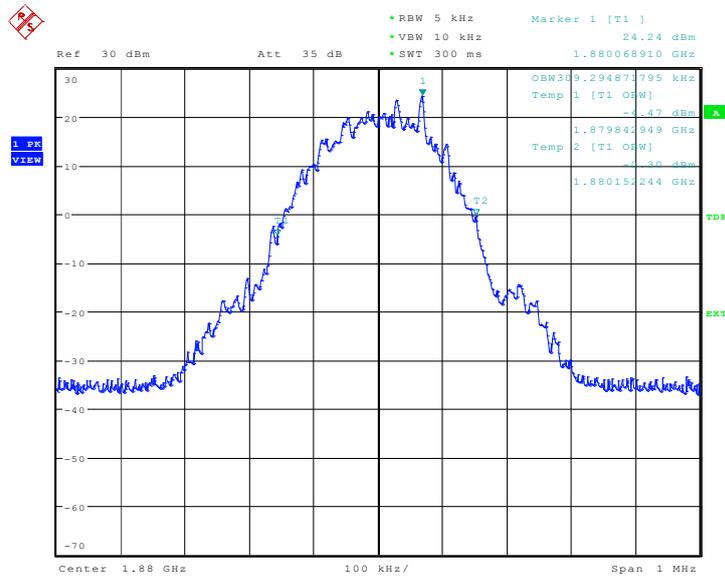
PCS 1900

Channel 512-Occupied Bandwidth (-26dBc BW)



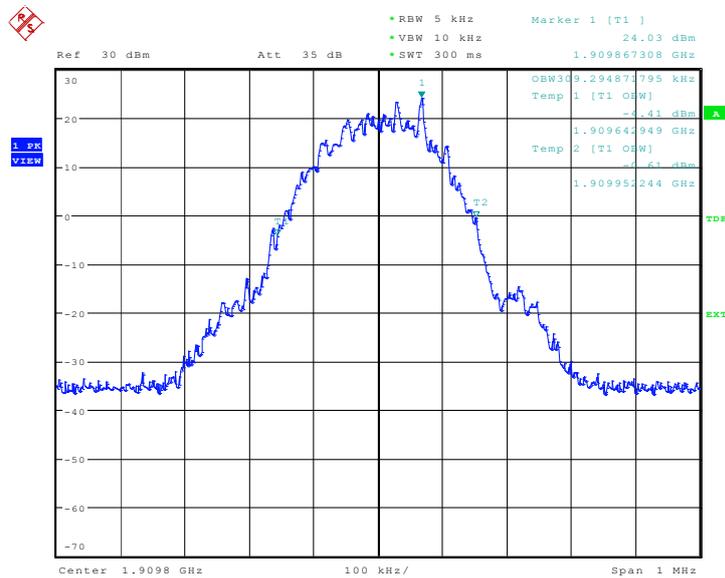
Date: 11.AUG.2010 03:30:05

Channel 661-Occupied Bandwidth (-26dBc BW)



Date: 11.AUG.2010 03:30:32

Channel 810-Occupied Bandwidth (-26dBc BW)



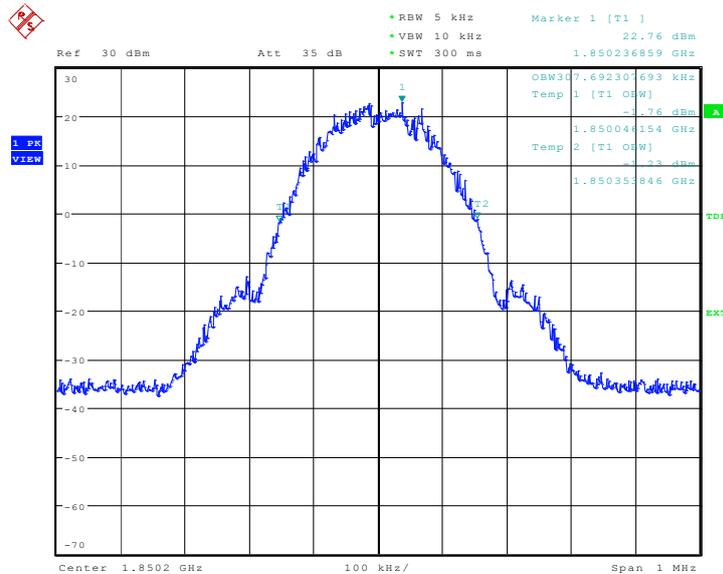
Date: 11.AUG.2010 03:30:59

GPRS 1900(-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc BW)(kHz)
1850.2	307.692
1880.0	306.089
1909.8	307.692

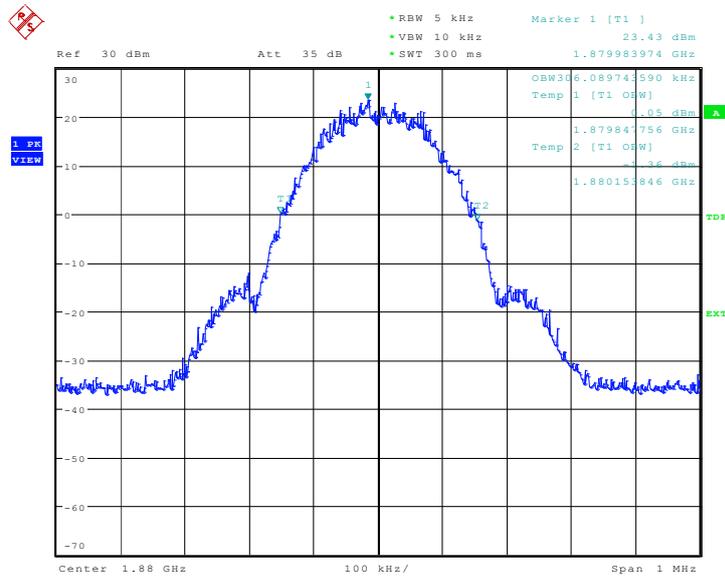
GPRS 1900

Channel 512-Occupied Bandwidth (-26dBc BW)



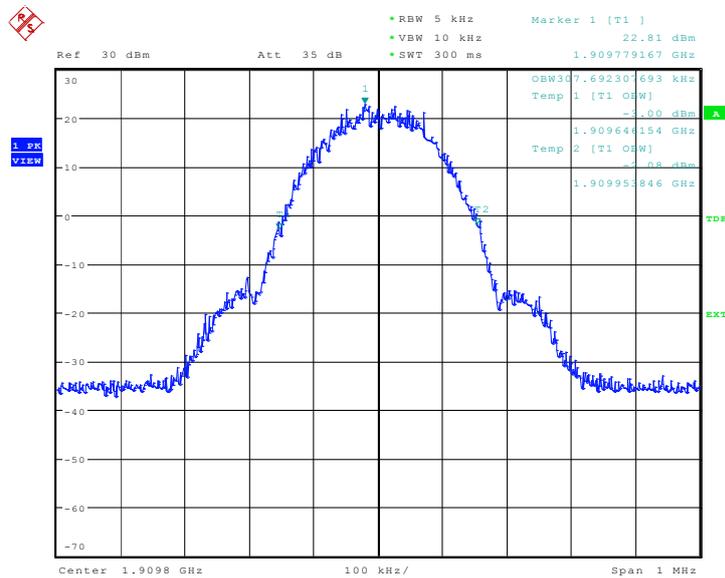
Date: 11.AUG.2010 02:17:59

Channel 661-Occupied Bandwidth (-26dBc BW)



Date: 11.AUG.2010 02:18:26

Channel 810-Occupied Bandwidth (-26dBc BW)



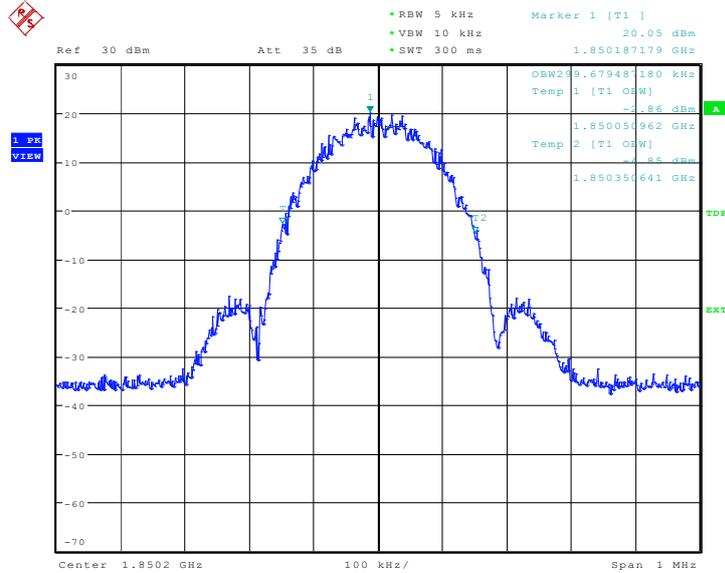
Date: 11.AUG.2010 02:18:53

EGPRS 1900(-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc BW)(kHz)
1850.2	299.679
1880.0	302.884
1909.8	301.282

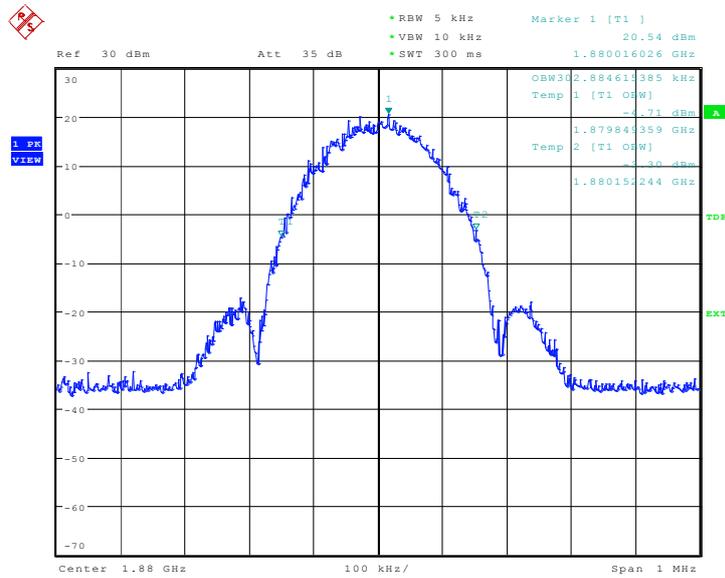
EGPRS 1900

Channel 512-Occupied Bandwidth (-26dBc BW)



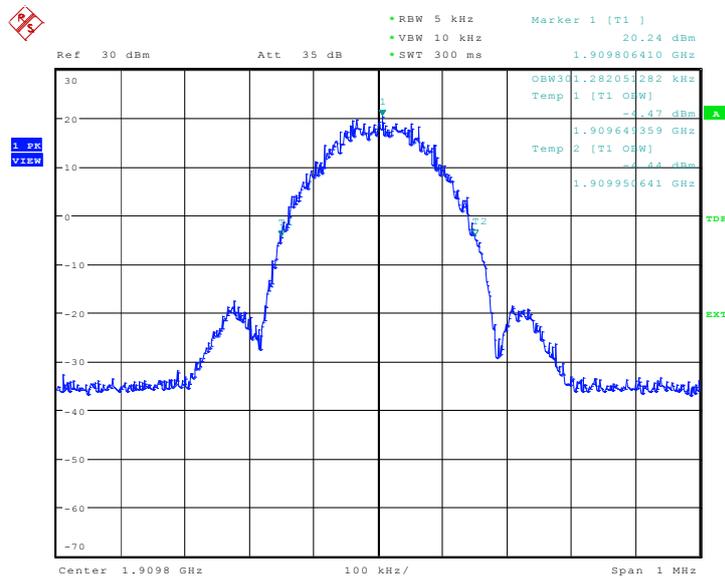
Date: 11.AUG.2010 02:33:55

Channel 661-Occupied Bandwidth (-26dBc BW)



Date: 11.AUG.2010 02:34:21

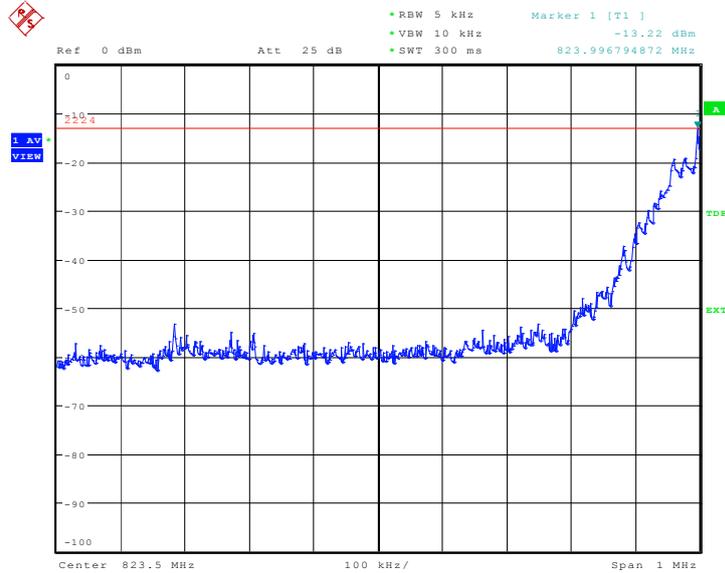
Channel 810-Occupied Bandwidth (-26dBc BW)



Date: 11.AUG.2010 02:34:48

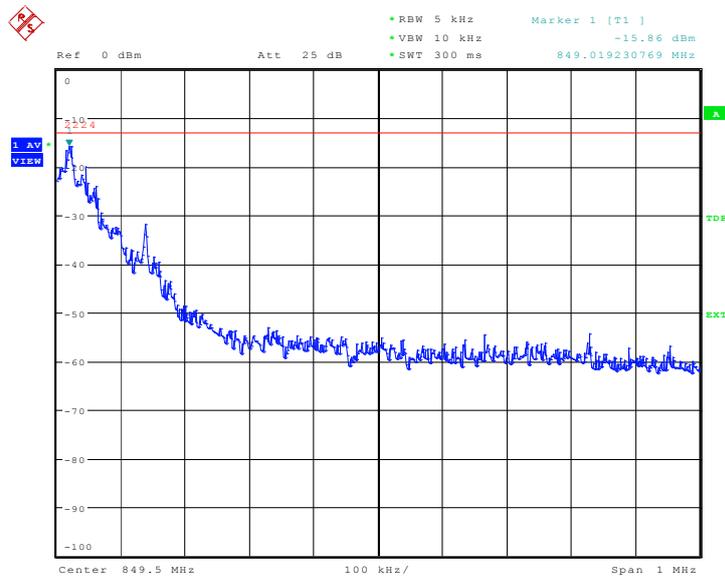
A.6 BAND EDGE COMPLIANCE (§22.917(b)/§24.238(b))

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



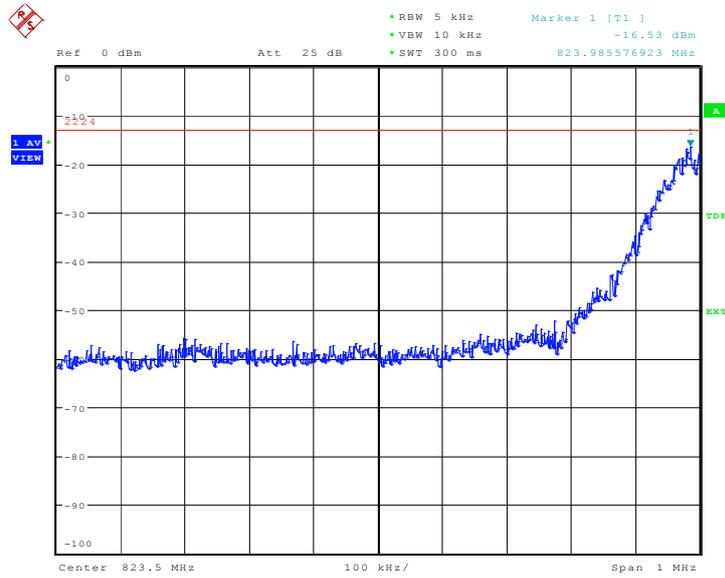
Date: 11.AUG.2010 03:22:17

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



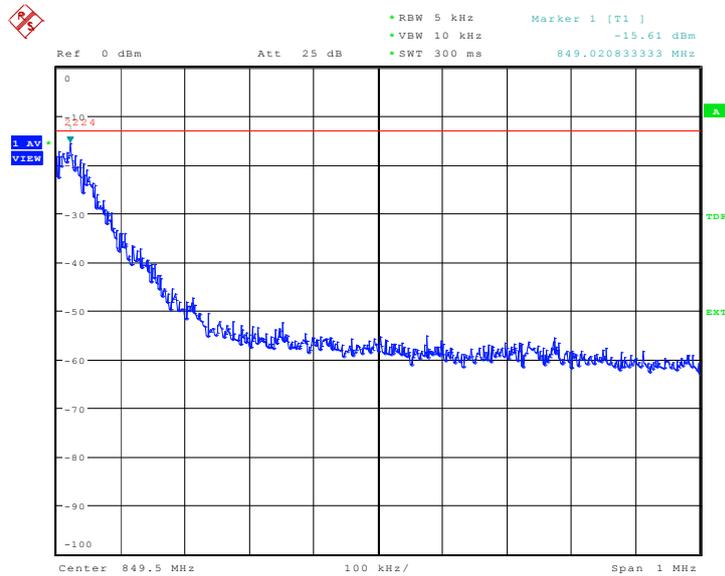
Date: 11.AUG.2010 03:22:46

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



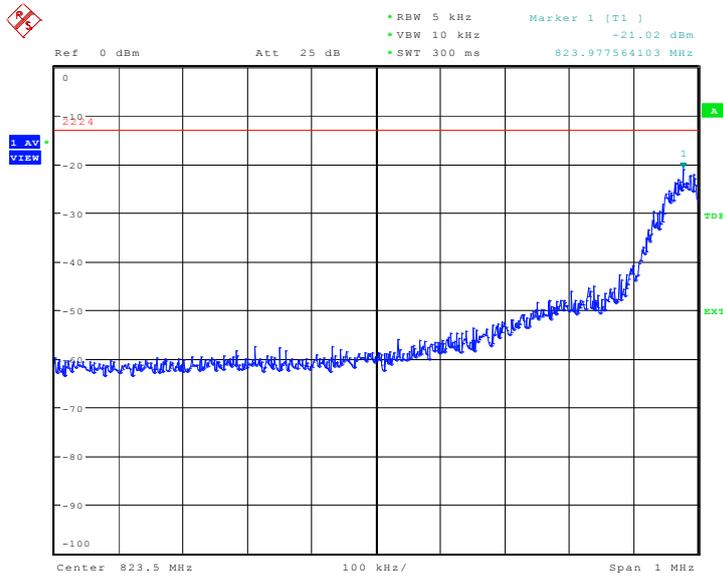
Date: 11.AUG.2010 02:13:17

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



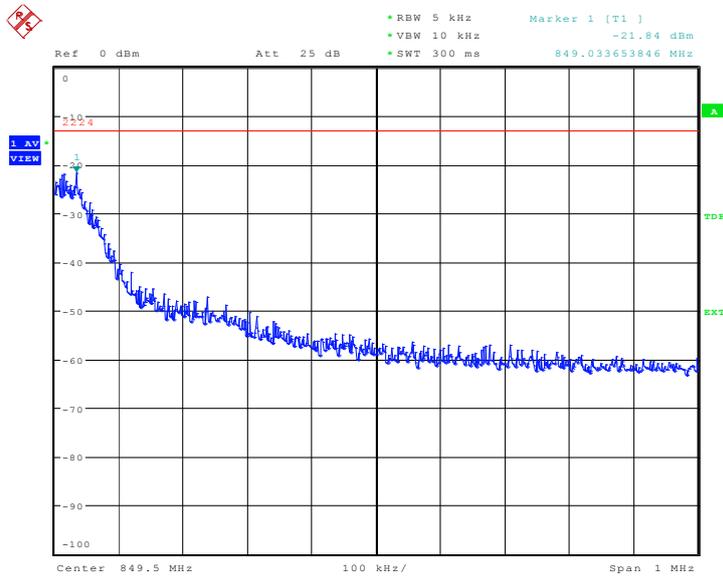
Date: 11.AUG.2010 02:13:46

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



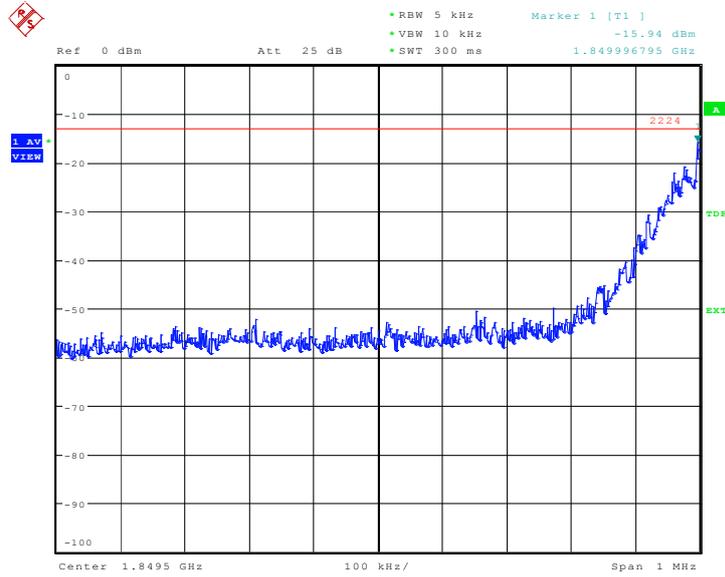
Date: 11.AUG.2010 02:27:48

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



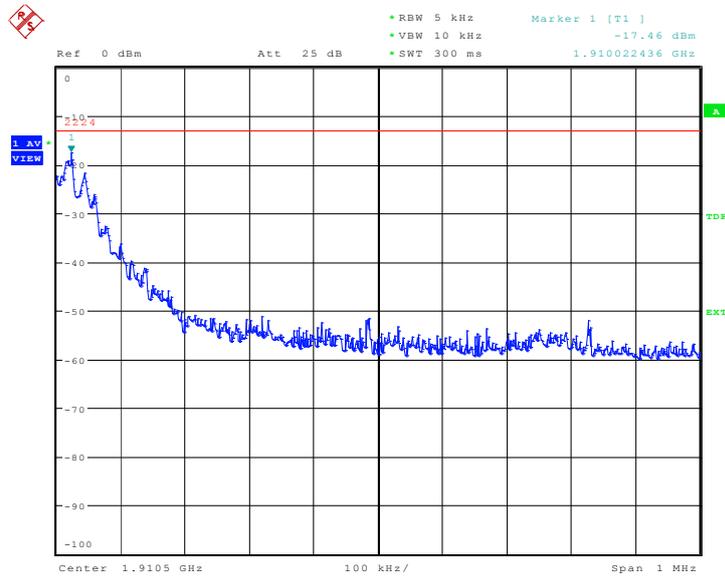
Date: 11.AUG.2010 02:28:15

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



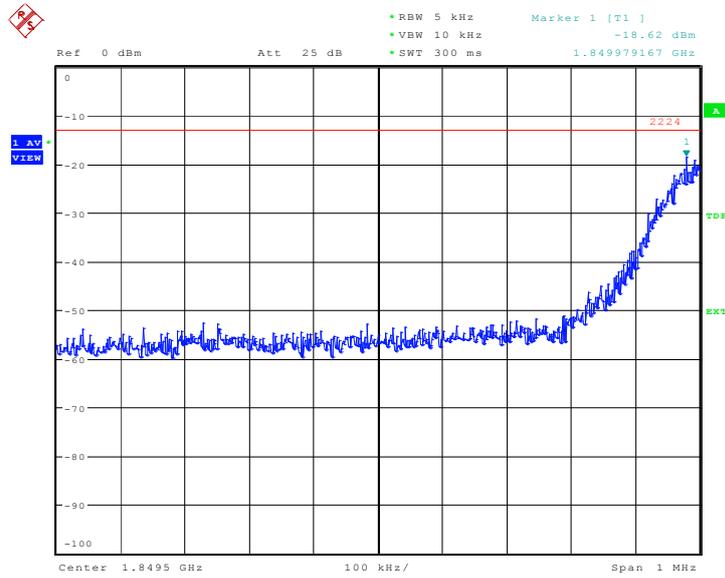
Date: 11.AUG.2010 03:31:28

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



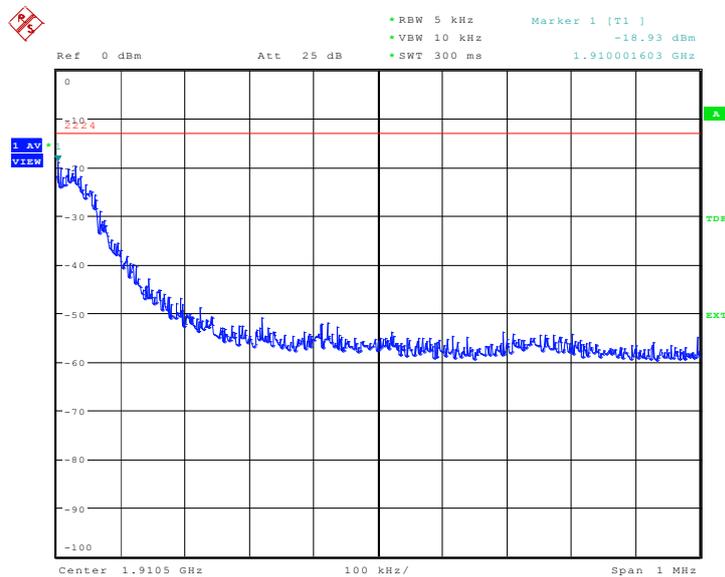
Date: 11.AUG.2010 03:31:58

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



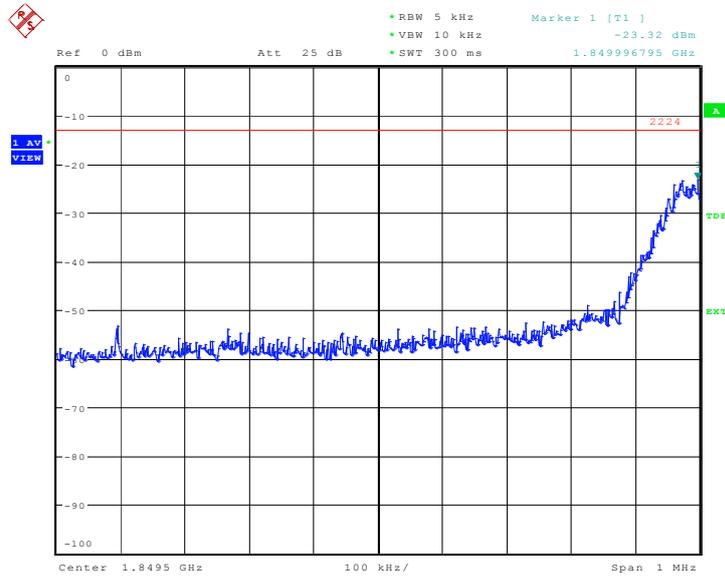
Date: 11.AUG.2010 02:19:21

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



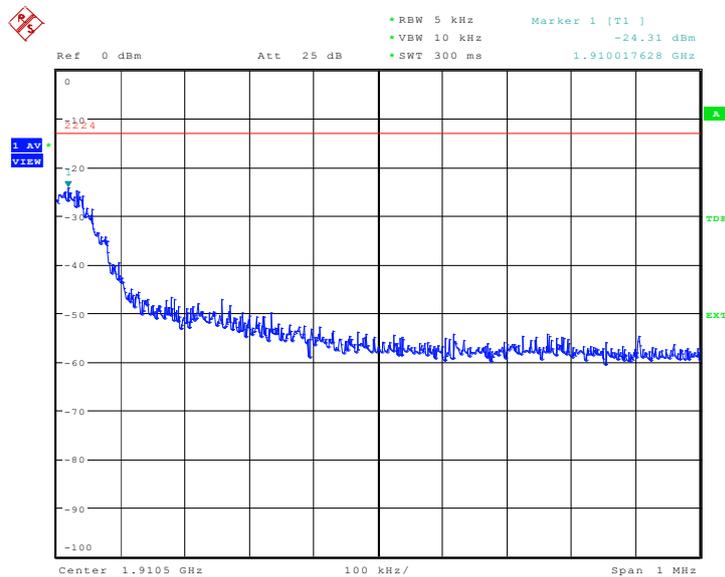
Date: 11.AUG.2010 02:19:50

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



Date: 11.AUG.2010 02:35:15

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



Date: 11.AUG.2010 02:35:42

A.7 CONDUCTED SPURIOUS EMISSION (§2.1057/§22.917/§24.238)

A.7.1 Measurement Method

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

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the equipment of PCS1900 band, this equates to a frequency range of 30 MHz to 19.1 GHz, data taken from 30 MHz to 20 GHz. For GSM850, data taken from 30 MHz to 9 GHz.
2. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

GSM850 Transmitter

Channel	Frequency (MHz)
128	824.2
190	836.6
251	848.8

PCS1900 Transmitter

Channel	Frequency (MHz)
512	1850.2
661	1880.0
810	1909.8

A.7.2 Measurement Limit

Sec. 24.238 Emission Limits.

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

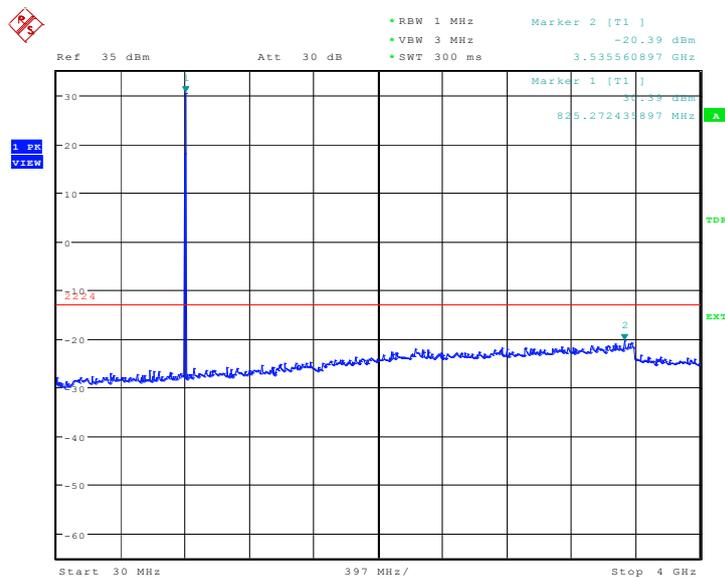
A. 7.3 Measurement result
GSM850

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

A.7.3.1 Channel 128: 30MHz – 4GHz

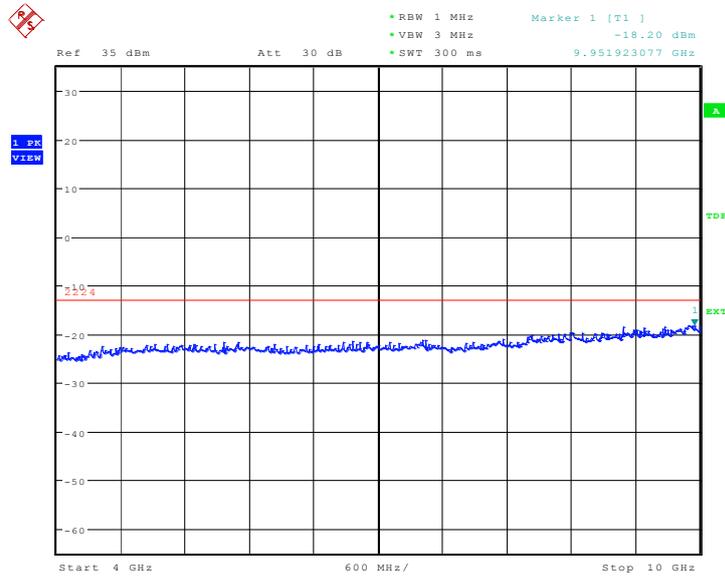
Spurious emission limit –13dBm.

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



Date: 11.AUG.2010 03:23:15

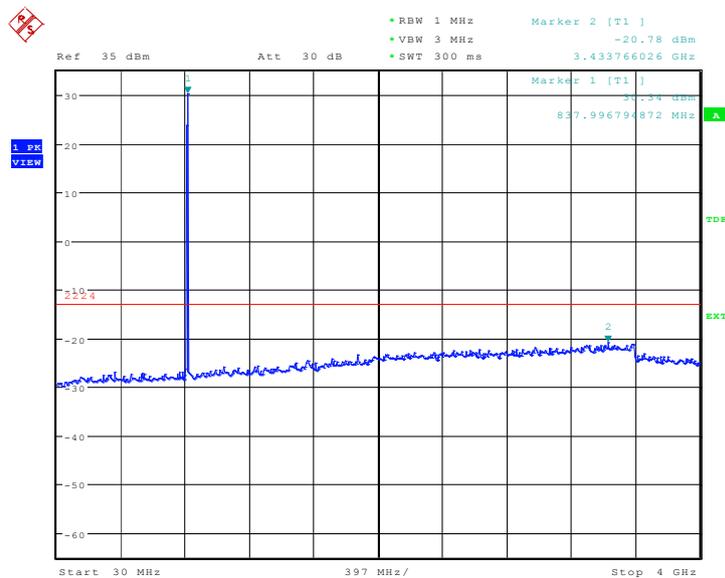
A.7.3.2 Channel 128: 4GHz – 10GHz
Spurious emission limit –13dBm.



Date: 11.AUG.2010 03:23:43

A.7.3.3 Channel 190: 30MHz – 4GHz
Spurious emission limit –13dBm

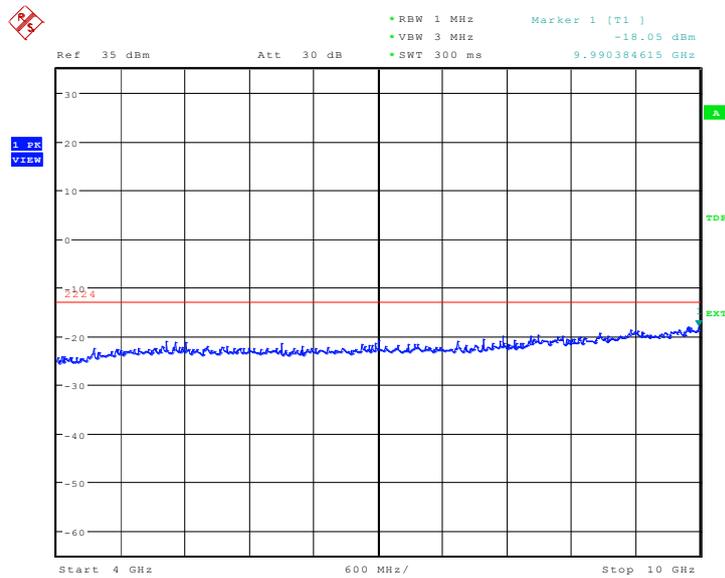
NOTE: peak above the limit line is the carrier frequency.



Date: 11.AUG.2010 03:24:12

A.7.3.4 Channel 190: 4GHz –10GHz

Spurious emission limit –13dBm

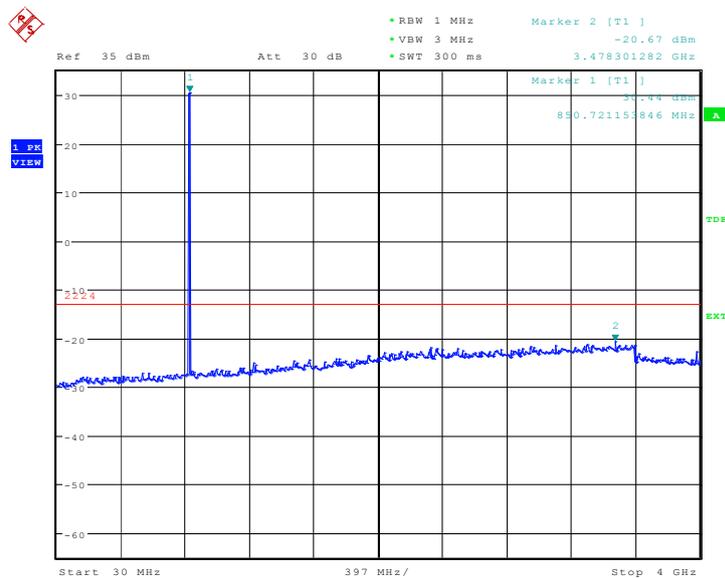


Date: 11.AUG.2010 03:24:40

A.7.3.5 Channel 251: 30MHz – 4GHz

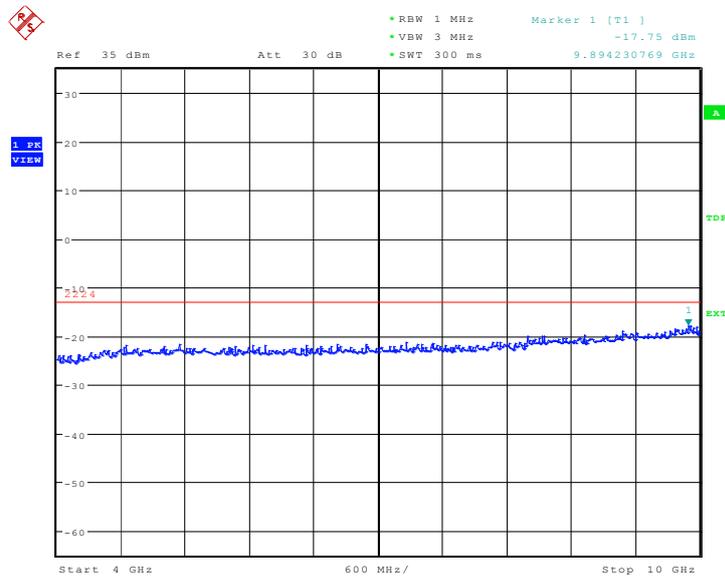
Spurious emission limit –13dBm.

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



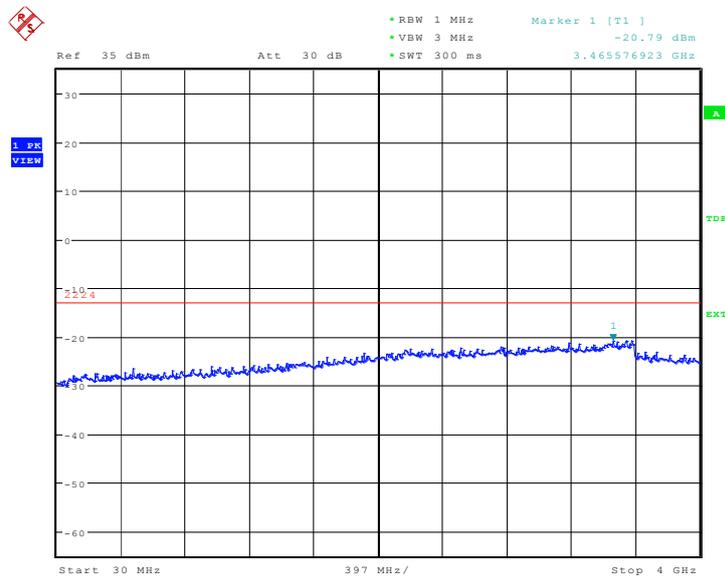
Date: 11.AUG.2010 03:25:09

A.7.3.6 Channel 251: 4GHz – 10GHz
Spurious emission limit -13dBm.



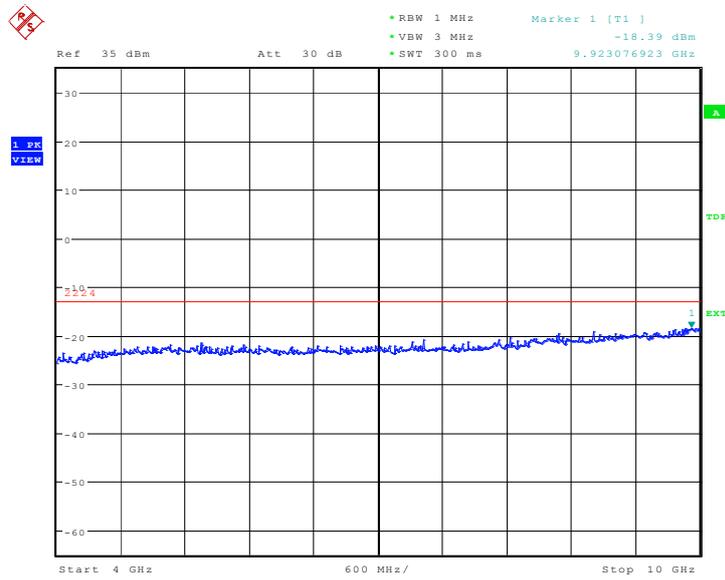
Date: 11.AUG.2010 03:25:37

A.7.3.7 Idle mode: 30MHz – 4GHz
Spurious emission limit -13dBm.



Date: 11.AUG.2010 03:26:05

A.7.3.8 Idle mode: 4GHz – 10GHz
Spurious emission limit -13dBm.



Date: 11.AUG.2010 03:26:33

PCS1900

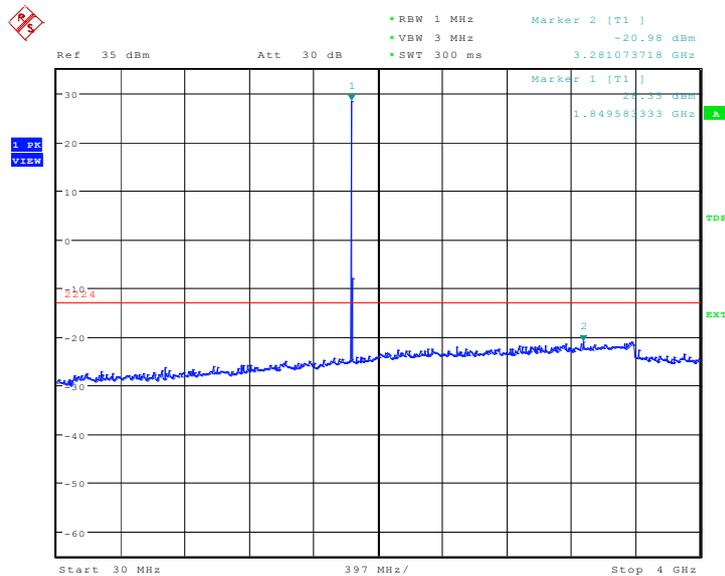
Harmonic	Tx ch. 512 Freq. (MHz)	Level (dBm)	Tx ch. 661 Freq. (MHz)	Level (dBm)	Tx ch. 810 Freq. (MHz)	Level (dBm)
2	3700.4	nf	3760	nf	3819.6	nf
3	5550.6	nf	5640	nf	5729.4	nf
4	7400.8	nf	7520	nf	7639.2	nf
5	9251.0	nf	9400	nf	9549.0	nf
6	11101.2	nf	11280	nf	11458.8	nf
7	12951.4	nf	13160	nf	13368.6	nf
8	14801.6	nf	15040	nf	15278.4	nf
9	16651.8	nf	16920	nf	17188.2	nf
10	18502.0	nf	18800	nf	19098.0	nf

nf: Noise floor

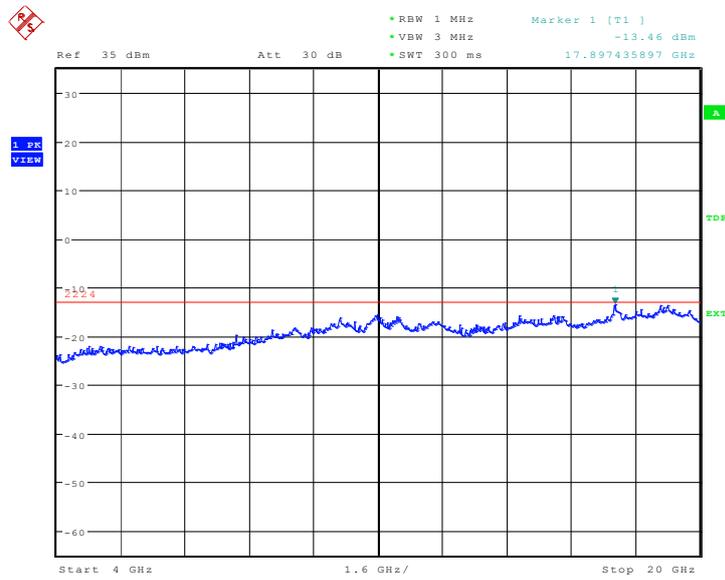
A. 7.3.9 Channel 512: 30MHz – 4GHz

Spurious emission limit –13dBm.

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



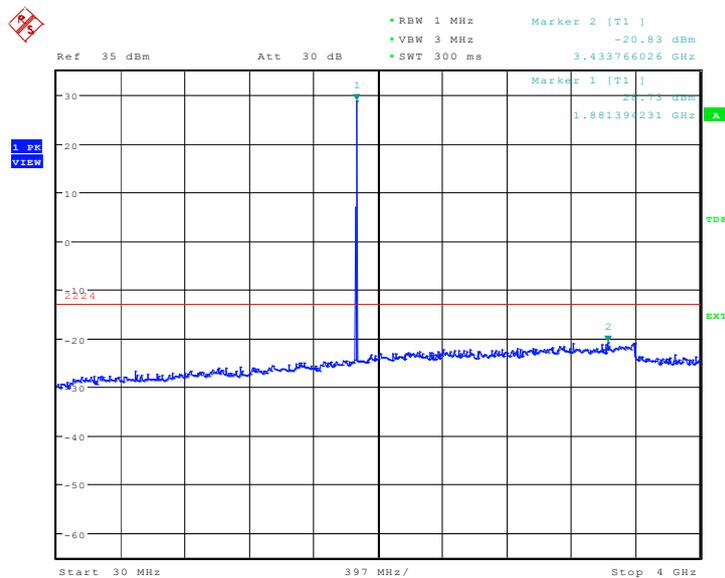
A. 7.3.10 Channel 512: 4GHz – 20GHz
Spurious emission limit –13dBm.



Date: 11.AUG.2010 03:32:55

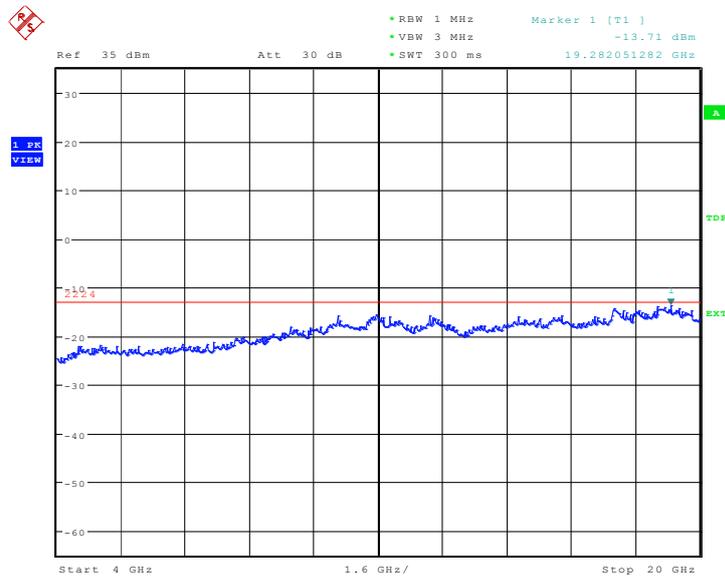
A. 7.3.11 Channel 661: 30MHz – 4GHz
Spurious emission limit –13dBm

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



Date: 11.AUG.2010 03:33:23

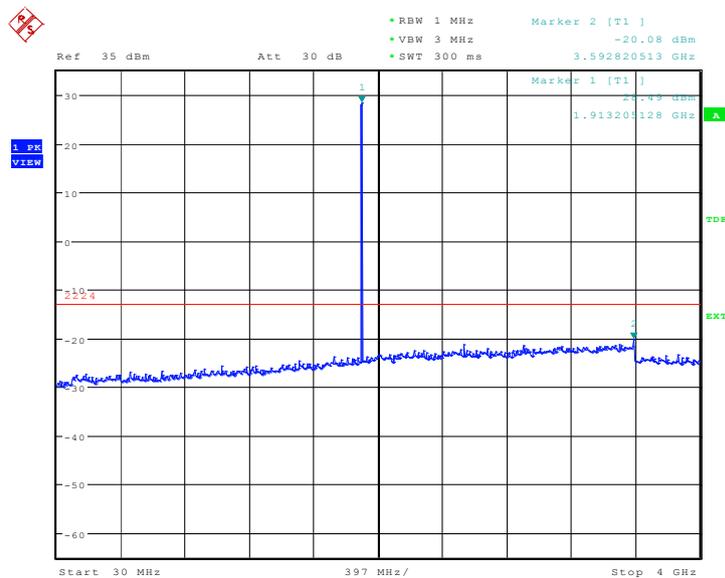
A. 7.3.12 Channel 661: 4GHz –20GHz
Spurious emission limit –13dBm



Date: 11.AUG.2010 03:33:51

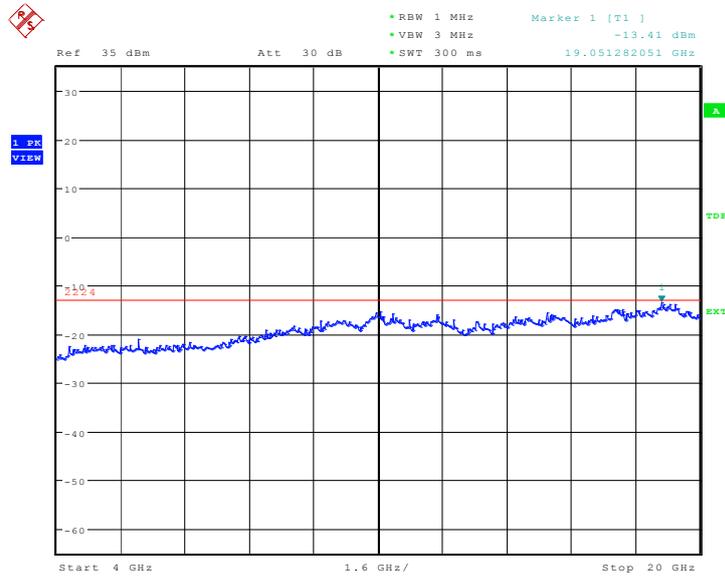
A. 7.3.13 Channel 810: 30MHz – 4GHz
Spurious emission limit –13dBm.

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



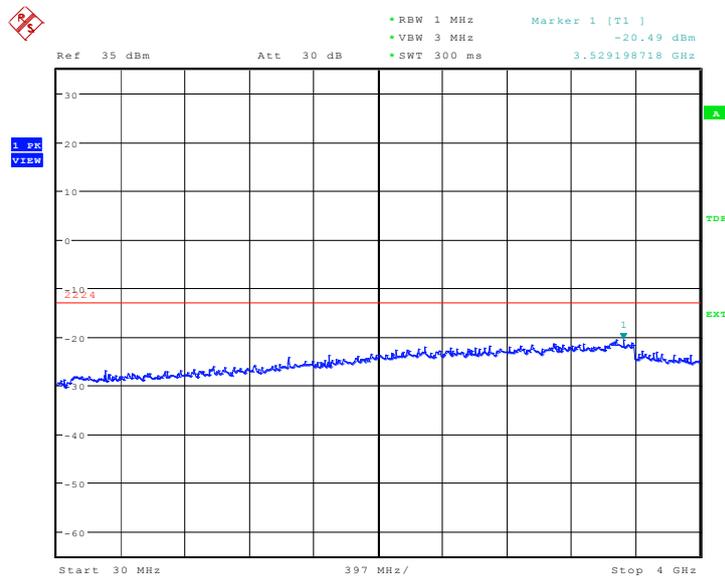
Date: 11.AUG.2010 03:34:20

A. 7.3.14 Channel 810: 4GHz – 20GHz
Spurious emission limit –13dBm.



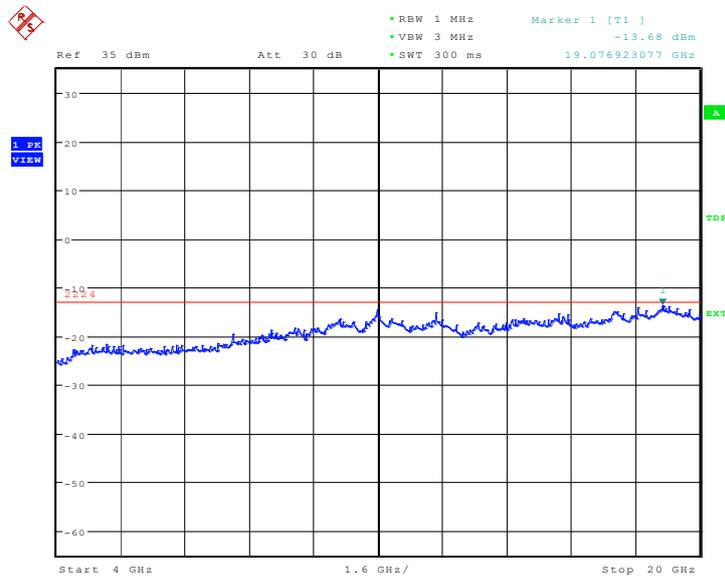
Date: 11.AUG.2010 03:34:48

A. 7.3.15 Idle mode: 30MHz – 4GHz
Spurious emission limit –13dBm.



Date: 11.AUG.2010 03:35:16

A. 7.3.16 Idle mode: 4GHz – 20GHz
Spurious emission limit -13dBm.



Date: 11.AUG.2010 03:35:44

END OF REPORT