

Test Site:
FCC Test Site No.:
IC OATS No.:

96997
IC3475A-1



ECL-TAL Test Report No.: 11-251

Equipment under test: **ION-M7P/7P/85P/19P 850MHz path**
FCC ID: **XS5-M778519P**
IC ID: **2237E-M778519P**

Type of test: **FCC 47 CFR Part 22 Subpart H:2011**
Cellular Radiotelephone Service
RSS-Gen:2007, RSS-131:2005
Cellular Telephones Employing New Technologies
Operating in the Bands 824-849 MHz and 869-894 MHz

Measurement Procedures: 47 CFR Parts 2: 2011 (*Frequency Allocations and Radio Treaty Matters; General Rules and Regulations*),
Part 22: 2011 (*Public Mobile Services*),
ANSI/TIA-603-C:2004, *Land Mobile FM or PM Communications Equipment Measurement and Performance Standards*
IC-GEN:2007 General Requirements and Information for the Certification of Radio communication Equipment

Test result: **Passed**

Date of issue:	20.10.2011			Signature:
Issue-No.:	01	Author:	T. Zahlmann Test engineer	
Date of delivery:	17.10.11	Checked:	T. Vogel Deputy Head EMC	
Test dates:	14.10. – 18.10.11			
Pages:	45			

Test Report No.: 11-157

FCC ID: XS5-M778519P

IC ID: 2237E-M778519P



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General:

The purpose of this report is to show compliance to the FCC regulations for licensed devices operating under section 22 H of the Code of Federal Regulations title 47.

This report informs about the results of the EMC tests, it only refers to the equipment under test. No part of this report may be reproduced in any form, without written permission.



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1 Test Results Summary

Name of Test	FCC Para. No.	FCC Method	FCC Spec.	Result
RF Power Output	22.913	2.1046	500 Watts	Complies
Occupied Bandwidth		2.1049	Input/Output	Complies
Spurious Emissions at Antenna Terminals	22.917	2.1051	-13dBm	Complies
Field Strength of Spurious Emissions	22.917	2.1053	-13dBm E.I.R.P	Complies
Frequency Stability	n.a.	2.1055	Must stay in band	NA

Frequency stability is given by: The system gets an electrical analog signal from the BSS which is converted into an analog optical signal, transmitted by the optical links and then reconverted in the Remote Unit into an analog electrical signal. During this process happens no frequency change/modification, so input and output have same frequency what can be seen under capture "Occupied Bandwidth".



2 Equipment under test (E.U.T.)

2.1 Description

Kind of equipment	ION-M7P/7P/85P/19P	
Andrew Indent. Number	7631019-0001	
Serial no.(SN)	11	
Revision	00	
Software version and ID	n.a.	
Type of modulation and Designator	GSM (GXW)	<input checked="" type="checkbox"/>
	GSM EDGE (G7W)	<input checked="" type="checkbox"/>
	CDMA (F9W)	<input checked="" type="checkbox"/>
	W-CDMA (F9W)	<input checked="" type="checkbox"/>
	LTE QAM (D7D)	<input checked="" type="checkbox"/>
Frequency Translation	F1-F1	<input checked="" type="checkbox"/>
	F1-F2	<input type="checkbox"/>
	N/A	<input type="checkbox"/>
Band Selection	Software	<input type="checkbox"/>
	Duplexer	<input type="checkbox"/>
	Full band	<input checked="" type="checkbox"/>

2.1.1 Downlink

Pass band	Path 869 MHz – 894 MHz
Maximum rated output power	43.1 dBm = 20,4 W
System Gain*	10 dB @ Pout BTS of 33 dBm

*see 2.1.5

2.1.2 Uplink

Pass band	824 MHz – 849 MHz
Maximum rated output power	n. a.
System Gain*	n. a.

*see 2.1.5

Note: The EUT does not transmit over the air in the uplink direction.

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2.1.3 Description of EUT

ION-M7P/7P/85P/19P is a LTE MIMO, 850 MHz, and 1900 MHz CDMA/WCDMA multi-operator Remote Unit with various Extension Units. It is used in conjunction with a Master Unit in the ION optical distribution system. This system transports multiple LTE channels, a 850 MHz, and a 1900 MHz wideband signal simultaneously, providing a cost-effective solution for distributing capacity from one or more base stations.

The ION-M7P/7P/85P/19P consists of two identical 700 MHz paths with one antenna port each. This Test Report describes only the approval of one path in the range 728 MHz – 757 MHz. Each path covers Cellular 700, with the intended use of simultaneous transmission.

2.1.4 System diagram of EUT

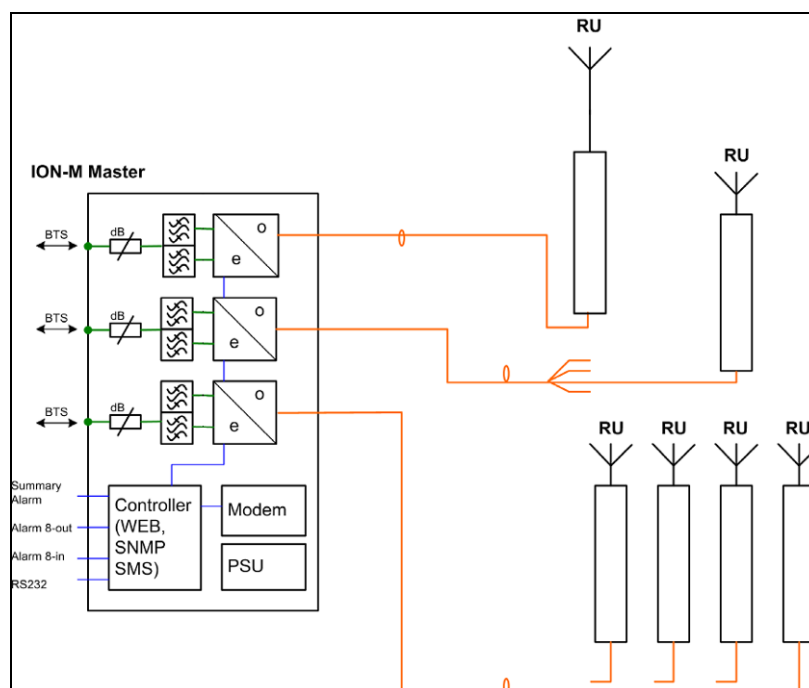


figure 2.1.4-#1 System diagram of EUT: ION optical distribution system

2.1.5 Block diagram of measurement reference points

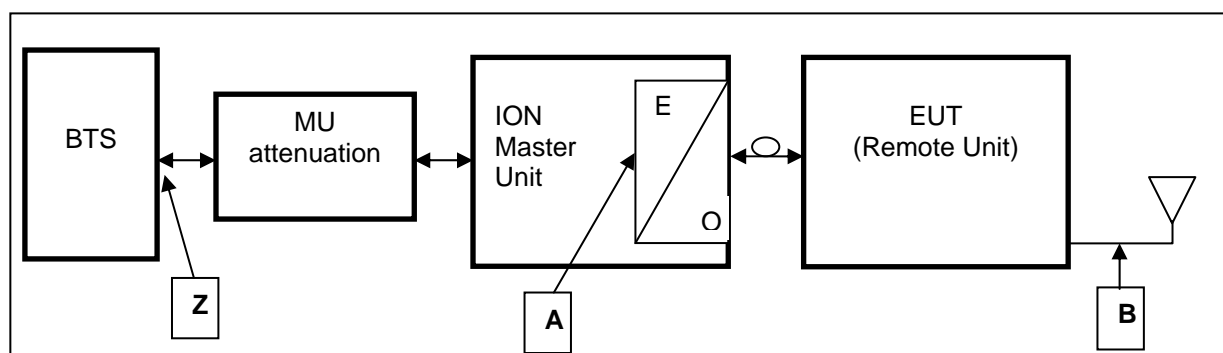


figure 2.1.5-#1 Block diagram of measurement reference points

Remote Unit is the EUT

O/E Optical / Electrical converter

SRMU Sub Rack Master Unit

Reference point A, Remote Unit DL output, UL input

Reference point B, SRMU UL output, DL input

Reference point Z, BTS DL output, BTS UL input

Since a signal generator does not supply a good output signal with +33 or +43dBm, for the downlink measurement the MU Attenuation is not used.

That means for downlink measurements the signal generator is connected to measurement point A at the master optical / electrical converter and the analyzer to the measurement point B at the RU.

3 Test site (Andrew Buchdorf)

3.1 Test environment

All tests were performed under the following environmental conditions:

Condition	Minimum value	Maximum value
Barometric pressure	86 kPa	106 kPa
Temperature	15°C	30°C
Relative Humidity	20 %	75 %
Power supply range	±5% of rated voltages	

3.2 Test equipment

ANDREW Inv. No.	Test equipment	Type	Manufacturer	Serial No.	Calibration
8372	Network Analyzer	8753D	HP	3410A08675	02/12
8890	Spectrum Analyzer	FSP	R&S	100674	08/12
8736	Spectrum Analyzer	FSIQ-26	R&S	100290	12/11
9069	Signal Generator	SMBV100A	R&S	256275	08/12
7412	Power Attenuator	769-30	Narda	09741	CIU
7416	Divider	2way	Andrew	4943	CIU
7414	RF-Cable	1,0m; N-N	Andrew	---	CIU
7415	RF-Cable	2,0m; N-N	Andrew	---	CIU
7418	RF-Cable	0,6m; SMA	Huber & Suhner	---	CIU
7419	RF-Cable	0,6m; SMA	Huber & Suhner	---	CIU
7417	RF-Cable	1,0m; SMA	Huber & Suhner	---	CIU
7413	RF-Cable	1,0m; SMA	Huber & Suhner	---	CIU

CIU = Calibrate in use

3.3 Input and output losses

All recorded power levels should be referenced to the input and output connectors of the repeater, unless explicitly stated otherwise.

The test equipment used in this test has to be calibrated, so that the functionality is also checked.

All cables, attenuators, splitter, isolator, circulator and combiner etc. must be measured before testing and used for compensation during testing.

3.4 Measurement uncertainty

The extended measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor $k=2$. The true value is located in the corresponding interval with a probability of 95 %.

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4 Test site (TEMPTON)

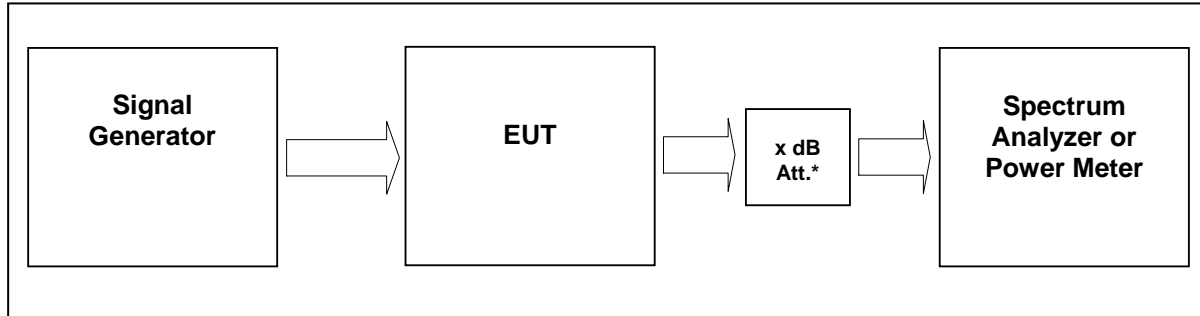
FCC Test site:

IC OATS:

See relevant dates under section 8.



5 RF Power Out: §22.913, §2.1046



External Attenuator DL x dB = 30 dB
figure 5-#1 Test setup: RF Power Out: §22.913, §2.1046

Measurement uncertainty	± 0,38 dB
Test equipment used	8372, 8890, 8736, 9069, 7412, 7416, 7414, 7415, 7418, 7419, 7417, 7413

5.1 Limit

Minimum standard:

Para. No.22.913

The effective radiated power (ERP) of transmitters in the Cellular Radiotelephone

Service must not exceed the limits in this section.

(a) *Maximum ERP*. In general, the effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts. However, for those systems operating in areas more than 72 km (45 miles) from international borders that:

(1) Are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census; or,

(2) Extend coverage on a secondary basis into cellular unserved areas, as those areas are defined in § 22.949, the ERP of base transmitters and cellular repeaters of such systems must not exceed 1000 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

5.2 Test method

§ 2.1046 Measurements required: RF power output.

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

(c) For measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations

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5.3 Test results

Detector RMS.

Test signal GSM:

Signal waveform with GMSK modulation in all time slots according to 3GPP TS45.004

Test signal GSM EDGE:

Signal waveform with 8-PSK modulation in all time slots according to 3GPP TS45.004

Test signal CDMA

Signal waveform according to table 6.2-1 of standard specification 3GPP2 C.p0051-0 v1.0 16.February 2006 pilot, sync, paging, 37 traffics, which is equal to the table 6.5.2.1 of 3GPP2 C.S0010-C v2.0 24.February 2006.

Test signal WCDMA

Signal waveform according to Test Model 1 of standard specification 3GPP TS25.141. Signal modulated with a combination of PCCPCH, SCCPCH and Dedicated Physical Channels specified as test model 1 64 DPCH.

Test signal LTE:

Signal waveform according to E-TM 3.1 widest possible bandwidth of standard specification 3GPP TS36.141

5.3.1 Downlink

Modulation	RBW VBW Span	Measured at f / (MHz)		RF Power (dBm)	RF Power (W)	Plot
GSM	1 MHz 3 MHz 10 MHz	Middle	881,5	43.0	20	5.3.3.1
						#1
GSM EDGE	1 MHz 3 MHz 10 MHz	Middle	881,5	43.0	20	5.3.3.2
						#1
CDMA	3 MHz 10 MHz 15 MHz	Middle	881,5	43.1	20.4	5.3.3.3
						#1
WCDMA	10 MHz 28 MHz 50 MHz	Middle	881,5	43.0	20	5.3.3.4
						#1
LTE	3 MHz 10 MHz 15 MHz	Middle	881,5	43.0	20	5.3.3.5
						#1
Maximum output power = 43.1 dBm = 20 W						
Limit Maximum output power = 57 dBm = 500 W (erp)						

table 5.3.1-#1 RF Power Out: §22.913, §2.1046; Test results; Downlink

The max RF Power out is 43.0 dBm, so the maximum antenna gain (x) can be calculated as follow:

Limit = 500W (erp) = **57 dBm** => 59.15 dBm (eirp)

Info: 500W (erp) = 820W (eirp)

57 dBm > 43 dBm + x

14 dBd = 16.15 dBi > x

=> The antenna that will use for the complete system have to have a gain lower than 16 dBi, relative to a dipol.

Modulation	Pin / dBm (Ref. point B)
GSM	8.8
GSM EDGE	8.6
CDMA	8.9
WCDMA	9.0
LTE	8.9

table 5.3.1-#2 RF Power Out: §22.913, §2.1046; Test results; Downlink; Input power

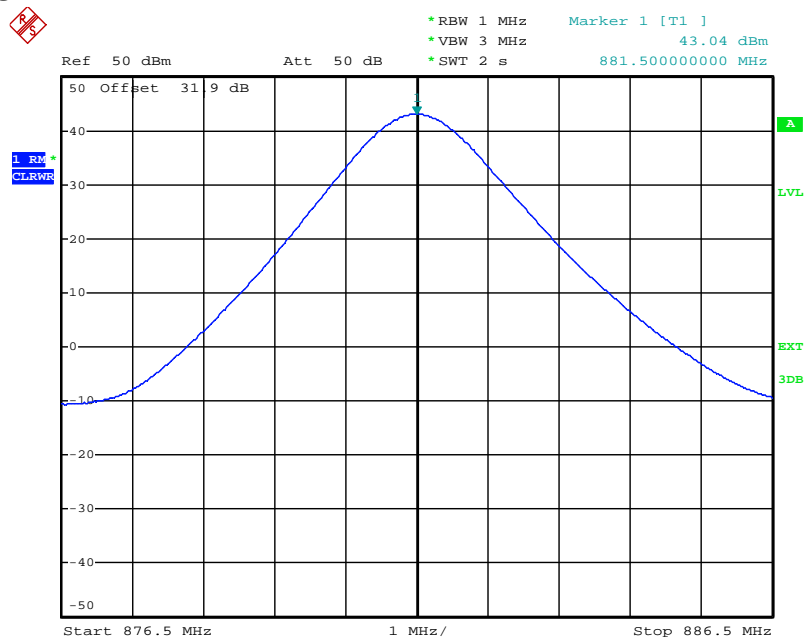
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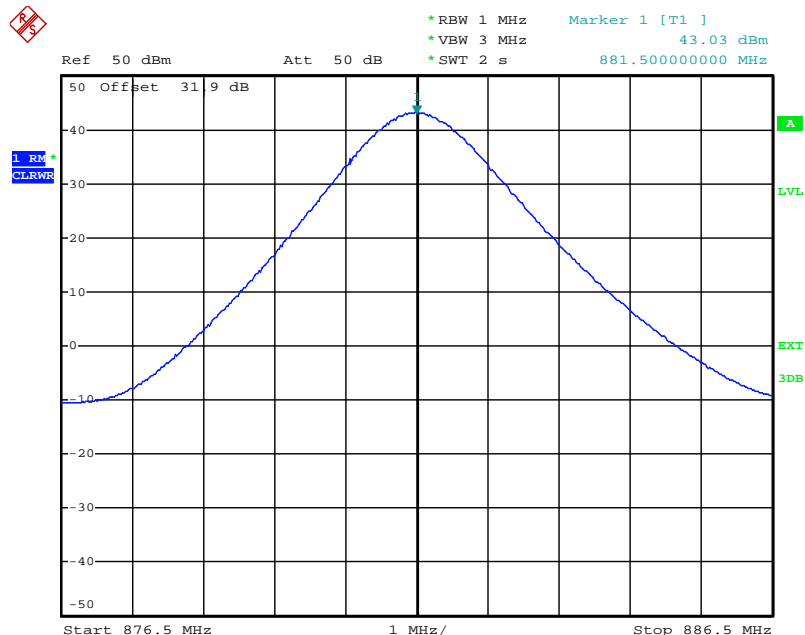
5.3.1.1 GSM



Date: 13.OCT.2011 10:27:56

plot 5.3.1.1-#1 RF Power Out: §22.913, §2.1046; Test results; Downlink; GSM Middle

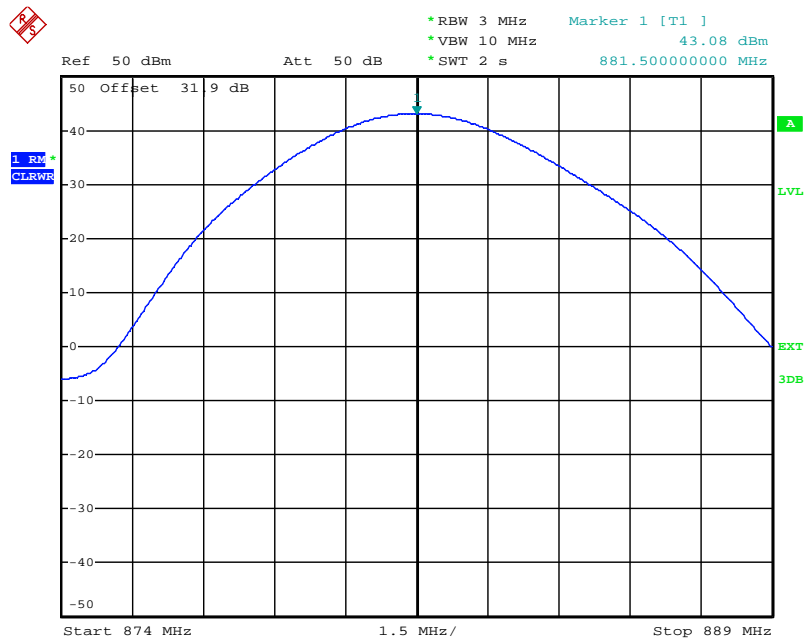
5.3.1.2 GSM EDGE



Date: 13.OCT.2011 10:36:45

plot 5.3.1.2-#1 RF Power Out: §22.913, §2.1046; Test results; Downlink; GSM EDGE Middle

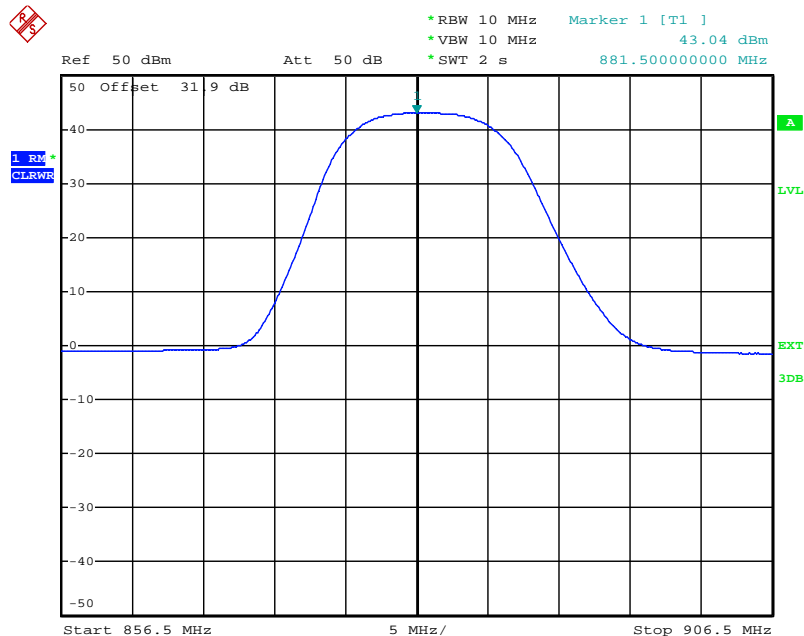
5.3.1.3 CDMA



Date: 13.OCT.2011 11:33:05

plot 5.3.1.3-#1 RF Power Out: §22.913, §2.1046; Test results; Downlink; CDMA Middle

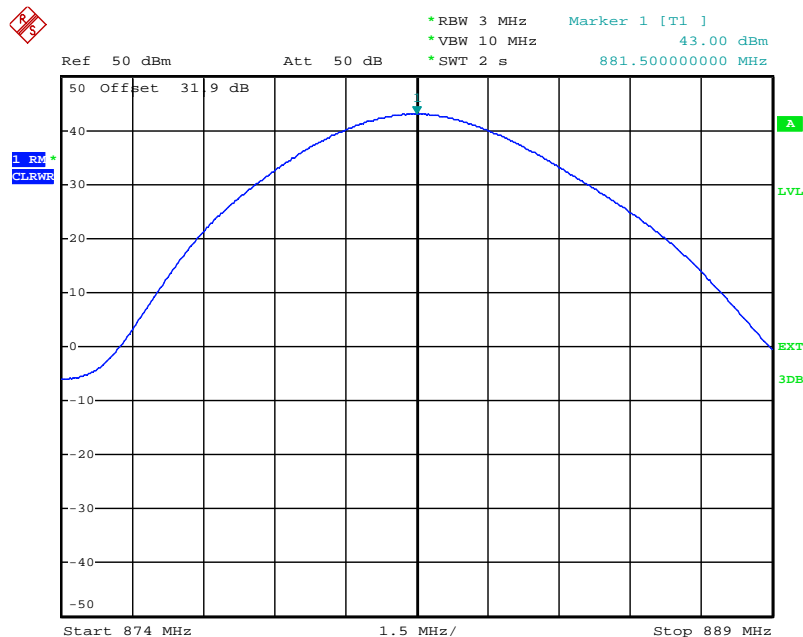
5.3.1.4 W-CDMA



Date: 13.OCT.2011 12:39:26

plot 5.3.1.4-#1 RF Power Out: §22.913, §2.1046; Test results; Downlink; W-CDMA Middle

5.3.1.5 LTE



Date: 13.OCT.2011 11:57:15

plot 5.3.1.5-#1 RF Power Out: §22.913, §2.1046; Test results; Downlink; LTE Middle

5.3.2 Uplink

n.a.

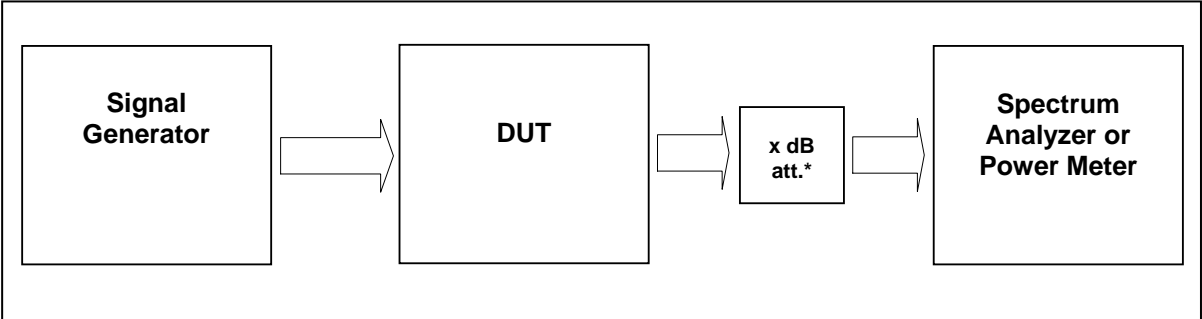
Note: The EUT does not transmit over the air in the uplink direction.

5.4 Summary test result

Test result	complies, according the plots above
Tested by:	Ph. Wagner
Date:	13.10.2011



6 Occupied Bandwidth: §2.1049



External Attenuator DL x dB = 30 dB
figure 6-#1 Test setup: Occupied Bandwidth: §2.1049

Measurement uncertainty	± 0,38 dB
Test equipment used	8372, 8890, 8736, 9069, 7412, 7416, 7414, 7415, 7418, 7419, 7417, 7413

6.1 Limit

The spectral shape of the output should look similar to input for all modulations.

6.2 Test method

Para. No.2.1049

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable:

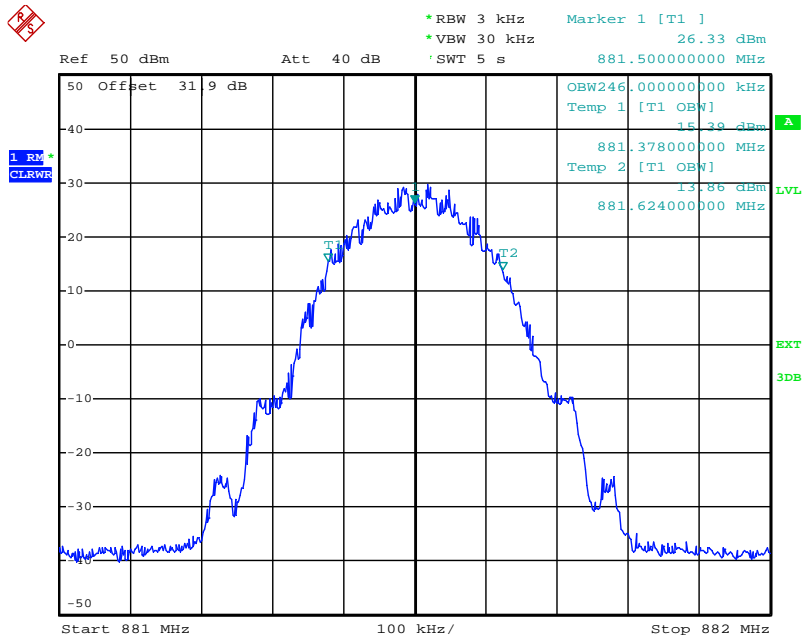
6.3 Test results

For composite power measurements: Detector RMS.

6.3.1 Downlink

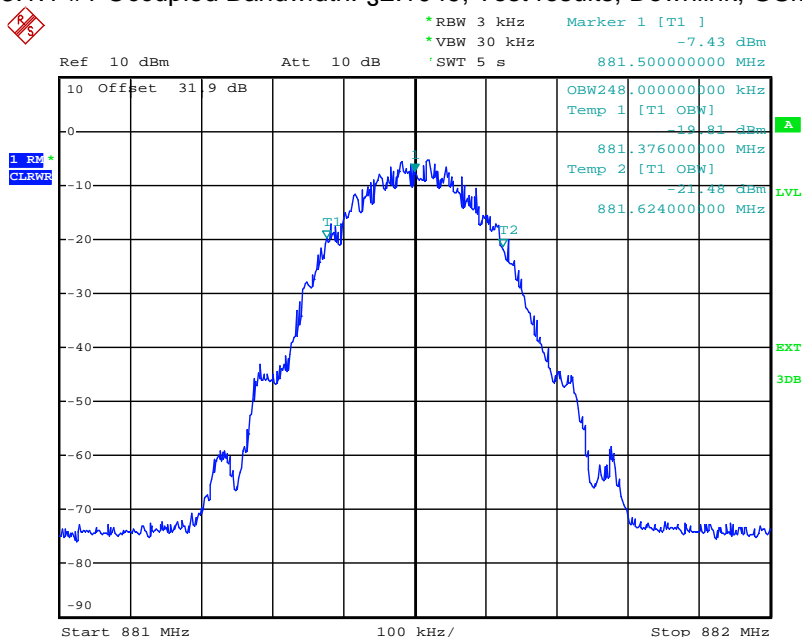
Modulation	Measured at f / MHz		RBW VBW Span	Occupied Bandwidth / kHz	Plot
GSM	Middle	881,5	3 kHz 30 kHz 1 MHz	246	6.3.1.1
					#1, #2
GSM EDGE	Middle	881,5	3 kHz 30 kHz 1 MHz	244	6.3.1.2
					#1, #2
CDMA	Middle	881,5	30kHz 300kHz 5 MHz	1240	6.3.1.3
					#1, #2
WCDMA	Middle	881,5	100kHz 1 MHz 10 MHz	4200	6.3.1.4
					#1, #2
LTE	Middle	881,5	30kHz 300kHz 5 MHz	1100	6.3.1.5
					#1, #2

table 6.3-#1 Occupied Bandwidth: §2.1049 Test results



Date: 13.OCT.2011 11:19:31

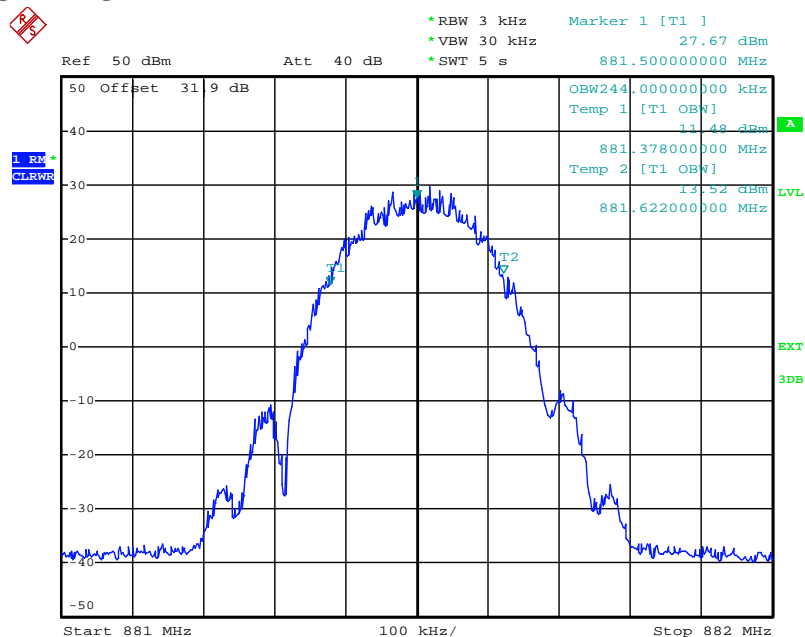
plot 6.3.1.1-#1 Occupied Bandwidth: \$2.1049; Test results; Downlink; GSM Output; Middle



Date: 13.OCT.2011 11:16:17

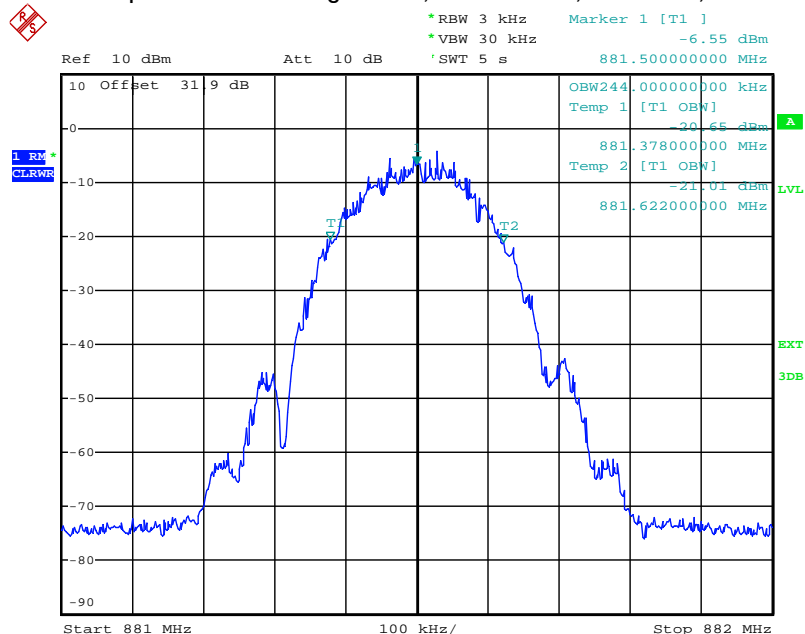
plot 6.3.1.1-#2 Occupied Bandwidth: \$2.1049; Test results; Downlink; GSM Input; Middle

6.3.1.2 GSM EDGE



Date: 13.OCT.2011 10:56:15

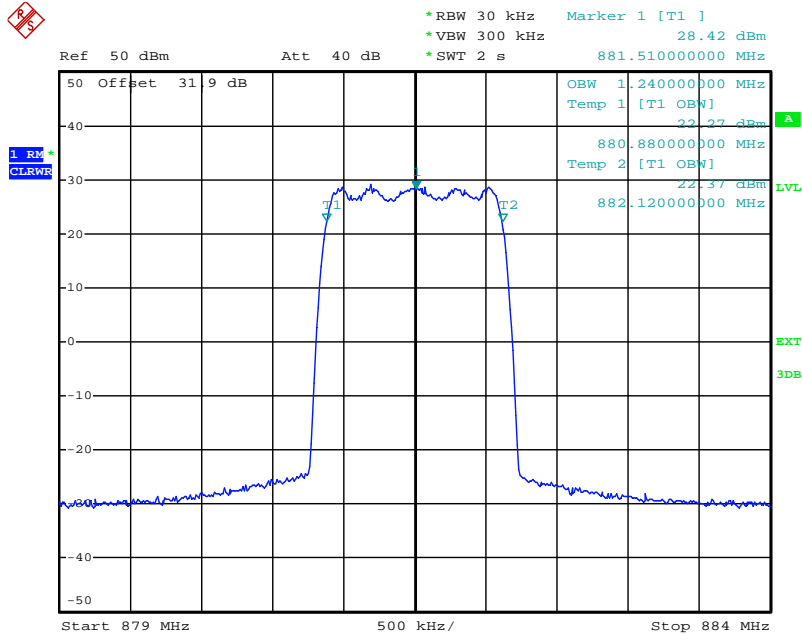
plot 6.3.1.2-#1 Occupied Bandwidth: §2.1049; Test results; Downlink; GSM EDGE Output; Middle



Date: 13.OCT.2011 11:14:28

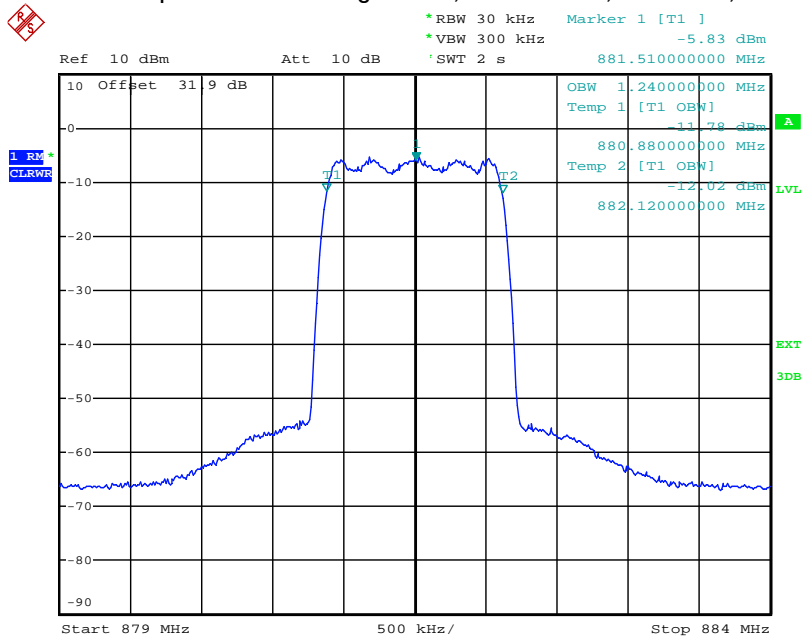
plot 6.3.1.2-#2 Occupied Bandwidth: §2.1049; Test results; Downlink; GSM EDGE Input; Middle

6.3.1.3 CDMA



Date: 13.OCT.2011 11:47:16

plot 6.3.1.3-#1 Occupied Bandwidth: §2.1049; Test results; Downlink; CDMA Output; Middle



Date: 13.OCT.2011 11:50:07

plot 6.3.1.3-#2 Occupied Bandwidth: §2.1049; Test results; Downlink; CDMA Input; Middle

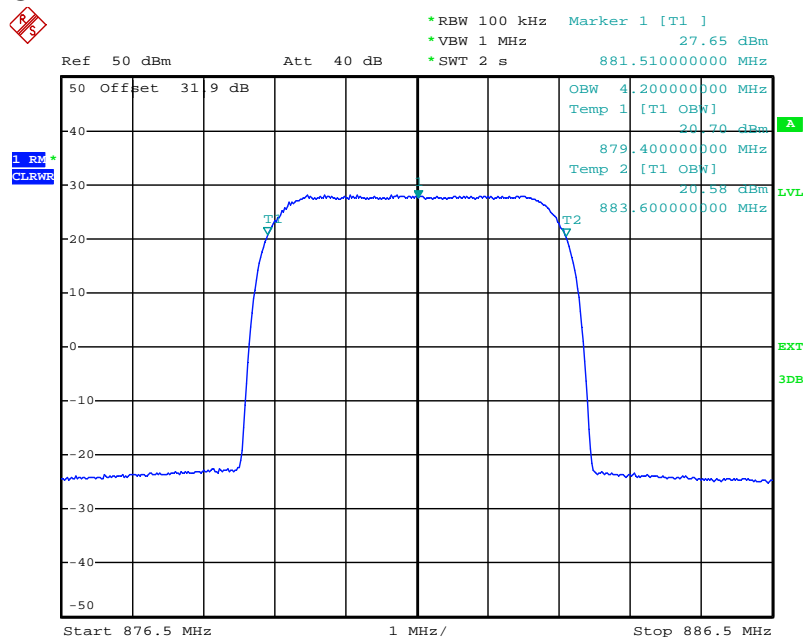
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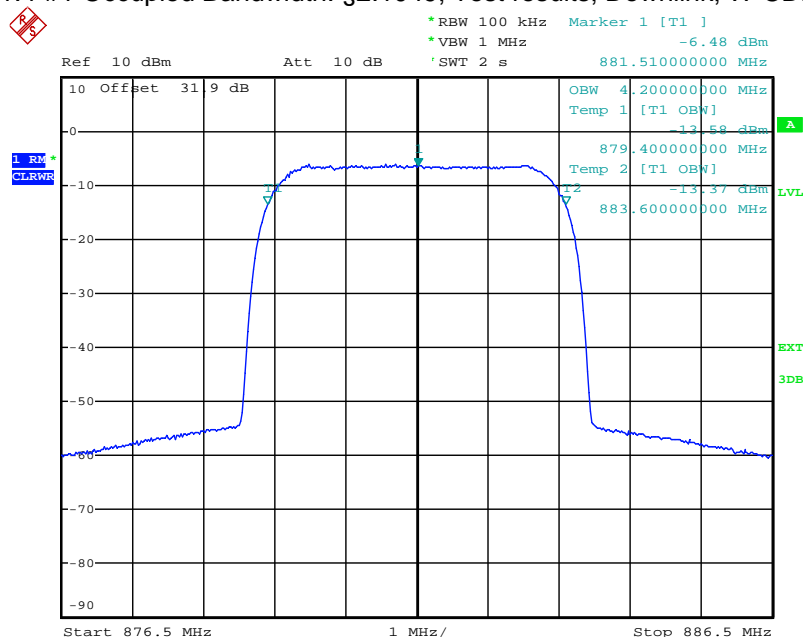


6.3.1.4 W-CDMA



Date: 13.OCT.2011 12:43:29

plot 6.3.1.4-#1 Occupied Bandwidth: §2.1049; Test results; Downlink; W-CDMA Output; Middle

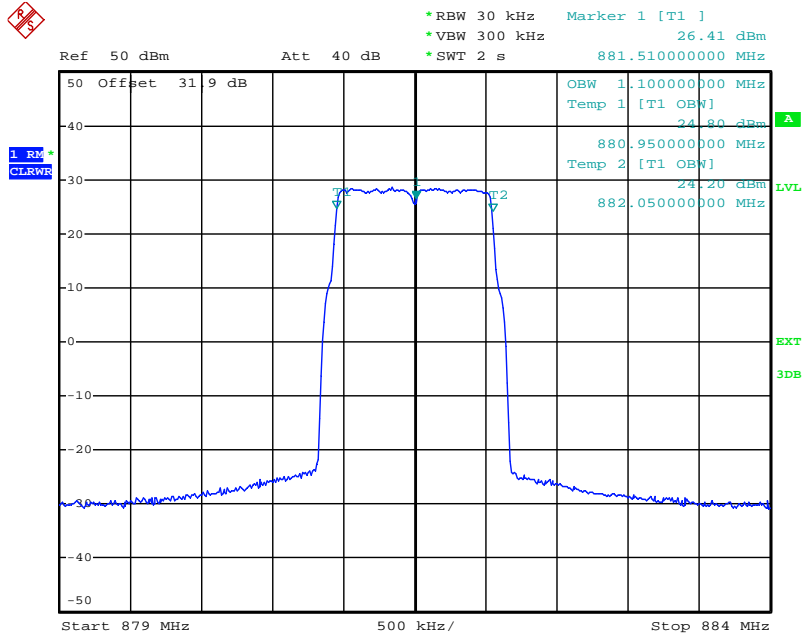


Date: 13.OCT.2011 12:45:11

plot 6.3.1.4-#2 Occupied Bandwidth: §2.1049; Test results; Downlink; W-CDMA Input; Middle

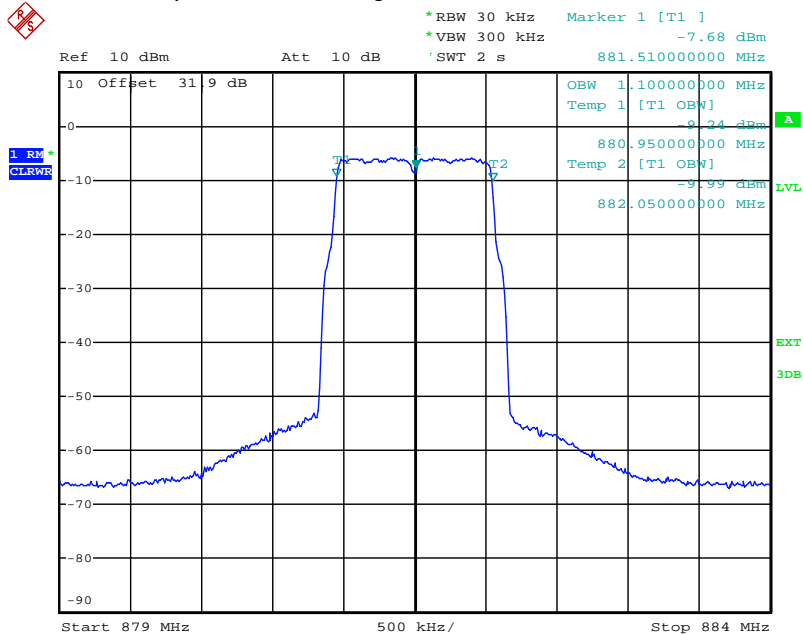


6.3.1.5 LTE



Date: 13.OCT.2011 11:58:43

plot 6.3.1.5-#1 Occupied Bandwidth: \$2.1049; Test results; Downlink; LTE Output; Middle



Date: 13.OCT.2011 12:34:04

plot 6.3.1.5-#2 Occupied Bandwidth: \$2.1049; Test results; Downlink; LTE Input; Middle

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6.3.2 Uplink

n.a.

Note: The EUT does not transmit over the air in the uplink direction.

6.4 Summary test result

Test result	complies, according the plots above
Tested by:	Ph. Wagner
Date:	13.10.2011



7 Spurious Emissions at Antenna Terminals: §22.917, §2.1051

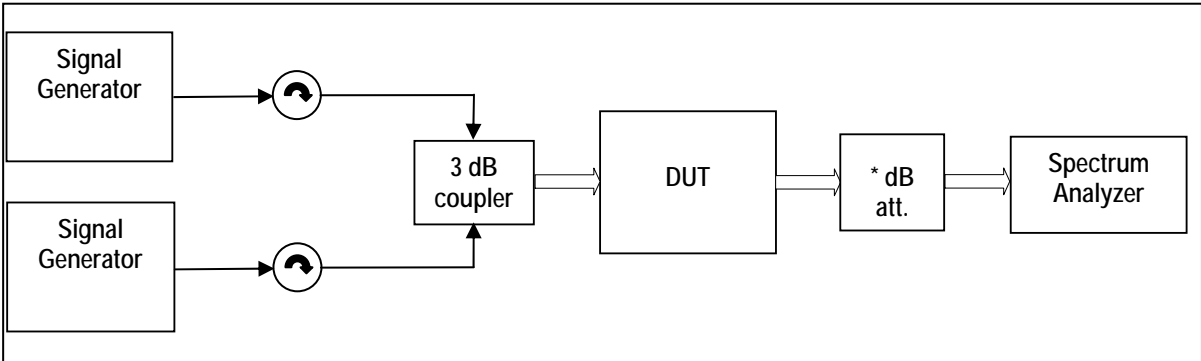


figure 7-#1 Test setup: Spurious Emissions at Antenna Terminals: §22.917, §2.1051

Measurement uncertainty	$\pm 0,54$ dB $\pm 1,2$ dB $\pm 1,5$ dB	9 kHz to 3 GHz 3 GHz to 7 GHz 7 GHz to 13,6 GHz
Test equipment used	8372, 8890, 8736, 9069, 7412, 7416, 7414, 7415, 7418, 7419, 7417, 7413	

7.1 Limit

Minimum standard:
Para. No.22.917

(a) *Out of band emissions.* 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.

(b) *Measurement procedure.* Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

7.2 Test method

Para. No 2.1051 Measurements required: Spurious emissions at antenna terminals.
The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

[39 FR 5919, Feb. 15, 1974. Redesignated and amended at 63 FR 36599, July 7, 1998]

7.3 Test results

7.3.1 Downlink

<1MHz from Band Edge

Detector: RMS.

Modulation	RBW VBW Span	Measured at f / MHz		Max. level (dBm)	Plot
GSM	3 kHz 30 kHz 2 MHz	Bottom	869,4 869,6	-36.9	7.3.3.1 #1
		Top	893,4 893,6	-36.9	7.3.3.1 #2
GSM EDGE	3 kHz 30 kHz 2 MHz	Bottom	869,4 869,6	-36.5	7.3.3.2 #1
		Top	893,4 893,6	-35.7	7.3.3.2 #2
CDMA	30 kHz 300 kHz 6 MHz	Bottom	869,73 870,96	-16.2	7.3.3.3 #1
		Top	892,02 893,25	-24.2	7.3.3.3 #2
WCDMA	100 kHz 1 MHz 15 MHz	Bottom	871,6 876,6	-23.7	7.3.3.4 #1
		Top	886,4 891,4	-24.3	7.3.3.4 #2
LTE	30 kHz 300 kHz 6 MHz	Bottom	869,7 871,1	-23.6	7.3.3.5 #1
		Top	891,9 893,3	-25.0	7.3.3.5 #2

table 7.3-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051 Test results; Downlink; <1MHz from Band Edge



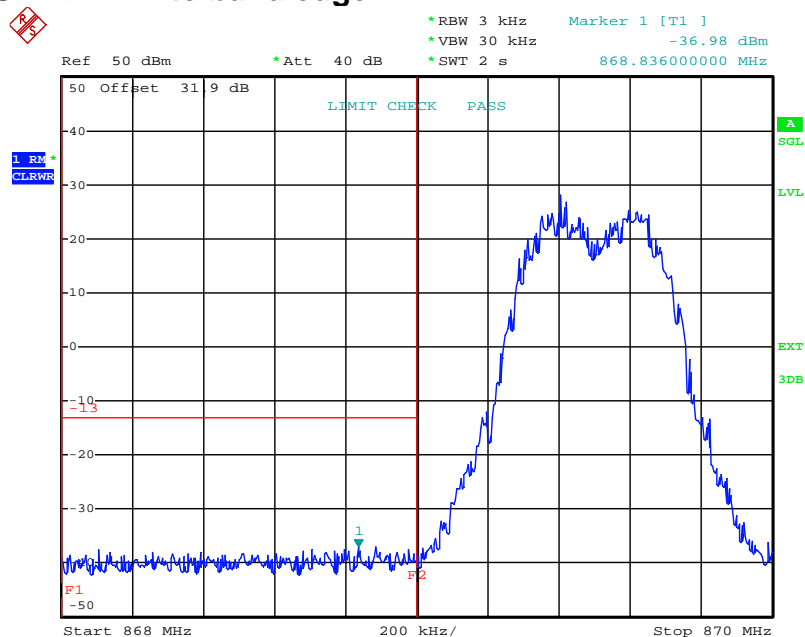
>1MHz from Band Edge

Detector: RMS.

Modulation	RBW VBW Span	Measured at f / (MHz)		Max. level (dBm)	Plot
GSM	1 MHz 3 MHz 30 MHz – 9 GHz	Middle	881,5	-24.9	7.3.1.6
					#1
GSM EDGE	1 MHz 3 MHz 30 MHz – 9 GHz	Middle	881,5	-25.4	7.3.1.7
					#1
CDMA	3 MHz 10 MHz 30 MHz – 9 GHz	Middle	881,5	-24.8	7.3.1.8
					#1
WCDMA	10 MHz 10 MHz 30 MHz – 9 GHz	Middle	881,5	-24.8	7.3.1.9
					#1
LTE	10 MHz 10 MHz 30 MHz – 9 GHz	Middle	881,5	-25.1	7.3.1.10
					#1

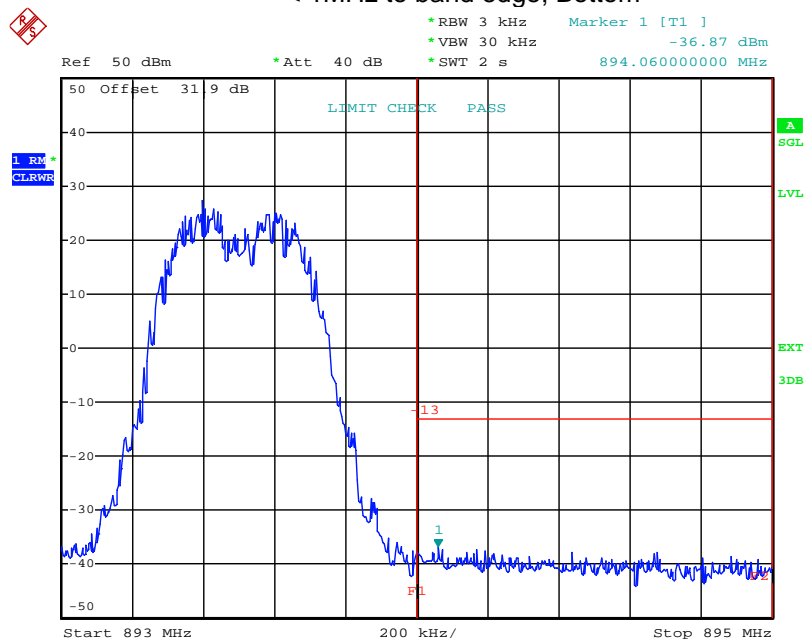
table 7.3-#2 Spurious Emissions at Antenna Terminals: §22.917, §2.1051 Test results; Downlink;

7.3.1.1 GSM < 1MHz to band edge



Date: 13.OCT.2011 14:36:21

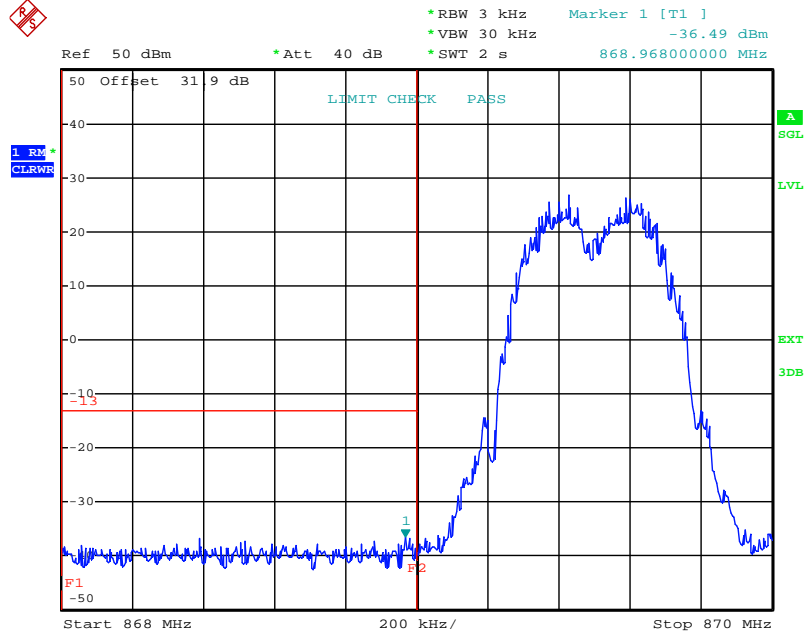
plot 7.3.1.1-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink; GSM < 1MHz to band edge; Bottom



Date: 13.OCT.2011 15:16:42

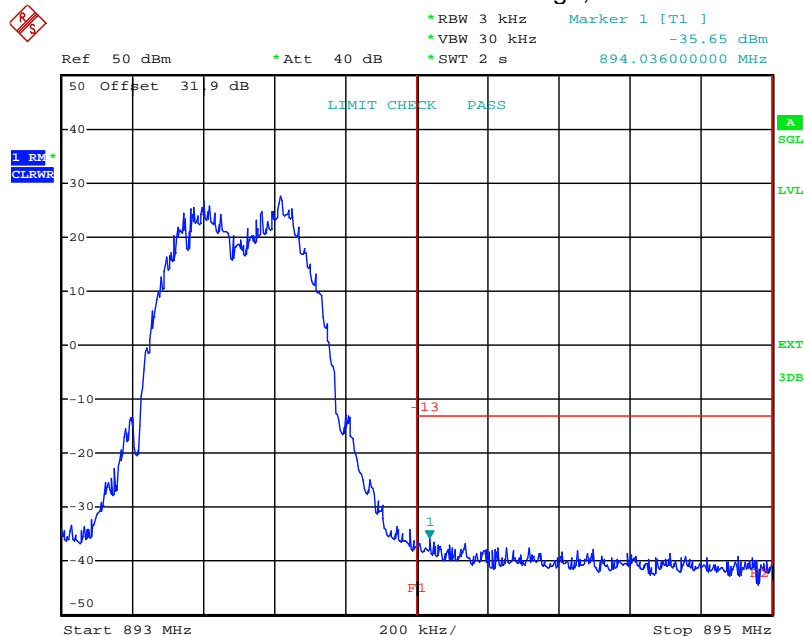
plot 7.3.1.1-#2 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink; GSM < 1MHz to band edge; Top

7.3.1.2 GSM EDGE < 1MHz to band edge



Date: 13.OCT.2011 14:42:15

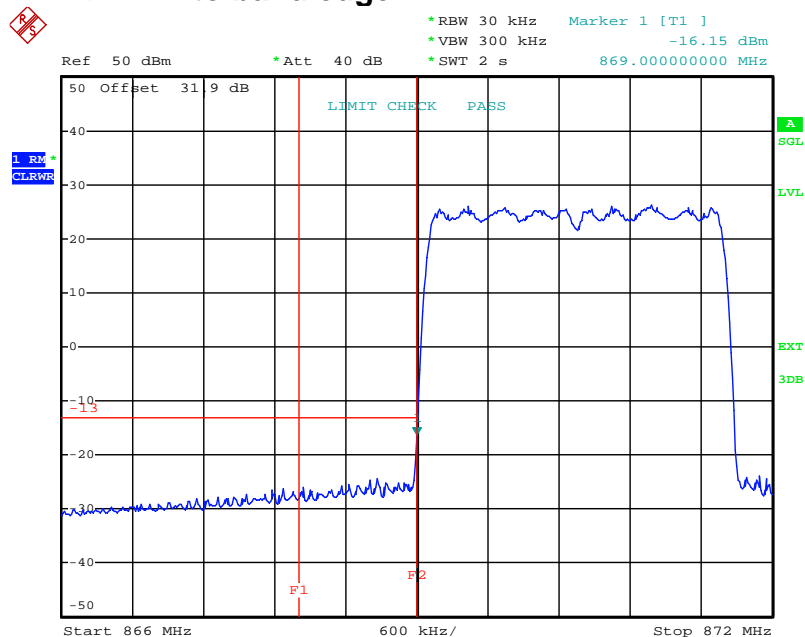
plot 7.3.1.2-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink; GSM EDGE < 1MHz to band edge; Bottom



Date: 13.OCT.2011 15:13:34

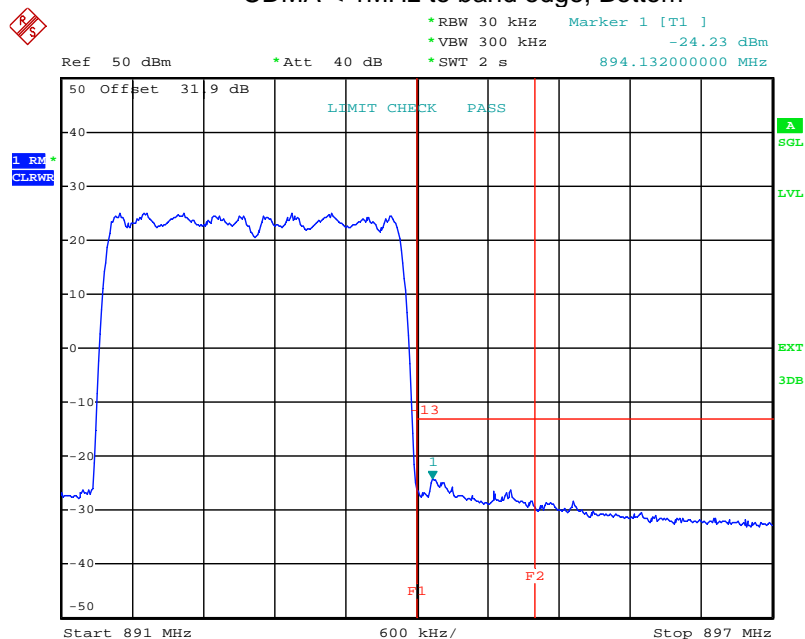
plot 7.3.1.2-#2 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink; GSM EDGE < 1MHz to band edge; Top

7.3.1.3 CDMA < 1MHz to band edge



Date: 13.OCT.2011 15:40:32

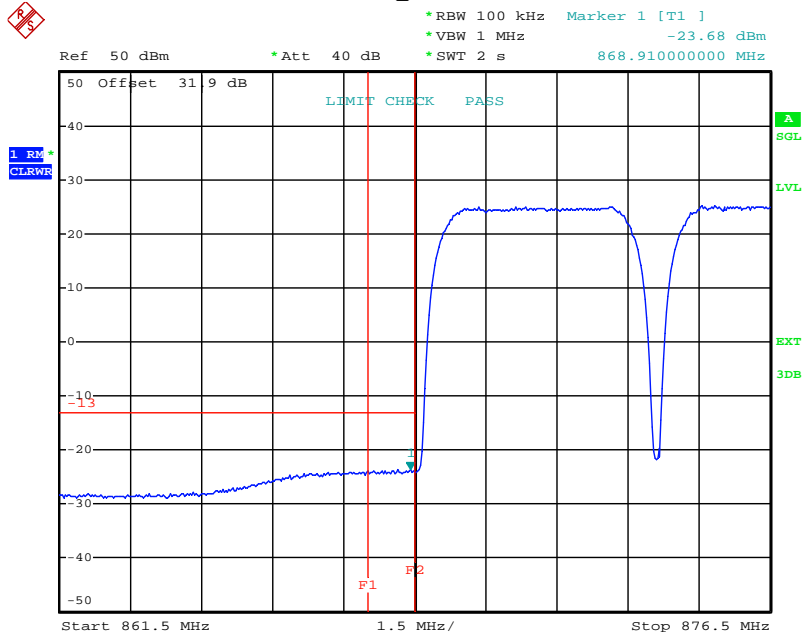
plot 7.3.1.3-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink;
CDMA < 1MHz to band edge; Bottom



Date: 13.OCT.2011 15:56:52

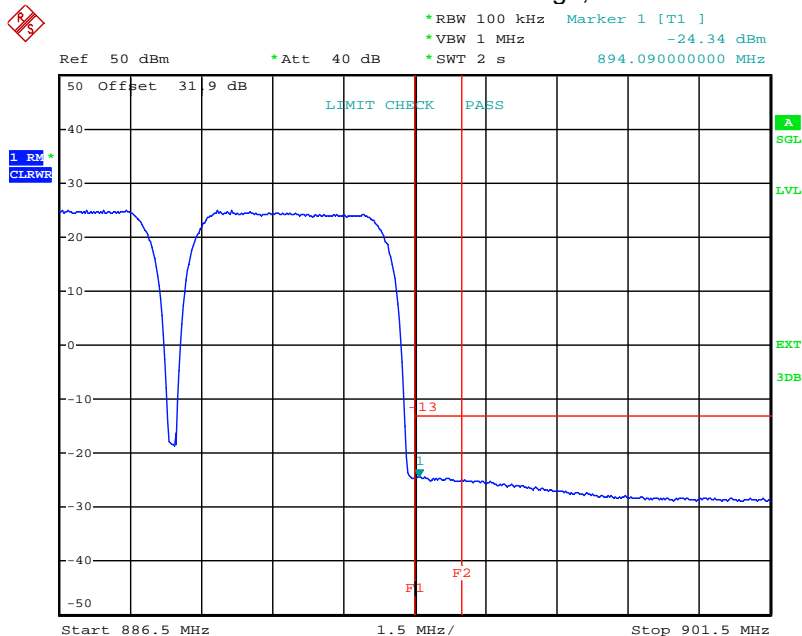
plot 7.3.1.3-#2 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink;
CDMA < 1MHz to band edge; Top

7.3.1.4 W-CDMA < 1MHz to band edge



Date: 13.OCT.2011 16:14:06

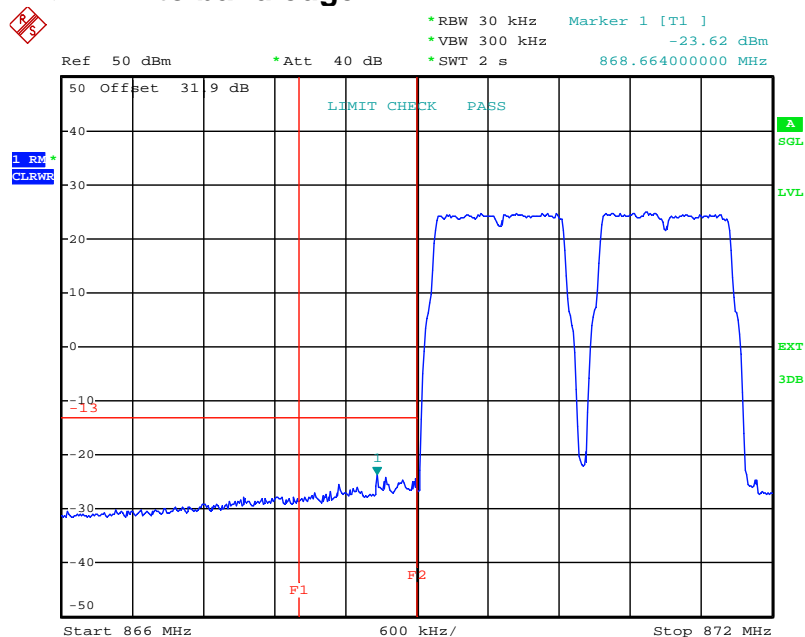
plot 7.3.1.4-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink; W-CDMA < 1MHz to band edge; Bottom



Date: 13.OCT.2011 16:09:09

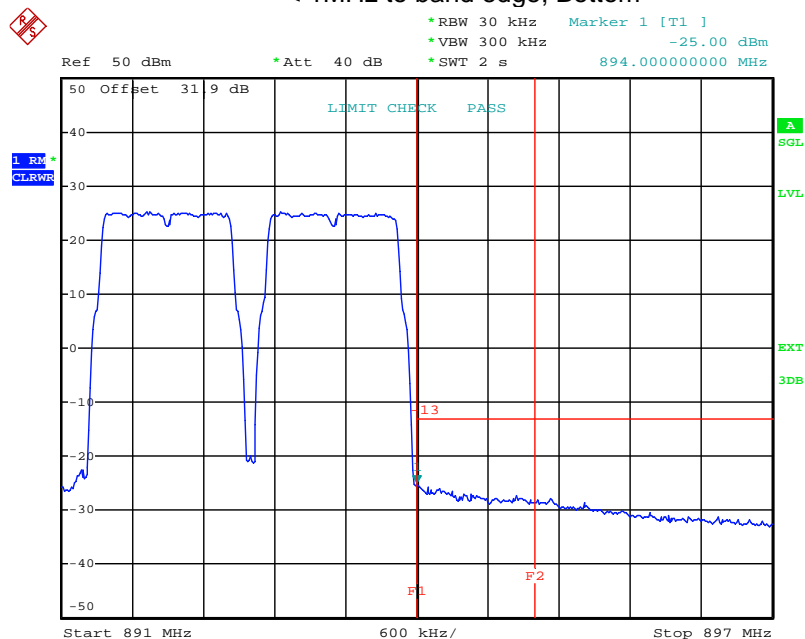
plot 7.3.1.4-#2 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink; W-CDMA < 1MHz to band edge; Top

7.3.1.5 LTE < 1MHz to band edge



Date: 13.OCT.2011 15:44:22

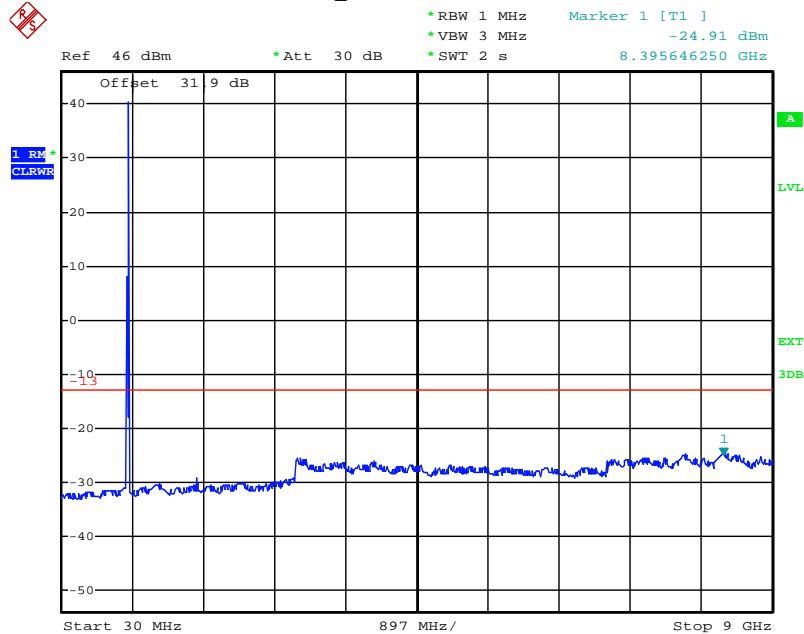
plot 7.3.1.5-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink; LTE < 1MHz to band edge; Bottom



Date: 13.OCT.2011 15:51:46

plot 7.3.1.5-#2 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink; LTE < 1MHz to band edge; Top

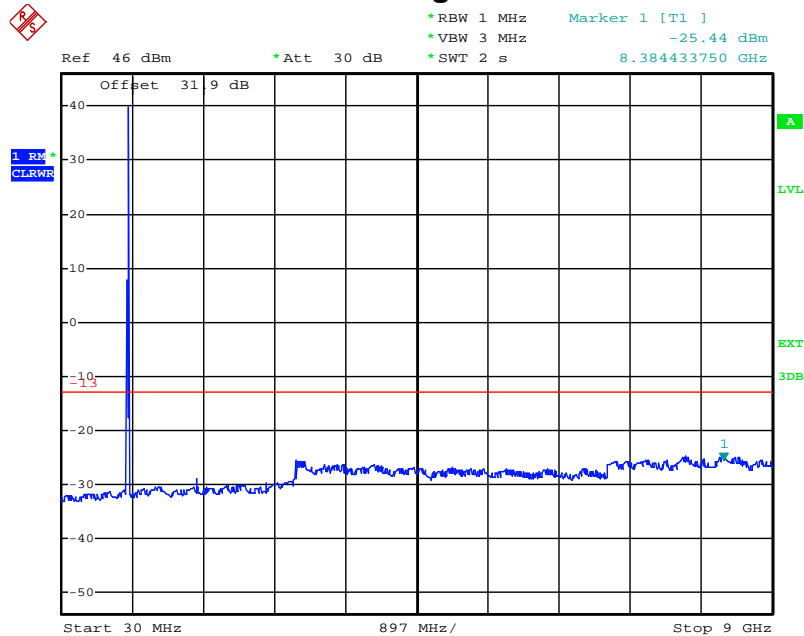
7.3.1.6 GSM > 1MHz to band edge



Date: 13.OCT.2011 16:49:27

plot 7.3.1.6-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink; GSM > 1MHz to band edge; Middle

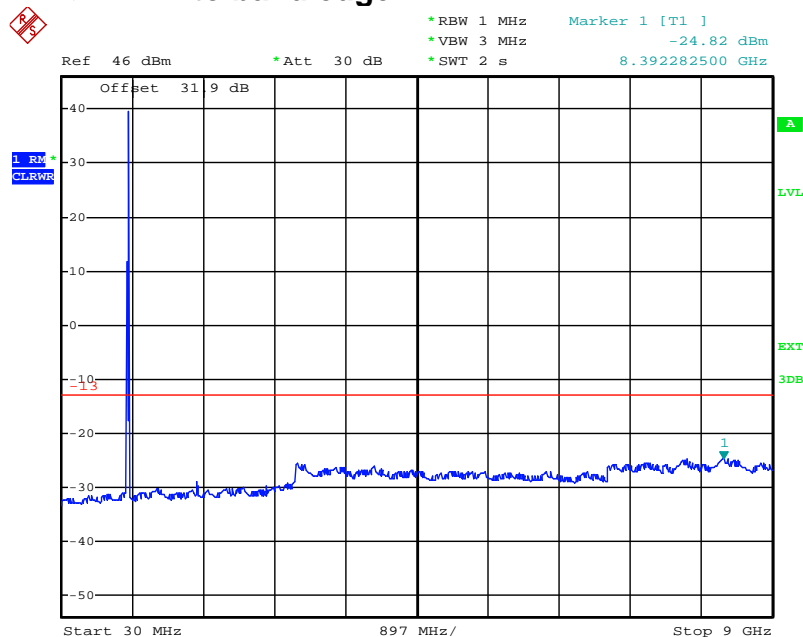
7.3.1.7 GSM EDGE > 1MHz to band edge



Date: 13.OCT.2011 16:48:16

plot 7.3.1.7-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink; GSM EDGE > 1MHz to band edge; Middle

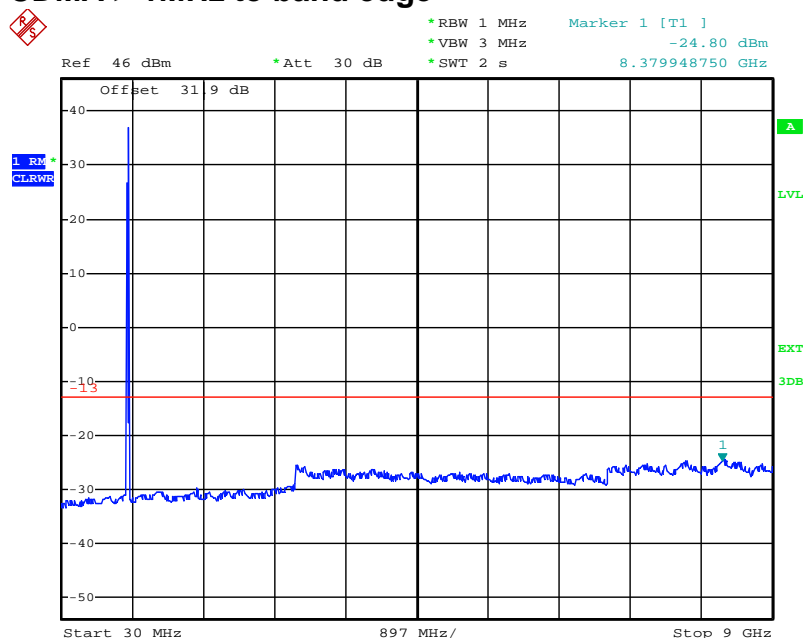
7.3.1.8 CDMA > 1MHz to band edge



Date: 13.OCT.2011 16:47:33

plot 7.3.1.8-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink;
CDMA > 1MHz to band edge; Middle

7.3.1.9 W-CDMA > 1MHz to band edge

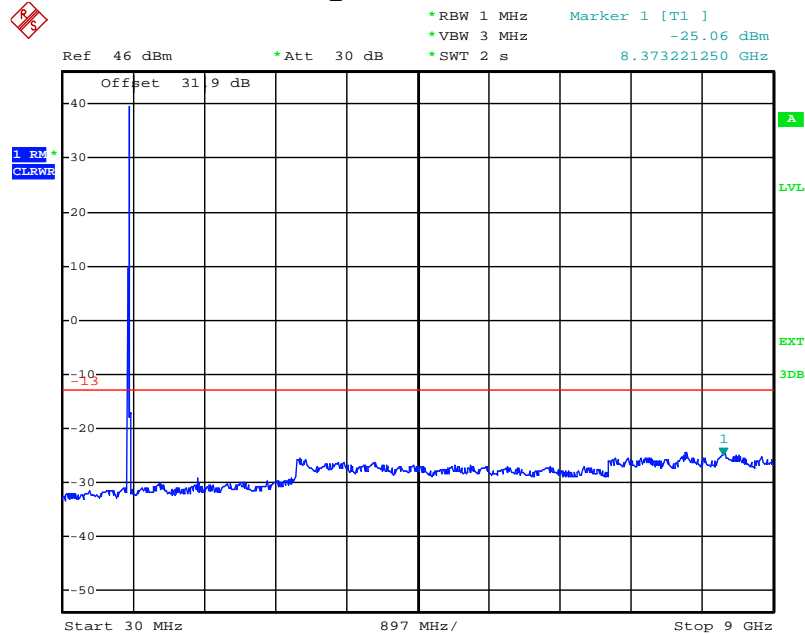


Date: 13.OCT.2011 16:40:55

plot 7.3.1.9-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink; W-
CDMA > 1MHz to band edge; Middle



7.3.1.10 LTE > 1MHz to band edge



Date: 13.OCT.2011 16:45:30

plot 7.3.1.10-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink;
LTE > 1MHz to band edge; Middle

7.3.2 Uplink

n.a.
Note: The EUT does not transmit over the air in the uplink direction.

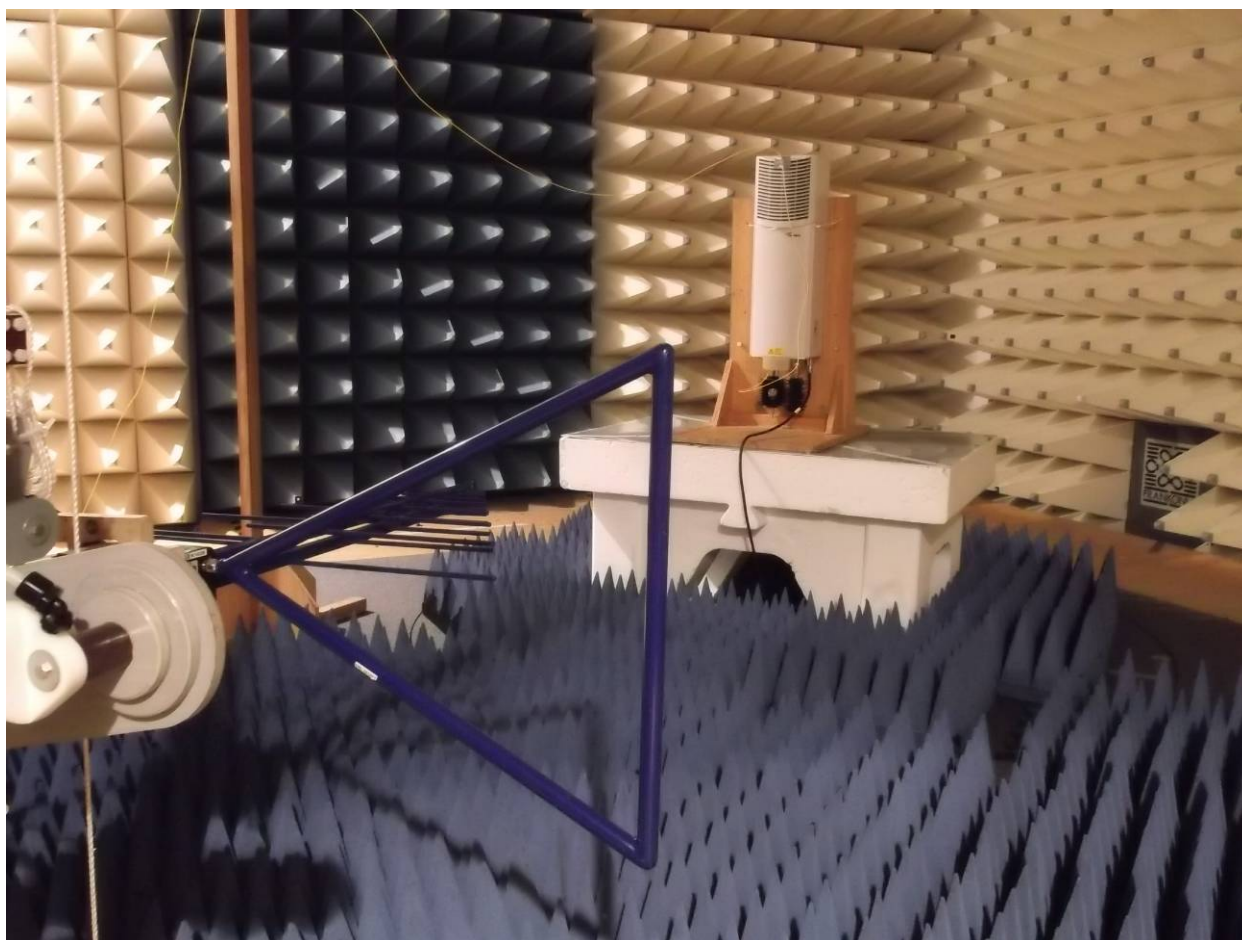
7.4 Summary test result

Test result	complies, according the plots above
Tested by:	Ph. Wagner
Date:	13.10.2011

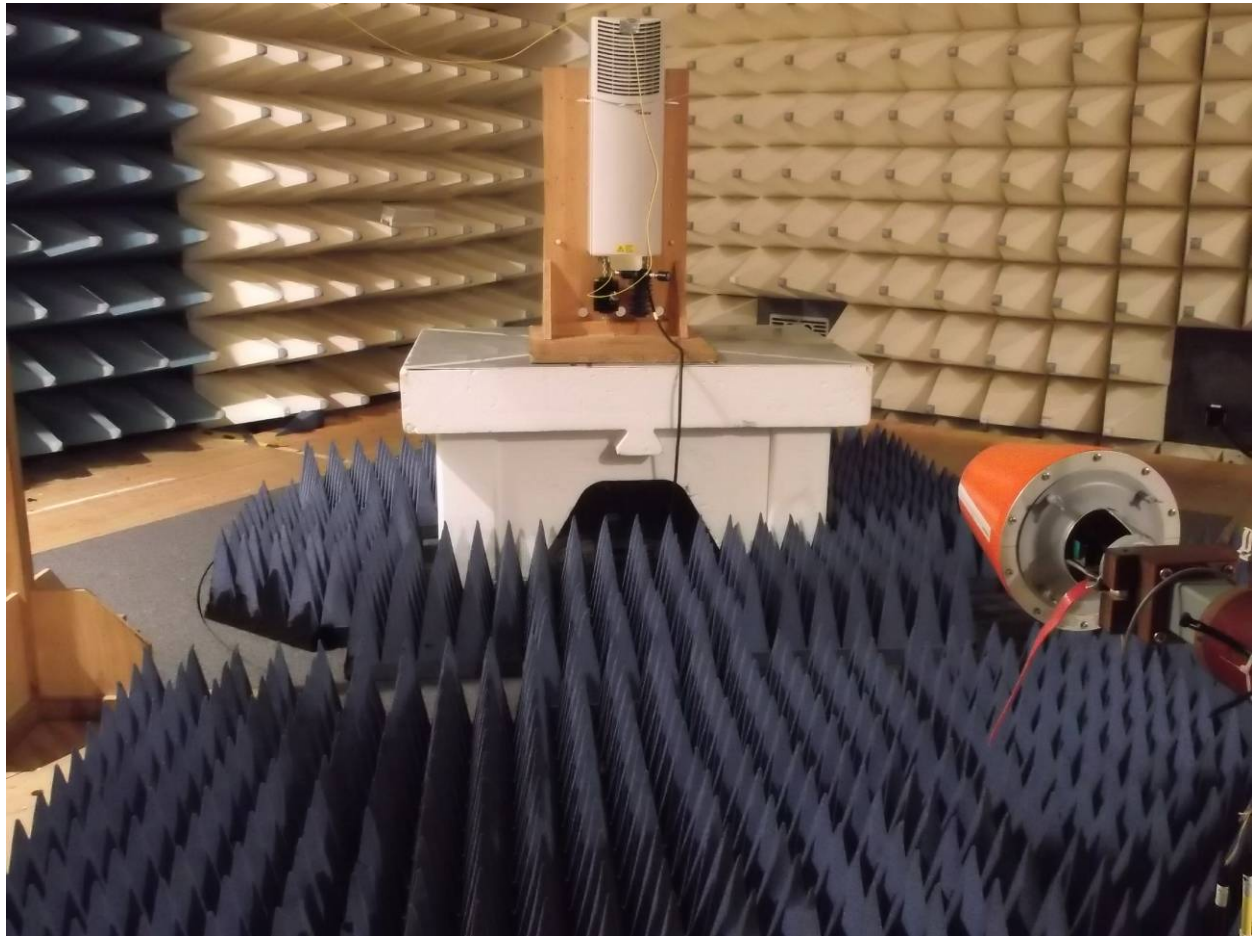
8 Field Strength of Spurious Emissions: §22.917, §2.1053



picture 8.1: name plate



picture 8.2: Test setup: Field Strength Emission <1 GHz @3m in the FAC



picture 8.3: Test setup: Field Strength Emission >1 GHz @3m in the FAC

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FCC ID: XS5-M778519P

IC ID: 2237E-M778519P



This clause specifies requirements for the measurement of radiated emission.

Frequency range	Distance: EUT <-> antenna / location	Limit	Test method
30 MHz - 20 GHz	3 metres / FAC	FCC 47 CFR Part 22.917	TIA/EIA-603-C:2004
		IC RSS-131	
		FCC 47 CFR Part 22.917	
		IC RSS-131	

Test equipment used:

Designation	Type	Manufacturer	Invent.-no.	Cal.-date	due Cal.- date	used
EMI test receiver	ESI40	Rohde & Schwarz	E1607	23.05.2011	23.05.2012	X
Antenna	CBL 6111	Chase	K1149	02.08.2011	02.08.2012	X
RF Cable		Frankonia	K1121 SET	14.07.2011	14.07.2012	X
Pre amplifier	AM1431	Miteq	K1721	14.07.2011	14.07.2012	X
Antenna	HL 025	R&S	K809	25.07.2011	25.07.2012	X
RF Cable	Sucoflex 100	Suhner	K1742	05.04.2011	05.04.2012	X
Preamplifier	AFS4-00102000	Miteq	K838	09.02.2011	09.02.2012	X

The REMI version 2.135 has been used for max search.

Test set-up:

Test location: FAC
Both, the Fully Anechoic Chamber (FAC) and the Semi Anechoic Chamber (SAC) fulfil the requirements of ANSI C63.4 and CISPR 16-1-4 with regards to NSA and SVSWR.

Test Voltage: 115V / 60 Hz

Type of EUT: Wall mounted

Measurement uncertainty:

Measurement uncertainty expanded (95% or K=2)	± 4,7 dB for ANSI C63.4 measurement ± 0,5 dB for TIA-603 measurement
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8.1 Limit §22.917

The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

(a) *Out of band emissions.* 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.

(b) *Measurement procedure.* Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

The emission measurements have been made with transmission at **Bottom/Middle/Top** frequency **(869MHz/881.5MHz/894MHz)**

The limit is -13dBm (e.i.r.p).

8.2 Test method ANSI/TIA/EA-603-C

Measurement procedure. TIA-603-C

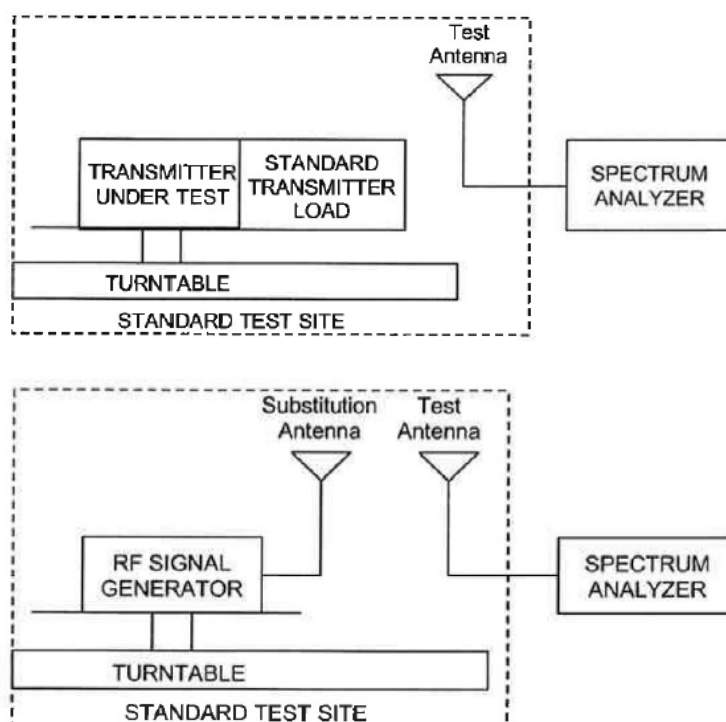
The antenna substitution method is used to determine the equivalent radiated power at spurious frequencies. The spurious emissions are measured at a distance of 3 meters. The EUT is then replaced with a reference substitution antenna with a known gain referenced to a dipole. This antenna is fed with a signal at the spurious frequency. The level of the signal is adjusted to repeat the previously measured level. The resulting eirp is the signal level fed to the reference antenna corrected for gain referenced to an isotropic dipole (see Figure 7.2).

From KDB (AMPLIFIER, BOOSTER, AND REPEATER REMINDER SHEET):

Radiated spurs (enclosure) – Use of CW signal (low, mid. and high freq.) is acceptable rather than all modulations.

The maximum RFI field strength was determined during the measurement by rotating the turntable (± 180 degrees) and varying the height of the receive antenna ($h = 1 \dots 4$ m) as like defined in ANSI C63.4. A measurement receiver has been used with a RBW 120 kHz up to 1 GHz and 1 MHz above 1 GHz. Steps with during pre measurement was half the RBW.

Both, the Fully Anechoic Chamber (FAC) and the Semi Anechoic Chamber (SAC) fulfil the requirements of ANSI C63.4 and CISPR 16-1-4 with regards to NSA and SVSWR.



picture 8.3: Substitution method

8.3 Climatic values in the lab

Temperature: 20°
 Relative Humidity: 45%
 Air-pressure: 1009hPa

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IC ID: 2237E-M778519P

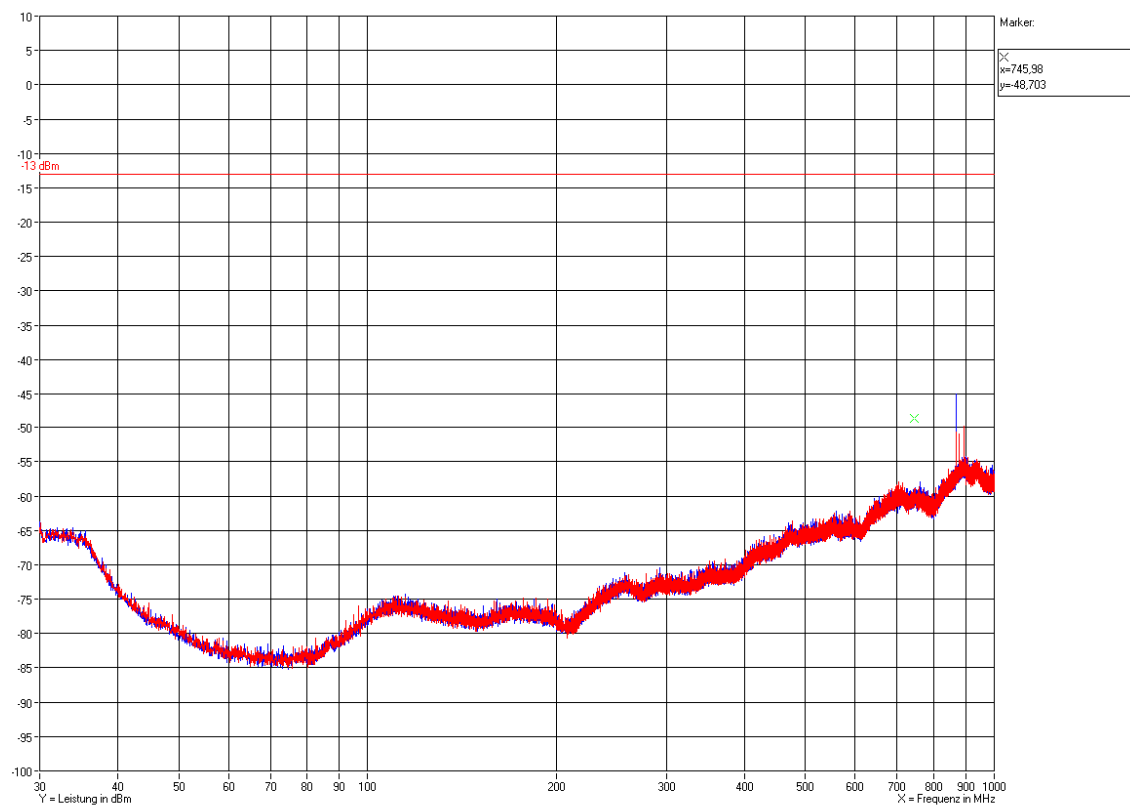


8.4 Test results

8.4.1 30 MHz to 1 GHz Downlink (Bottom – Middle – Top)

B/M/T: 869MHz/881.5MHz/894MHz

Polarisation: horizontal, vertical



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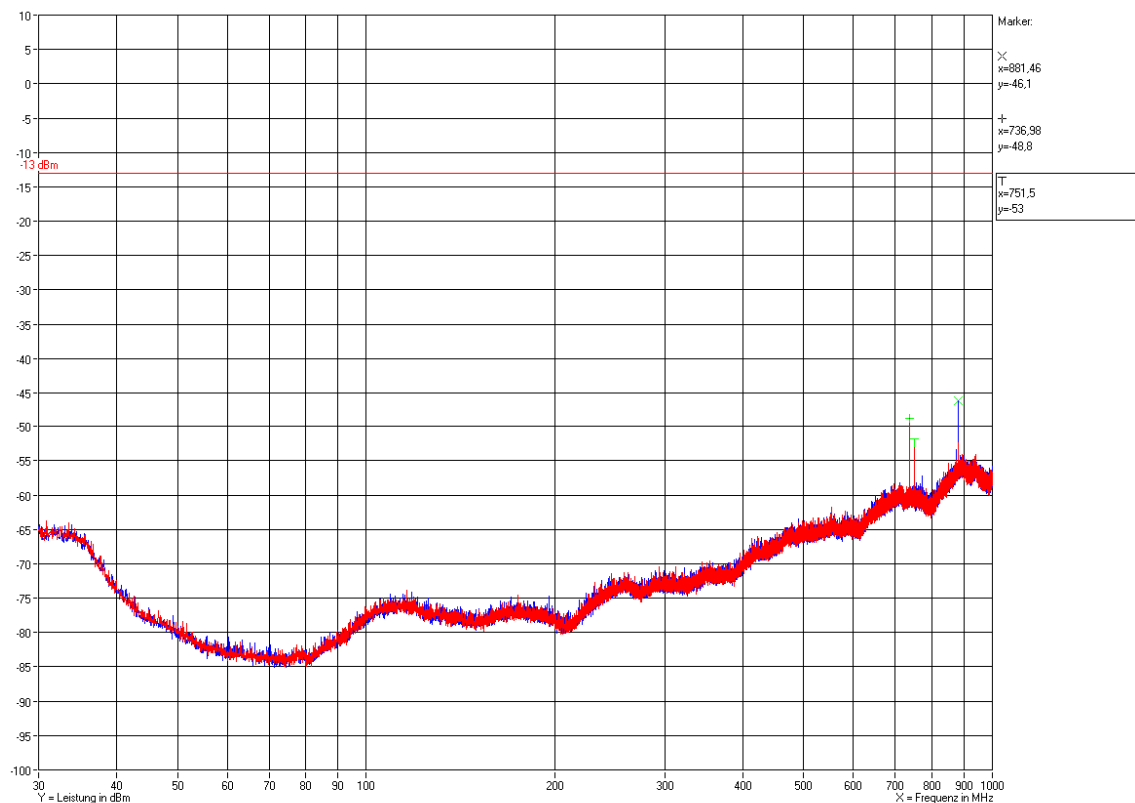
8.4.2 30 MHz to 1 GHz Downlink (Middle of all carriers)

f1 = 737 MHz

f2 = 751.5 MHz

f3 = 881.5 MHz

Polarisation: horizontal, vertical

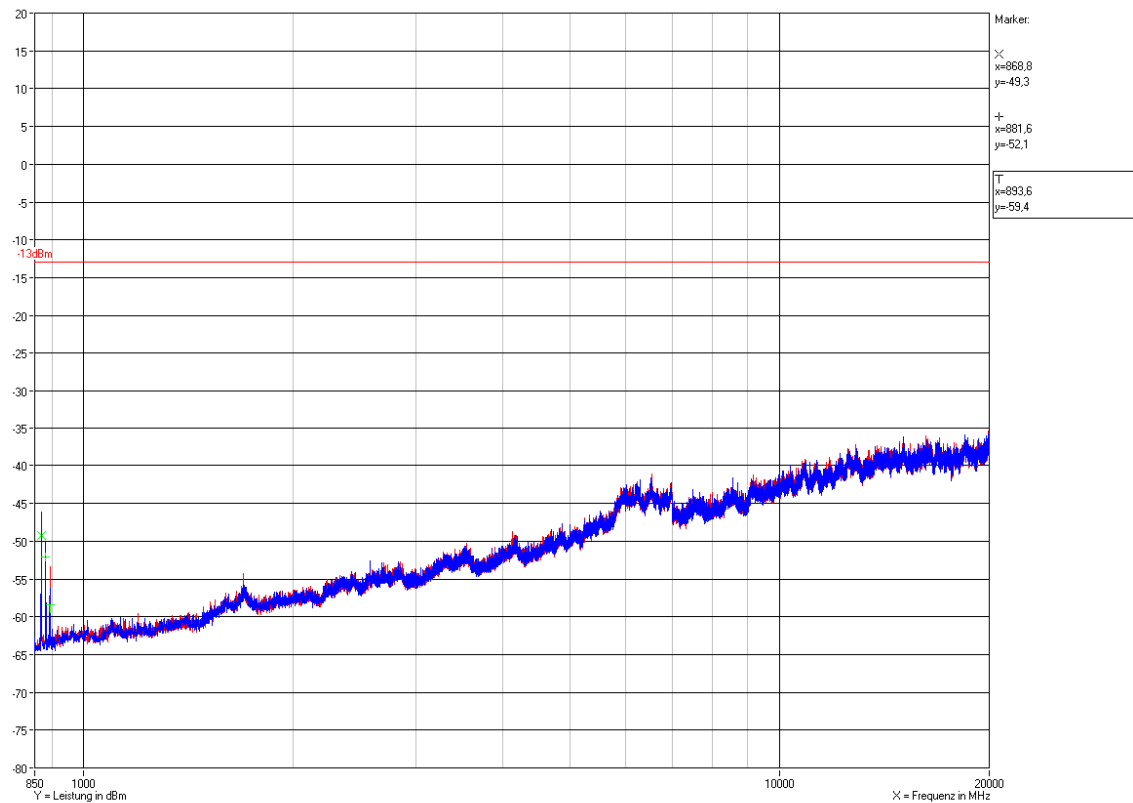




8.4.3 1 GHz to 20 GHz Downlink (Bottom – Middle – Top)

B/M/T: 869MHz/881.5MHz/894MHz

Polarisation: horizontal, vertical



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FCC ID: XS5-M778519P

IC ID: 2237E-M778519P



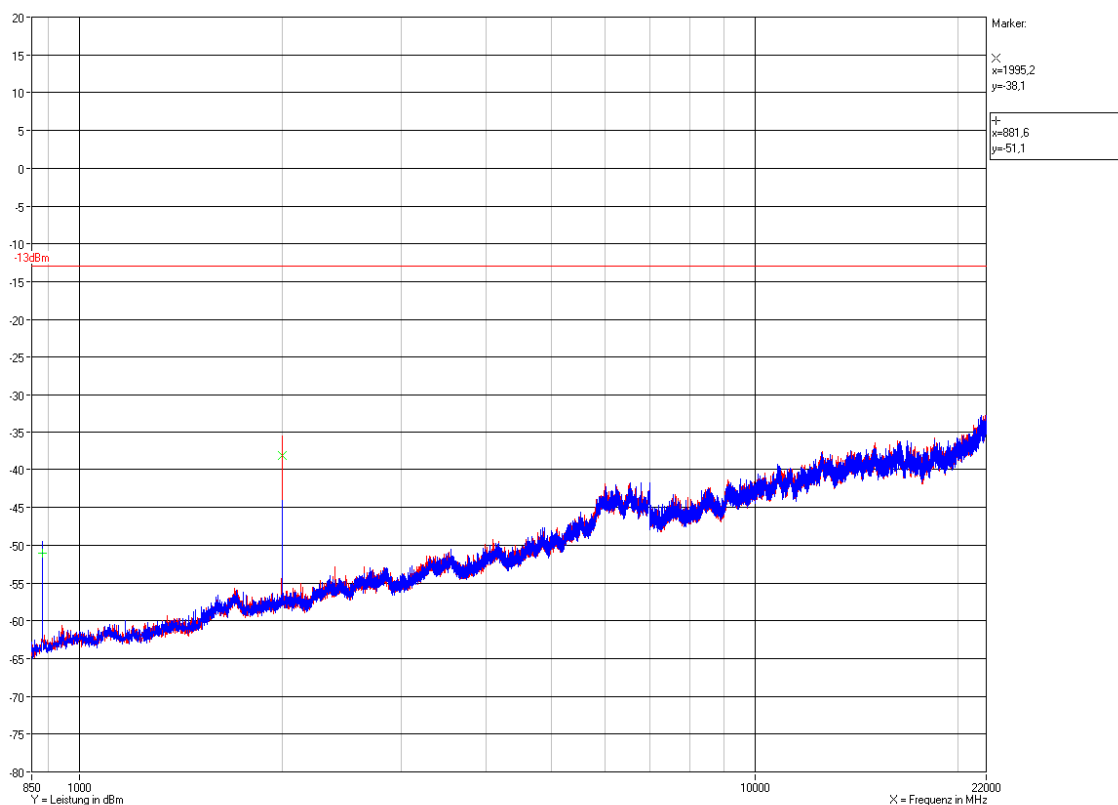
8.4.4 1 GHz to 20 GHz Downlink (Middle of all carriers)

f1 = 737 MHz

f2 = 751.5 MHz

f3 = 881.5 MHz

Polarisation: horizontal, vertical



No emission could be measured other than the fundamental frequencies.

8.5 Summary test result

Test result	complies, according to the plots above
Tested by:	Tom Zahlmann
Date:	18.10.2011

Test Report No.: 11-157

FCC ID: XS5-M778519P

IC ID: 2237E-M778519P



9 History

Revision	Modification	Date	Name
V01.00	Initial	19.10.2011	Tom Zahlmann

***** End of test report *****