ECL-TAL Test Report No.: 10-251

Equipment under test: **ION-M85P/19HP 850MHz Path**
FCC ID: **XS5-ION-M85P19HP**
IC ID: **2237E-IONM85P19HP**

Type of test: **FCC 47 CFR Part 22 Subpart H:2009**
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 2:2009 (*Frequency Allocations and Radio Treaty Matters; General Rules and Regulations*),
Part 22:2009,
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:	15.11.10			Signature:
Issue-No.:	02	Author:	**M. Lehmann** Head EMC	Digital unterschrieben von Mario Lehmann DN: cn=Mario Lehmann, o=TEMPTON Service Plus GmbH, ou=ECL, email=mario.lehmann@tempton.de, c=DE Datum: 2010.11.15 11:29:22 +01'00'
Date of delivery:	04.10.10	Checked:	**T. Vogel** Deputy Head EMC	Digital unterschrieben von Thomas Vogel DN: cn=Thomas Vogel, o=Tempton Service Plus GmbH, ou=ECL, email=thomas.vogel@tempton.de, c=DE Datum: 2010.11.15 11:48:51 +01'00'
Test dates:	10.09. – 04.10.10			
Pages:	47			

Manufacturer:

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Test Location:

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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.

Table of contents

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 not applicable because the device uses a common oscillator to up convert and down convert the RF signal. The EUT does not contain modulation circuitry, or frequency generation, therefore the test was not performed.

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

2.1 Description

Kind of equipment	ION-M85P/19HP
Andrew Indent. Number	7622238-0001
Serial no.(SN)	11
Revision	00
Software version and ID	V3.19.0 Id.No. 7162793
Type of modulation and Designator	Analog (F3E (Voice)) ☒ GSM (GXW) ☒ GSM EDGE (G7W) ☒ CDMA (F9W) ☒ W-CDMA (F9W) ☒ LTE QAM (D7D) ☒
Frequency Translation	F1-F1 ☒ F1-F2 ☐ N/A ☐
Band Selection	Software ☐ Duplexer ☐ Full band ☒

2.1.1 Downlink

Pass band	869 MHz – 894 MHz
Maximum rated output power	43,0 dBm = 20 W
Gain	10 dB @ Pout BTS of 33 dBm

2.1.2 Uplink

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

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

2.1.3 Description of EUT

Andrew ION-Mx is a multi-band, multi-operator remote unit with various extension units. It is used in conjunction with a master unit in the ION optical distribution system.

This Test Report describes only the approval of the 850 MHz Path (ION-M85P).
The ION-M85P/19HP Repeater consists of one 850 MHz path and one 1900 MHz path, with the intended use of simultaneous transmission.

2.1.4 System diagram of EUT

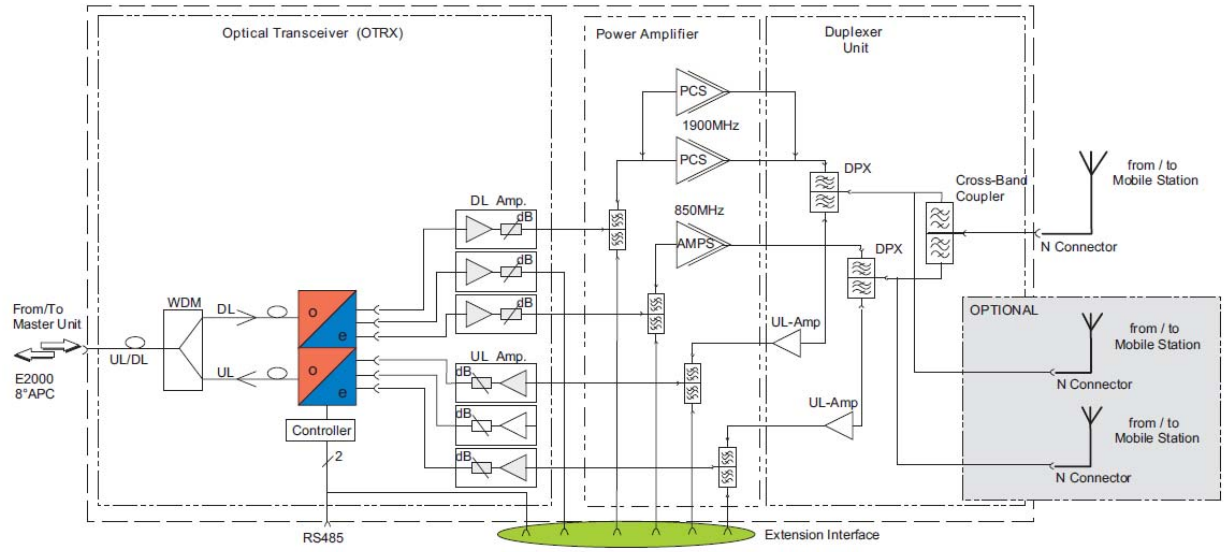


figure 2.1.4-#1 System diagram of EUT: ION optical distribution system

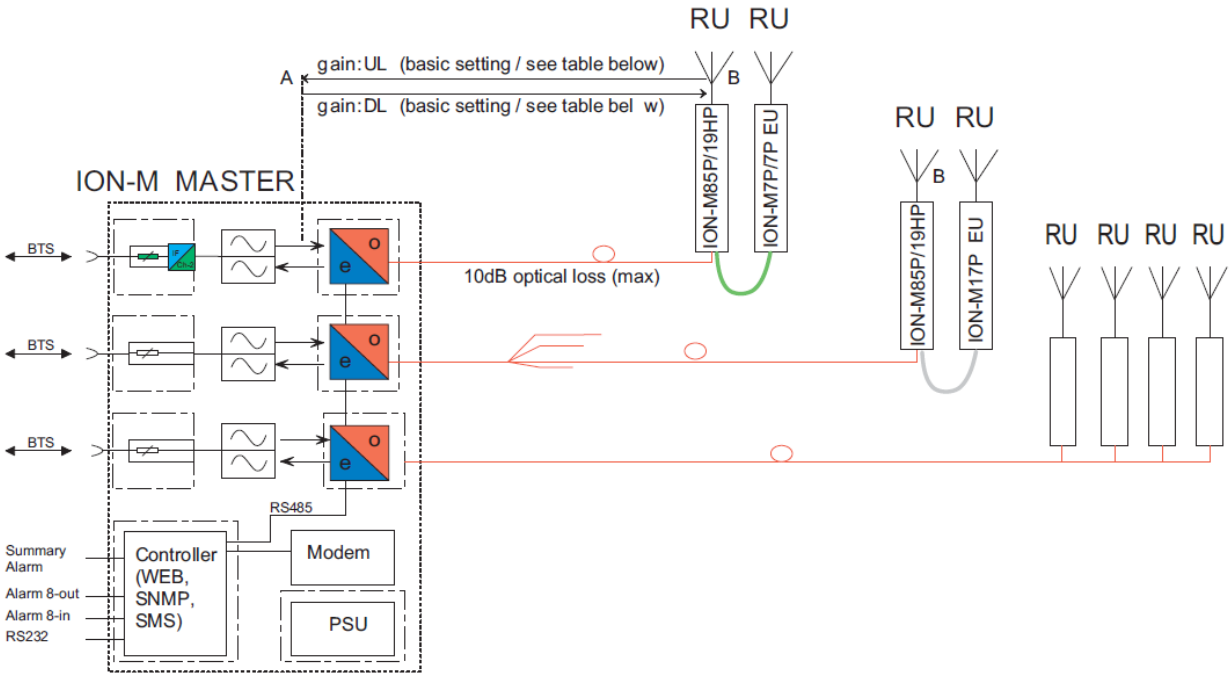


figure 2.1.4-#2 System diagram of EUT: EUT is Remote Unit (RU)

2.1.5 Block diagram of measurement reference points

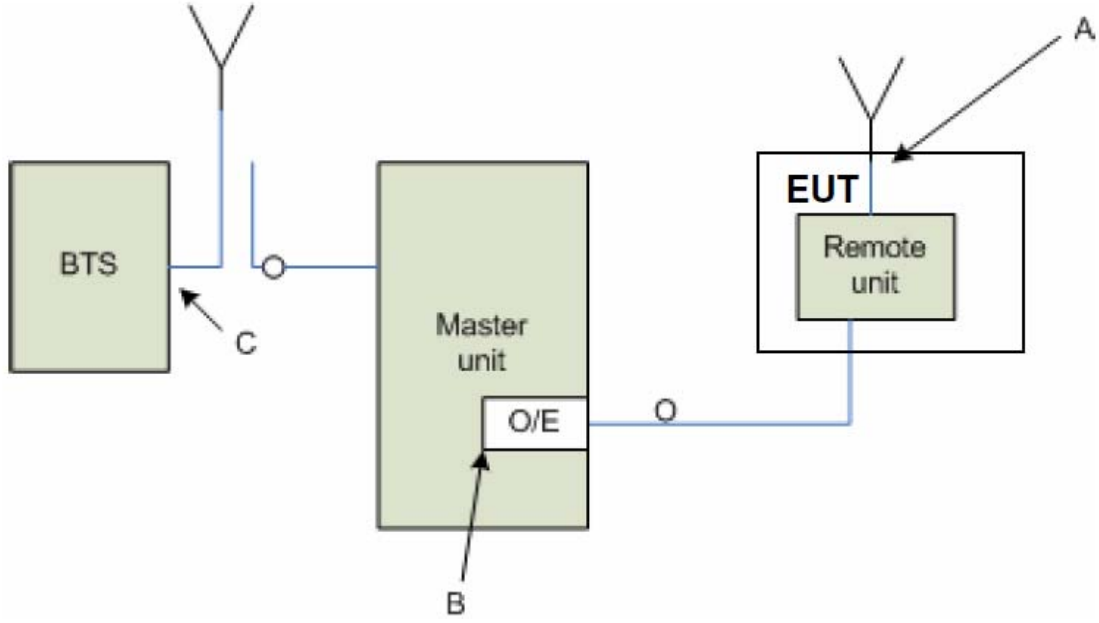


figure 2.1.5-#1 Block diagram of measurement reference points

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 C, BTS DL output, BTS UL input

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
8917	Network Analyzer	ZVCE8	R&S	827712/009	12/10
9054	Spectrum Analyzer	FSV13	R&S	100859	01/11
8736	Spectrum Analyzer	FSIQ26	R&S	100290	12/10
8877	Signal Generator	E4438C	Agilent	MY42082954	01/11
8990	Signal Generator	SMJ100A	R&S	101288	07/11
9052	Signal Generator	SMBV100A	R&S	255089	01/11
8671	Power Meter	E4418B	Agilent	GB39513094	06/11
8672	Power Sensor	E9300H	Agilent	US41090179	06/11
7280	Power Attenuator	768-30	Narda	---	CIU
7403	Divider	2way	Mikom	4148	CIU
7397	RF-Cable	0.5m; SMA	Huber & Suhner	40226/4P	CIU
7398	RF-Cable	0.5m; SMA	Huber & Suhner	40227/4P	CIU
7399	RF-Cable	1m; SMA	Huber & Suhner	40444/4P	CIU
7400	RF-Cable	1m; SMA	Huber & Suhner	40445/4P	CIU
7401	RF-Cable	2m; SMA	Huber & Suhner	40189/4P	CIU
7402	RF-Cable	2m; SMA	Huber & Suhner	40187/4P	CIU
7363	RF-Cable	2,0m; N-N	Huber & Suhner	28439/4PEA	CIU
7295	RF-Cable	2,5m; N-N	Huber & Suhner	28964/4PEA	CIU
7299	RF-Cable	2,5m; N-N	Huber & Suhner	28964/4PEA	CIU
7364	RF-Cable	1,0m; SMA	Huber & Suhner	36309/4P	CIU
7365	RF-Cable	1,0m; SMA	Huber & Suhner	36292/4P	CIU
7366	RF-Cable	2,0m; SMA	Huber & Suhner	36183/4P	CIU
7367	RF-Cable	2,0m; SMA	Huber & Suhner	36158/4P	CIU
7368	Matrix	Extended Version	Andrew	---	monthly

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.

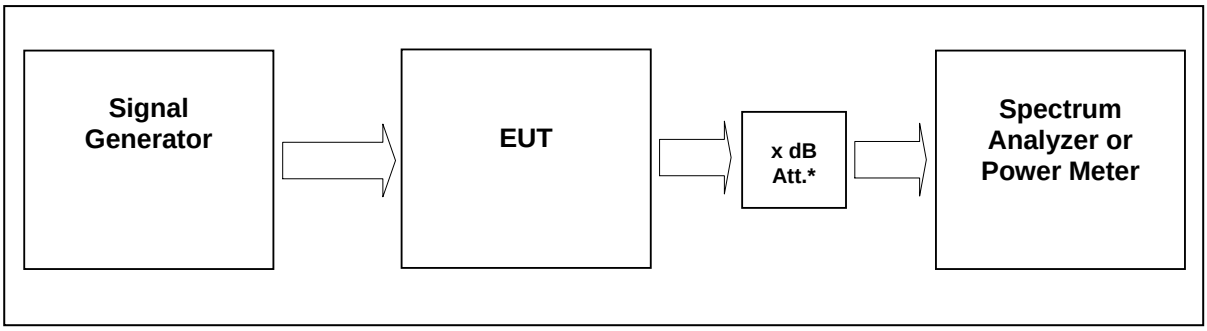
3.4 Measurement uncertainty

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 %.

4 Test site (TEMPTON Service Plus GmbH)

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	9054, 7399, 7280, 7299, 7401, 7367, 9052, 8990, 8877

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 secondarybasis 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

5.3 Test results

Detector RMS.

Test signal Analog:
FM signal with 3.0 kHz deviation and 2.5 kHz rate and sine waveform

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 possilbe bandwidth of standard specification 3GPP TS36.141

5.3.1 Downlink

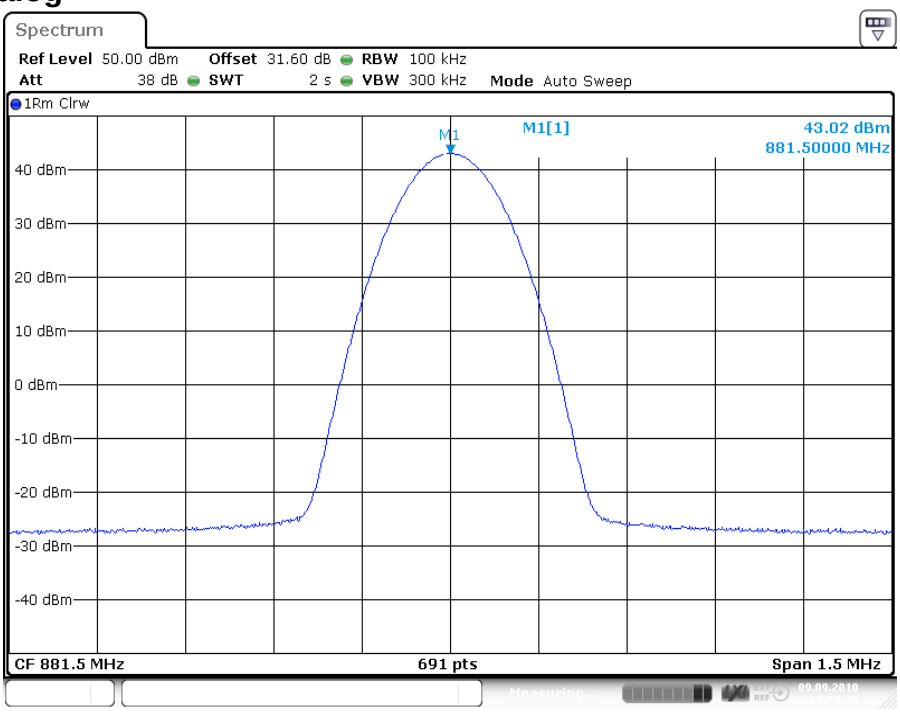
Modu-lation	RBW VBW Span	Measured at f / (MHz)		RF Power (dBm)	RF Power (W)	Plot
Analog	0,1 MHz 0,3 MHz 1,5 MHz	Middle	881,5	43,0	20	5.3.1.1 #1
GSM	1 MHz 3 MHz 10 MHz	Middle	881,5	43,0	20	5.3.1.2 #1
GSM EDGE	1 MHz 3 MHz 10 MHz	Middle	881,5	43,0	20	5.3.1.3 #1
CDMA	3 MHz 10 MHz 15 MHz	Middle	881,5	43,0	20	5.3.1.4 #1
WCDMA	10 MHz 28 MHz 50 MHz	Middle	881,5	42,0	15,9	5.3.1.5 #1
LTE	3 MHz 10 MHz 15 MHz	Middle	881,5	42,0	15,9	5.3.1.6 #1
Maximum output power = 43,0 dBm = 20 W						
Limit Maximum output power = 57 dBm = 500 W						

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

Modulation	Pin / dBm (Ref. point B)
Analog	2,3
GSM	2,2
GSM EDGE	2,2
CDMA	2,2
WCDMA	1,0
LTE	1,2

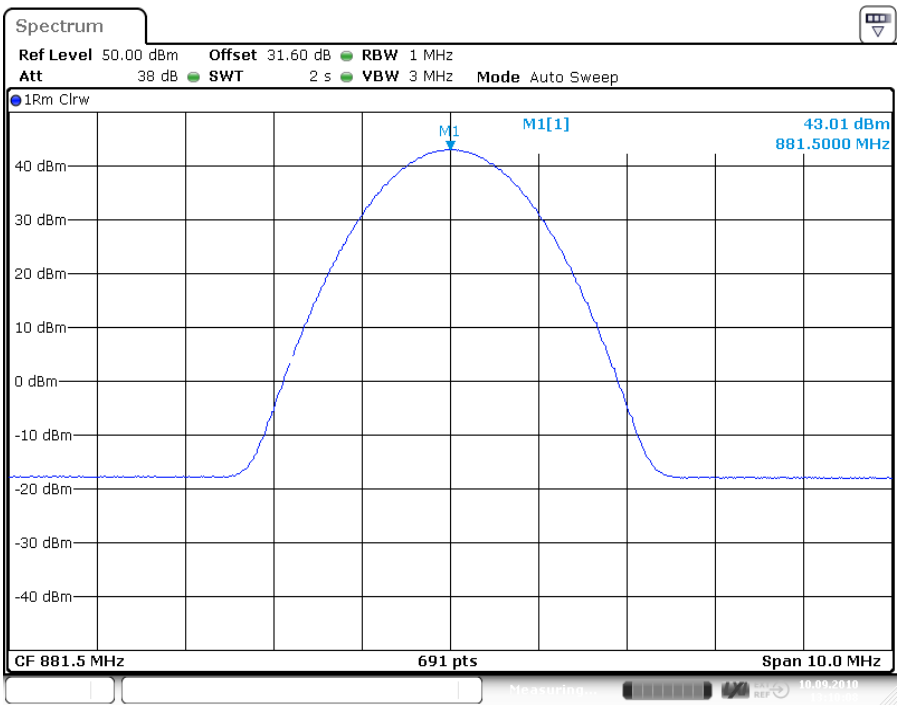
table 5.3.1-#2 RF Power Out: §22.913, §2.1046; Test results; Downlink; Input power

5.3.1.1 Analog



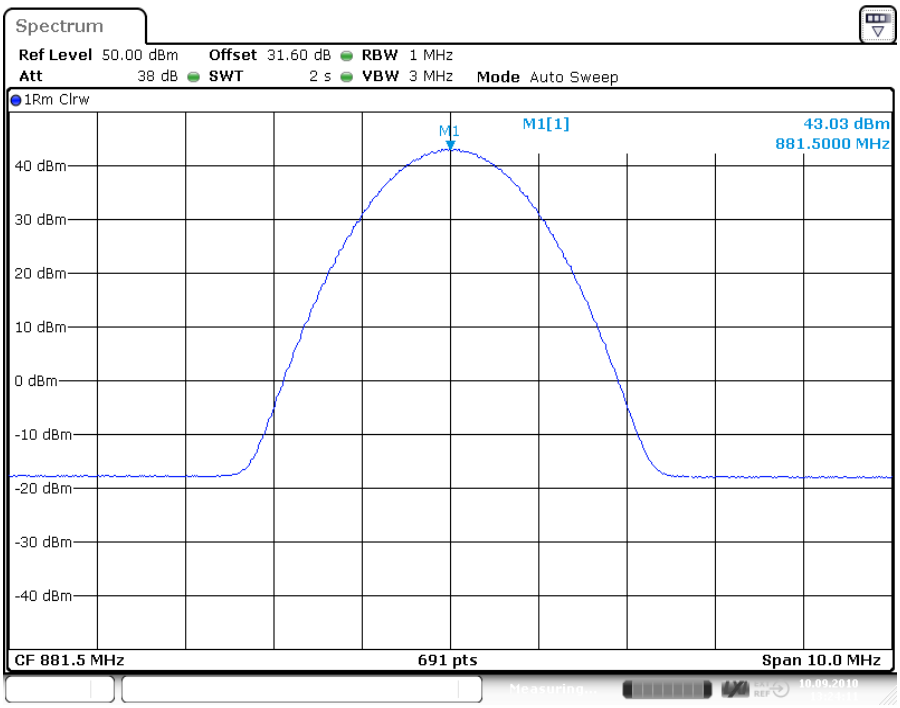
plot 5.3.1.1-#1 RF Power Out: §22.913, §2.1046; Test results; Downlink; Analog Middle

5.3.1.2 GSM



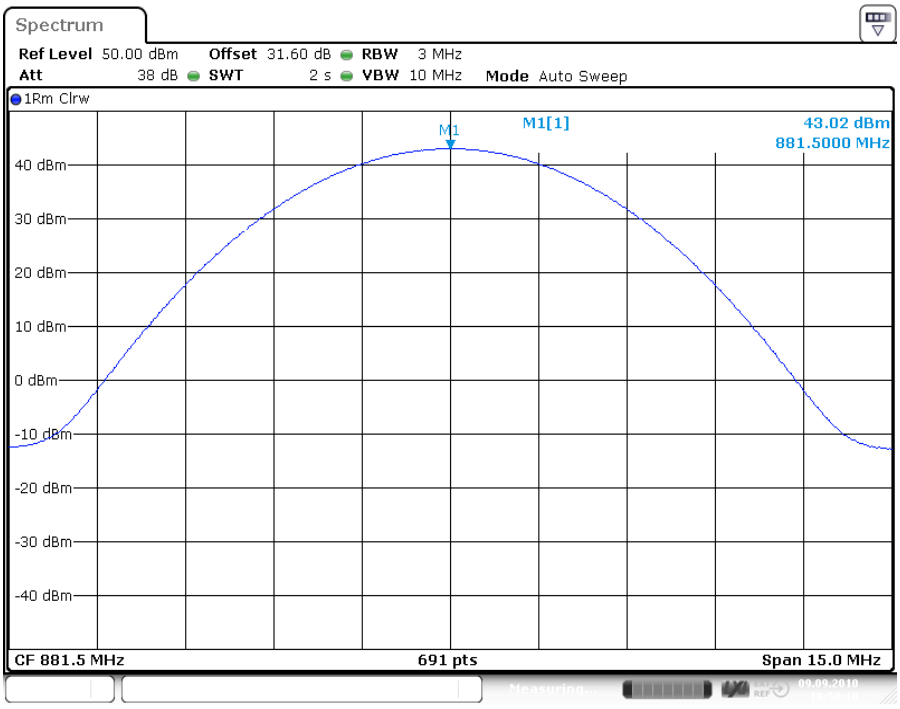
plot 5.3.1.2-#1 RF Power Out: §22.913, §2.1046; Test results; Downlink; GSM Middle

5.3.1.3 GSM EDGE



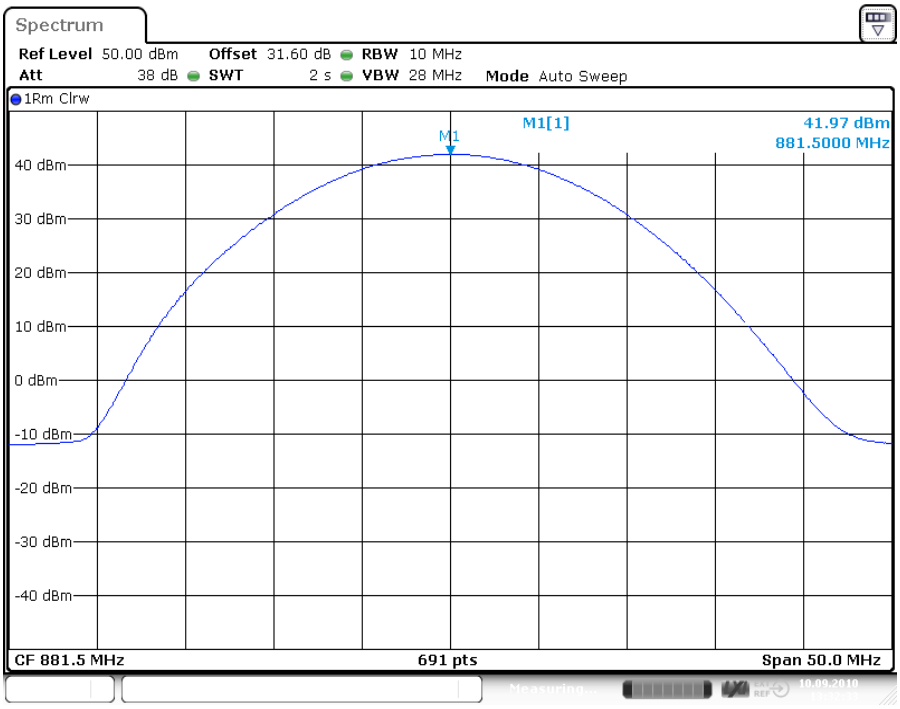
plot 5.3.1.3-#1 RF Power Out: §22.913, §2.1046; Test results; Downlink; GSM EDGE Middle

5.3.1.4 CDMA



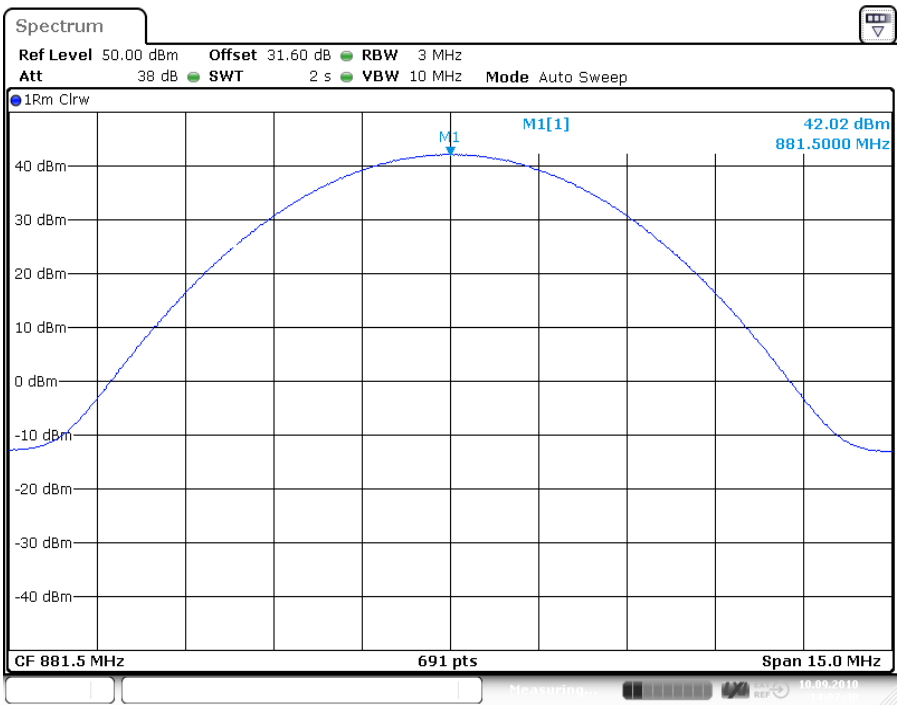
plot 5.3.1.4-#1 RF Power Out: §22.913, §2.1046; Test results; Downlink; CDMA Middle

5.3.1.5 W-CDMA



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

5.3.1.6 LTE



plot 5.3.1.6-#1 RF Power Out: §22.913, §2.1046; Test results; Downlink; LTE Middle

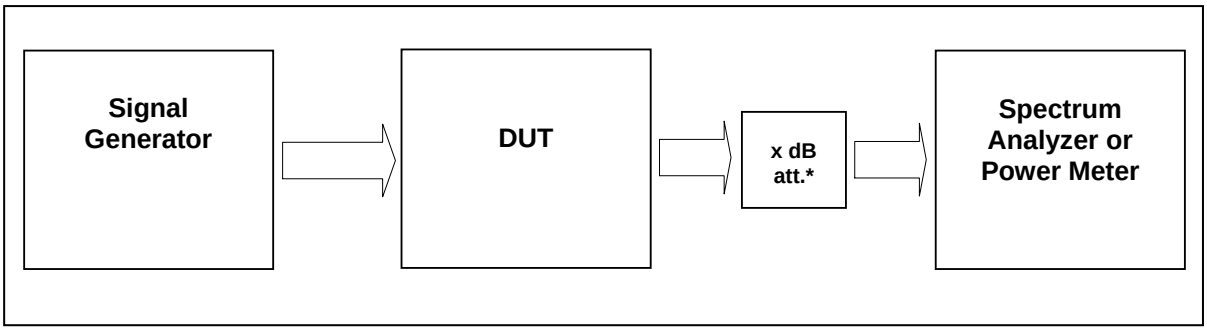
5.3.2 Uplink

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:	Michael Leinfelder
Date:	10.09.2010

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	9054, 7399, 7280, 7299, 7401, 7367, 9052, 8990, 8877

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

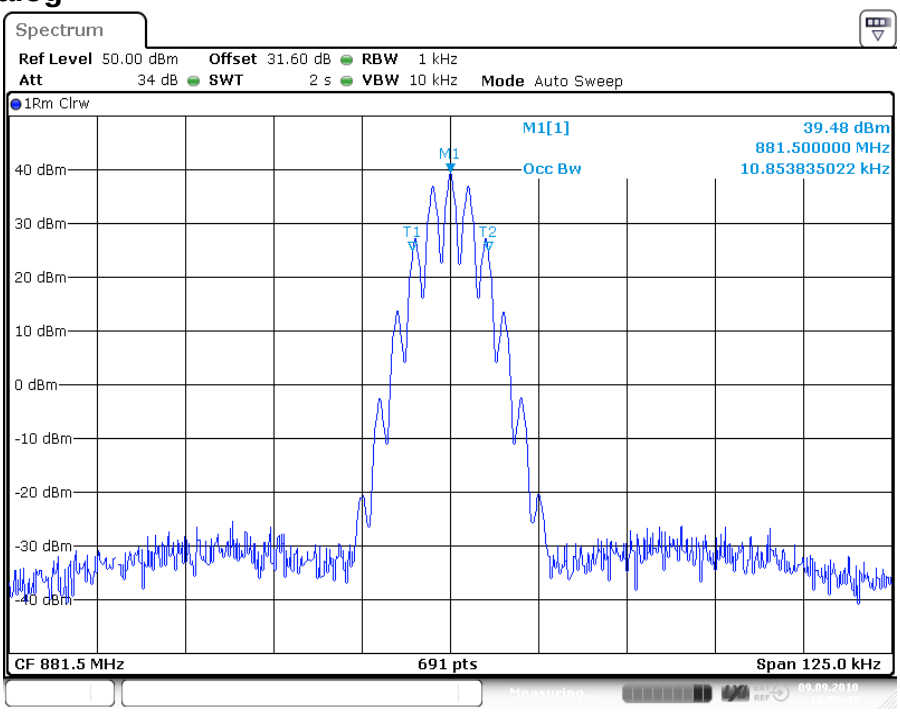
For composite power measurements: Detector RMS.

6.3.1 Downlink

Modu-lation	Measured at f / MHz		RBW VBW Span	Occupied Bandwidth / kHz	Plot
Analog	Middle	881,5	1 kHz 10 kHz 125 kHz	10,85	6.3.1.1 #1, #2
GSM	Middle	881,5	3 kHz 30 kHz 1 MHz	247,5	6.3.1.2 #1, #2
GSM EDGE	Middle	881,5	3 kHz 30 kHz 1 MHz	244,6	6.3.1.3 #1, #2
CDMA	Middle	881,5	30kHz 300kHz 5 MHz	1259	6.3.1.4 #1, #2
WCDMA	Middle	881,5	100kHz 1 MHz 10 MHz	4167	6.3.1.5 #1, #2
LTE	Middle	881,5	30kHz 300kHz 5 MHz	1100	6.3.1.6 #1, #2

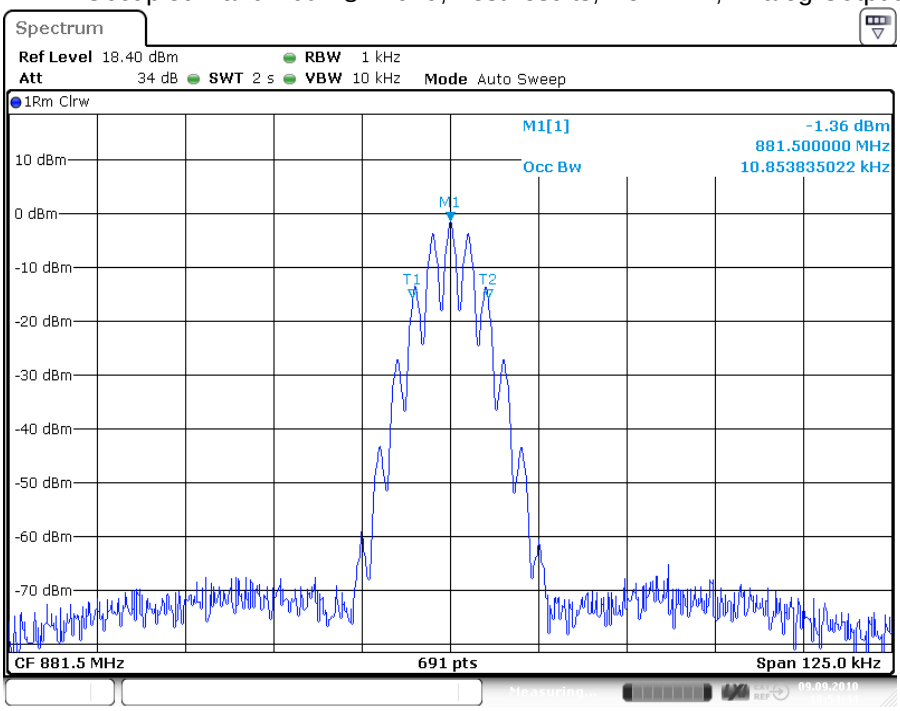
table 6.3-#1 Occupied Bandwidth: §2.1049 Test results

6.3.1.1 Analog



Date: 9.SEP.2010 18:53:47

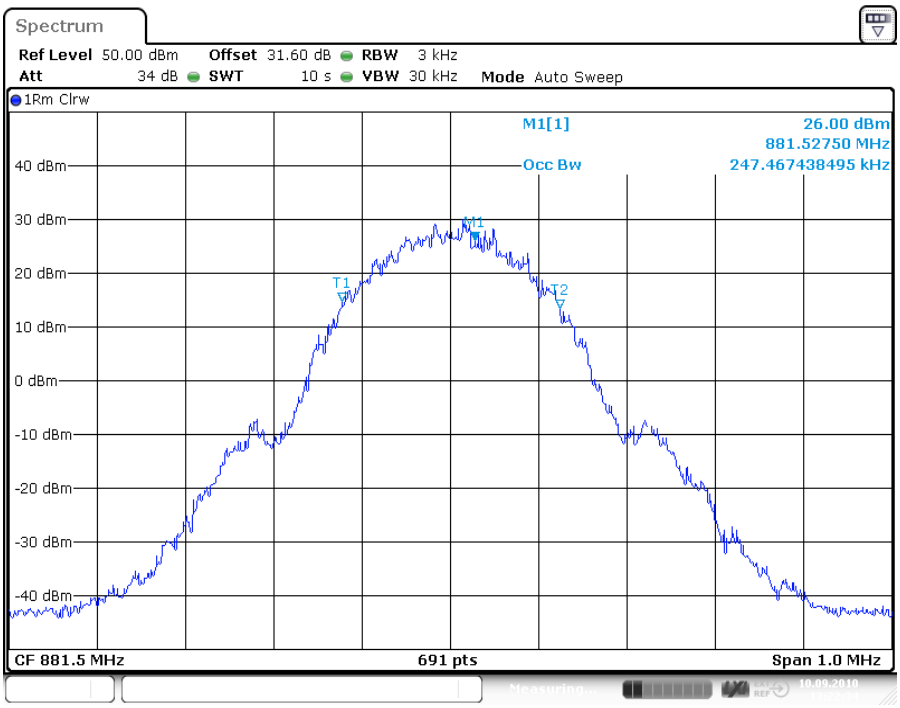
plot 6.3.1.1-#1 Occupied Bandwidth: §2.1049; Test results; Downlink; Analog Output; Middle



Date: 9.SEP.2010 18:54:44

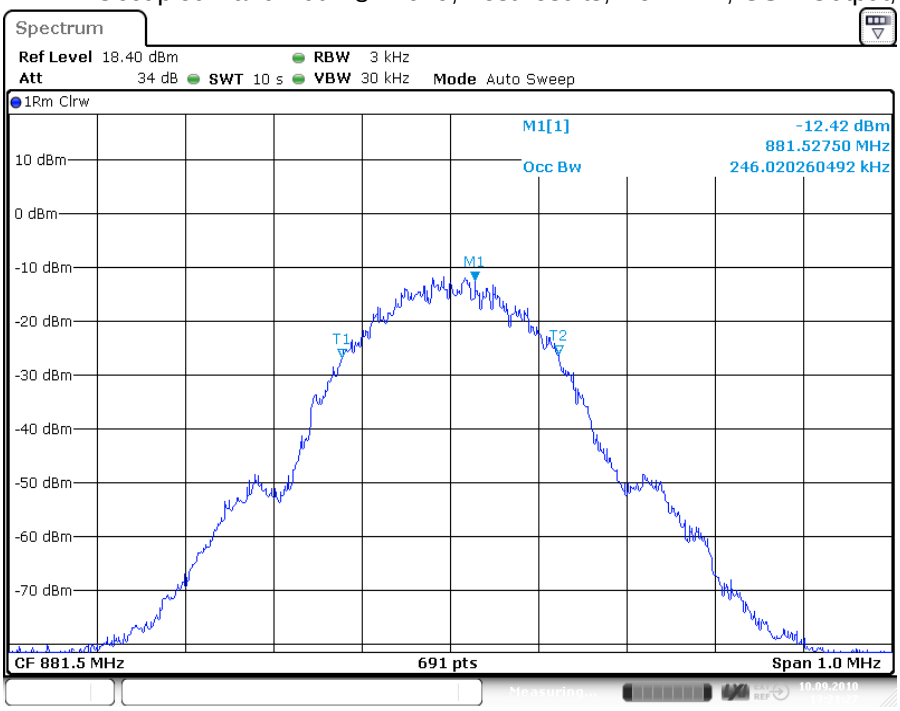
plot 6.3.1.1-#2 Occupied Bandwidth: §2.1049; Test results; Downlink; Analog Input; Middle

6.3.1.2 GSM



Date: 10.SEP.2010 13:22:34

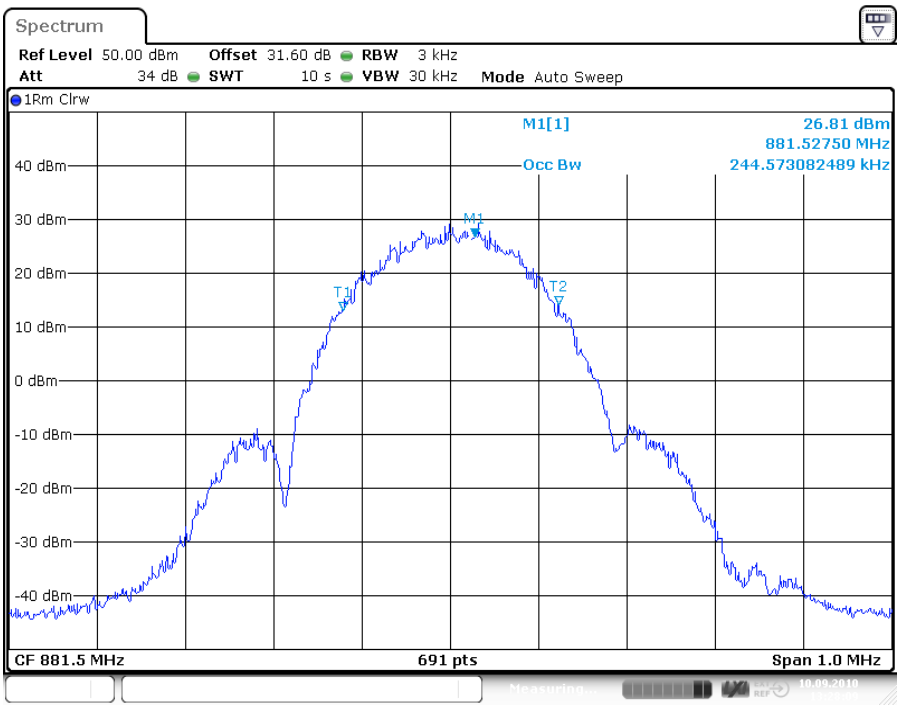
plot 6.3.1.2-#1 Occupied Bandwidth: §2.1049; Test results; Downlink; GSM Output; Middle



Date: 10.SEP.2010 13:21:27

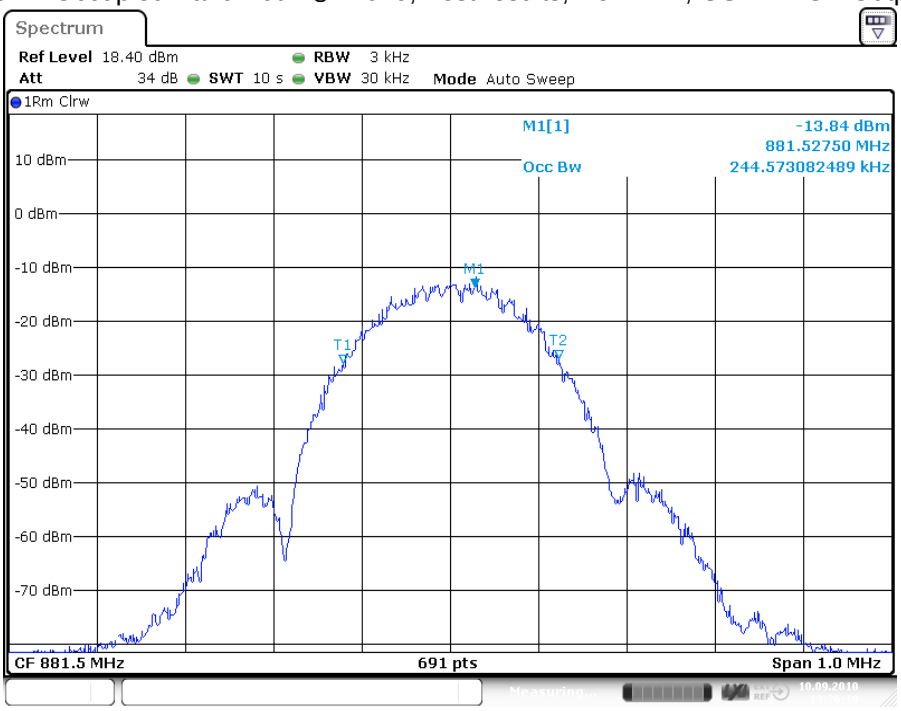
plot 6.3.1.2-#2 Occupied Bandwidth: §2.1049; Test results; Downlink; GSM Input; Middle

6.3.1.3 GSM EDGE



Date: 10.SEP.2010 13:28:09

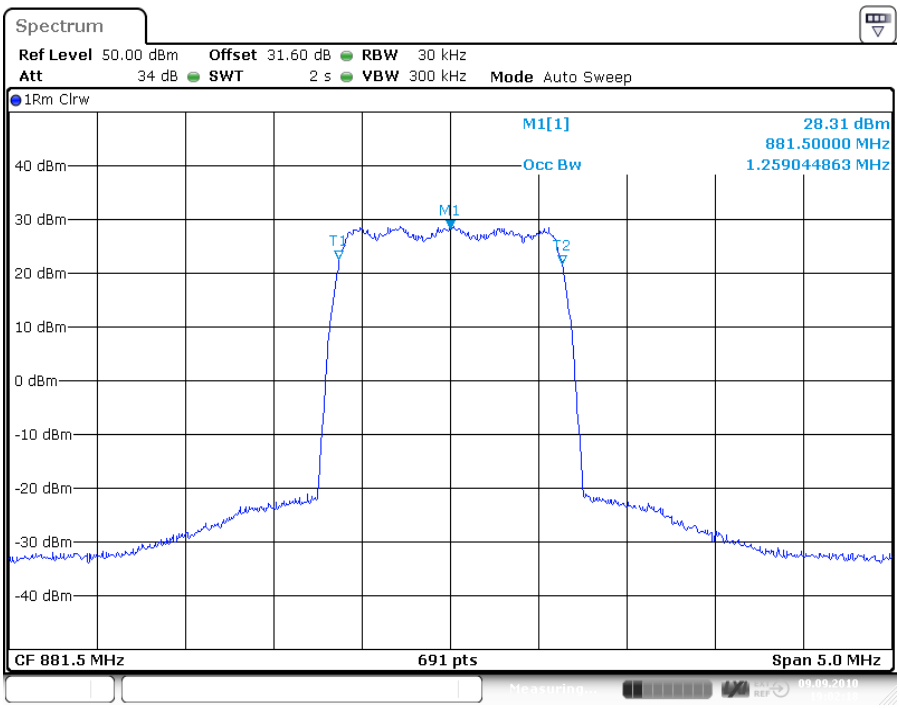
plot 6.3.1.3-#1 Occupied Bandwidth: §2.1049; Test results; Downlink; GSM EDGE Output; Middle



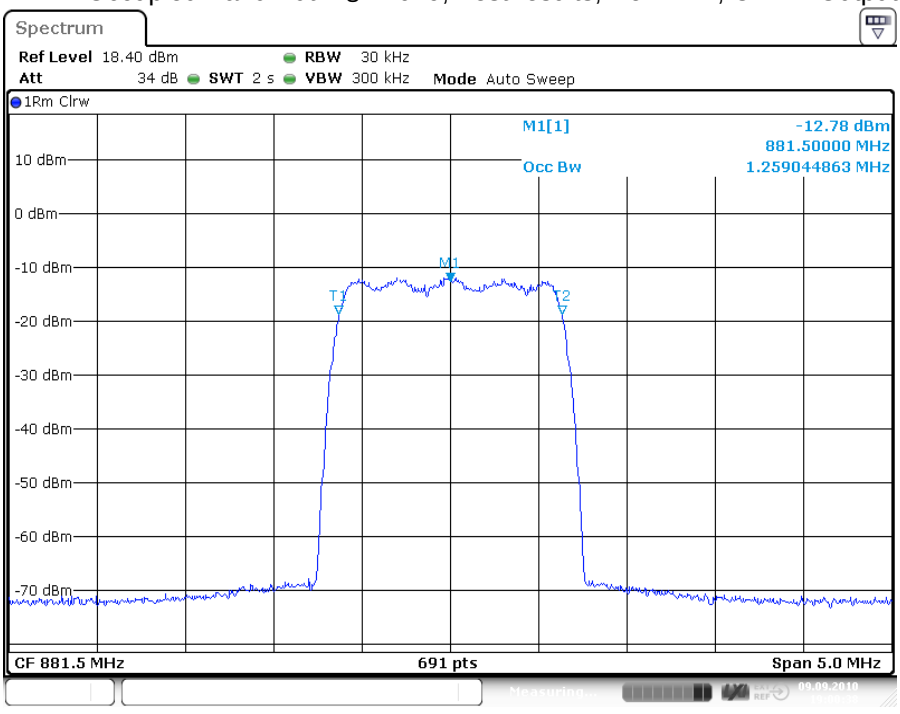
Date: 10.SEP.2010 13:26:18

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

6.3.1.4 CDMA

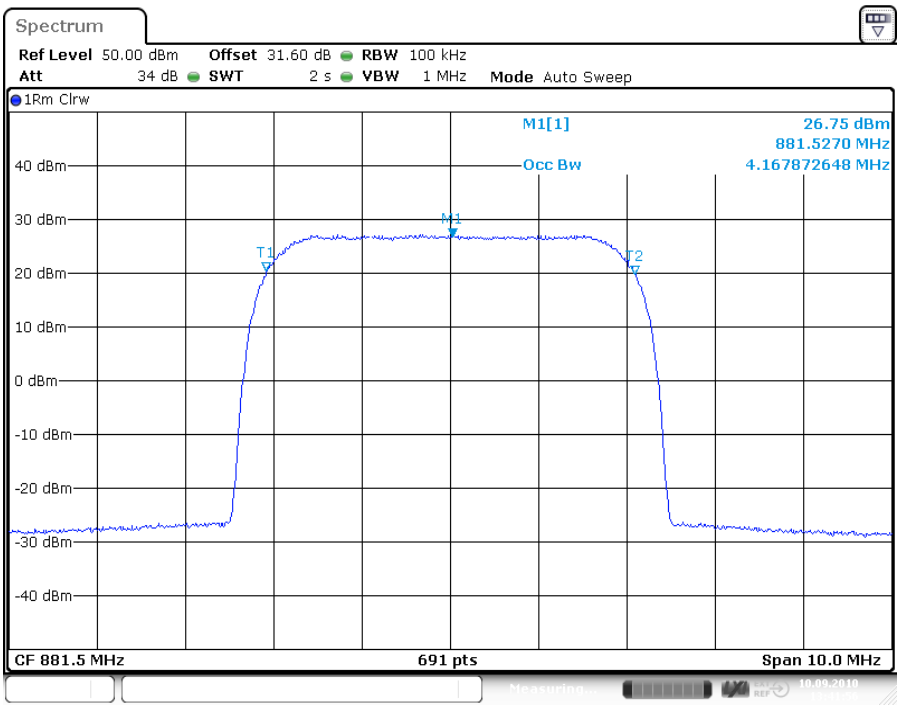


plot 6.3.1.4-#1 Occupied Bandwidth: §2.1049; Test results; Downlink; CDMA Output; Middle



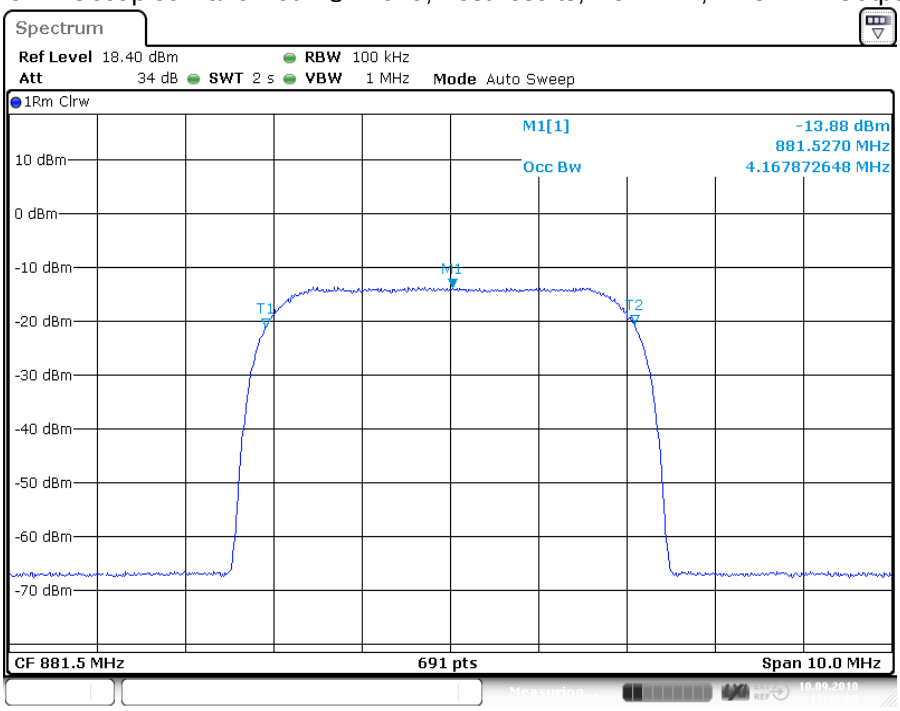
plot 6.3.1.4-#2 Occupied Bandwidth: §2.1049; Test results; Downlink; CDMA Input; Middle

6.3.1.5 W-CDMA



Date: 10.SEP.2010 13:41:55

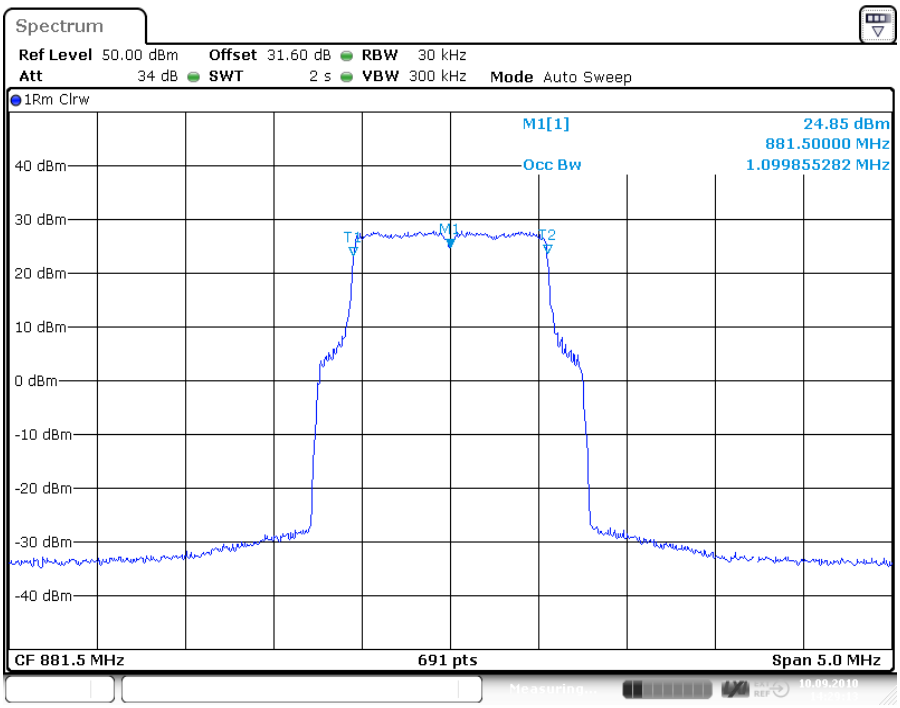
plot 6.3.1.5-#1 Occupied Bandwidth: §2.1049; Test results; Downlink; W-CDMA Output; Middle



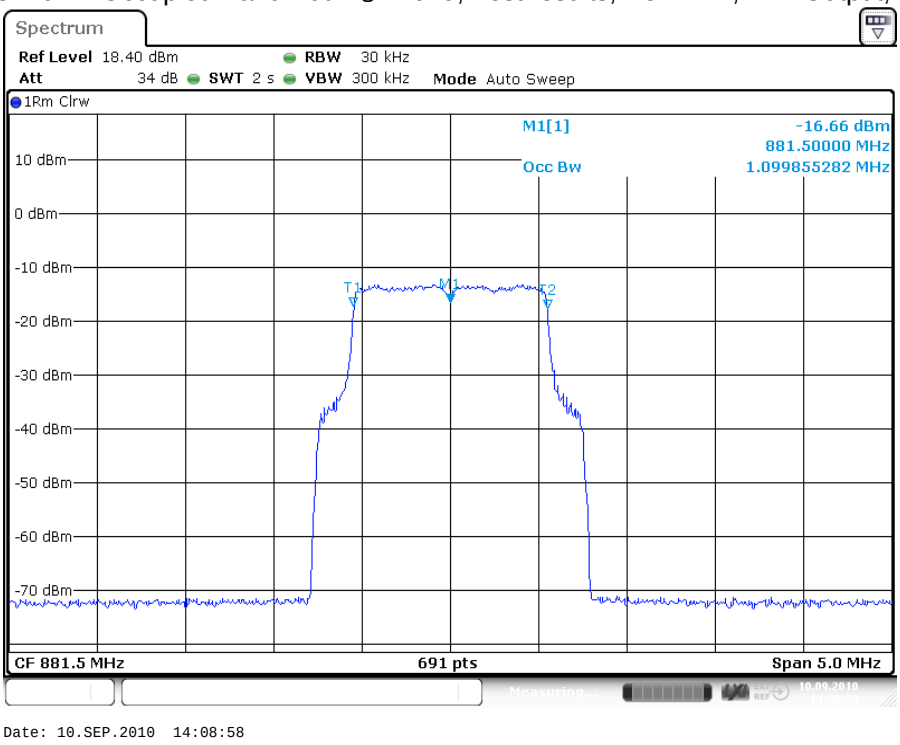
Date: 10.SEP.2010 13:40:05

plot 6.3.1.5-#2 Occupied Bandwidth: §2.1049; Test results; Downlink; W-CDMA Input; Middle

6.3.1.6 LTE



plot 6.3.1.6-#1 Occupied Bandwidth: §2.1049; Test results; Downlink; LTE Output; Middle



plot 6.3.1.6-#2 Occupied Bandwidth: §2.1049; Test results; Downlink; LTE Input; Middle

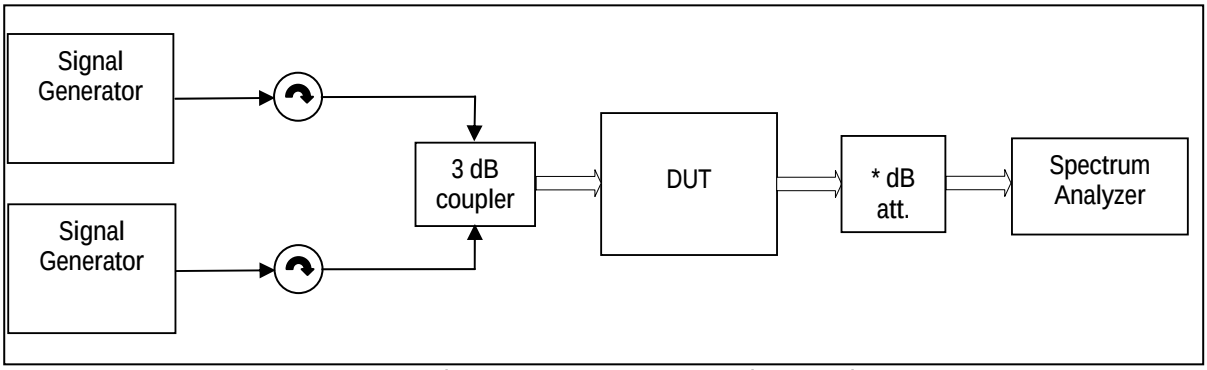
6.3.2 Uplink

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:	Michael Leinfelder
Date:	10.09.2010

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



External Attenuator DL x dB = 30 dB

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

Measurement uncertainty	± 0,54 dB ± 1,2 dB ± 1,5 dB	9 kHz to 3 GHz 3 GHz to 7 GHz 7 GHz to 13,6 GHz
Test equipment used	9054, 7399, 7280, 7299, 7401, 7367, 7403, 7397, 7398, 9052, 8990, 8877	

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 andamended at 63 FR 36599, July 7, 1998]

7.3 Test results

7.3.1 Downlink

<1MHz from Band Edge

Detector: RMS.

Modu-lation	RBW VBW Span	Measured at f / MHz		Max. level (dBm)	Plot
Analog	0.3 kHz 3 kHz 2 MHz	Bottom	869,0125 869,0375	-27,7	7.3.1.1 #1
		Top	893,9625 893,9875	-23,5	7.3.1.1 #2
GSM	3 kHz 30 kHz 2 MHz	Bottom	869,4 869,6	-37,9	7.3.1.2 #1
		Top	893,4 893,6	-37,5	7.3.1.2 #2
GSM EDGE	3 kHz 30 kHz 2 MHz	Bottom	869,4 869,6	-36,7	7.3.1.3 #1
		Top	893,4 893,6	-36,4	7.3.1.3 #2
CDMA	30 kHz 300 kHz 6 MHz	Bottom	869,73 870,96	-23,3	7.3.1.4 #1
		Top	892,02 893,25	-23,4	7.3.1.4 #2
WCDMA	100 kHz 1 MHz 15 MHz	Bottom	871,6 876,6	-25,9	7.3.1.5 #1
		Top	886,4 891,4	-26,1	7.3.1.5 #2
LTE	30 kHz 300 kHz 6 MHz	Bottom	869,7 871,1	-21,9	7.3.1.6 #1
		Top	891,9 893,3	-25,3	7.3.1.6 #2

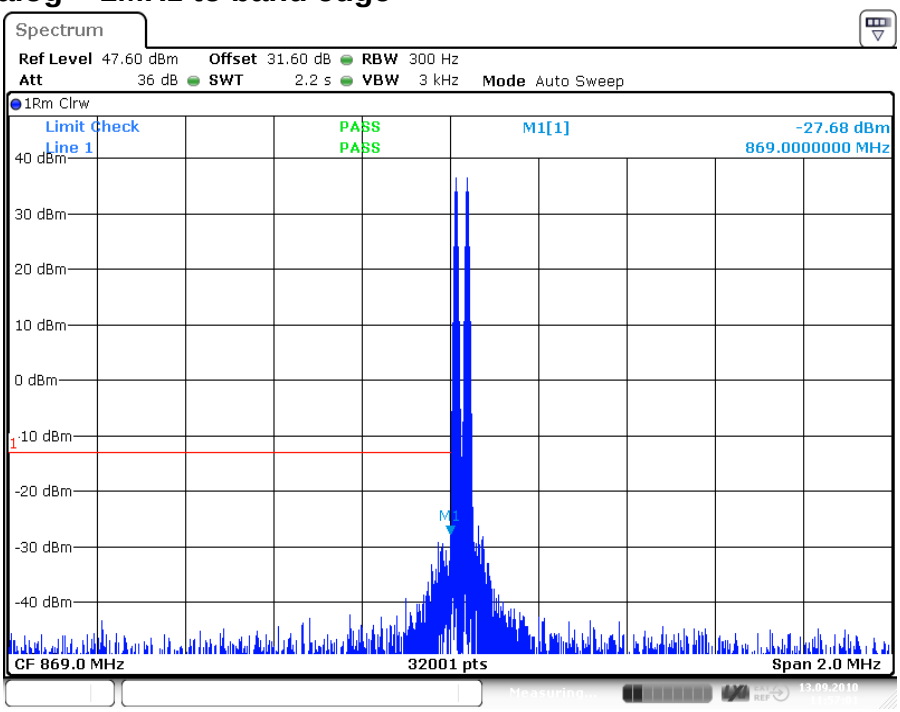
table 7.3-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051 Test results; Downlink; <1MHz from Band Edge

>1MHz from Band Edge
Detector: RMS.

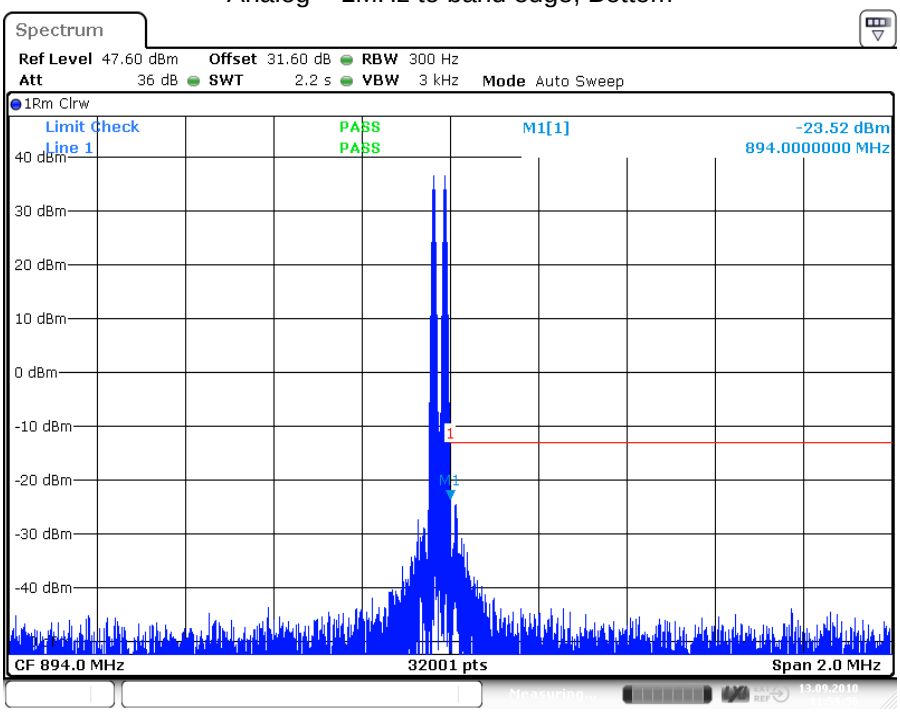
Modu-lation	RBW VBW Span	Measured at f / (MHz)		Max. level (dBm)	Plot
Analog	1 MHz 3 MHz 30 MHz – 9 GHz	Middle	881,5	-15,3	7.3.1.7 #1
GSM	1 MHz 3 MHz 30 MHz – 9 GHz	Middle	881,5	-15,2	7.3.1.8 #1
GSM EDGE	1 MHz 3 MHz 30 MHz – 9 GHz	Middle	881,5	-15,4	7.3.1.9 #1
CDMA	3 MHz 10 MHz 30 MHz – 9 GHz	Middle	881,5	-15,2	7.3.1.10 #1
WCDMA	10 MHz 10 MHz 30 MHz – 9 GHz	Middle	881,5	-15,5	7.3.1.11 #1
LTE	10 MHz 10 MHz 30 MHz – 9 GHz	Middle	881,5	-15,4	7.3.1.12 #1

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

7.3.1.1 Analog < 1MHz to band edge

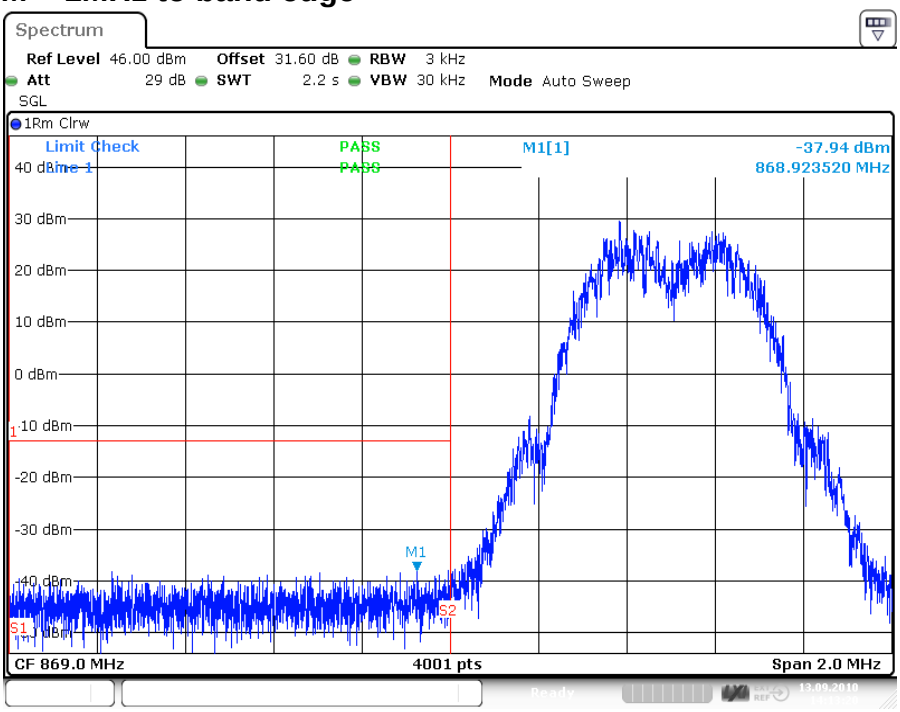


plot 7.3.1.1-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink; Analog < 1MHz to band edge; Bottom

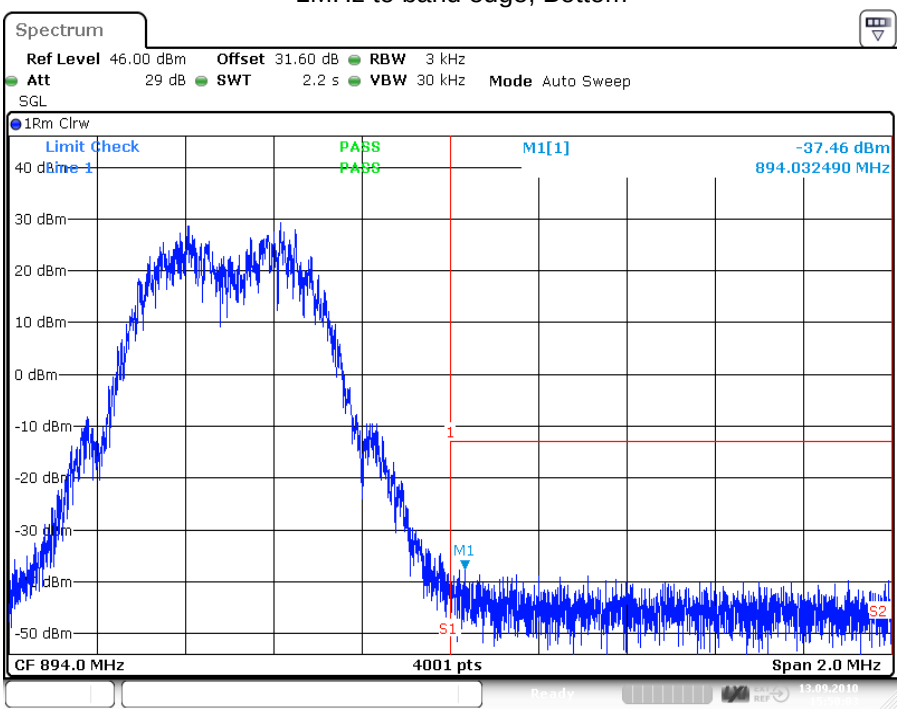


plot 7.3.1.1-#2 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink; Analog < 1MHz to band edge; Top

7.3.1.2 GSM < 1MHz to band edge

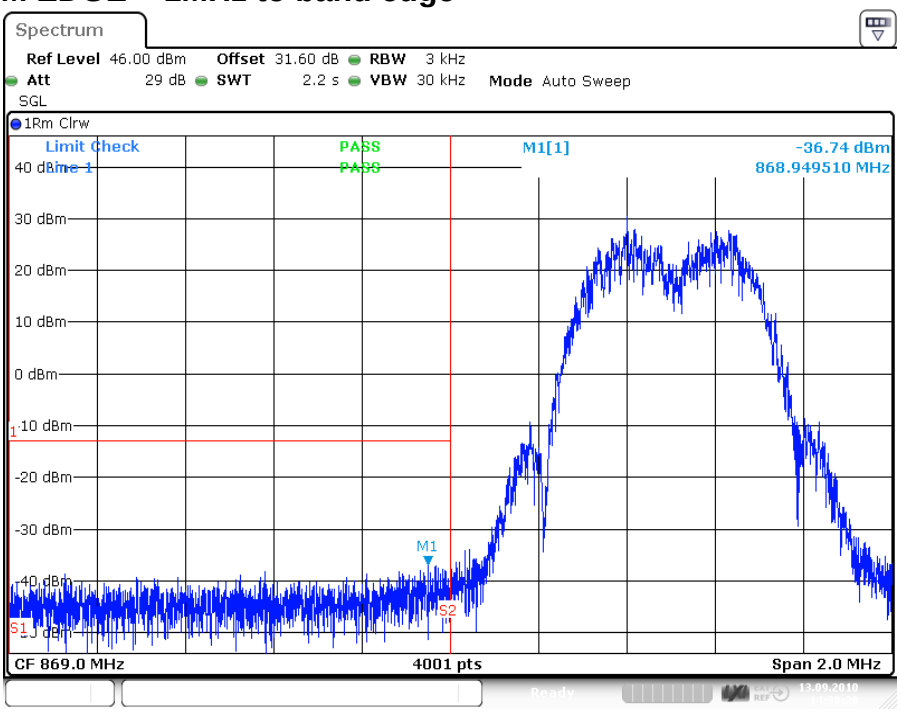


plot 7.3.1.2-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink; GSM < 1MHz to band edge; Bottom

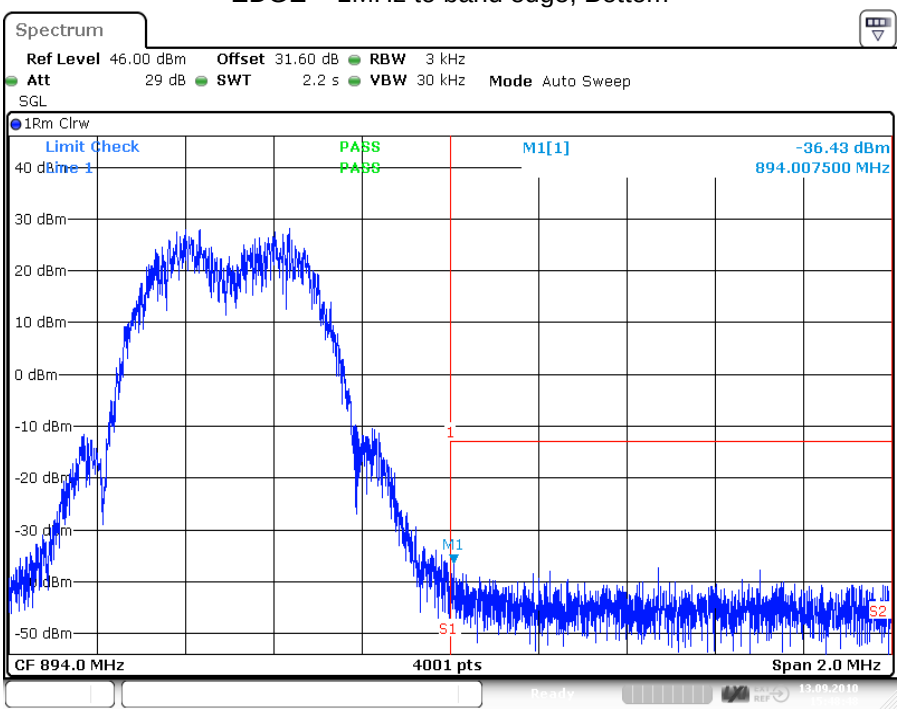


plot 7.3.1.2-#2 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink; GSM < 1MHz to band edge; Top

7.3.1.3 GSM EDGE < 1MHz to band edge

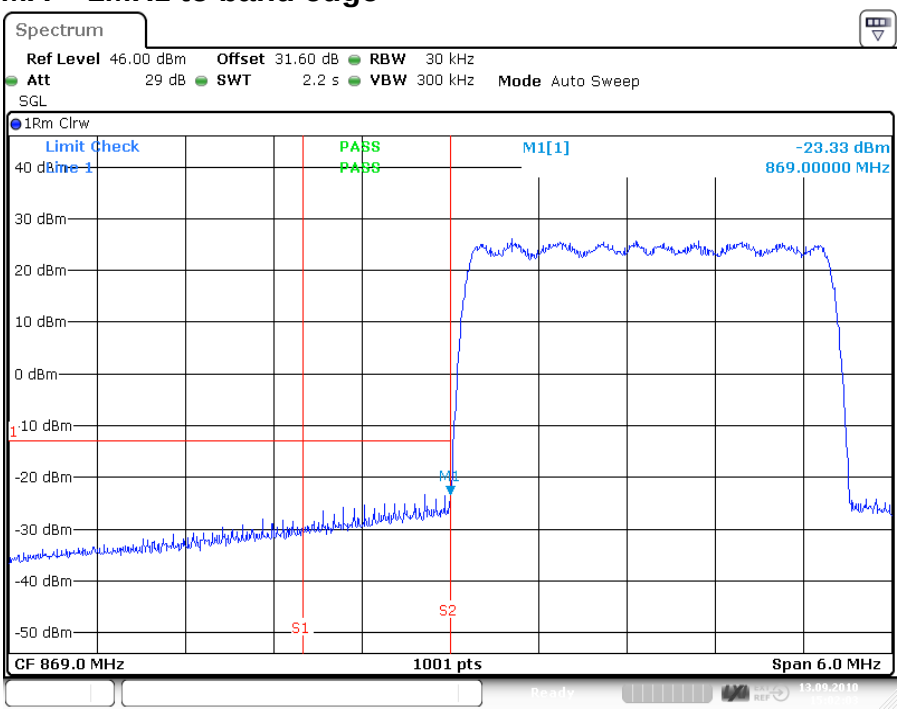


plot 7.3.1.3-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink; GSM EDGE < 1MHz to band edge; Bottom

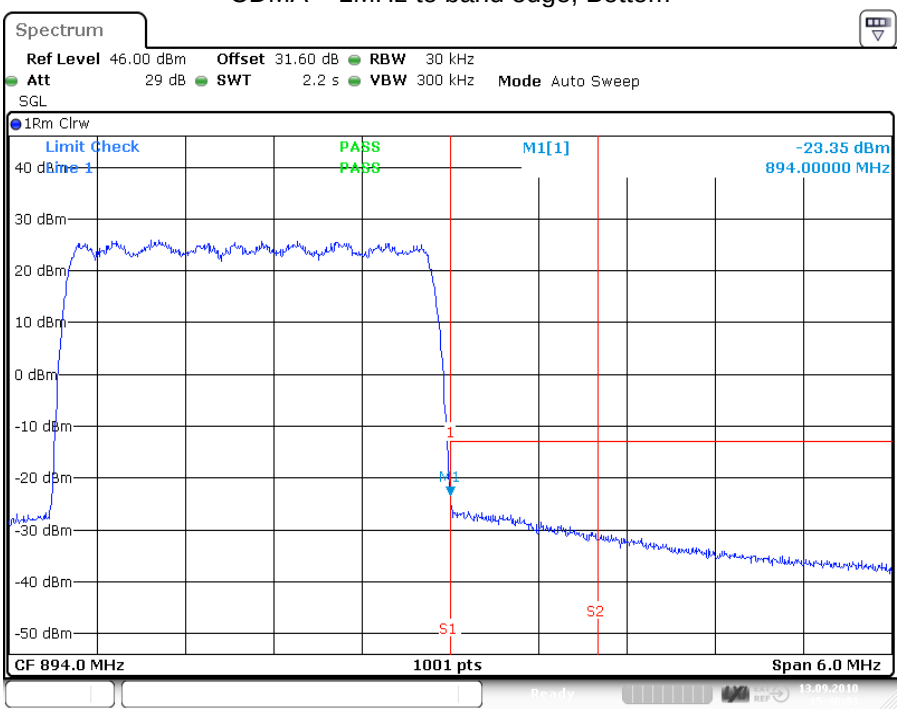


plot 7.3.1.3-#2 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink; GSM EDGE < 1MHz to band edge; Top

7.3.1.4 CDMA < 1MHz to band edge

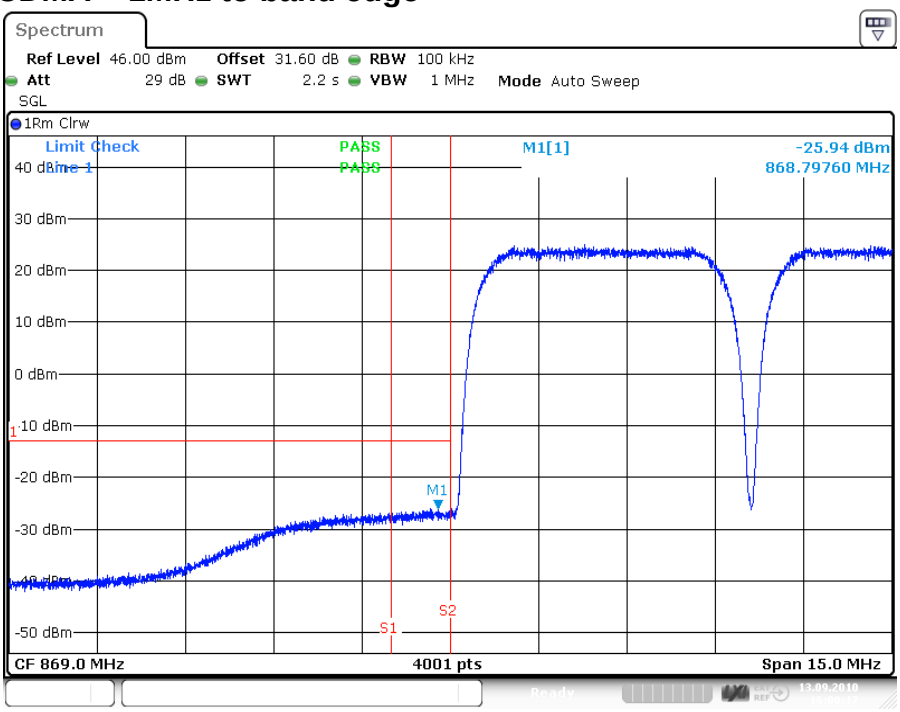


plot 7.3.1.4-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink; CDMA < 1MHz to band edge; Bottom



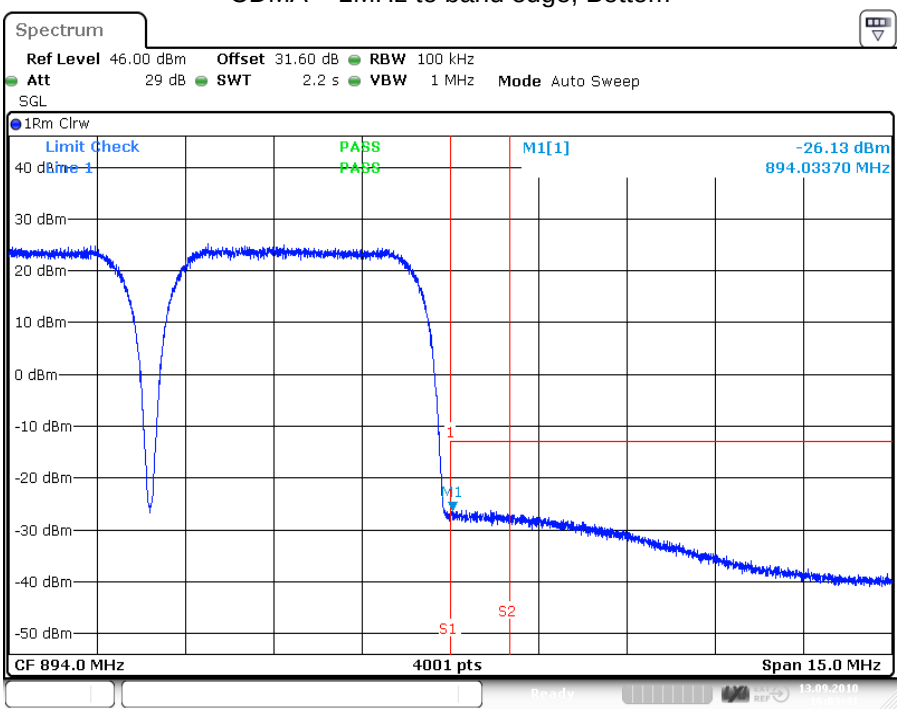
plot 7.3.1.4-#2 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink; CDMA < 1MHz to band edge; Top

7.3.1.5 W-CDMA < 1MHz to band edge



Date: 13.SEP.2010 16:00:16

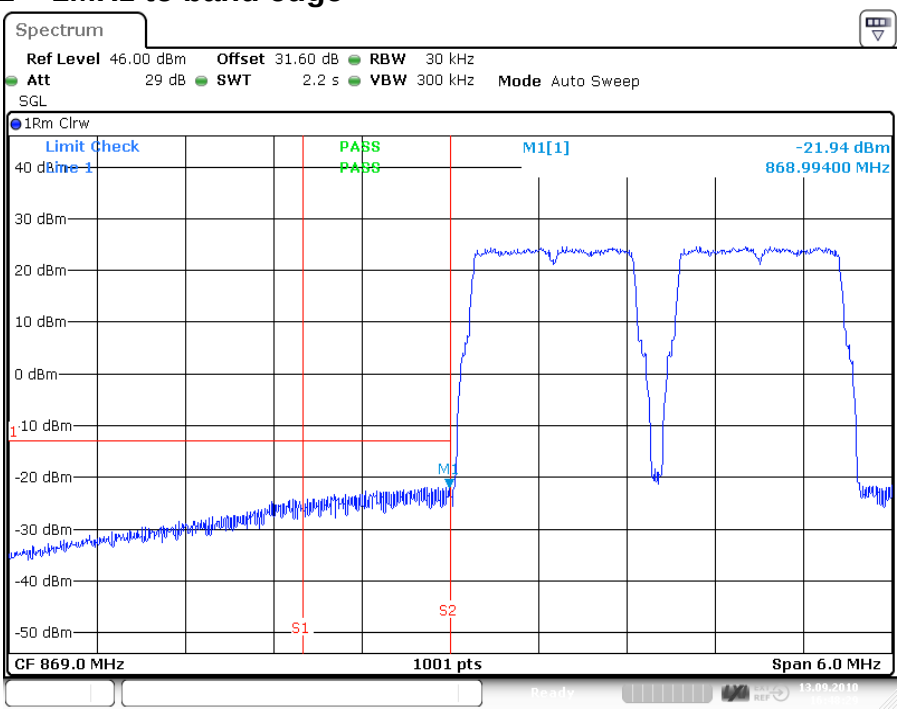
plot 7.3.1.5-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink; W-CDMA < 1MHz to band edge; Bottom



Date: 13.SEP.2010 16:03:41

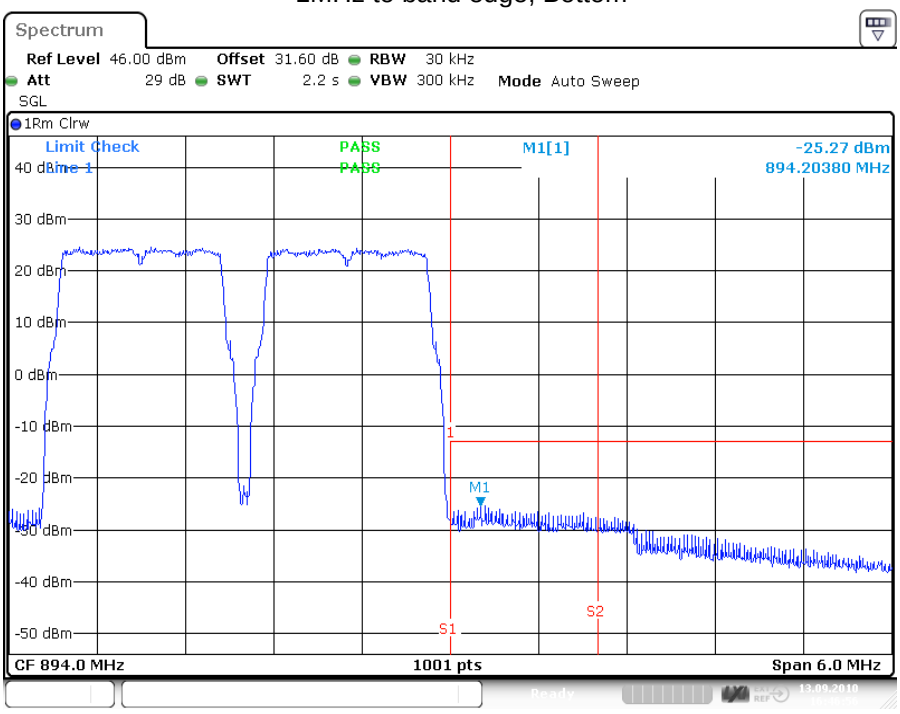
plot 7.3.1.5-#2 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink; W-CDMA < 1MHz to band edge; Top

7.3.1.6 LTE < 1MHz to band edge



Date: 13.SEP.2010 16:48:29

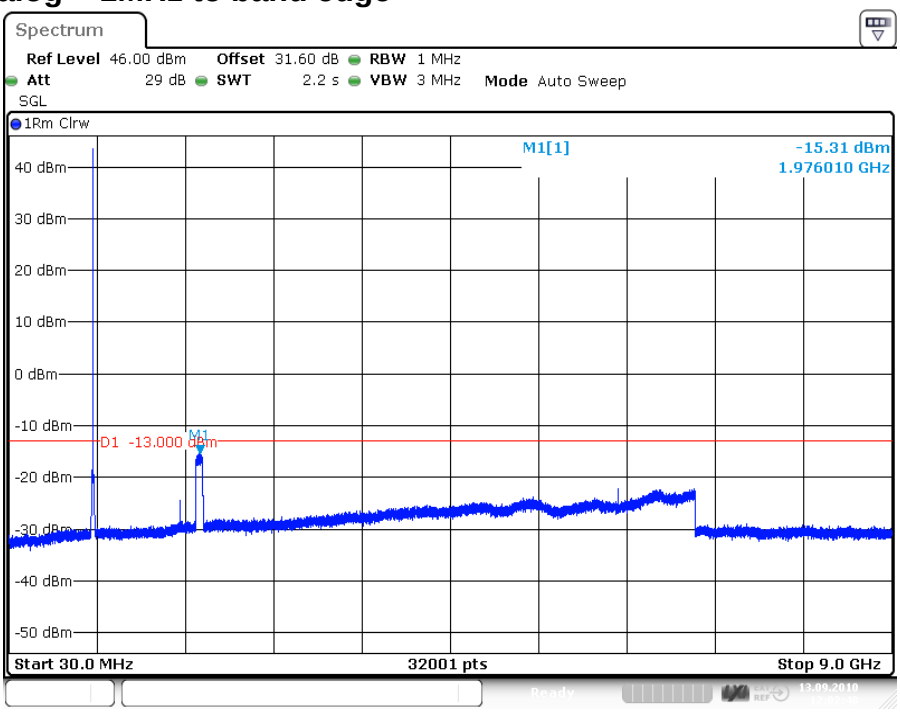
plot 7.3.1.6-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink; LTE < 1MHz to band edge; Bottom



Date: 13.SEP.2010 16:46:56

plot 7.3.1.6-#2 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink; LTE < 1MHz to band edge; Top

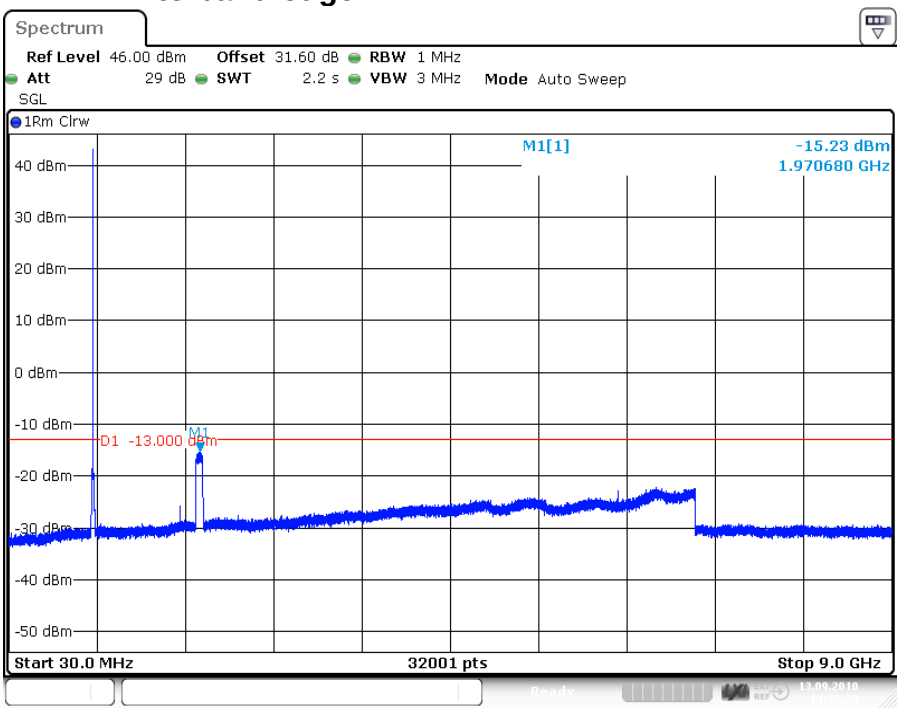
7.3.1.7 Analog > 1MHz to band edge



Date: 13.SEP.2010 12:02:48

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

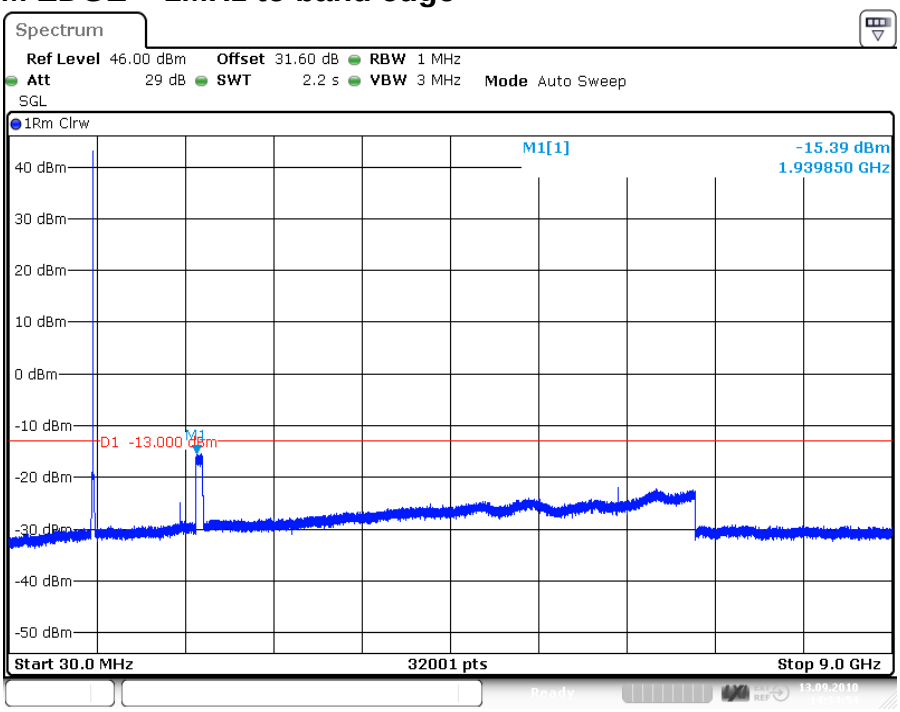
7.3.1.8 GSM > 1MHz to band edge



Date: 13.SEP.2010 14:32:26

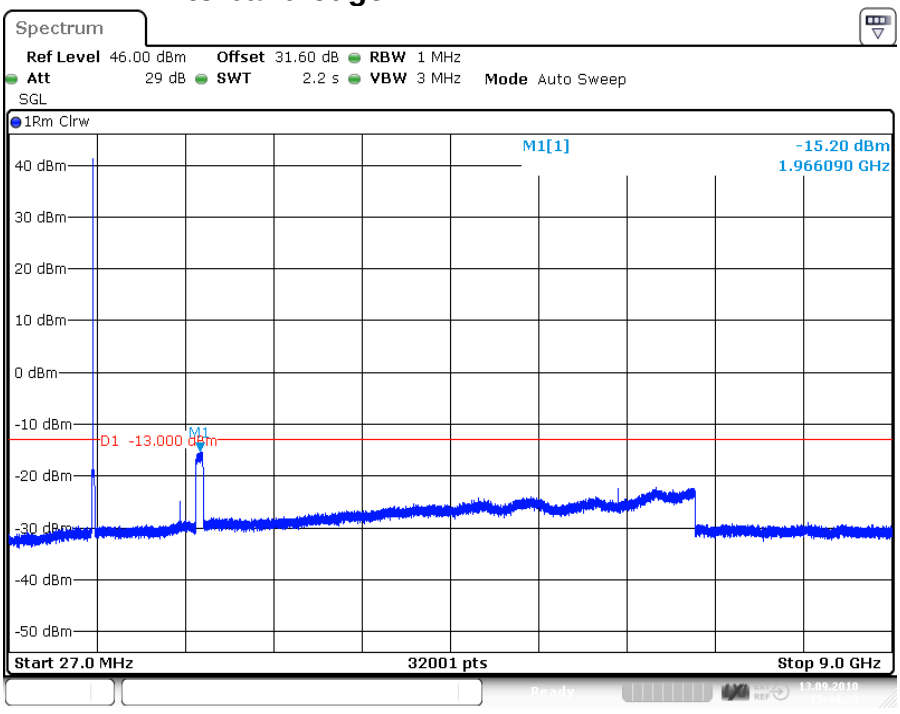
plot 7.3.1.8-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink; GSM > 1MHz to band edge; Middle

7.3.1.9 GSM EDGE > 1MHz to band edge



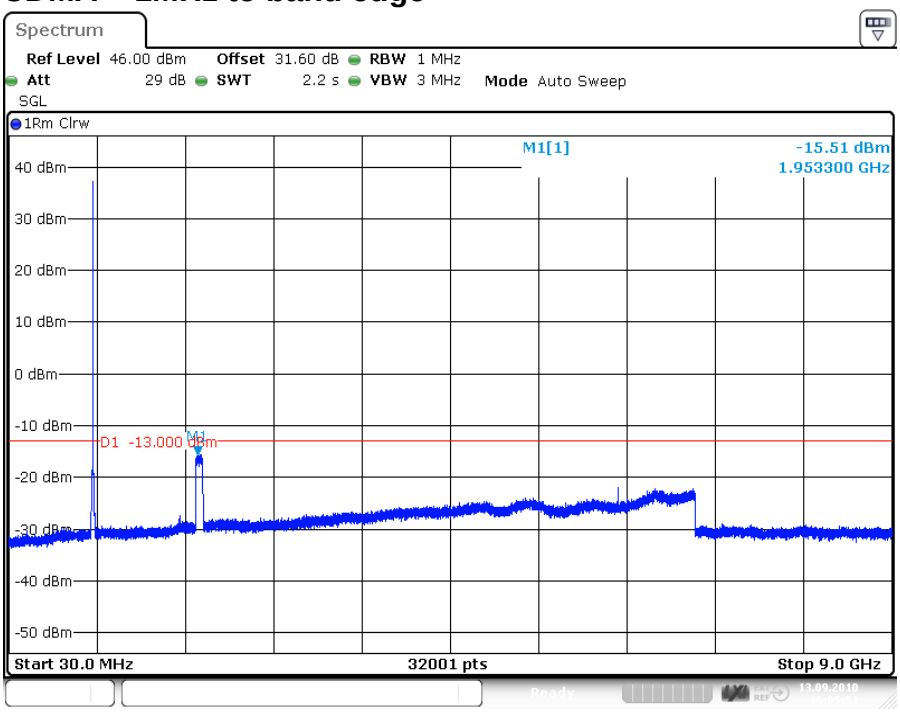
plot 7.3.1.9-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink; GSM EDGE > 1MHz to band edge; Middle

7.3.1.10 CDMA > 1MHz to band edge



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

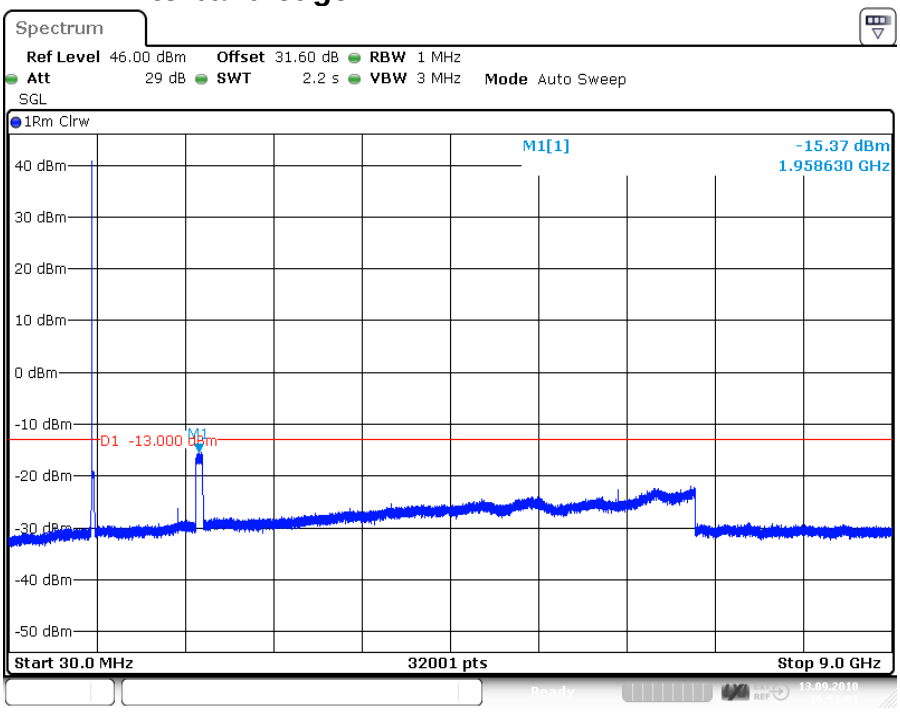
7.3.1.11 W-CDMA > 1MHz to band edge



Date: 13.SEP.2010 16:05:51

plot 7.3.1.11-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink; W-CDMA > 1MHz to band edge; Middle

7.3.1.12 LTE > 1MHz to band edge



Date: 13.SEP.2010 16:51:00

plot 7.3.1.12-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; Test results; Downlink; LTE > 1MHz to band edge; Middle

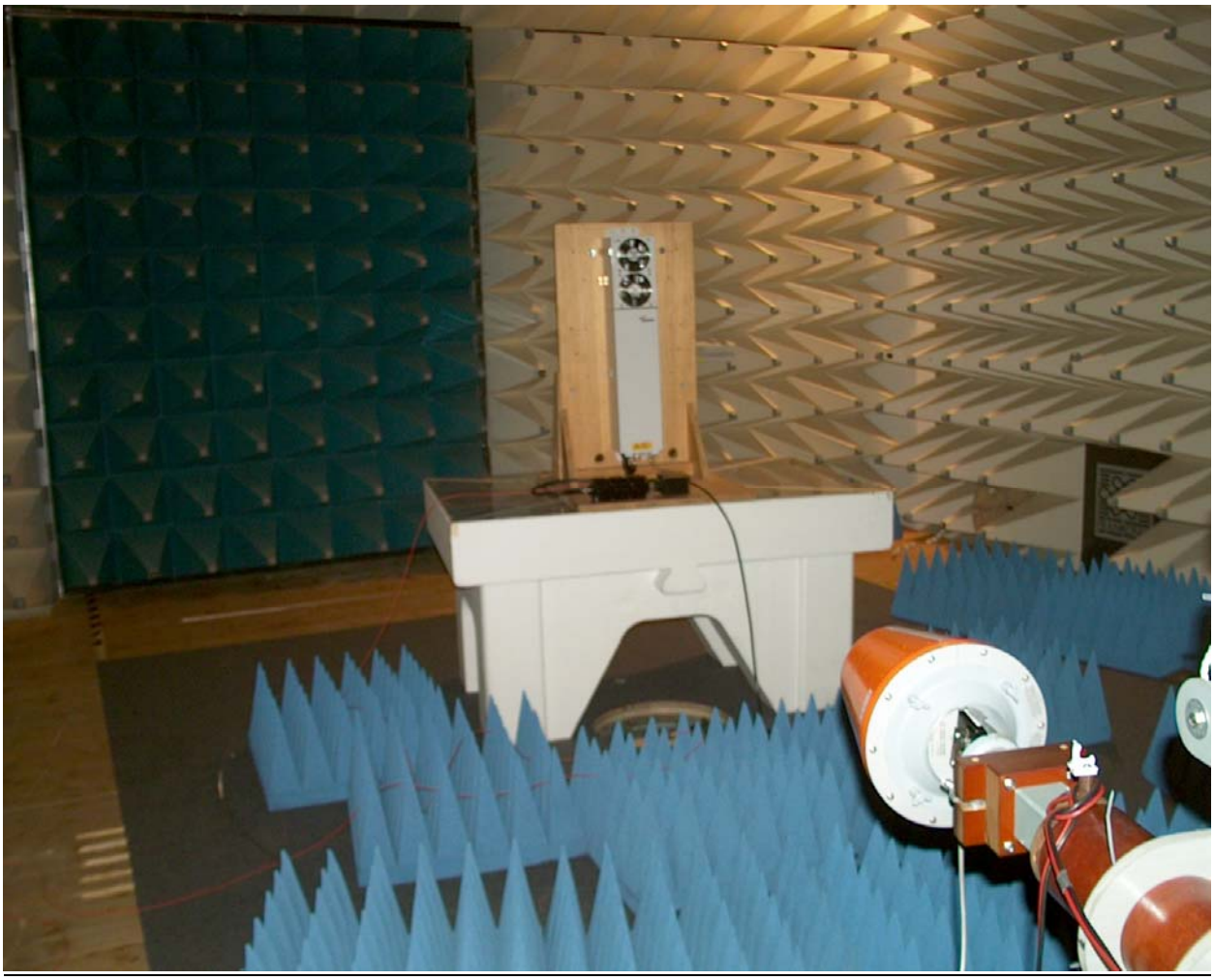
7.3.2 Uplink

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

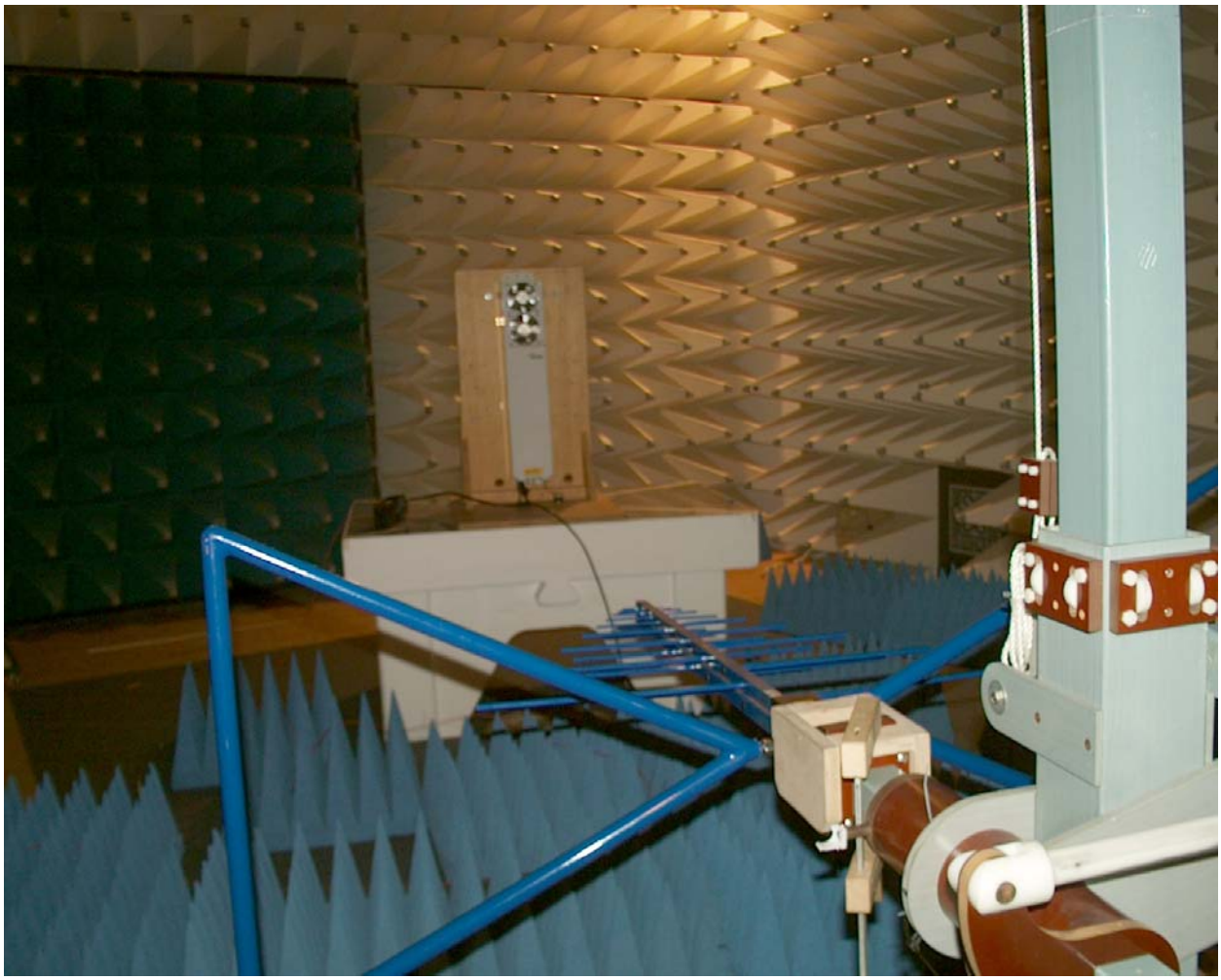
7.4 Summary test result

Test result	complies, according the plots above
Tested by:	Michael Leinfelder
Date:	13.09.2010

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



picture 8.1: Test setup: Field Strength Emission 1GHz to 9GHz @3m in the FAC



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

This clause specifies requirements for the measurement of radiated emission.

Frequency range	Distance: EUT <-> antenna / location	Limit	Test method
30 MHz - 9 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	E1687	20.10.2009	20.10.2010	X
EMI test receiver	ESI40	Rohde & Schwarz	E1607	04.03.2009	04.03.2010	
Antenna	CBL 6111	Chase	K1149	21.05.2010	21.05.2011	X
Antenna	CBL 6111	Chase	K1026	14.09.2009	14.09.2010	
RF Cable	Rosenberger	Frankonia	K1121 SET	28.12.2009	28.12.2010	X
Pre amplifier	AM1431	Miteq	K1721	02.07.2010	02.07.2011	X
Antenna	HL 025	R&S	K809	04.02.2010	04.02.2011	X
Antenna	MWH-1826 / B	ARA Inc.	K1042	06.04.2009	06.04.2011	X
Antenna	MWH-2640 / B	ARA Inc.	K1043	06.04.2009	06.04.2011	
Preamplifier	AFS4-00102000	Miteq	K817	11.11.2009	11.11.2010	X
Preamplifier	AFS4-00102000	Miteq	K838	06.10.2009	06.10.2010	
Preamplifier	JS43-1800-4000	Miteq	K1104	26.08.2009	26.08.2010	
RF Cable	Sucoflex 100	Suhner	K1742	09.04.2010	09.04.2011	X

The REMI version 2.135 has been used for max search.

Test set-up:

Test location: SAC/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

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

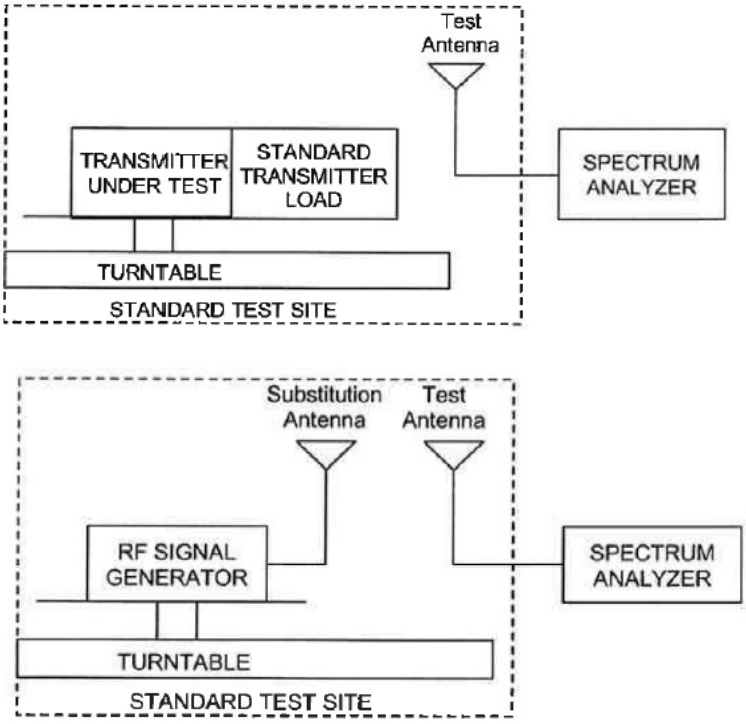
Measurement procedure. **TIA-603-C**

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 ... 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

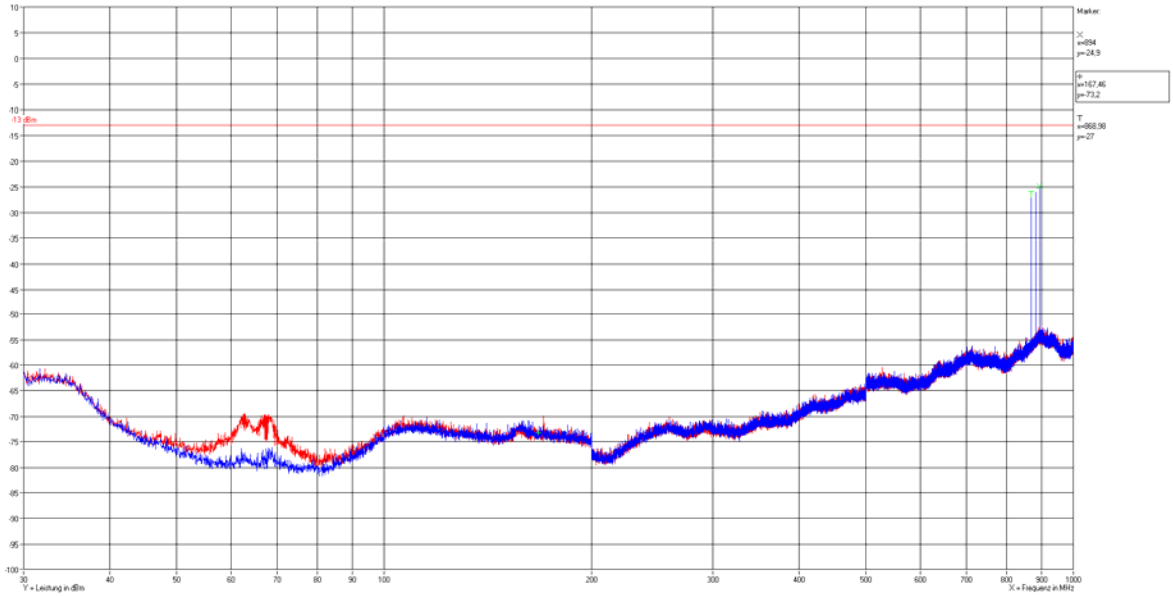
8.3 Climatic values in the lab

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

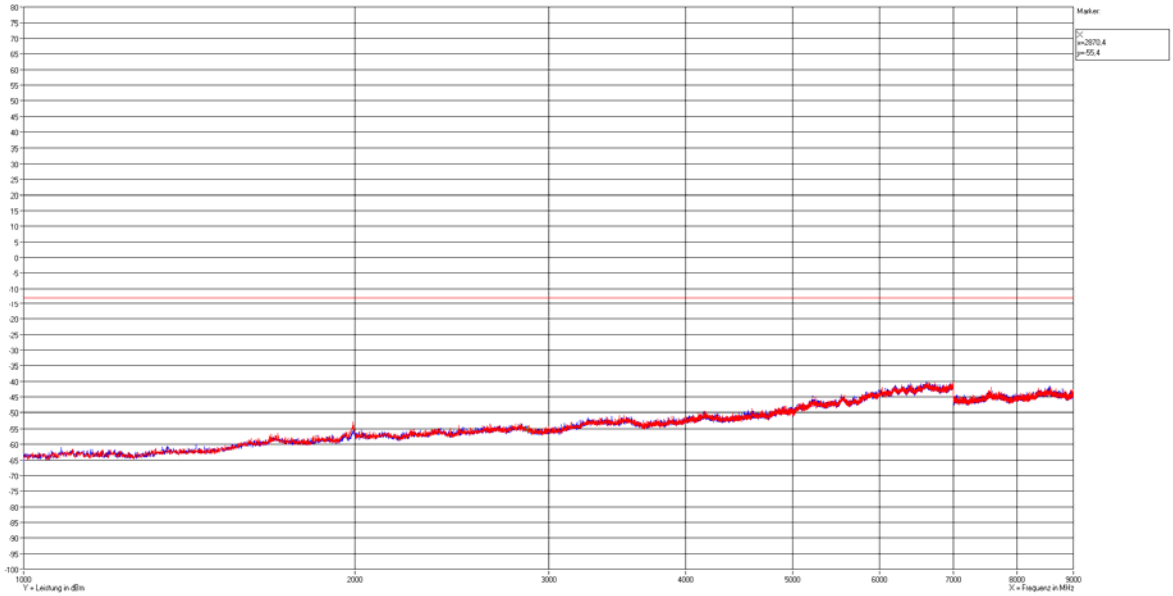
8.4 Test results

8.4.1 30 MHz to 9 GHz Downlink (Bottom – Middle – Top)

B/M/T: 869MHz/881.5MHz/894MHz
Polarisation: horizontal, vertical



Plot 8.1: Measurement: Field Strength Emission <1 GHz @3m in the FAC max.hold



Plot 8.2: Measurement: Field Strength Emission >1 GHz to 9GHz @3m in the FAC max.hold

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:	Mario Lehmann
Date:	04.10.2010

9 History

Revision	Modification	Date	Name
V01.00	Initial	15.10.2010	M. Lehmann
V02.00	Pages 14, 29, 30 Plot references changed	15.11.2010	T. Bieber

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