ECL-EMC Test Report No.: 11-038

Equipment under test: **ION-M7P/7P/85P 850MHz Path**
FCC ID: **XS5-IONM7785P**
IC ID: **2237E-IONM7785P**
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 (Miscellaneous Wireless Communication 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 Radiocommunication Equipment

Test result: **Passed**

Date of issue:	10.02.11			Signature:
Issue-No.:	01	Author:	**T. Zahlmann** Test engineer	Digital unterschrieben von Tom Zahlmann DN: cn=Tom Zahlmann, o=TEMPTON Service Plus GmbH, ou=ECL, email=tom.zahlmann@tempton.de, c=DE Datum: 2011.02.15 16:50:50 +01'00'
Date of delivery:	10.02.11	Checked:	**M. Lehmann** **EMV-Leiter** Head of 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: 2011.02.15 16:52:44 +01'00'
Test dates:	09.02.11			
Pages:	38			

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General:
The purpose of this report is to show compliance to the FCC regulations for devices operating under Part 22 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

Name of Test	IC Para. No.	IC Method	Result
RF Power Output	RSS-131 6.2	RSS-GEN 4.8	Complies
Occupied Bandwidth	RSS-Gen 6.3	RSS-GEN 4.6.1	Complies
Spurious Emissions at Antenna Terminals	RSS-131 6.4	RSS-GEN 4.9	Complies
Field Strength of Spurious Emissions	RSS-131 6.4	RSS-GEN 4.9 SRSP-513	Complies
Frequency Stability	RSS-131 6.5	RSS-GEN 4.7	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-M7P/7P/85P
Andrew Ident. Number	Id.No. 7626561-0001
Serial no.(SN)	11
Revision	00
Software version and ID	n. a.
Type of modulation and Designator	GXW ☒ G7W ☒ F9W ☒
Frequency Translation	F1-F1 ☒ F1-F2 ☐ N/A ☐
Band Selection	Software ☐ Duplexer ☒ Full band ☐

2.1.1 Downlink

Pass band	Path 869 MHz – 894 MHz
Max. composite output power based on one carrier per path (rated)	43,10 dBm = 20,42 W
Gain	10 dB @ Pout BTS of 33 dBm

2.1.2 Uplink

Pass band	Path 824 MHz – 849 MHz
Gain	n.a.

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

2.1.3 Description of EUT

ION-M7P/7P/85P is a LTE MIMO 850 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 and a 850 MHz wideband signal simultaneously, providing a cost-effective solution for distributing capacity from one or more base stations.

This Test Report describes only the approval of the 850 MHz.
The ION-M7P/7P/85P Repeater consists of one 850 MHz path and two indentical 700MHz paths with one antenna port of 850 MHz path with 700 MHz MAIN and one antenna port of 700 MHz path MIMO, with the intended use of simultaneous transmission

2.1.4 System diagram of EUT

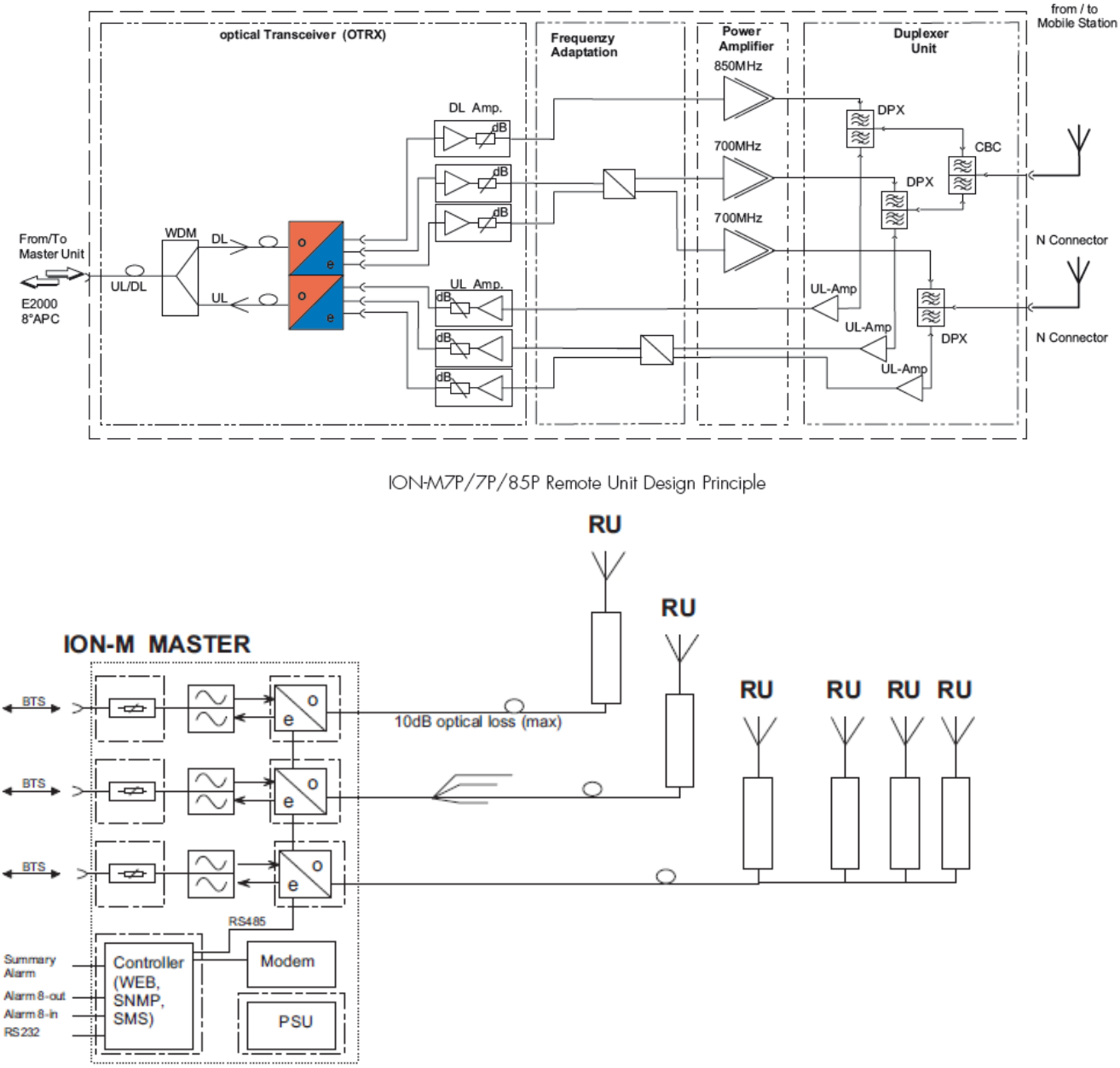


figure 2.1.4-#1 System diagram of EUT: ION-M7P/7P/85P

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.

2.1.5 Block diagram of measurement reference points

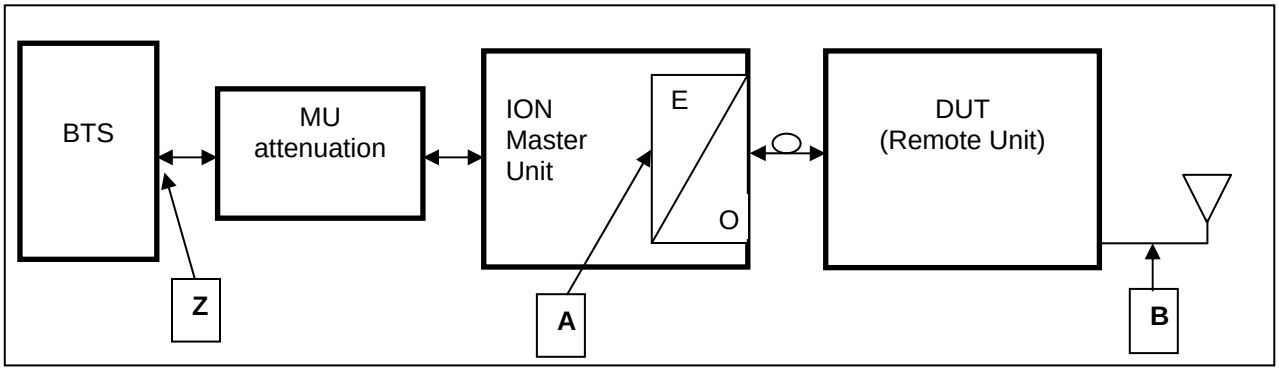


figure 2.1.5-#1 Block diagram of measurement reference points

Remote Unit is the DUT
O/E Opitcal/Electrical converter
SRMU SubRack Master Unit

Reference point A, SRMU UL output, DL input
Reference point B, Remote Unit DL output, UL input
Reference point Z, BTS DL output, BTS UL input

Uplink measure from reference point B to Z
Downlink measure from reference point A to B

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	02/11
8961	Spectrum Analyzer	FSP-13	R&S	100147/013	10/11
8849	Signal Generator	SMU200A	R&S	101732	04/11
8856	Signal Generator	SMIQ 03B	R&S	100435	12/11
7192	Power Attenuator	769-30	Narda	07448	CIU
7338	Power Attenuator	769-10	Narda	05773	CIU
7191	Power Attenuator	765-20	Narda	0012	CIU
7119	Divider	2way	Mikom	3512	CIU
7287	RF-Cable	2,0m; N-N	Huber & Suhner	28441/4PEA	CIU
7288	RF-Cable	2,0m; N-N	Huber & Suhner	28442/4PEA	CIU
7391	RF-Cable	1,0m; SMA	Huber & Suhner	40447/4P	CIU
7391	RF-Cable	0,5m; SMA	Huber & Suhner	40225/4P	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 %.

4 Test site (TEMPTON)

FCC Test site: **96997**
IC OATS: **IC3475A-1**
See relevant dates under section 8 of this test report.

5 RF Power Out: §22.913, §2.1046; RSS-131, RSS-GEN

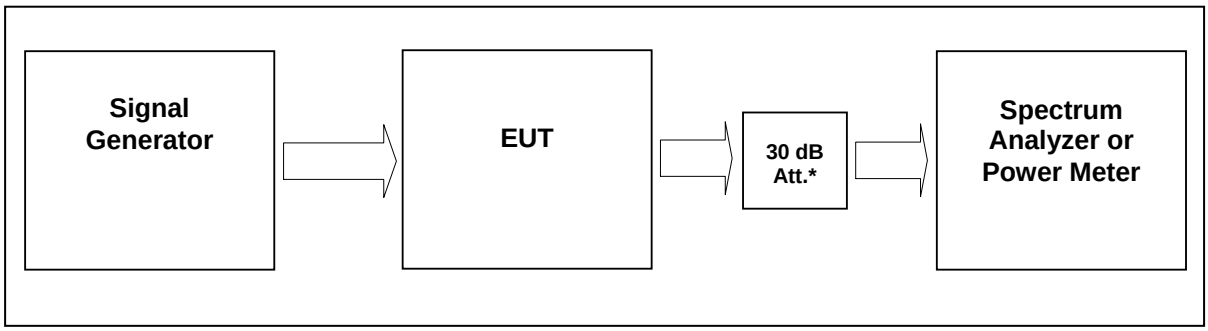


figure 5-#1 Test setup: RF Power Out: §22.913, §2.1046; RSS-131, RSS-GEN

Measurement uncertainty	± 0,38 dB
Test equipment used	8849, 8961, 8849, 7338, 7191, 7287, 7288, 7391

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 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 GSM:
Signal waveform with GMSK modulation in all time slots according to 3GPP TS45.005

Test signal GSM EDGE:
Signal waveform with 8-PSK modulation in all time slots according to 3GPP TS45.005

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.

5.3.1 Downlink

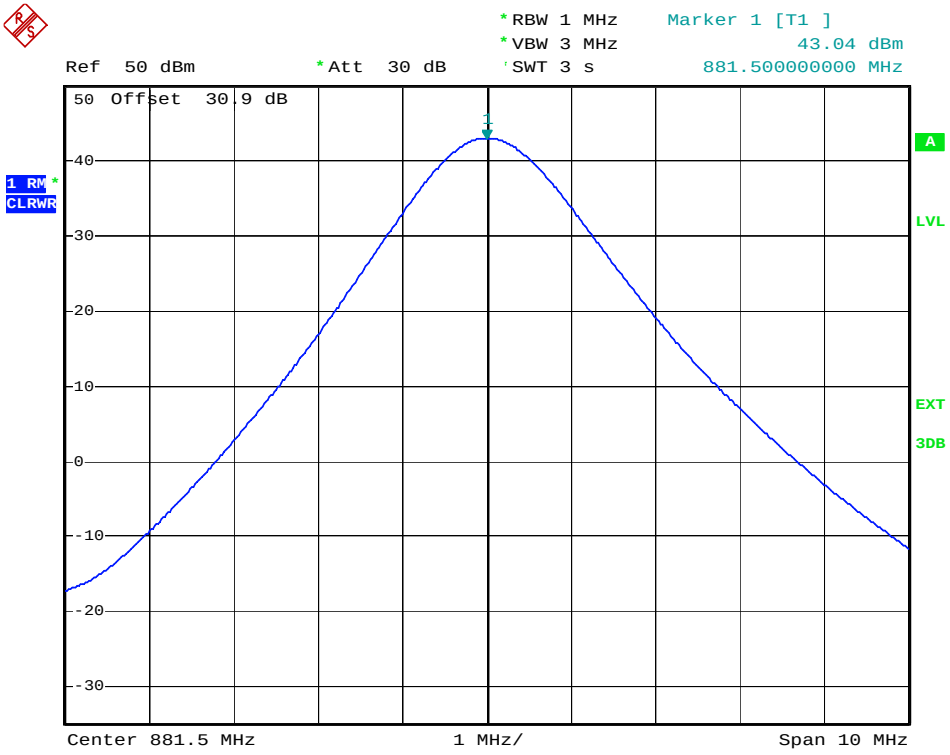
Modulation	Measured at		RBW VBW Span	RF Power [dBm]	RF Power [W]	Plot -
GSM	Middle	881,5 MHz	1MHz 3MHz 10MHz	43,04	20,14	5.3.1.1 #1
EDGE	Middle	881,5 MHz	1MHz 3MHz 10MHz	43,10	20,42	5.3.1.1 #1
CDMA	Middle	881,5 MHz	3MHz 10MHz 15MHz	43,02	20,04	5.3.1.1 #1
WCDMA	Middle	881,5 MHz	10MHz 10MHz 50MHz	43,02	20,04	5.3.1.1 #1
Maximum output power = 43,0 dBm = 20 W						
Limit Maximum output power = 500 W						

table 5.3.1-#1 RF Power Out: §22.913, §2.1046; RSS-131, RSS-GEN Test results Downlink

Modulation	Pin / dBm (Ref. point B)
GSM	6,23
EDGE	6,25
CDMA	6,31
WCDMA	6,43

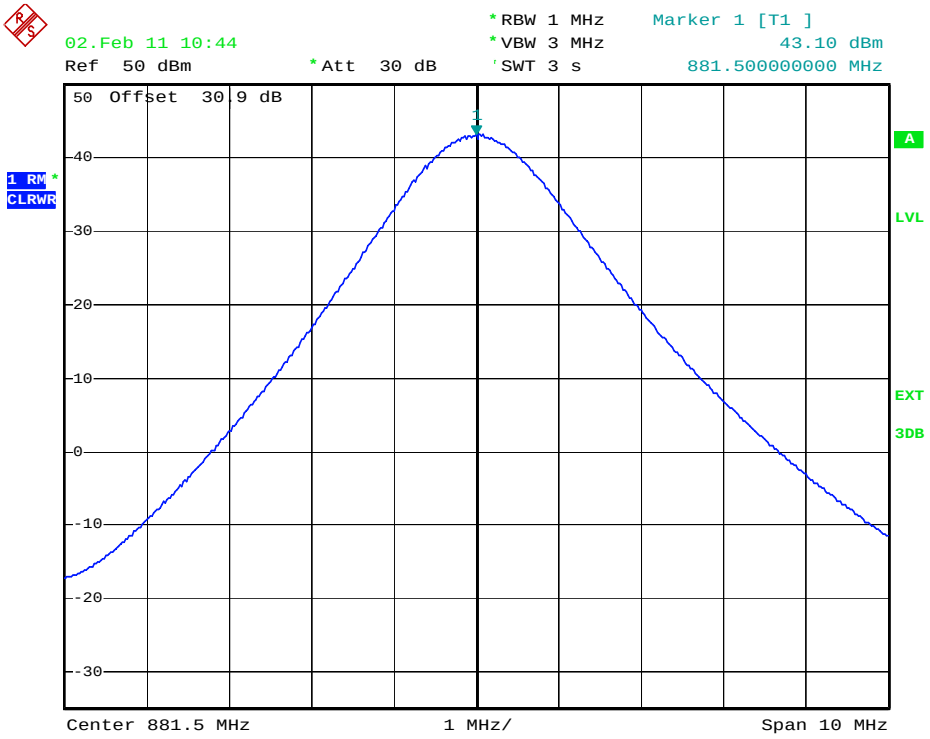
table 5.3.1-#2 RF Power Out: §22.913, §2.1046; RSS-131, RSS-GEN; Test results; Downlink; Input power

5.3.1.1 GSM



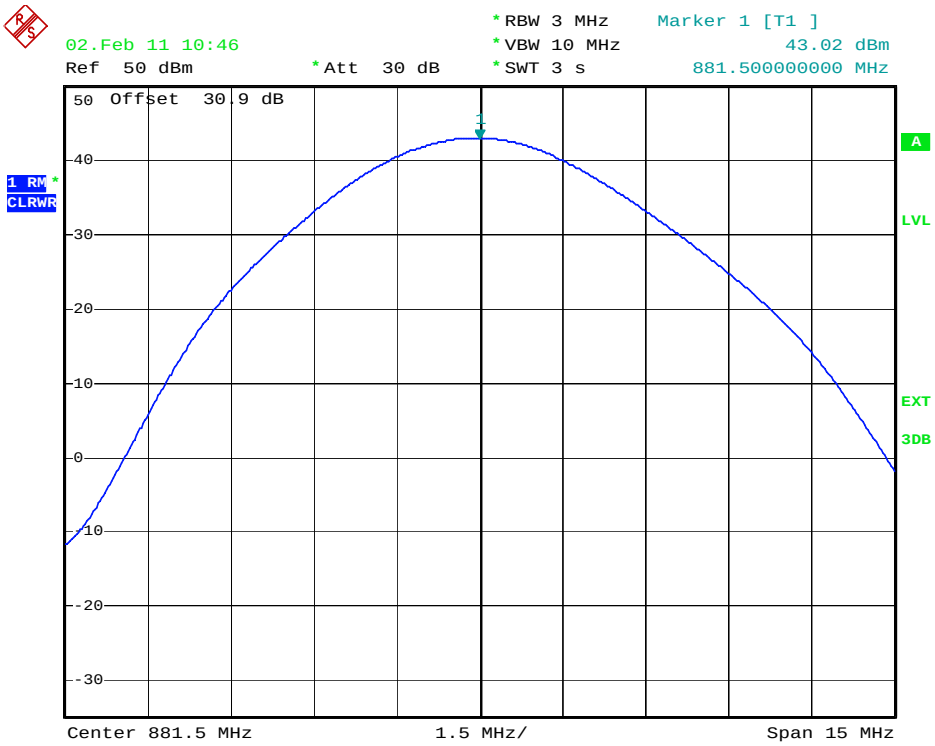
plot 5.3.1.1-#1 RF Power Out: §22.913, §2.1046; RSS-131, RSS-GEN; Test results; Downlink; GSM Middle

5.3.1.2 EDGE



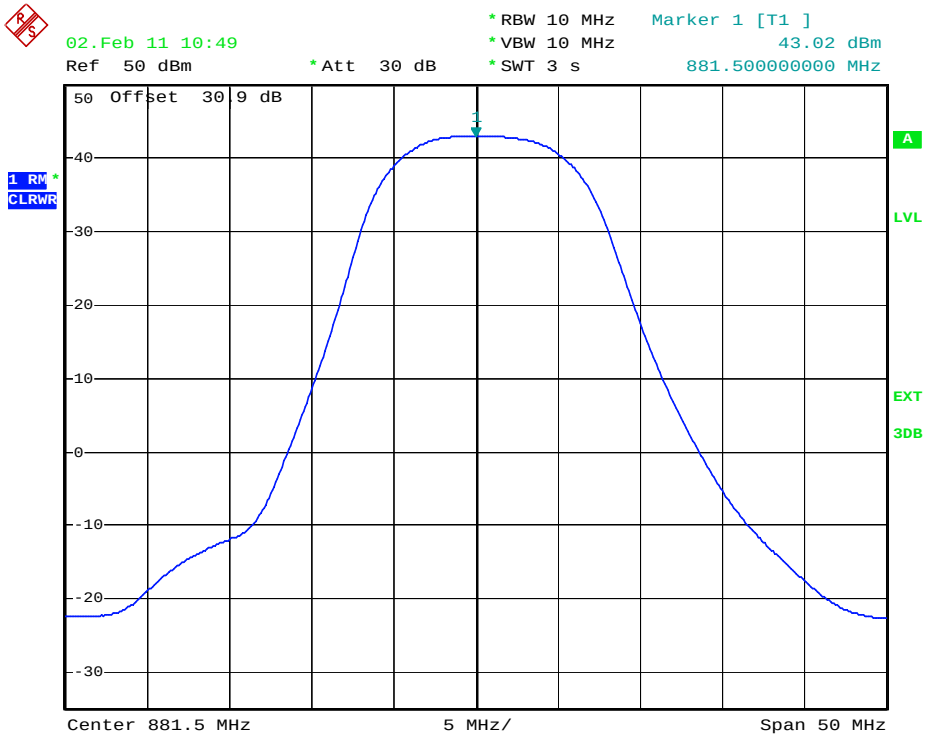
plot 5.3.1.2-#1 RF Power Out: §22.913, §2.1046; RSS-131, RSS-GEN; Test results; Downlink; EDGE Middle

5.3.1.3 CDMA



plot 5.3.1.3-#1 RF Power Out: §22.913, §2.1046; RSS-131, RSS-GEN; Test results; Downlink; CDMA Middle

5.3.1.4 W-CDMA



plot 5.3.1.4-#1 RF Power Out: §22.913, §2.1046; RSS-131, RSS-GEN; Test results; Downlink; W-CDMA Middle

5.3.2 Uplink

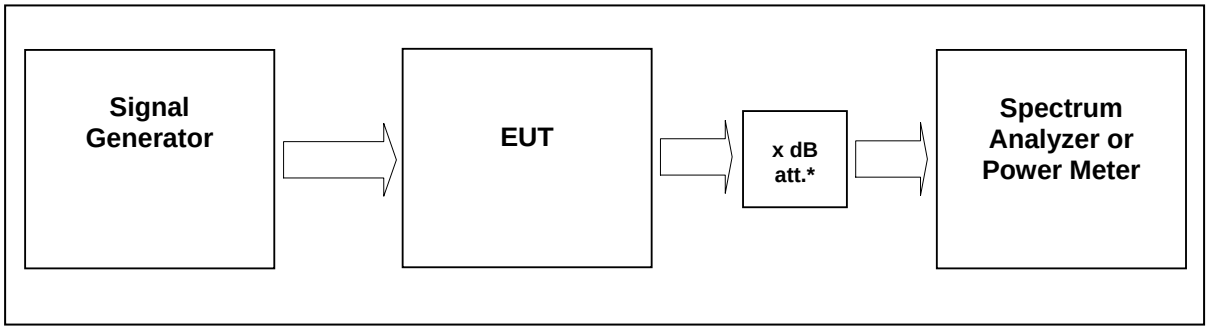
n.a.

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:	Leo Oskerko
Date:	04.02.2011

6 Occupied Bandwidth: §2.1049; RSS-GEN



External Attenuator DL x dB = 30,9 dB

figure 6-#1 Test setup: Occupied Bandwidth: §2.1049; RSS-GEN

Measurement uncertainty	± 0,38 dB
Test equipment used	8372, 8961, 8849, 7192, 7287, 7288, 7391

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

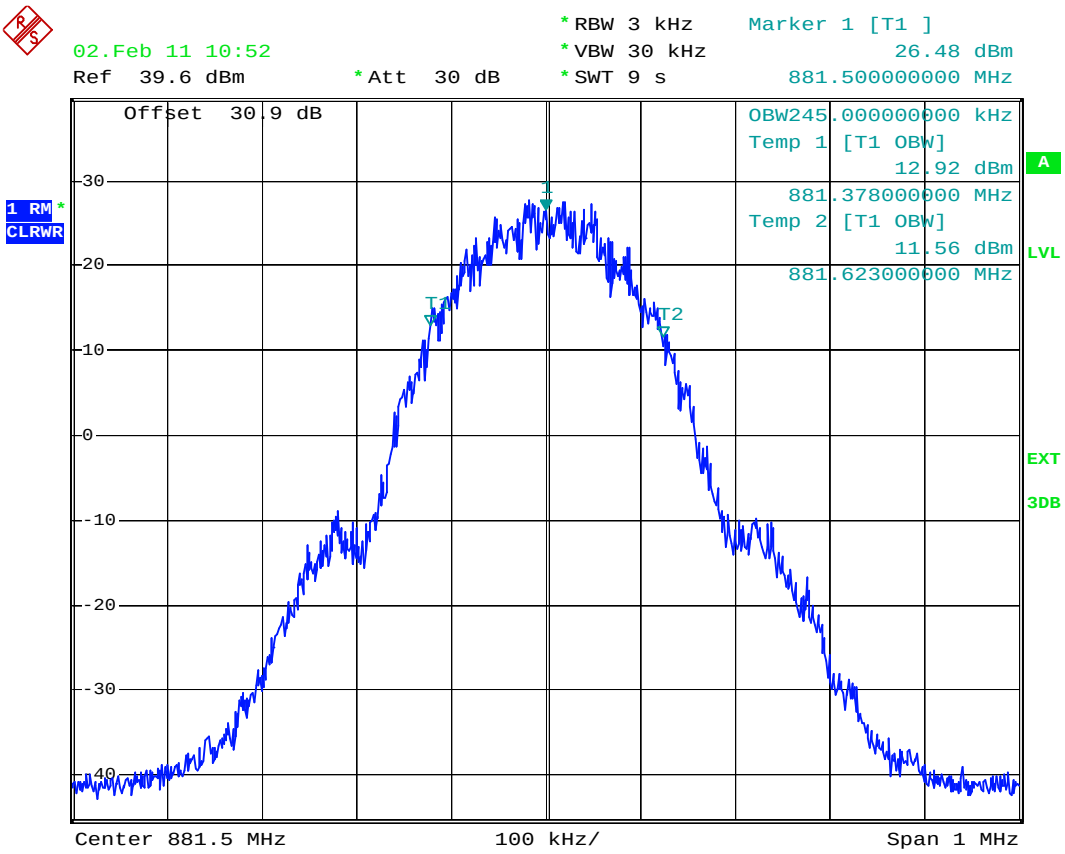
6.3.1 Downlink

Detector RMS.

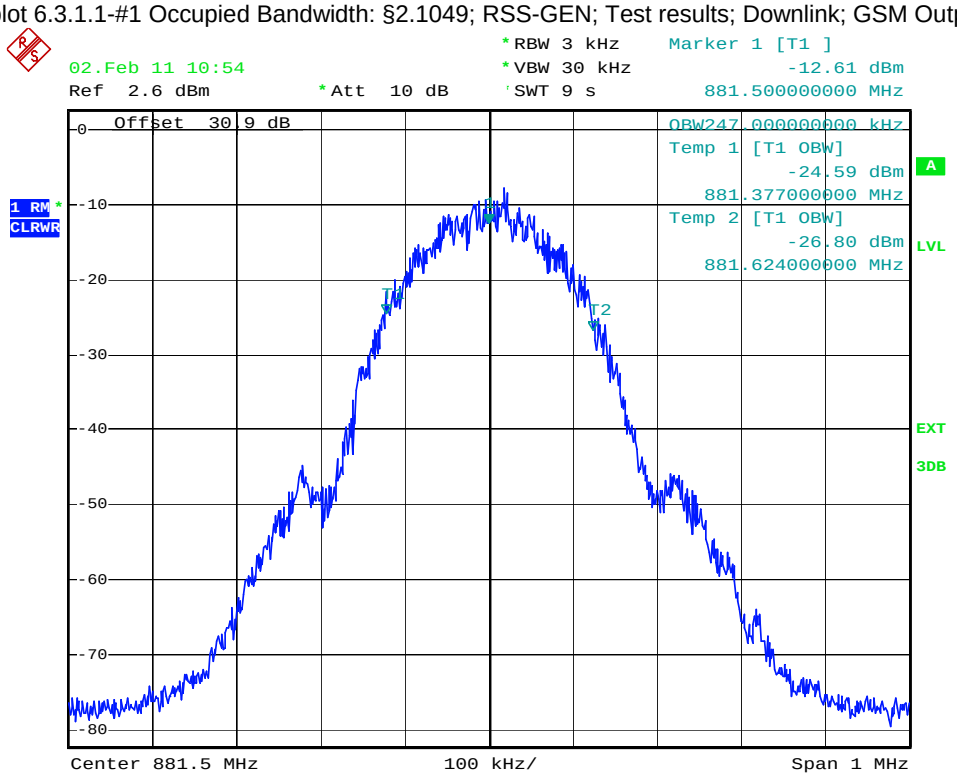
Modulation	Measured at	Path	RBW VBW Span	Occupied Bandwidth / kHz	Plot #
GSM	Middle	881,5	3 kHz 30 kHz 1 MHz	245,0 kHz	5.3.1.4 #1,#2
EDGE	Middle	881,5	3 kHz 30 kHz 1 MHz	246,0 kHz	5.3.1.4 #1,#2
CDMA	Middle	881,5	30 kHz 300 kHz 5 MHz	1,24 MHz	5.3.1.4 #1,#2
WCDMA	Middle	881,5	100kHz 1 MHz 10 MHz	4,18 MHz	5.3.1.4 #1,#2

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

6.3.1.1 GSM

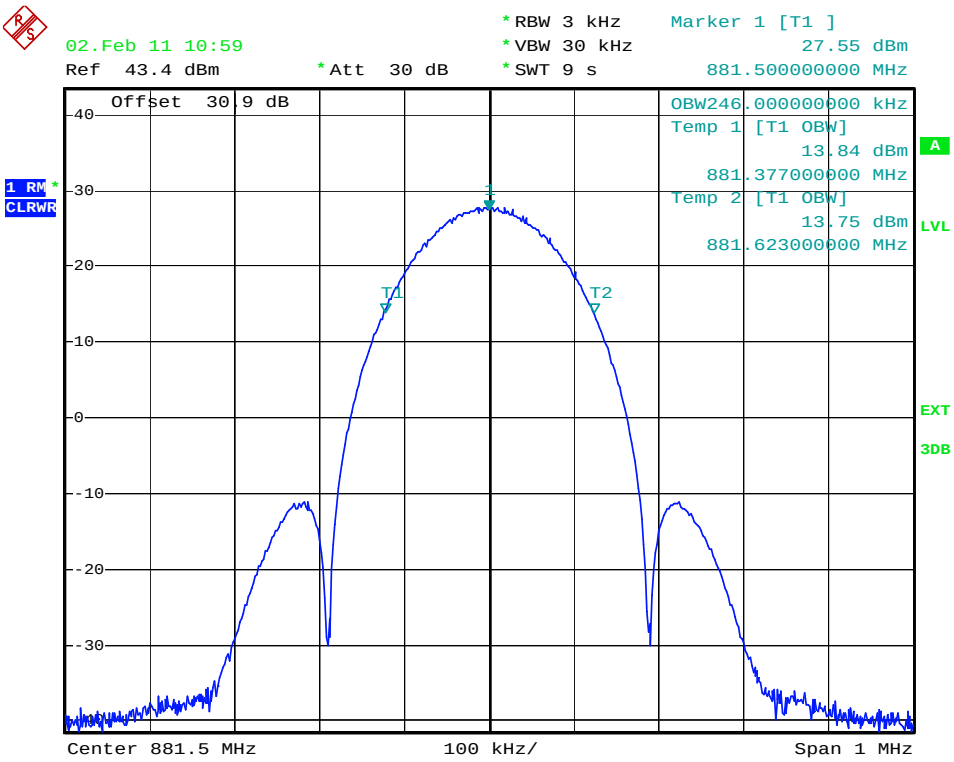


plot 6.3.1.1-#1 Occupied Bandwidth: §2.1049; RSS-GEN; Test results; Downlink; GSM Output

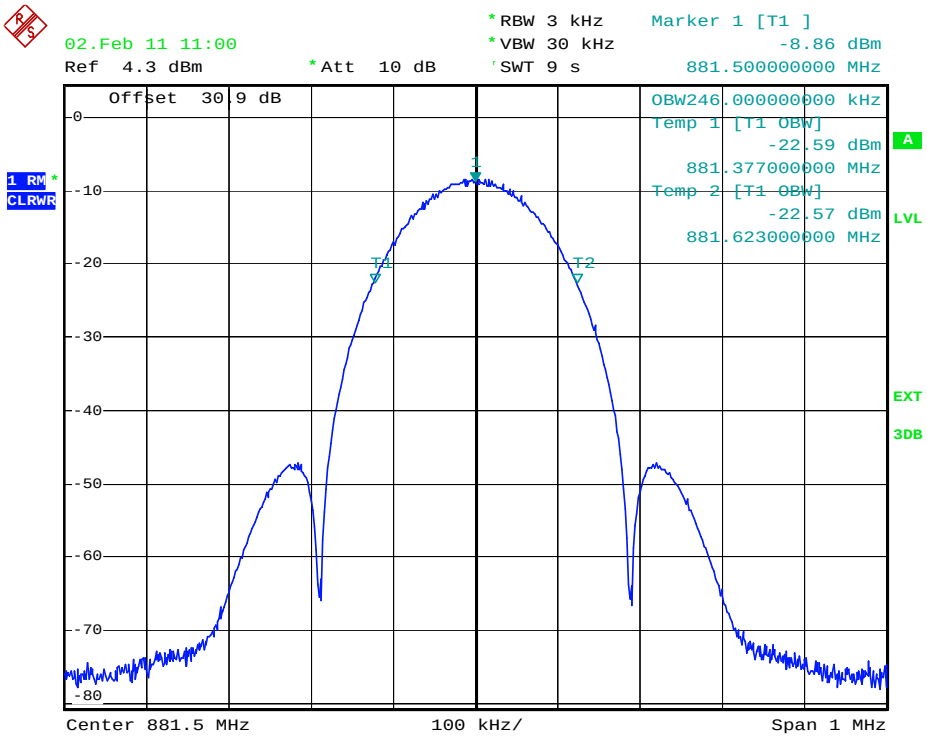


plot 6.3.1.1-#2 Occupied Bandwidth: §2.1049; RSS-GEN; Test results; Downlink; GSM Input

6.3.1.2 EDGE

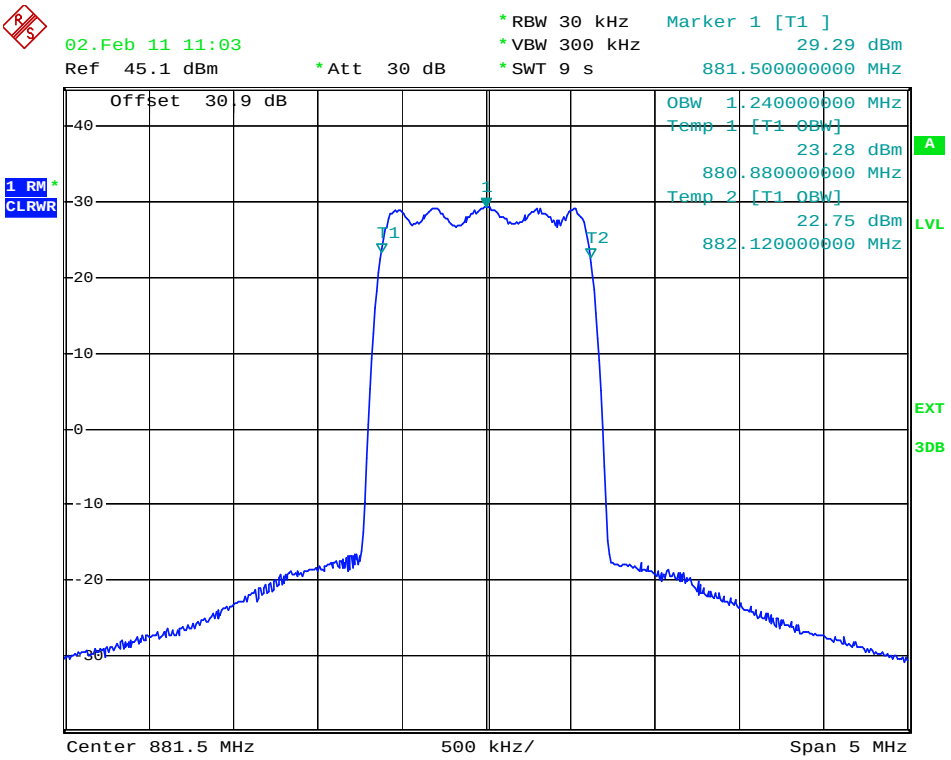


plot 6.3.1.2-#1 Occupied Bandwidth: §2.1049; RSS-GEN; Test results; Downlink; EDGE Output

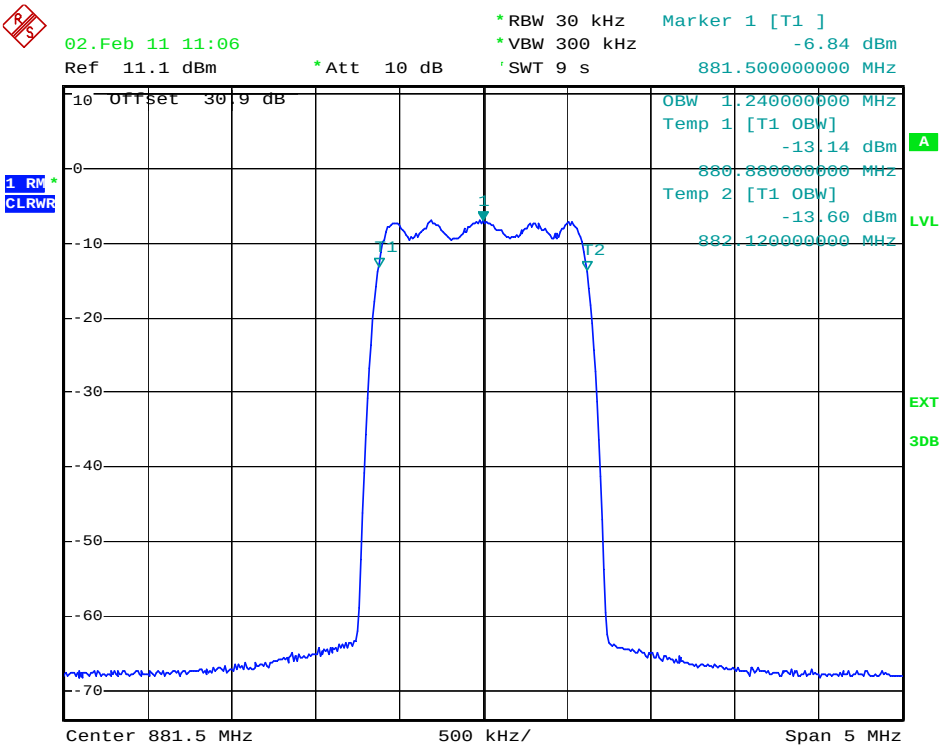


plot 6.3.1.2-#2 Occupied Bandwidth: §2.1049; RSS-GEN; Test results; Downlink; EDGE Input

6.3.1.3 CDMA

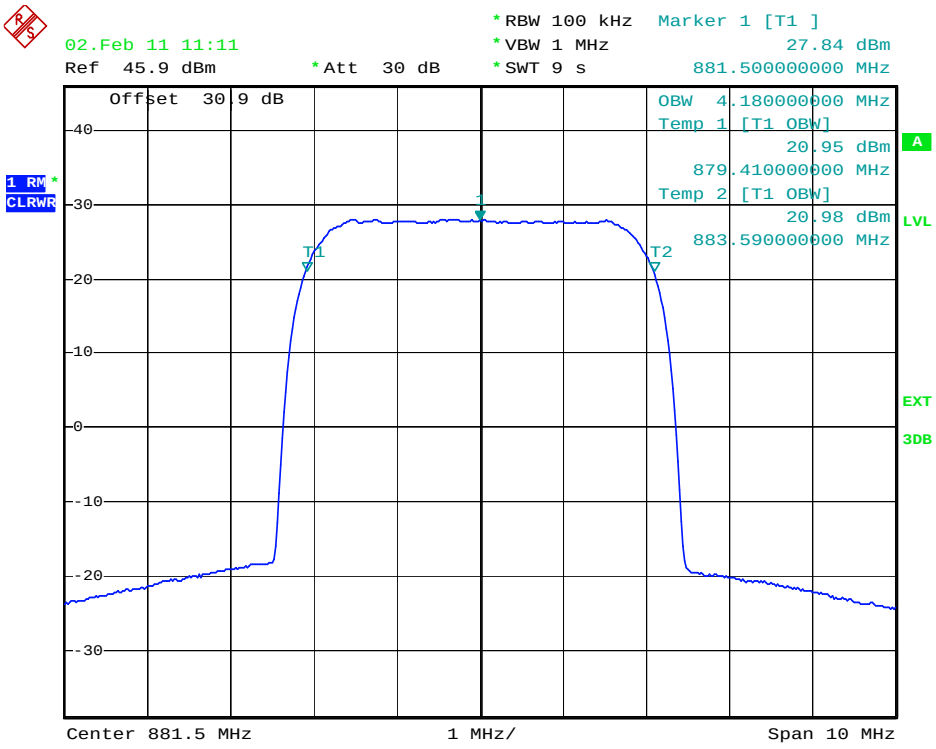


plot 6.3.1.3-#1 Occupied Bandwidth: §2.1049; RSS-GEN; Test results; Downlink; CDMA Output

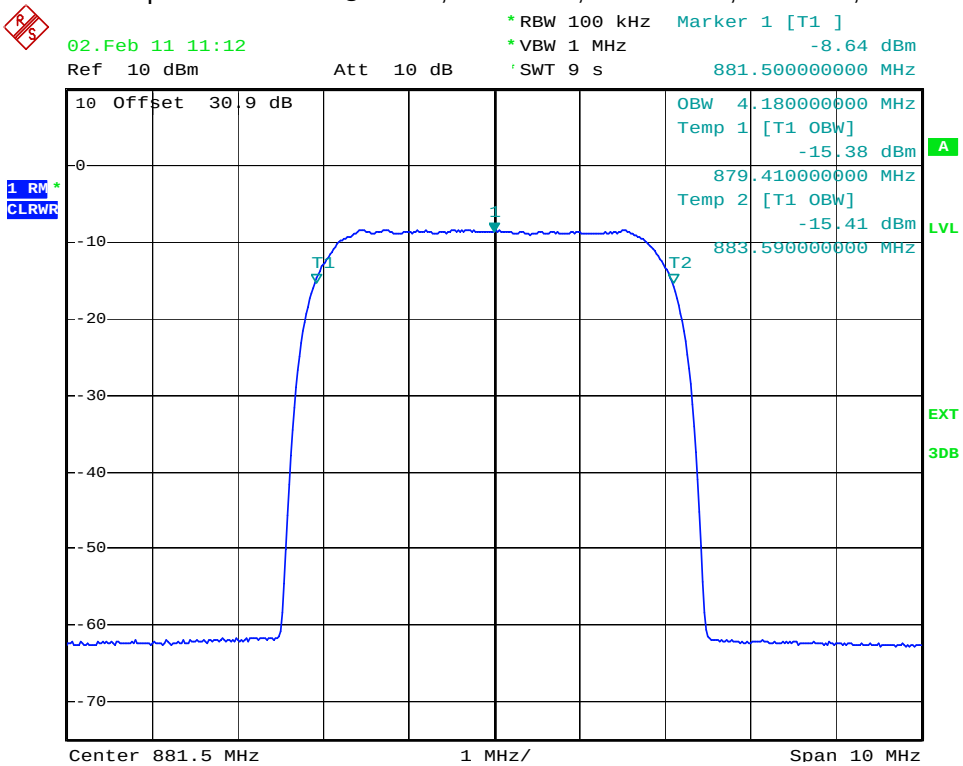


plot 6.3.1.3-#2 Occupied Bandwidth: §2.1049; RSS-GEN; Test results; Downlink; CDMA Inpu

6.3.1.4 W-CDMA



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



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

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:	L.Oskerko
Date:	04.02.2011

7 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN

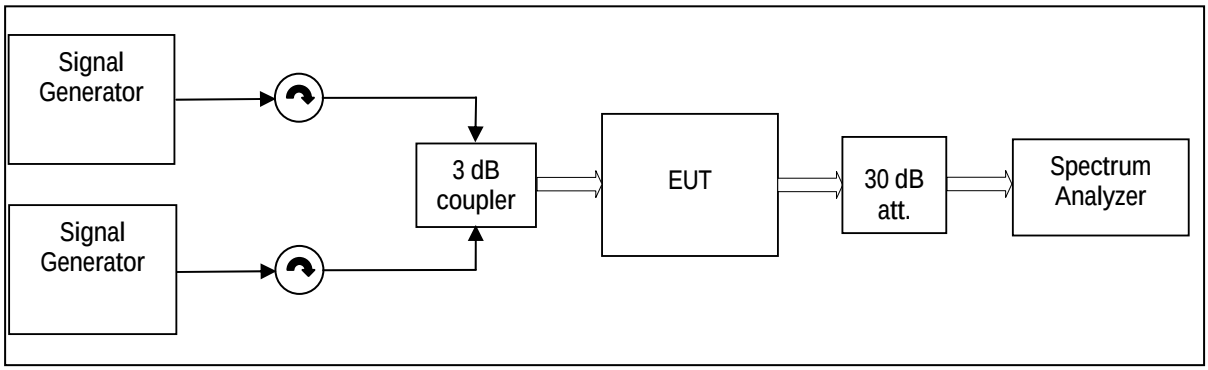


figure 7-#1 Test setup: Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN

Measurement uncertainty	± 0,54 dB ± 1,2 dB ± 1,5 dB	9 kHz to 3 GHz 3 GHz to 7 GHz 7 GHz to 26 GHz
Test equipment used	8956, 8961, 8849, 7338, 7191, 7287, 7288, 7391	

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	Measured at Band Edge	Carriers	RBW VBW Span Sweep points	Max. level (dBm)	Plot -
GSM	Lower Edge Upper Edge	869,4 MHz 869,6 MHz 893,4 MHz 893,6 MHz	3kHz 30kHz 2MHz	-37,70	6.3.1.47.3.1.1 #1 #2
EDGE	Lower Edge Upper Edge	869,4 MHz 869,6 MHz 893,4 MHz 893,6 MHz	3kHz 30kHz 2MHz	-36,09	7.3.1.2 #1 #2
CDMA	Lower Edge Upper Edge	869,775 MHz 871,025 MHz 891,975 MHz 893,225 MHz	30kHz 300kHz 6MHz	-23,30	7.3.1.3 #1 #2
WCDMA	Lower Edge Upper Edge	871,6 MHz 876,6 MHz 886,4 MHz 891,4 MHz	100kHz 1MHz 15MHz	-22,81	7.3.1.4 #1 #2

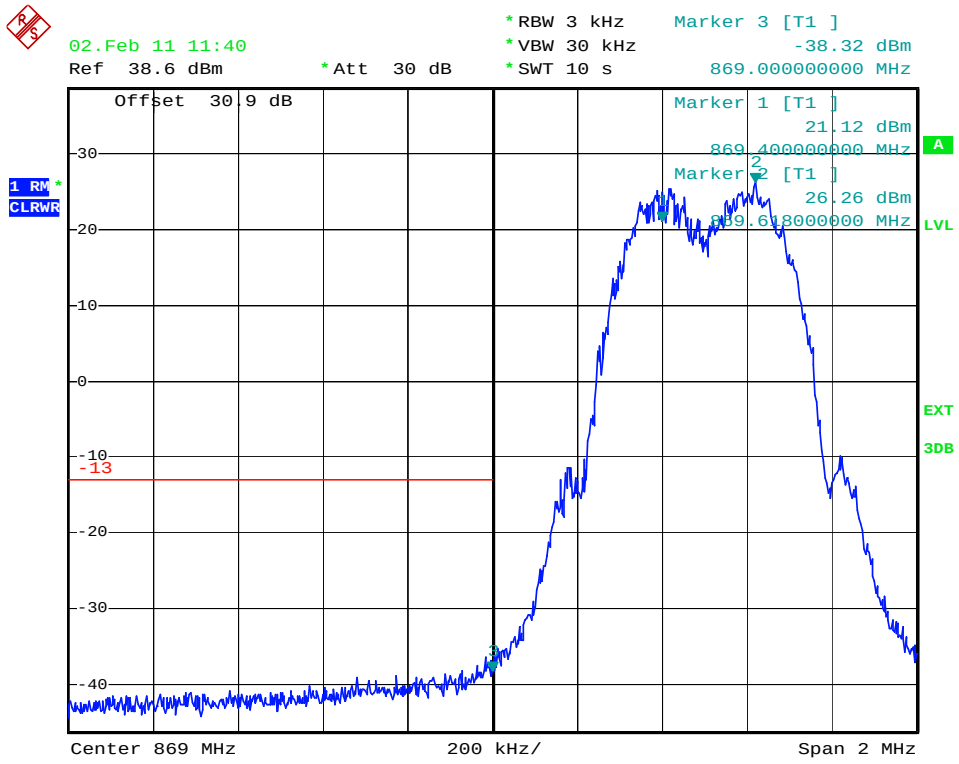
table 7.3-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN Test results; Downlink; <1MHz from Band Edge

>1MHz from Band Edge
Detector: RMS.

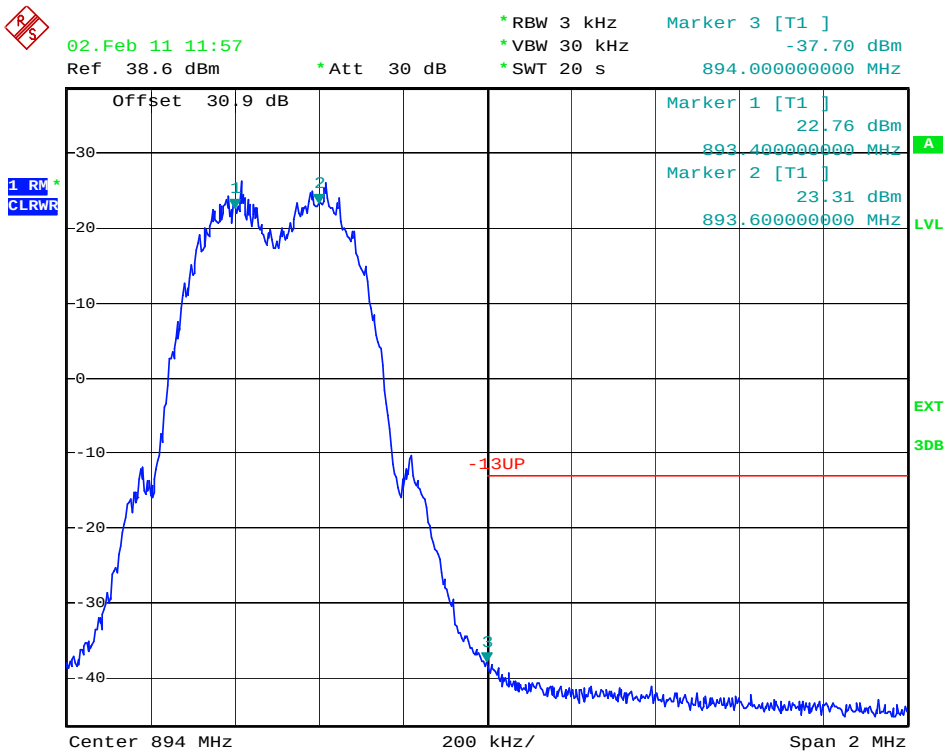
Modulation	Carrier	RBW VBW Span	Max. level (dBm)	Plot -
GSM	881,5 MHz	1MHz 3MHz 30MHz – 9GHz	-25,60	7.3.1.5 #1
EDGE	881,5 MHz	1MHz 3MHz 30MHz – 9GHz	-25,65	6.3.1.47.3.1.6 #1
CDMA	881,5 MHz	1MHz 3MHz 30MHz – 9GHz	-25,72	7.3.1.7 #1
WCDMA	881,5 MHz	1MHz 3MHz 30MHz – 9GHz	-25,48	7.3.1.8 #1

table 7.3-#2 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN Test results; Downlink;

7.3.1.1 GSM < 1MHz to band edge

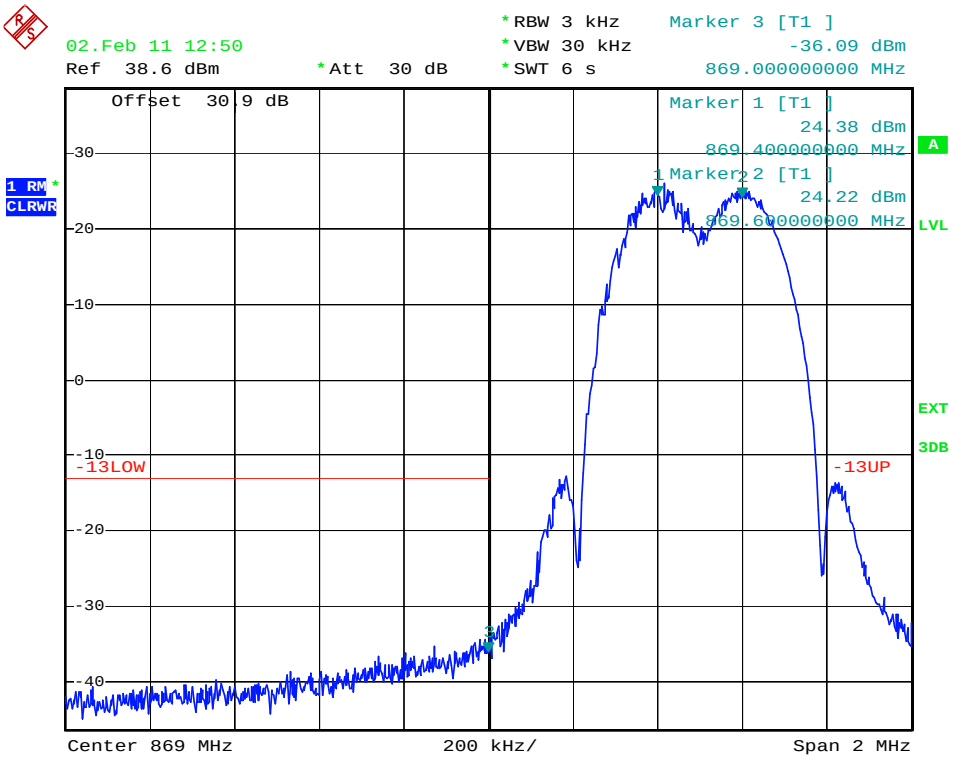


plot 7.3.1.1-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN; Test results; Downlink; GSM < 1MHz to band edge Lower Band Edge

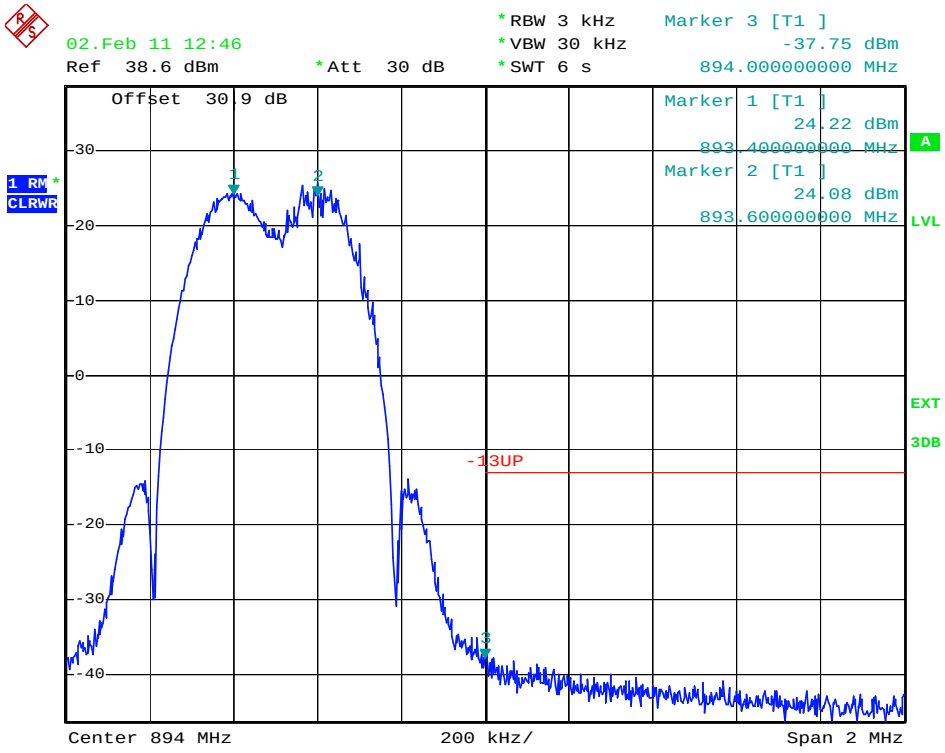


plot 7.3.1.1-#2 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN; Test results; Downlink; GSM < 1MHz to band edge Upper Band Edge

7.3.1.2 EDGE < 1MHz to band edge

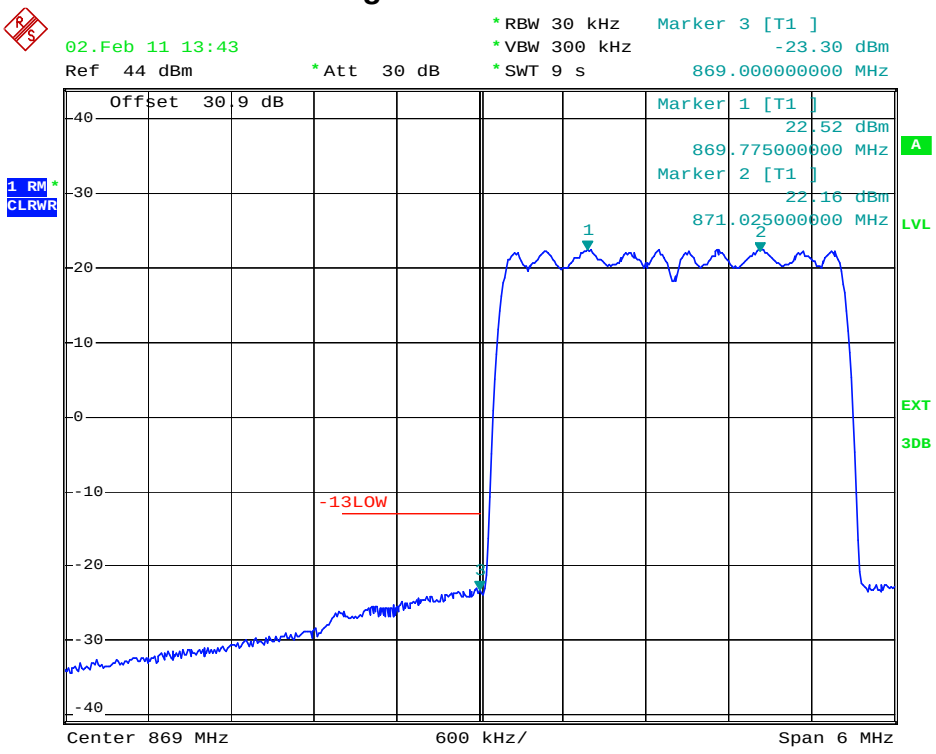


plot 7.3.1.2-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN; Test results; Downlink; EDGE < 1MHz to band edge Lower Band Edge

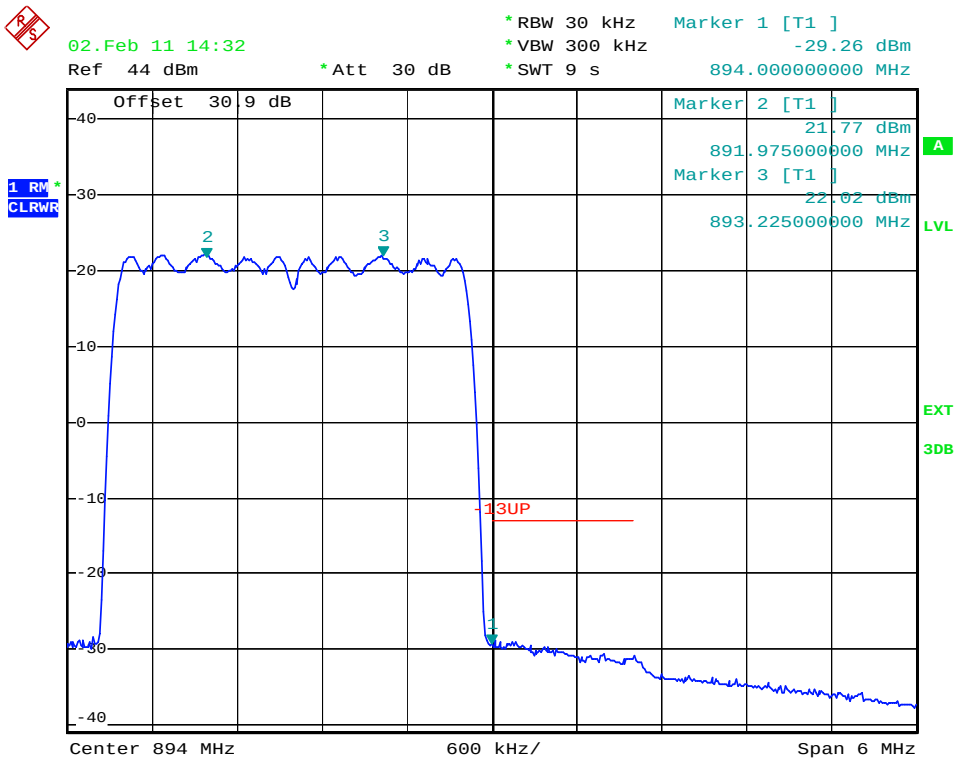


plot 7.3.1.2-#2 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN; Test results; Downlink; EDGE < 1MHz to band edge Upper Band Edge

7.3.1.3 CDMA < 1MHz to band edge

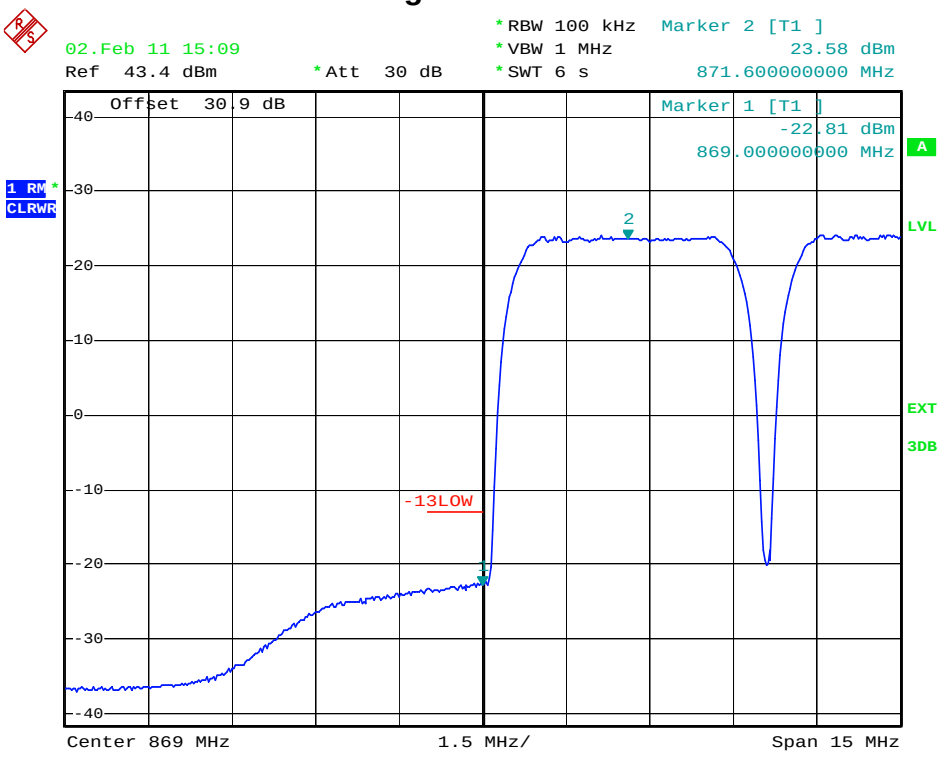


plot 7.3.1.3-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN; Test results; Downlink; CDMA < 1MHz to band edge Lower Band Edge

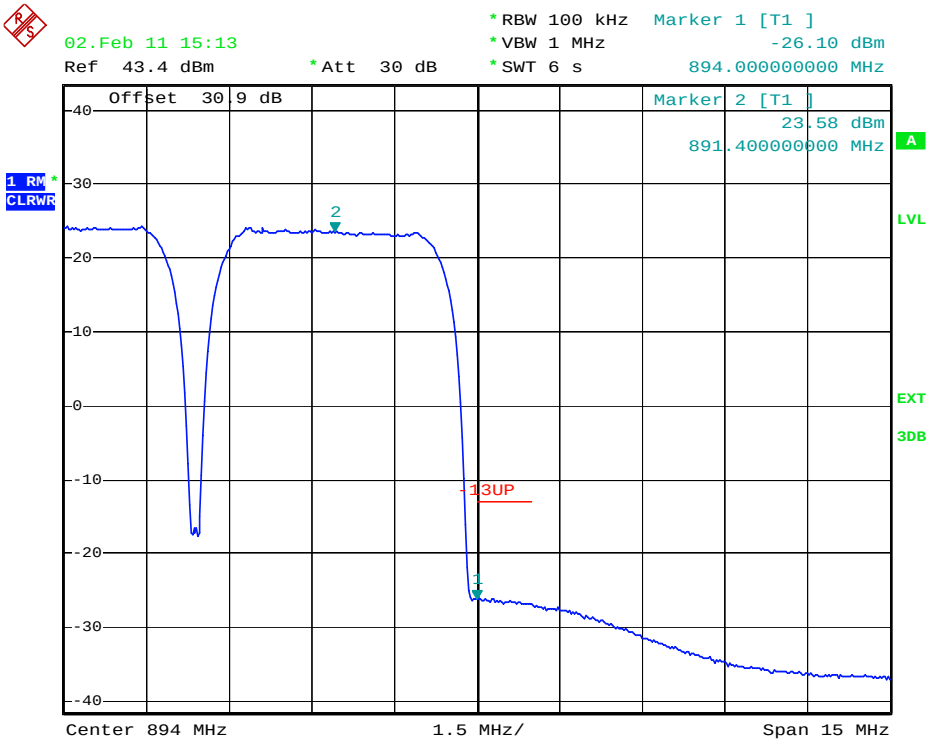


plot 7.3.1.3-#2 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN; Test results; Downlink; CDMA < 1MHz to band edge Upper Band Edge

7.3.1.4 WCDMA < 1MHz to band edge

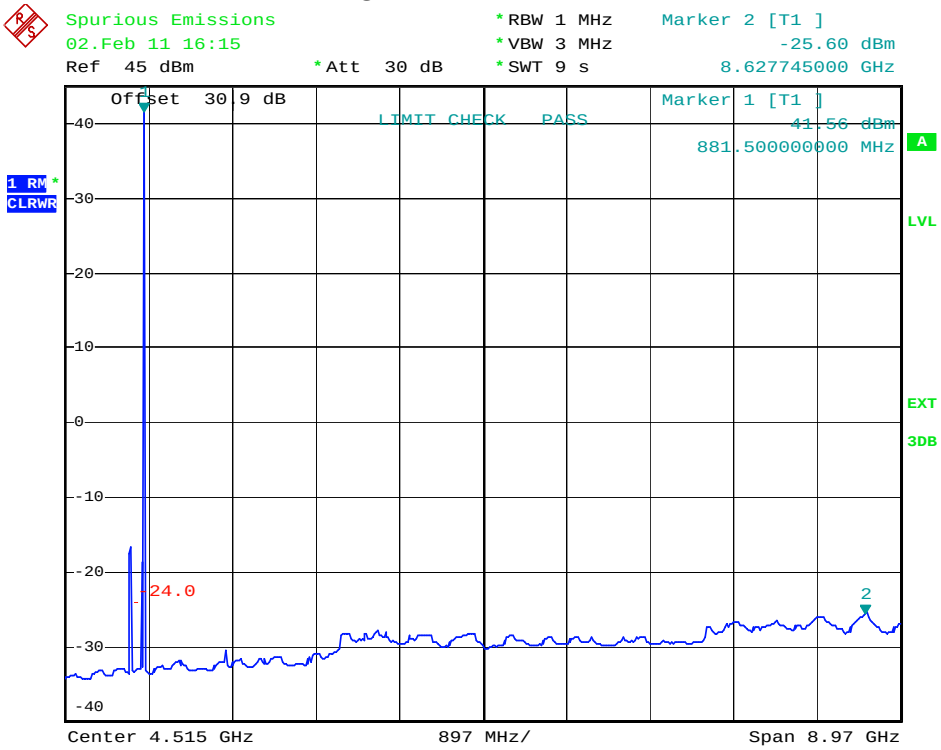


plot 7.3.1.4-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN; Test results; Downlink; WCDMA < 1MHz to band edge Lower Band Edge



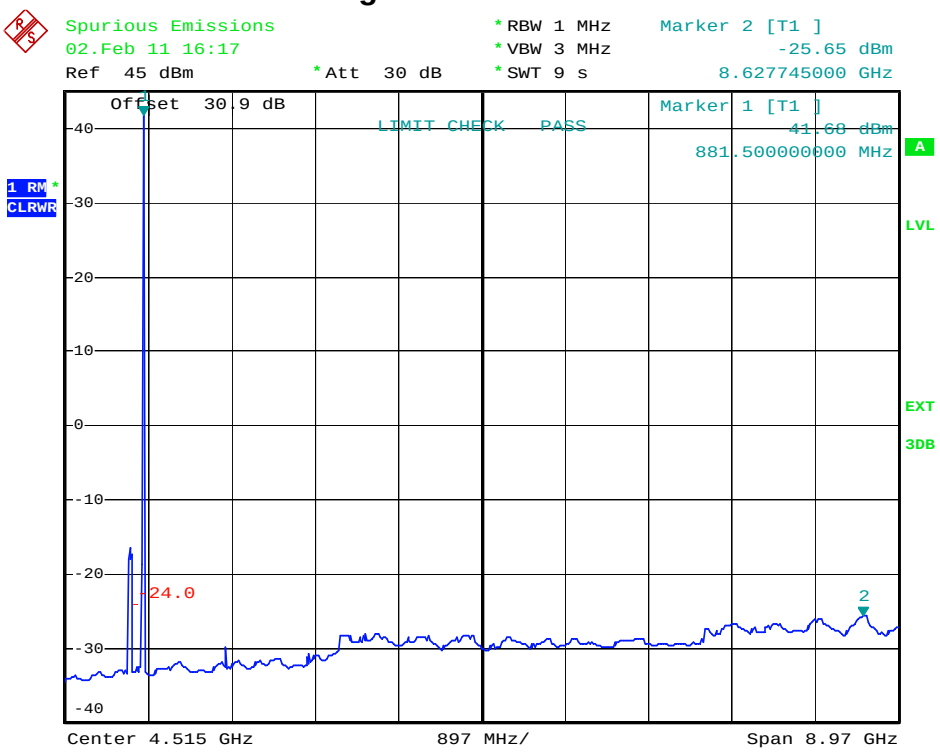
plot 7.3.1.4-#2 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN; Test results; Downlink; WCDMA < 1MHz to band edge Upper Band Edge

7.3.1.5 GSM > 1MHz to band edge



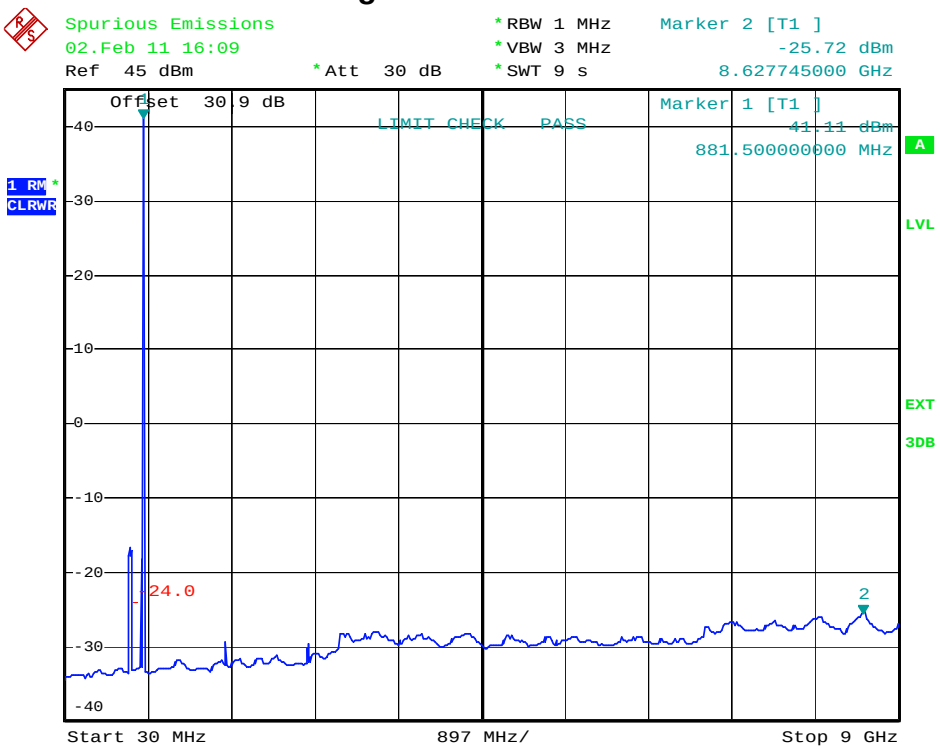
plot 7.3.1.5-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN; Test results; Downlink; GSM > 1MHz to band edge

7.3.1.6 EDGE > 1MHz to band edge



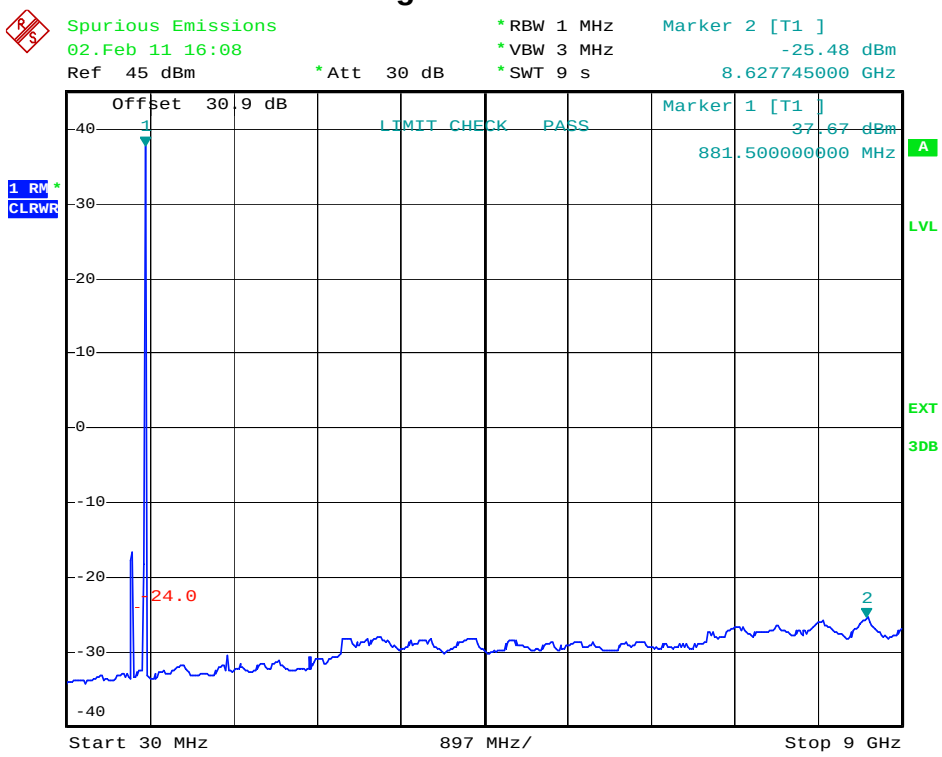
plot 7.3.1.6-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN; Test results; Downlink; EDGE > 1MHz to band edge

7.3.1.7 CDMA > 1MHz to band edge



plot 7.3.1.7-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN; Test results; Downlink; CDMA > 1MHz to band edge

7.3.1.8 WCDMA > 1MHz to band edge



plot 7.3.1.8-#1 Spurious Emissions at Antenna Terminals: §22.917, §2.1051; RSS-131, RSS-GEN; Test results; Downlink; WCDMA > 1MHz to band edge

7.3.2 Uplink

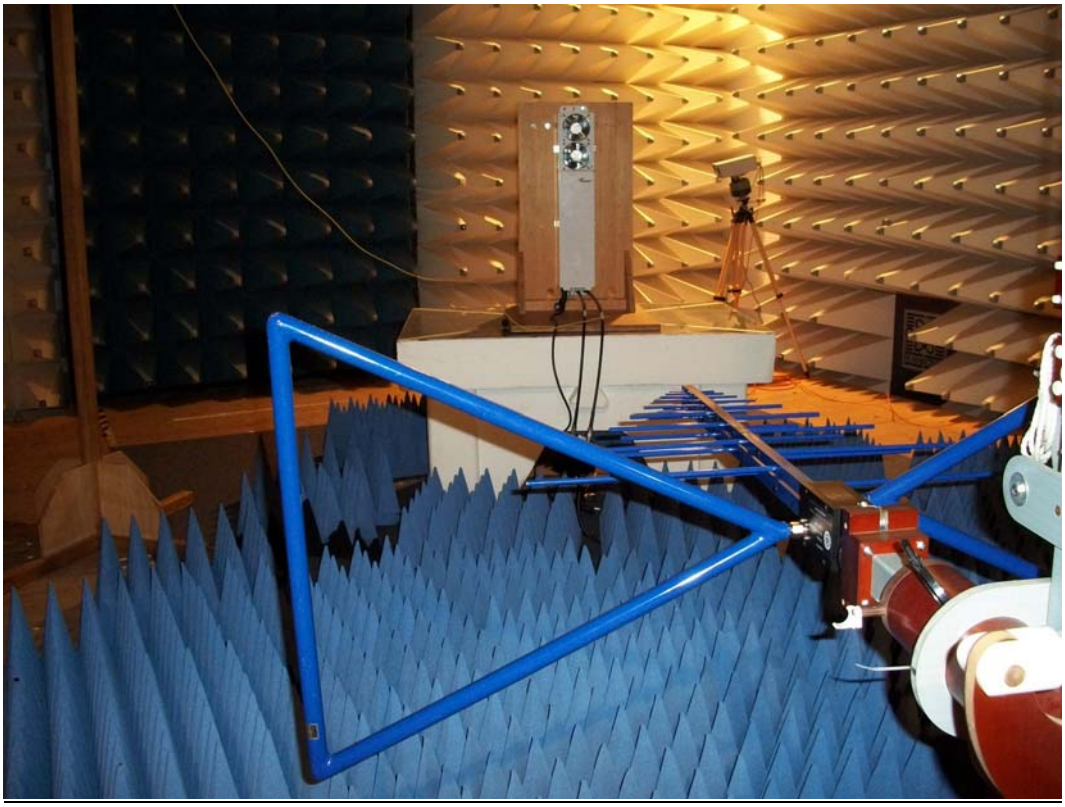
n.a.

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

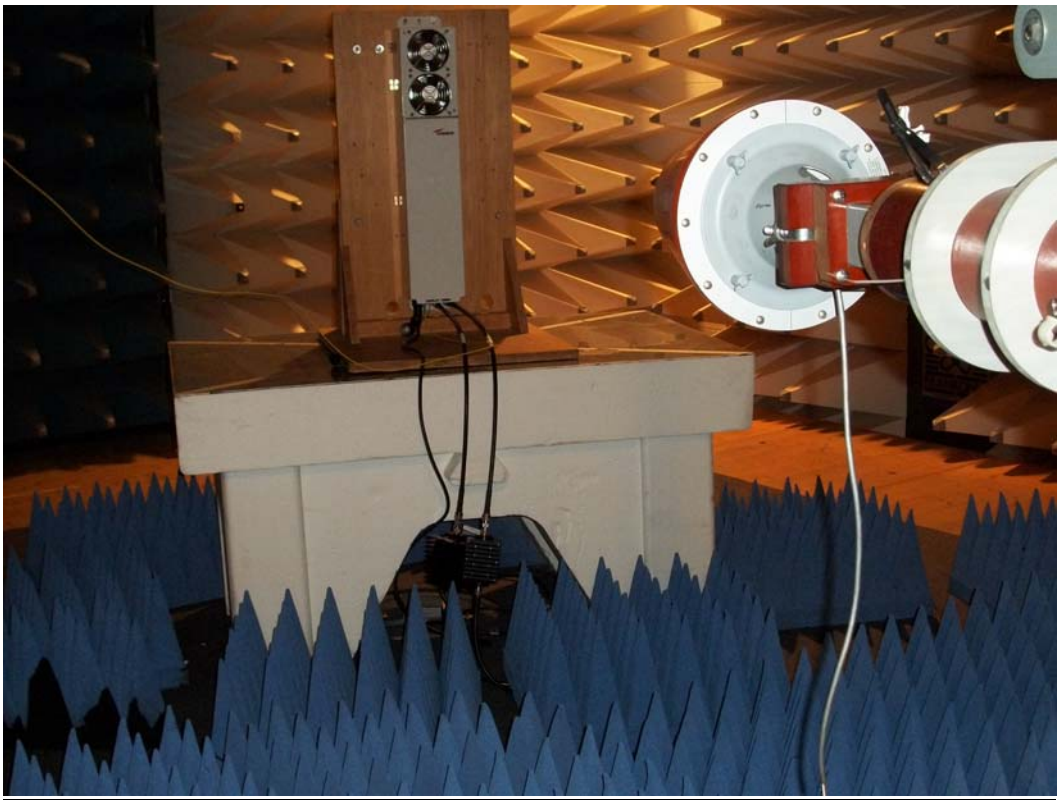
7.4 Summary test result

Test result	complies, according the plots above
Tested by:	L.Oskerko
Date:	04.02.2011

8 Radiated Spurious Emissions at the ECL (TEMPTON): §22.917, §2.1053, RSS-Gen, RSS-131



picture 8.1: Test setup: Field Strength Emission <1 GHz @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 IC RSS-131 sec. 4.4	TIA/EIA-603-C:2004

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	14.09.2009	14.09.2010	X
Antenna	CBL 6111	Chase	K1026	14.09.2009	14.09.2010	
RF Cable		Frankonia	K1121 SET	28.12.2009	28.12.2010	X
Pre amplifier	AM1431	Miteq	K1721	27.04.2009	27.04.2010	
Antenna	HL 025	R&S	K809	06.05.2009	06.05.2010	X
Antenna	MWH-1826 / B	ARA Inc.	K1042	06.04.2009	06.04.2010	
Antenna	MWH-2640 / B	ARA Inc.	K1043	06.04.2009	06.04.2010	
Preamplifier	AFS4-00102000	Miteq	K817	11.11.2009	11.11.2010	
Preamplifier	AFS4-00102000	Miteq	K838	06.10.2009	06.10.2010	X
Preamplifier	JS43-1800-4000	Miteq	K1104	26.08.2009	26.08.2010	
RF Cable	Sucoflex 100	Suhner	K1742	09.04.2009	21.07.2010	X

The REMI version 2.135 has been used to maximize radiated emission from the EUT with regards to ANSI C63.4:2009.

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

8.1 Method of Measurement

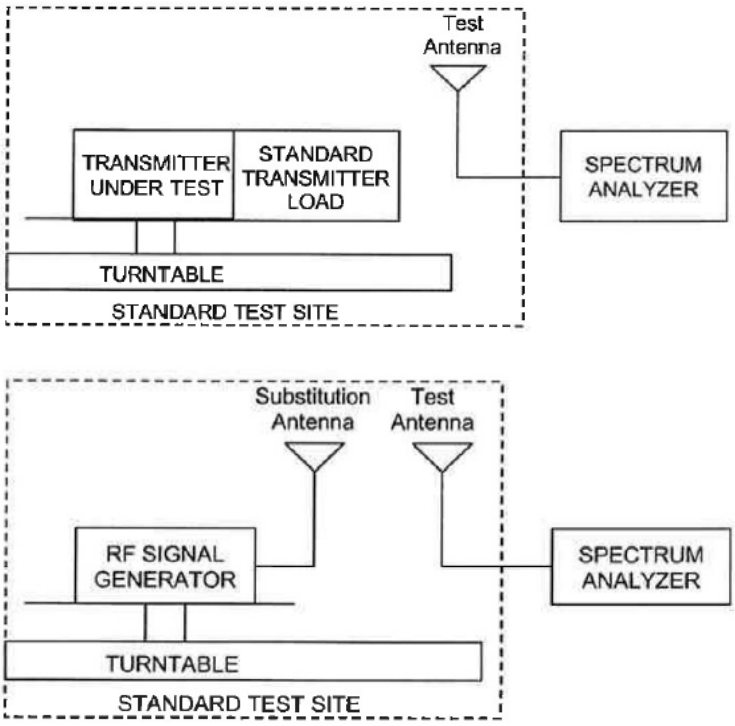
Measurement procedure. **TIA-603-C**

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

The maximum of the emission are searched by moving the turn table about 360 degrees and the height of the antenna from 1m to 4m. Due to this fact the polarisation has switched from vertical to horizontal to find the maximum of the unwanted emissions.

8.2 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).

$$Limit = P_{OUT} - (76 + 10LOG(P_{OUT}) - 10LOG(Bwdth / 6.25kHz))$$

8.3 Receiver Settings

	up to 1 GHz	above 1 GHz
Measurement bandwidth	120 kHz	1 MHz
Step width	60 kHz	500 kHz
Dwell time	20ms	
Detector	Peak	Average

8.4 Climatic values in the lab

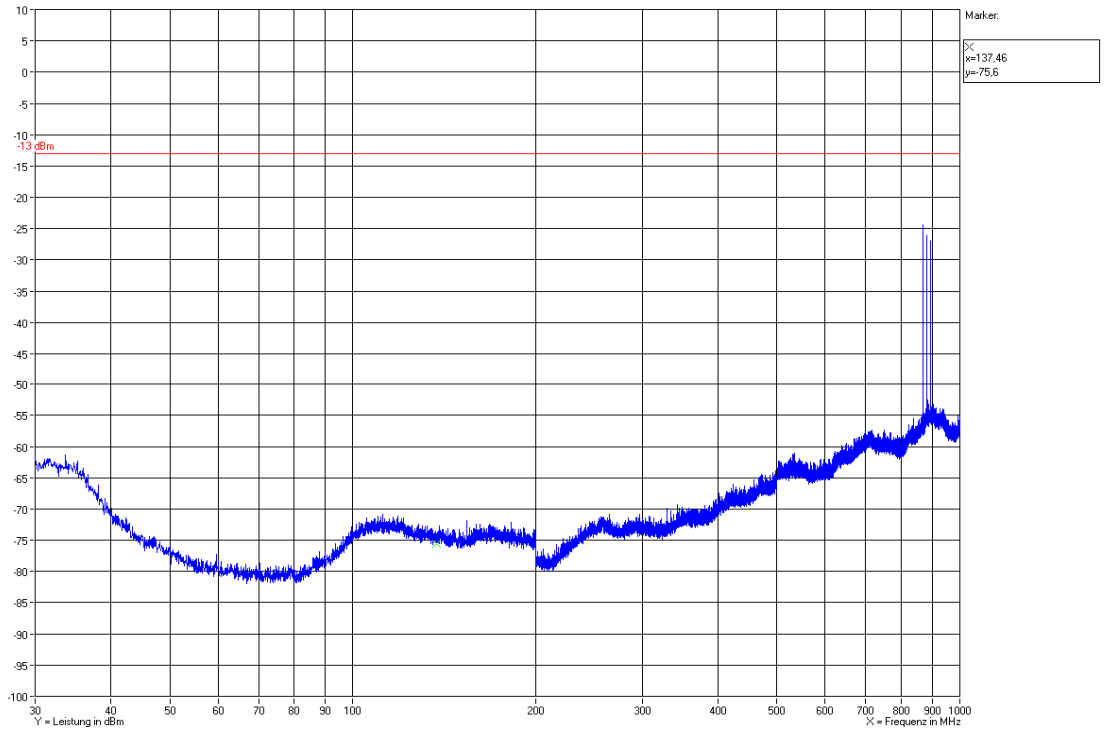
Temperature	21,5°C
Relative Humidity	47%
Air-pressure	1014 hPa

8.5 Test results

8.5.1 30 MHz to 1 GHz Downlink (Bottom – Middle – Top) Subpart H

Bottom: 869MHz; Middle: 881,5MHz; Top: 894MHz

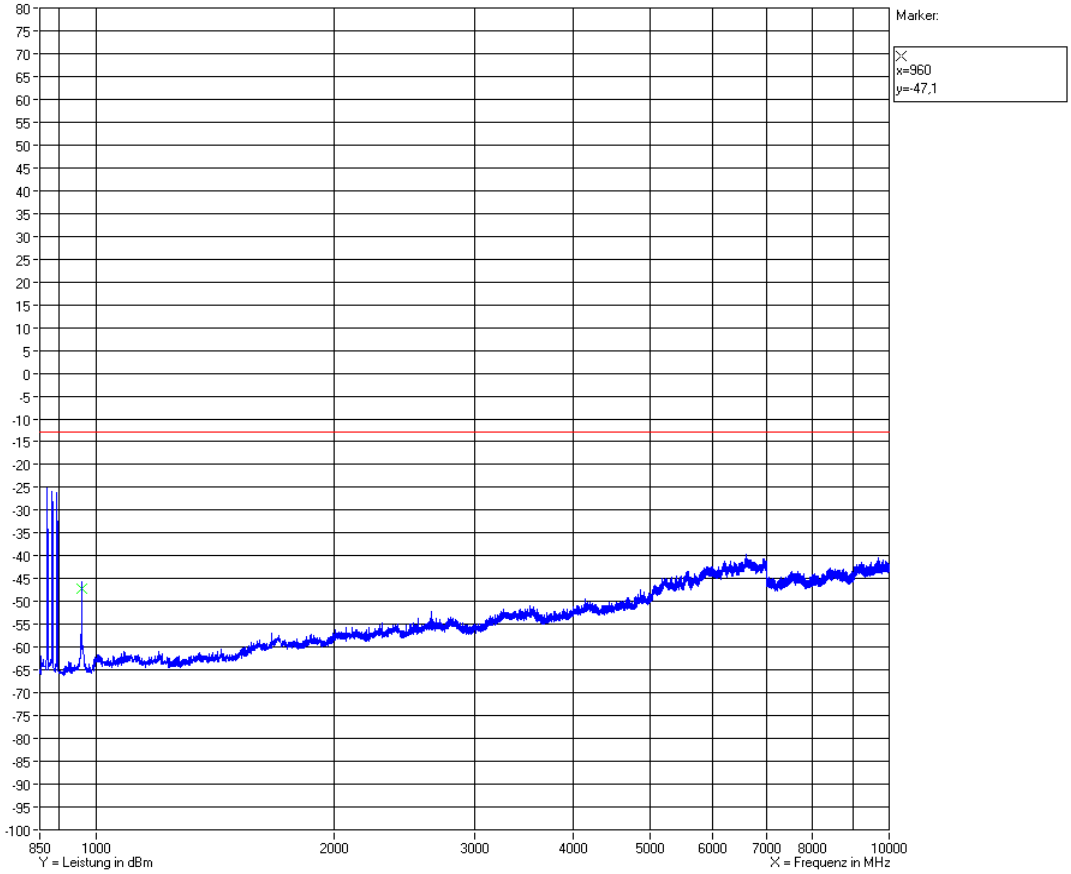
The following picture shows the maximum of the emission with horizontal and vertical polarisation.



8.5.1.1 1 GHz to 10 GHz Downlink (Bottom – Middle – Top) Subpart H

Bottom: 869MHz; Middle: 881,5MHz; Top: 894MHz

The following picture shows the maximum of the emission at antenna height of 145cm, -4 degree (turn table) and vertical polarisation. This can be seen at picture 8.2.



Zahlmann / 09.02.2011

The radiated spurious emission measurements have been passed!

9 History

Revision	Modification	Date	Name
01.00	Initial report	10.02.2011	Zahlmann

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