ECL-EMC Test Report No.: 12-187

Equipment under test: **ION-M19P/19P/19P Pseudo Omni**
FCC ID: **XS5-M191919P**
IC ID:
Type of test: **FCC 47 CFR Part 24 Subpart E: 2012**
Broadband PCS
IC RSS-131:2003
Zone Enhancers for the Land Mobile Service

Measurement Procedures: 47 CFR Parts 2: 2012(*Frequency Allocations and Radio Treaty Matters; General Rules and Regulations*),
24 (Broadband PCS),
ANSI/TIA-603-C (2004), *Land Mobile FM or PM Communications Equipment Measurement and Performance Standards*
IC-GEN General Requirements and Information for the Certification of Radiocommunication Equipment

Test result: **Passed**

Date of issue:	10.10.11		Signature
Issue-No.:	01	Author:	Tom Zahlmann Test engineer Digital unterschrieben von Tom Zahlmann DN: cn=Tom Zahlmann, o=Bureau Veritas CPS, ou=ECL, email=tom.zahlmann@de.bureauveritas.com, c=DE Datum: 2012.10.10 16:49:15 +02'00'
Date of delivery:	06.10.12	Checked:	Mario Lehmann Operational manager Digitally signed by Mario Lehmann DN: cn=Mario Lehmann, o=Bureau Veritas, ou=ECL, email=mario.lehmann@de.bureauveritas.com, c=DE Date: 2012.10.15 13:41:32 +02'00'
Test dates:	21.09. – 06.10.12		
Pages:	40		

Manufacturer:	ANDREW Wireless Systems GmbH Industriering 10 D-86675 Buchdorf Tel.: +49 (0)9099 69 0 Fax: +49 (0)9099 69 140
Test Location:	TEMTPON Service Plus GmbH European Compliance Laboratory (ECL) Thurn-und Taxis-Straße 18 D-90411 Nürnberg Tel.: +49 0911 59835 23 Fax: +49 0911 59835 90

General:
The purpose of this report is to show compliance to the FCC regulations for unlicensed devices operating under section 15.249 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	24.232(a)	2.1046(a)	160 Watts	Complies
Occupied Bandwidth		2.1049(h)	Input/Output	Complies
Spurious Emissions at Antenna Terminals	24.238(a)	2.1051	-13dBm	Complies
Field Strength of Spurious Emissions	24.238(a)	2.1053	-13dBm E.I.R.P	Complies
Frequency Stability		2.1055(a)(d)	Must stay in band	NA

Name of Test	IC Para. No.	IC Method	Result
RF Power Output	RSS-133 6.4	RSS-GEN 4.8	
Occupied Bandwidth		RSS-GEN 4.6.1	
Spurious Emissions at Antenna Terminals	RSS-133 6.5	RSS-GEN 4.9	
Field Strength of Spurious Emissions			
Frequency Stability	RSS-133 6.3	RSS-GEN 4.7	

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-M19P/19P/19P Pseudo-Omni
Andrew Ident. Number	Id.No. 7658132-0001
Serial no.(SN)	46
Revision	00
Software version and ID	n. a.
Type of modulation and Designator	GSM (GXW) ☒ GSM-EDGE (G7W) ☒ CDMA (F9W) ☒ W-CDMA (F9W) ☒ LTE (G7D) ☒
Frequency Translation	F1-F1 ☒ F1-F2 ☐ N/A ☐
Band Selection	Software ☐ Duplexer ☒ Fullband ☐

2.1.1 Downlink

Pass band	1975 MHz – 1990 MHz
Max. composite output power based on one carrier (rated)	43 dBm -> 20 W
Gain max.	10 dB @ Pout BTS of 33 dBm

2.1.2 Uplink

Pass band	1895 MHz – 1910 MHz
Gain max.	n.a.

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

2.1.3 Description of EUT

Andrew ION-M19P/19P/19P Pseudo-Omni 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 one 1900 MHz Path of the Remote Unit (EUT).
The ION-M19P/19P/19P Pseudo-Omni Remote Unit consists of three 1900 MHz paths with the intended use of simultaneous transmission

2.1.4 Block diagram of measurement reference points

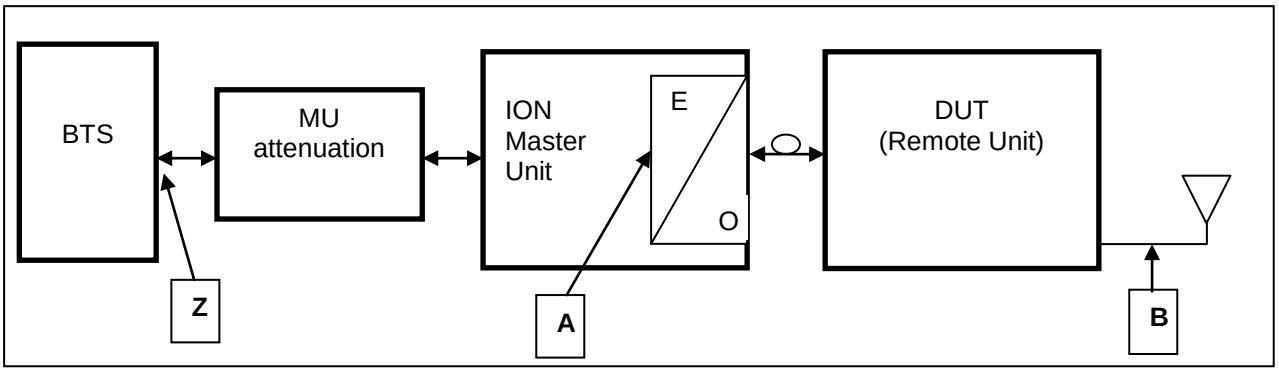


figure 2.1.4-#1 block diagramm

Remote Unit is the EUT

O/E	Optical / Electrical converter
SRMU	Sub Rack 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,	UL input

Downlink: Measure from reference point A to B

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 Downlink System Gain and Output Power

System optimized for BTS power *(fixed value)* **Z**	MU Attenuation *(manual leveling)*	Maximum rated input power at the MU OTRX *(fixed value)* **A**	RU Gain *(fixed value)* **A to B**	Maximum rated output power at RU Antenna port *(fixed value)* **B**
+33 dBm	**30 dB**	**3 dBm**	**+40 dB**	**+43 dBm** *@ 1 carrier*
System Gain Z to A	**+10 dB**			
+43 dBm	**40 dB**	**3 dBm**	**+40 dB**	**+43 dBm** *@ 1 carrier*
System Gain Z to A	**0 dB**			

table 2.1.5-#1 output power (DL)

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
9126	Spectrum Analyzer	FSV-30	R&S	101237	11/2012
9054	Spectrum Analyzer	FSV-13	R&S	100859	12/2012
9046	Generator	SMBV100A	R&S	255090	06/2013
8990	Generator	SMJ100A	R&S	101288	06/2013
8671	Power Meter	E4418B	Agilent	GB39513094	06/2013
8672	Power Sensor	E9300H	Agilent	US41090179	06/2013
7403	Splitter	2way	Andrew	4148	not necessary
7321	Circulator	E10-1FFF	AEROTEK	25350	not necessary
7326	Circulator	E10-1FFF	AEROTEK	25360	not necessary
7408	RF-Cable	2,0m; N-N	Andrew	---	not necessary
7449	RF-Cable	Multiflex141	Andrew	---	not necessary
7440	RF-Cable	RG-223 0.8m	Andrew	---	not necessary
7441	RF-Cable	RG-223 0.8m	Andrew	---	not necessary
7443	RF-Cable	Multiflex141	Andrew	---	not necessary
7444	RF-Cable	Multiflex141	Andrew	---	not necessary
7341	Power Attenuator	768-20	Narda	---	not necessary

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

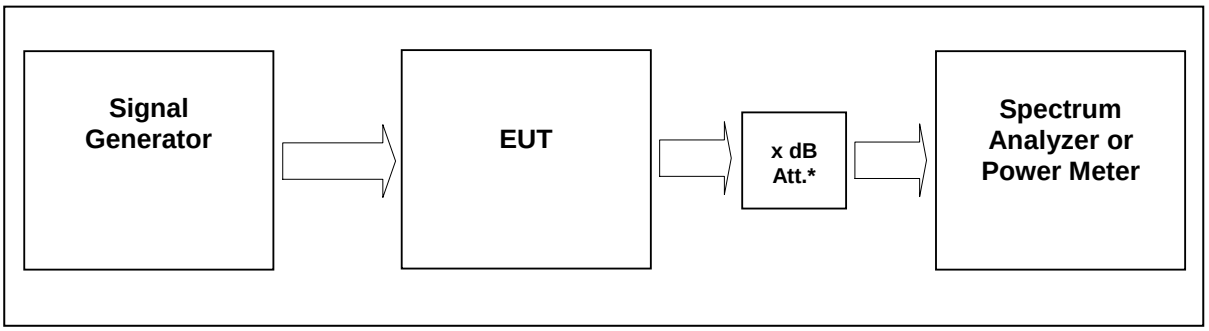
The extended measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor k=2. The true value is located in the corresponding interval with a probability of 95 %.

4 Test site (TEMPTON Service Plus GmbH)

FCC Test site: **96997**
IC OATS: **IC3475A-1**

See relevant dates under section 12 of this test report.

5 RF Power Out: §24.232, §2.1046



External Attenuator DL x dB = 20 dB

figure 3.4-#1 Test setup:

Measurement uncertainty	± 0,38 dB
Test equipment used	9054; 9046; 7321; 7408; 7449; 7341; 7443

5.1 Limit

Minimum standard:

Para. No.24.232

(a)(1) Base stations with an emission bandwidth of 1 MHz or less are limited to 1640 watts equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT, except as described in paragraph (b) below.

(2) Base stations with an emission bandwidth greater than 1 MHz are limited to 1640 watts/MHz equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT, except as described in paragraph (b) below.

Table 1—Reduced Power for Base Station Antenna Heights Over 300 Meters

HAAT in meters	Maximum EIRP watts
≤ 300	1640
≤ 500	1070
≤ 1000	490
≤ 1500	270
≤ 2000	160

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 testconditions 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 TS45.004

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 Test Model 1.1, E-TM1.1, clause 6.1.1.1-1, table 6.1.1.1-1 of standard specification 3GPP TS 36.141 V9.3.0 (2010-03).

5.3.1 Downlink

Modulation	Measured at	RBW VBW Span	RF Power (dBm)	RF Power (W)	Plot -
GSM	1982.5MHz	1MHz 3MHz 10MHz	43	20	5.3.1.1 #1
GSM-EDGE	1982.5MHz z	1MHz 3MHz 10MHz	43	20	5.3.1.2 #1
CDMA	1982.5MHz z	3MHz 10MHz 15MHz	43	20	5.3.1.3 #1
WCDMA	1982.5MHz	10MHz 10MHz 50MHz	43	20	5.3.1.4 #1
LTE	1982.5MHz	3MHz 10MHz 50MHz	43	20	5.3.1.5 #1
Maximum output power = 43 dBm -> 20 W					
Limit Maximum output power (eirp) = 1640 W/MHz					

table 5.3.1-#1 power out downlink

The max RF Power out is 43 dBm, so the maximum antenna gain (x) can be calculated as follow:

Limit = 1000W (erp) = **60 dBm** Info: 1000W (erp) = 1640W (eirp)

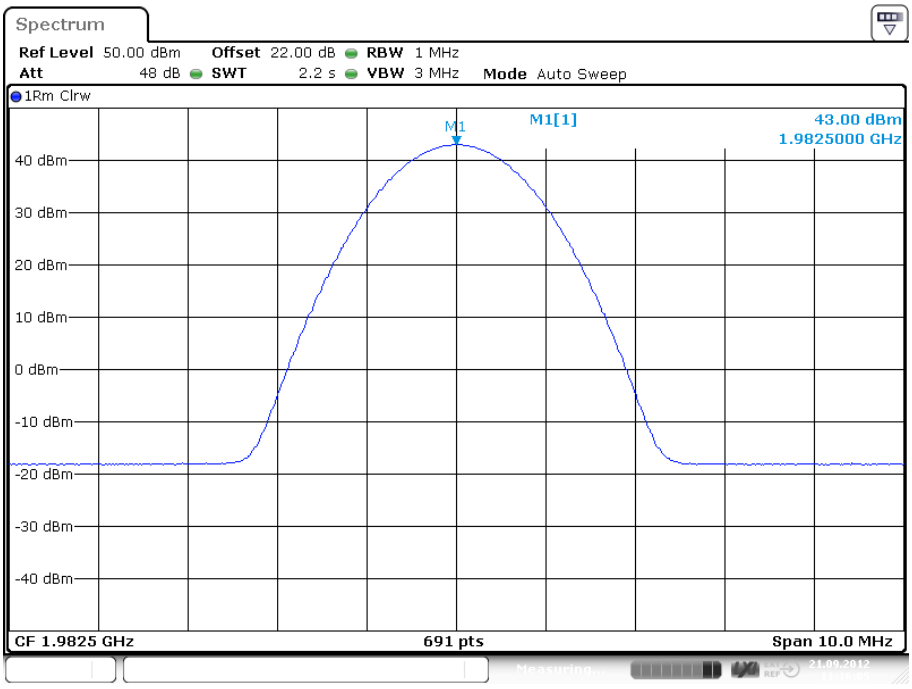
60 dBm **>** 43 dBm + x
17 dBd = 19.15 dBi > x

=> The antenna that will use for the complete system have to have a gain lower than 19 dBi, relative to a dipol.

Modulation	Pin / dBm (Ref. point A)
GSM	2.9
EDGE	3,1
CDMA	3.0
WCDMA	3.0
LTE	3.0

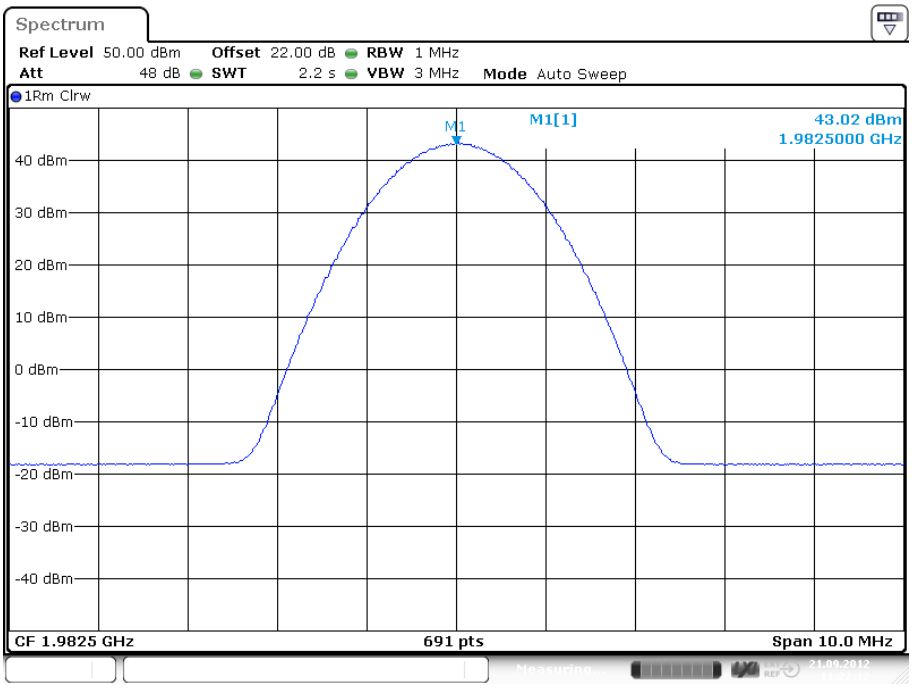
table 5.3.1-#2 Input power

5.3.1.1 GSM



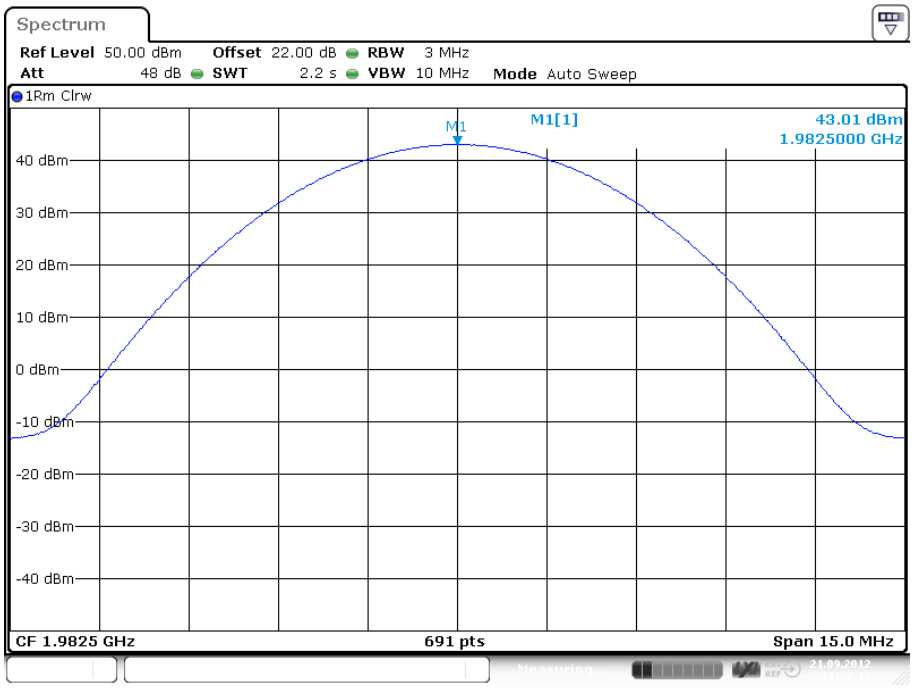
plot 5.3.1.1-#1 Middle

5.3.1.2 GSM-EDGE



plot 5.3.1.2-#1 Middle

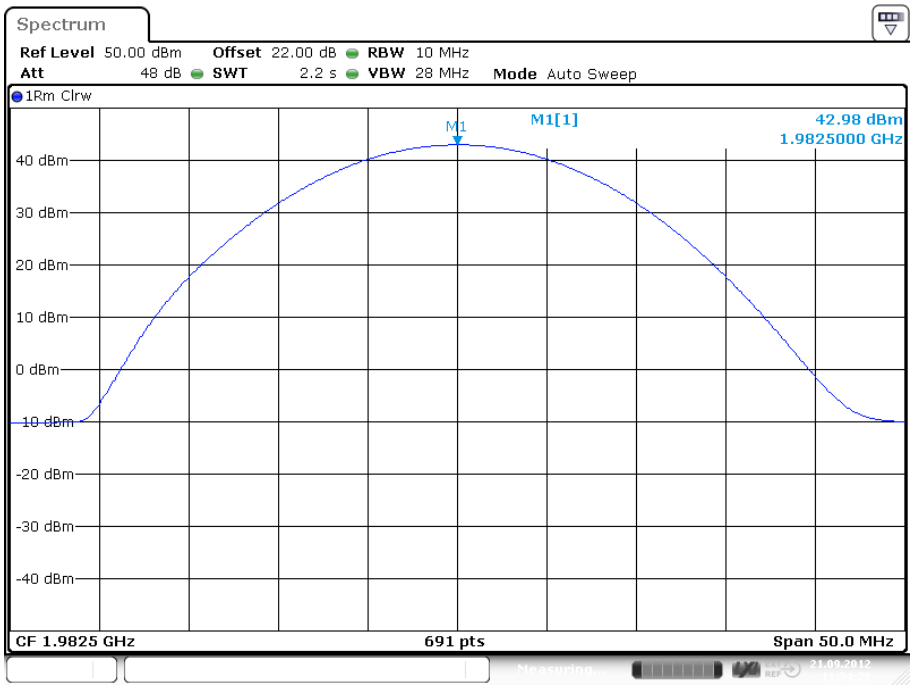
5.3.1.3 CDMA



Date: 21.SEP.2012 11:27:12

plot 5.3.1.3-#1 Middle

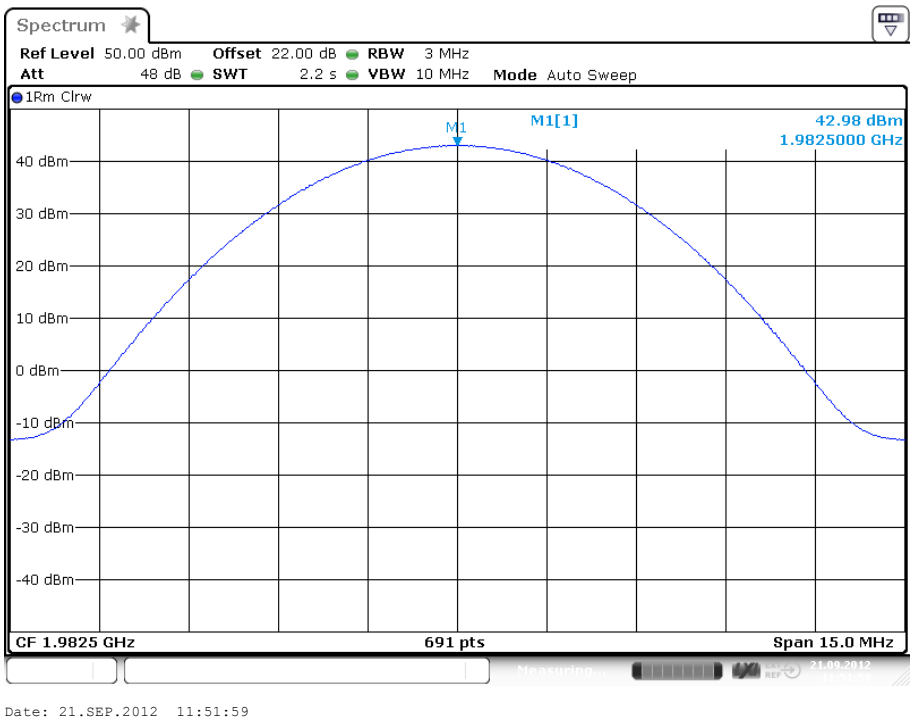
5.3.1.4 W-CDMA



Date: 21.SEP.2012 11:34:28

plot 5.3.1.4-#1 Middle

5.3.1.5 LTE



plot 5.3.1.5-#1 Middle

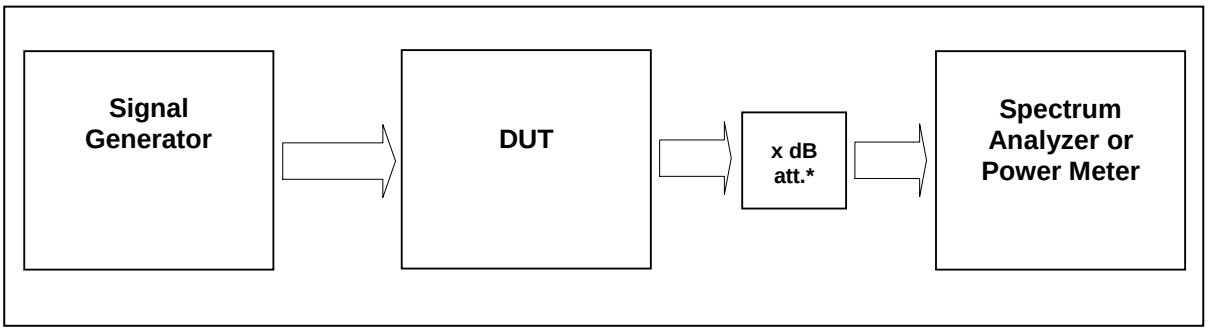
5.3.2 Uplink

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:	M. Leinfelder
Date:	21.09.2012

6 Occupied Bandwidth: §2.1049



External Attenuator DL x dB = 20 dB

figure 5.4-#1 Test setup

Measurement uncertainty	± 0,38 dB
Test equipment used	9054; 9046; 7321; 7408; 7449; 7341; 7443

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:

(h) Transmitters employing digital modulation techniques—when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at the discretion of the user.

6.3 Test results

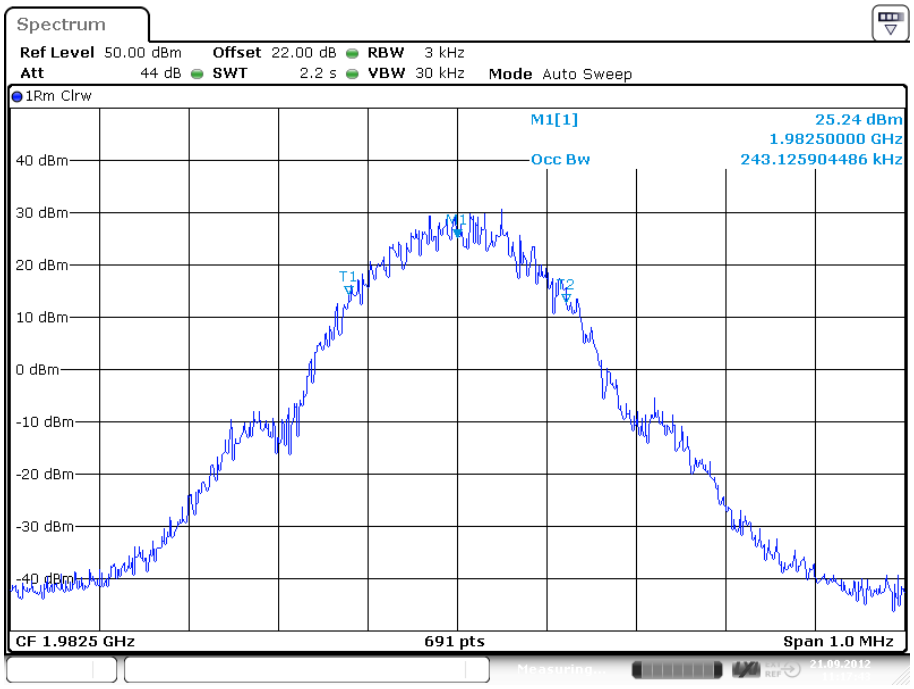
6.3.1 Downlink

Detector RMS.

Modulation	Measured at	Carrier /MHz	RBW VBW Span	Occupied Bandwidth / MHz	Plot #
GSM	Middle	1982.5MHz	30kHz 300kHz 5MHz	0.243	6.3.1.1 #1, #2
GSM-EDGE	Middle	1982.5MHz	100kHz 1MHz 10MHz	0.246	6.3.1.2 #1, #2
CDMA	Middle	1982.5MHz	3kHz 30kHz 1MHz	1.27	6.3.1.3 #1, #2
WCDMA	Middle	1982.5MHz	3kHz 30kHz 1MHz	4.18	6.3.1.4 #1, #2
LTE	Middle	1982.5MHz	30 kHz 300 kHz 5 MHz	1.1	6.3.1.5 #1,#2

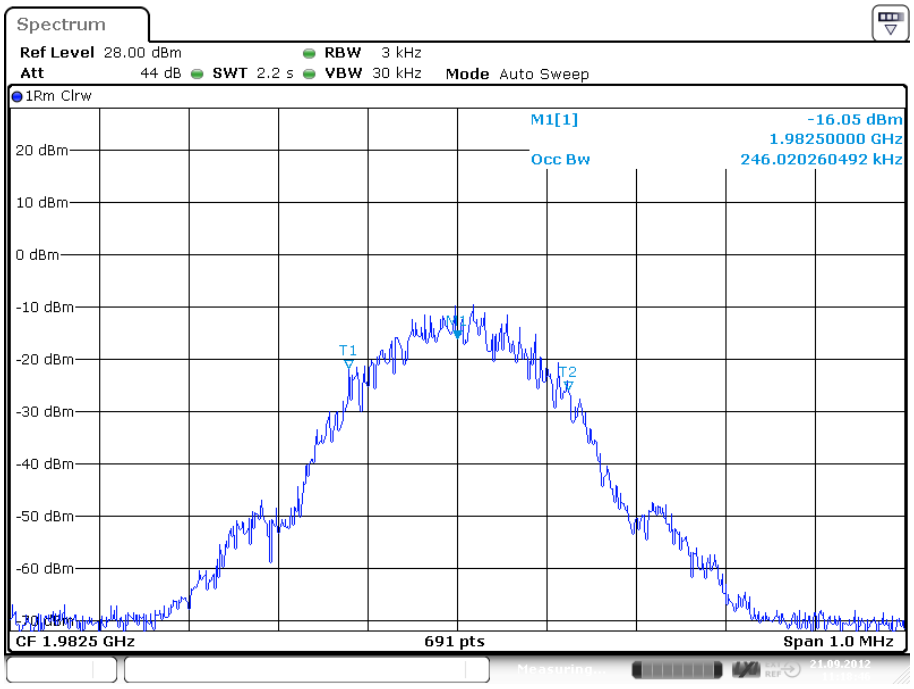
table 6.3-#1 downlink

6.3.1.1 GSM



Date: 21.SEP.2012 11:17:43

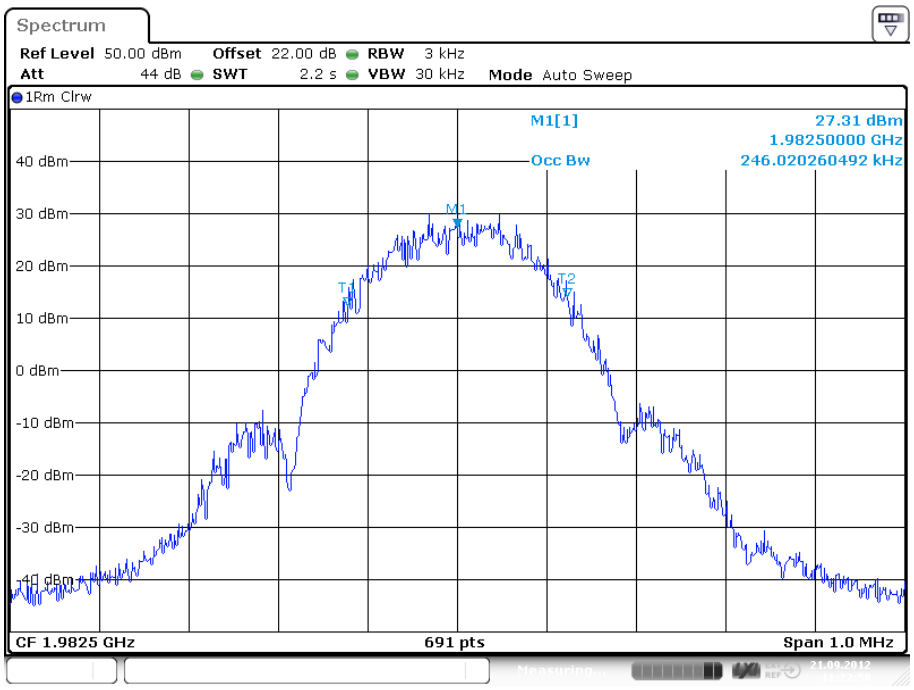
plot 6.3.1.1-#1 Output



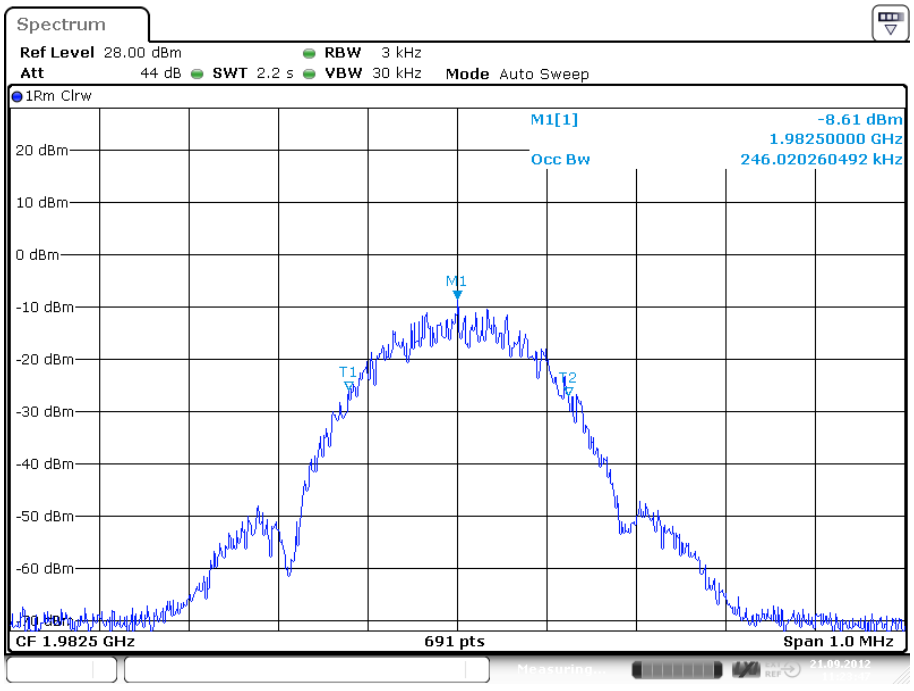
Date: 21.SEP.2012 11:18:45

plot 6.3.1.1-#2 Input

6.3.1.2 GSM-EDGE

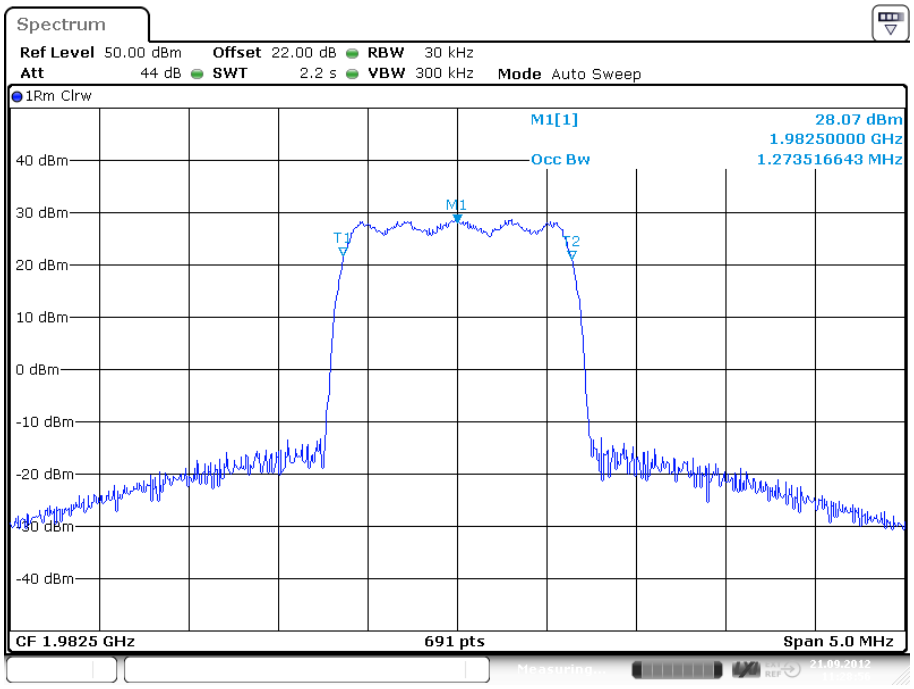


plot 6.3.1.2-#1 Output



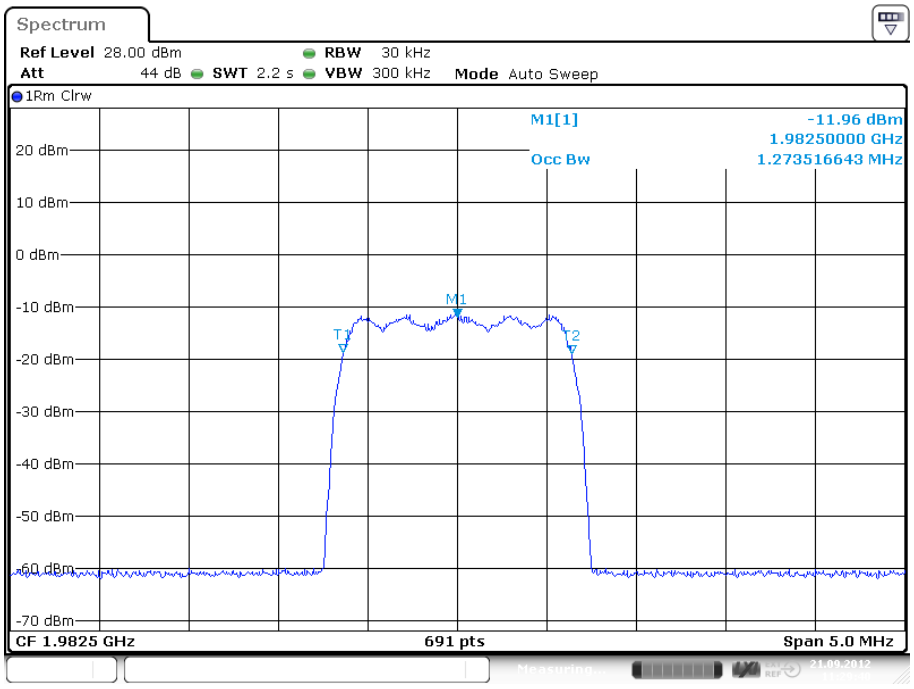
plot 6.3.1.2-#2 Input

6.3.1.3 CDMA



Date: 21.SEP.2012 11:28:56

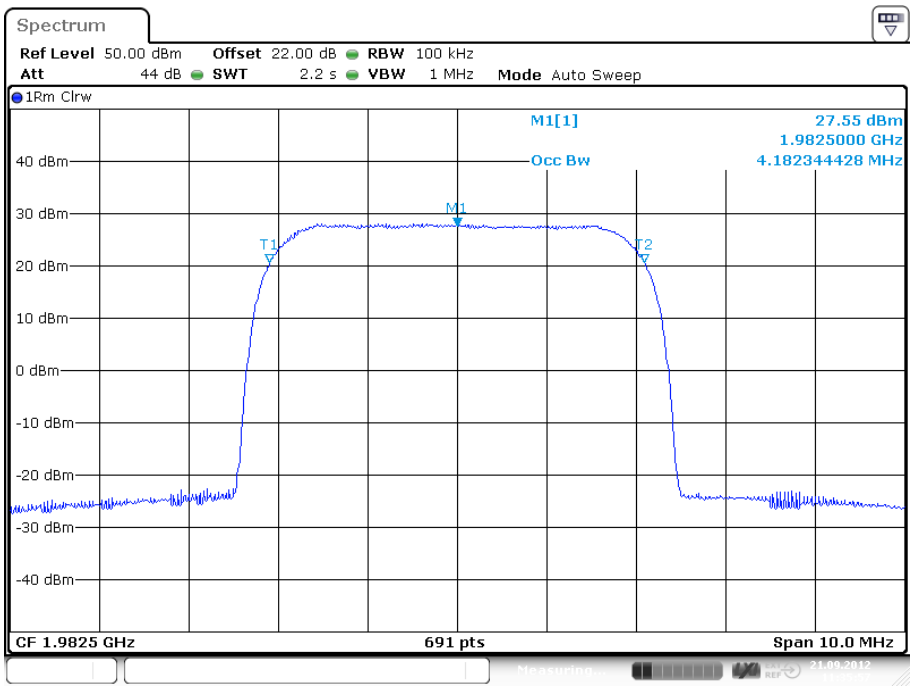
plot 6.3.1.3-#1 Output



Date: 21.SEP.2012 11:29:40

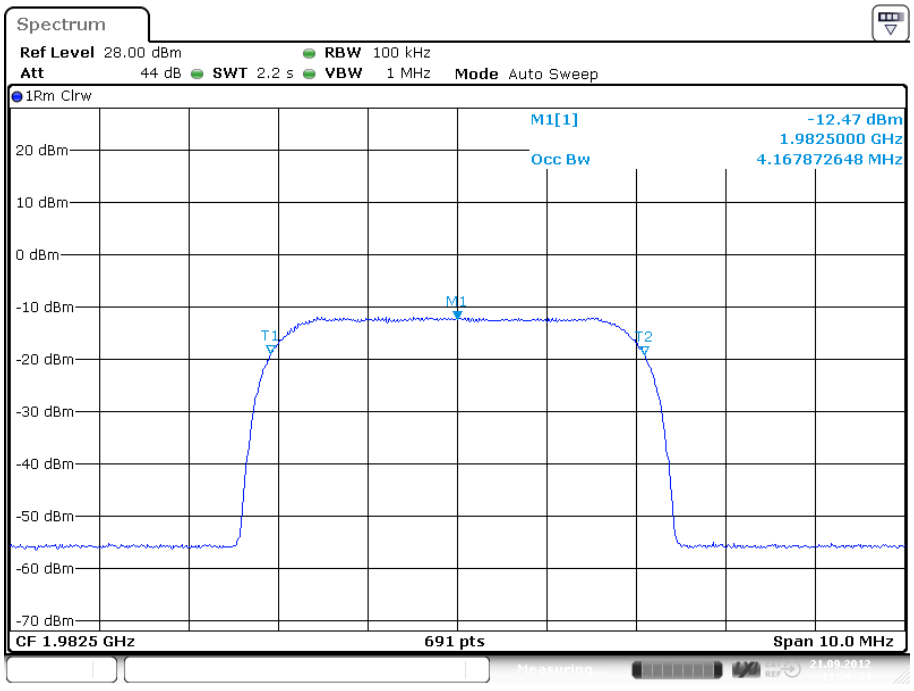
plot 6.3.1.3-#2 Input

6.3.1.4 W-CDMA



Date: 21.SEP.2012 11:35:57

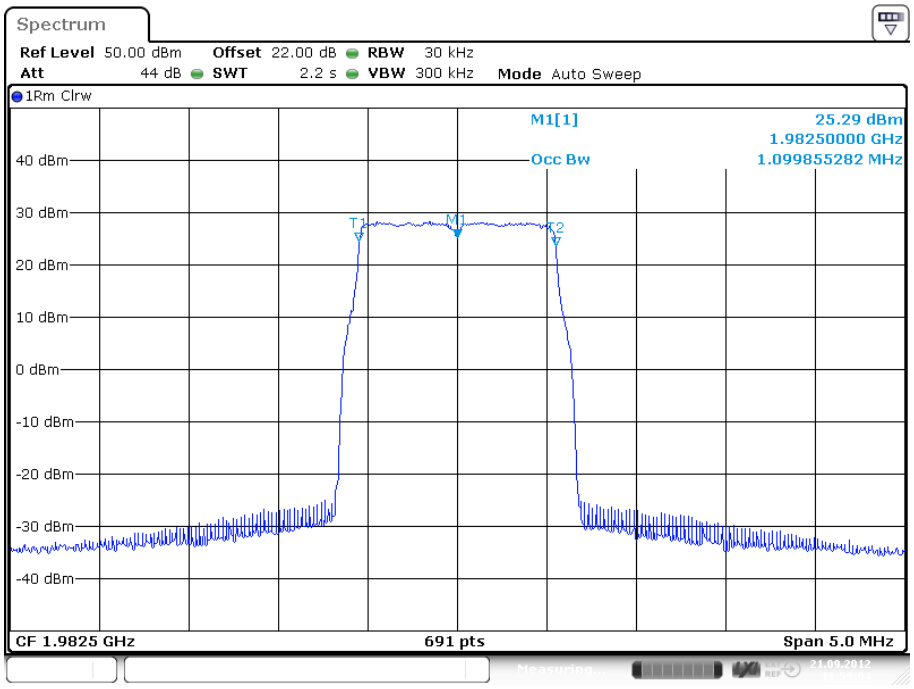
plot 6.3.1.4-#1 Output



Date: 21.SEP.2012 11:36:34

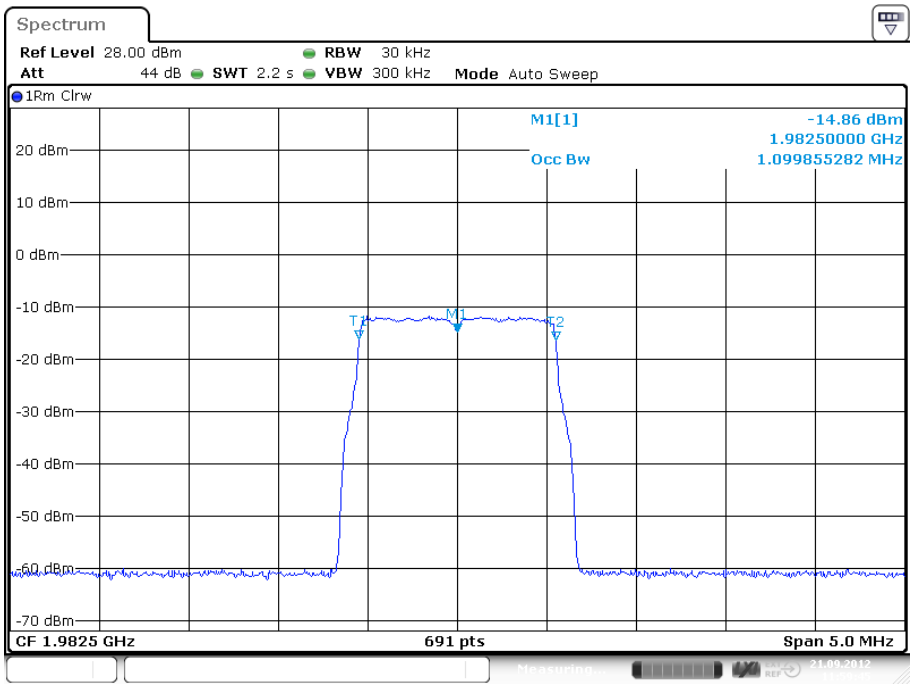
plot 6.3.1.4-#2 Input

6.3.1.5 LTE



Date: 21.SEP.2012 11:59:04

plot 6.3.1.5-#1 Output



Date: 21.SEP.2012 11:59:45

plot 6.3.1.5-#2 Input

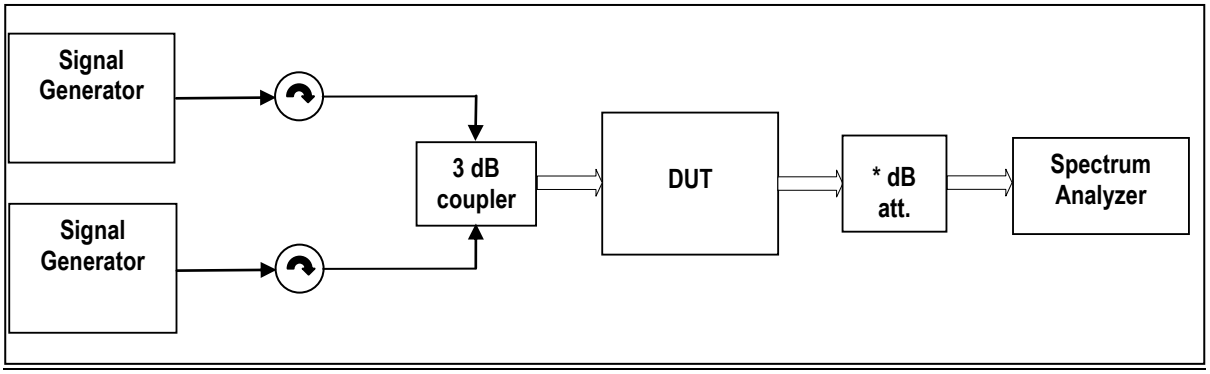
6.3.2 Uplink

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:	M. Leinfelder
Date:	21.09.2012

7 Spurious Emissions at Antenna Terminals: §24.238, §2.1051



Multisignal-Generator used; External Attenuator DL x dB = 20 dB
figure 7-#1 Test setup:

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	9126; 9054; 9046; 7321; 7408; 7449; 7341; 7443	
	8990; 7444;7403; 7326	

7.1 Limit

Minimum standard:

Para. No.24.238(a)

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.

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.

Modulation	Measured at Band Edge	Carriers	RBW VBW Span	Max. level (dBm)	Plot -
GSM	Lower Edge Upper Edge	1975.4 MHz 1975.6 MHz 1989.4 MHz 1989.6 MHz	3kHz 30kHz 2MHz	-34.3	0 #1 #2
GSM-EDGE	Lower Edge Upper Edge	1975.4 MHz 1975.6 MHz 1989.4 MHz 1989.6 MHz	3kHz 30kHz 2MHz	-35.2	7.3.1.1 #1 #2
CDMA	Lower Edge Upper Edge	1975.775 MHz 1977.025 MHz 1987.975 MHz 1989.225 MHz	30kHz 300kHz 6MHz	-24.9	7.3.1.2 #1 #2
WCDMA	Lower Edge Upper Edge	1977.6 MHz 1982.6 MHz 1982.4 MHz 1987.4 MHz	100kHz 1MHz 15MHz	-23	7.3.1.3 #1 #2
LTE	Lower Edge Upper Edge	1975.7 MHz 1977.1 MHz 1987.9 MHz 1989.3 MHz	30kHz 300kHz 6MHz	-24.6	7.3.1.4 #1 #2

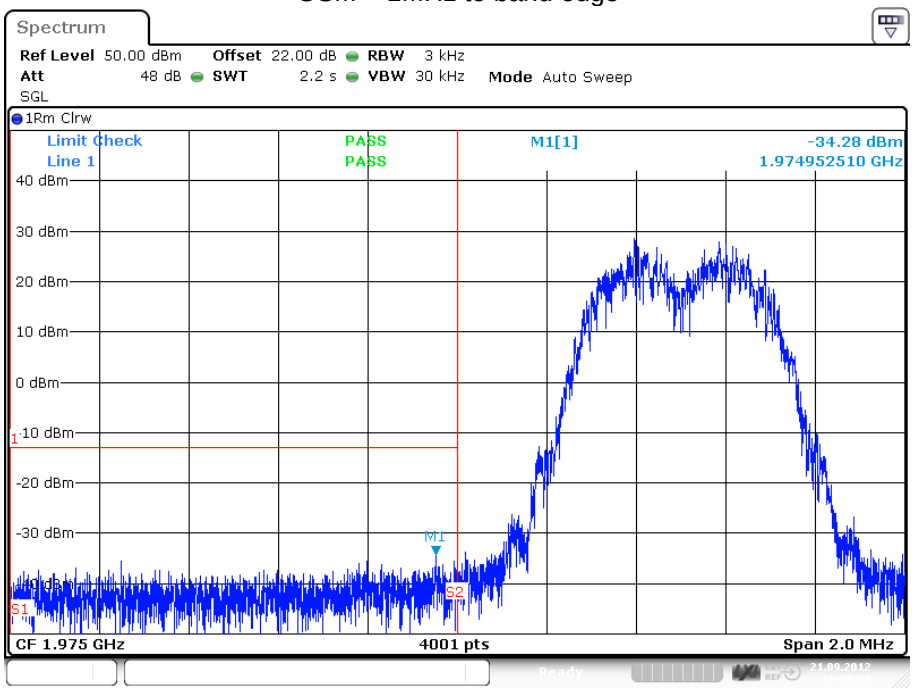
table 7.3-#1 <1MHz from Band Edge

>1MHz from Band Edge
Detector: RMS.

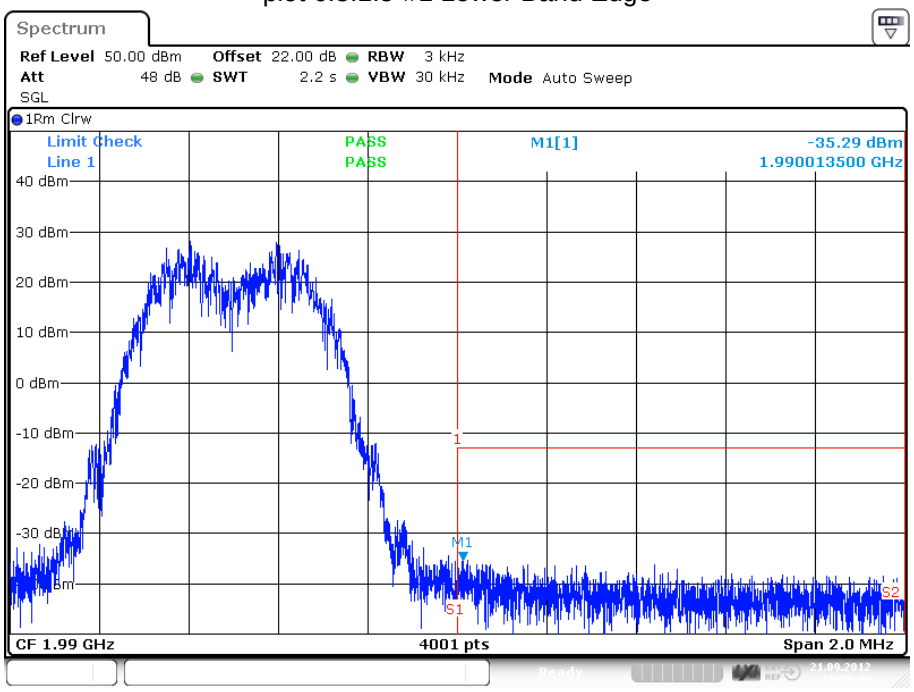
Modulation	Carrier at	Carrier	Max. level (dBm)	RBW VBW Frequency range	Plot -
GSM	Middle	1982,5 MHz	-20.6	1MHz 3MHz 30MHz – 20GHz	7.3.1.5 #1
GSM-EDGE	Middle	1982,5 MHz	-20.9	1MHz 3MHz 30MHz – 20GHz	7.3.1.6 #1
CDMA	Middle	1982,5 MHz	-20.7	1MHz 3MHz 30MHz – 20GHz	7.3.1.7 #1
WCDMA	Middle	1982,5 MHz	-20.7	1MHz 3MHz 30MHz – 20GHz	7.3.1.8 #1
LTE	Middle	1982,5 MHz	-20.7	1MHz 3MHz 30MHz – 20GHz	7.3.1.9 #1

table 7.3-#2 >1MHz from Band Edge

GSM < 1MHz to band edge

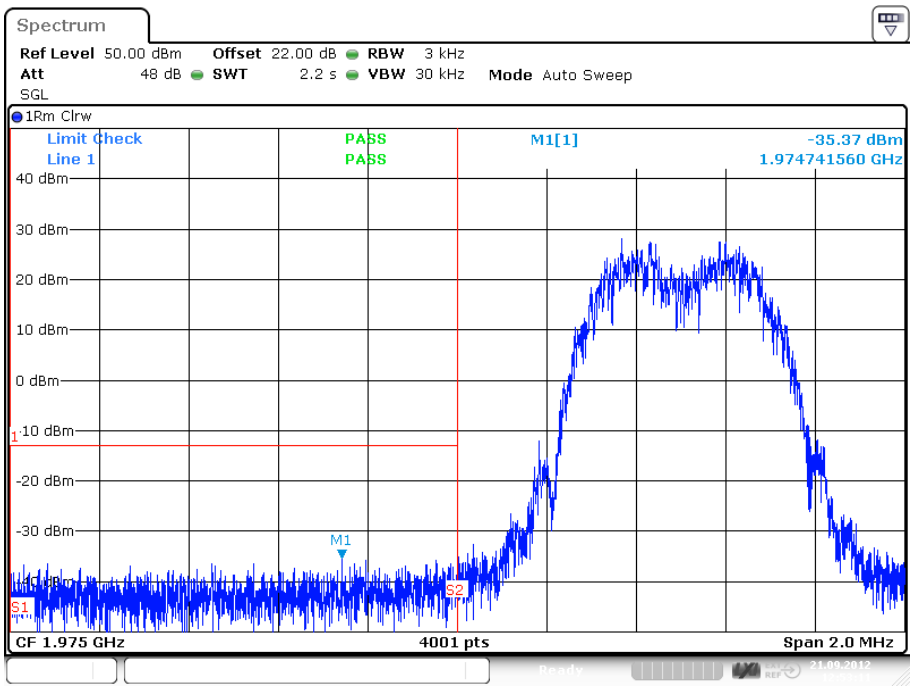


plot 6.3.1.5-#1 Lower Band Edge

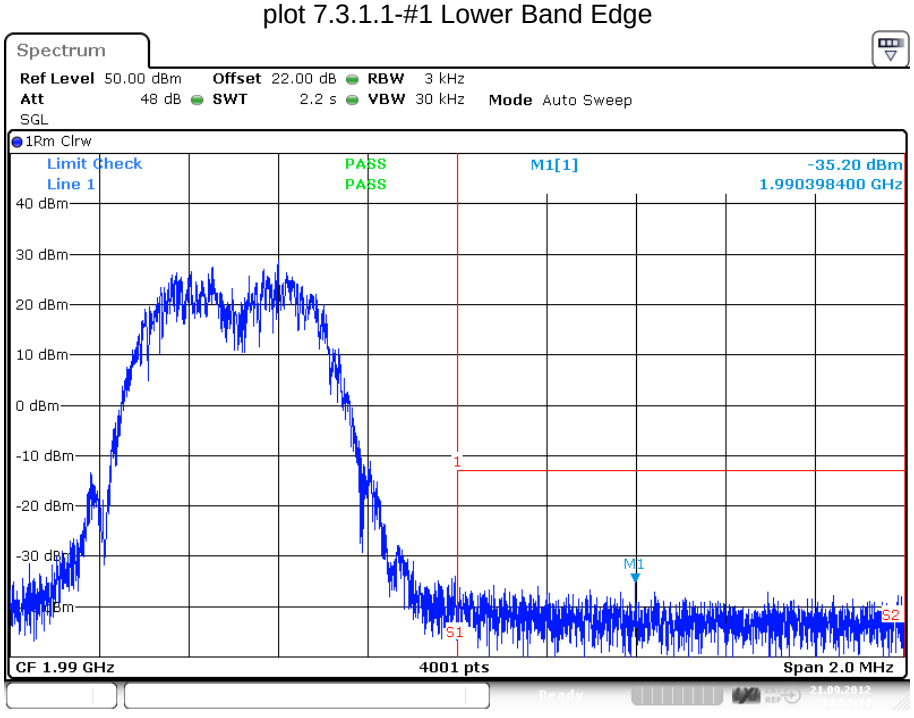


plot 6.3.1.5-#2 Upper Band Edge

7.3.1.1 GSM-EDGE < 1MHz to band edge

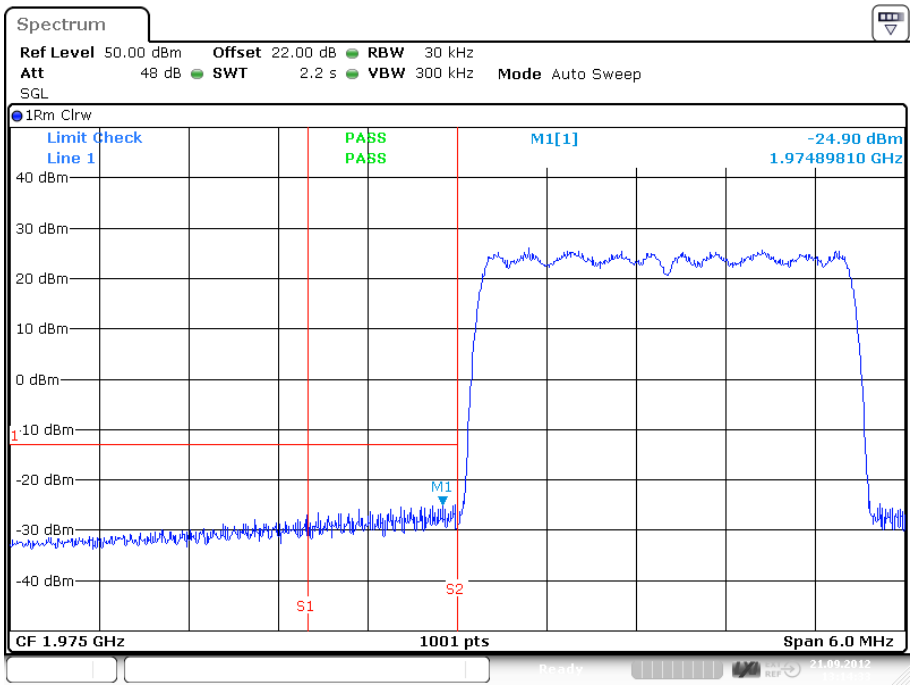


plot 7.3.1.1-#1 Lower Band Edge



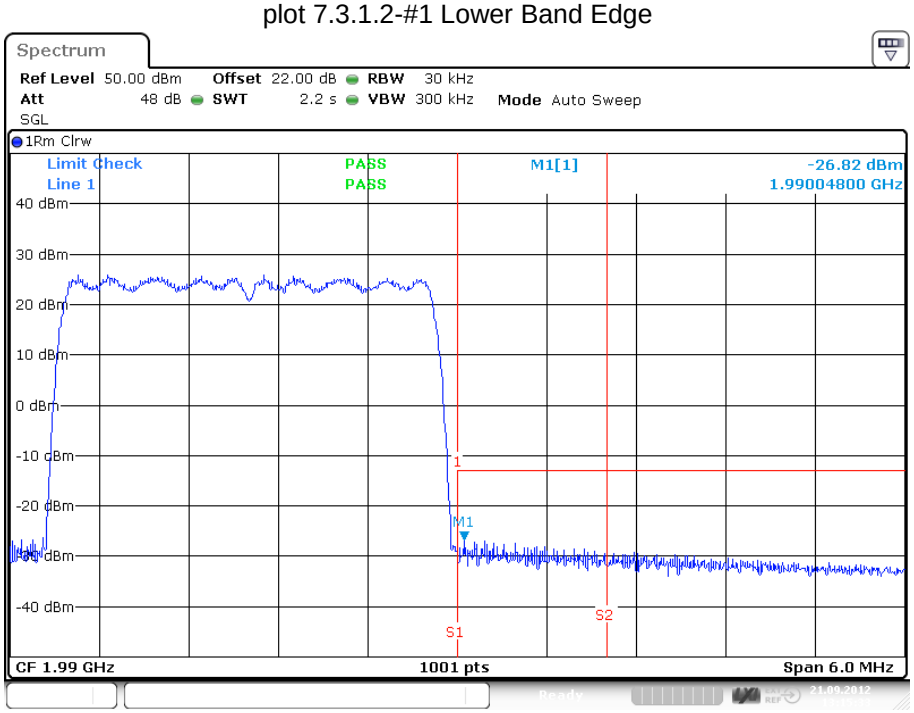
plot 7.3.1.1-#2 Upper Band Edge

7.3.1.2 CDMA < 1MHz to band edge



Date: 21.SEP.2012 13:14:33

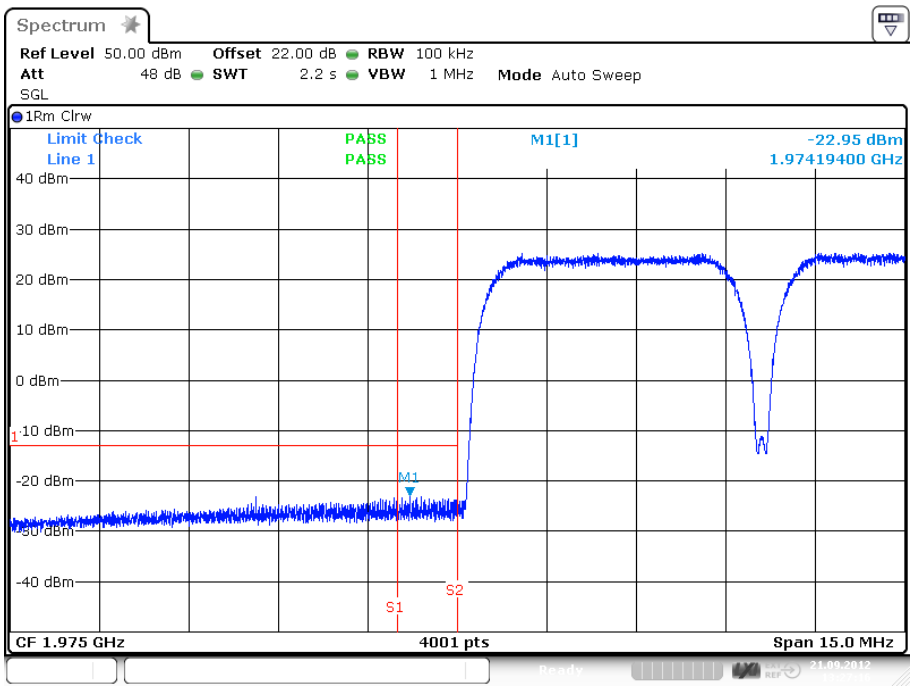
plot 7.3.1.2-#1 Lower Band Edge



Date: 21.SEP.2012 13:15:33

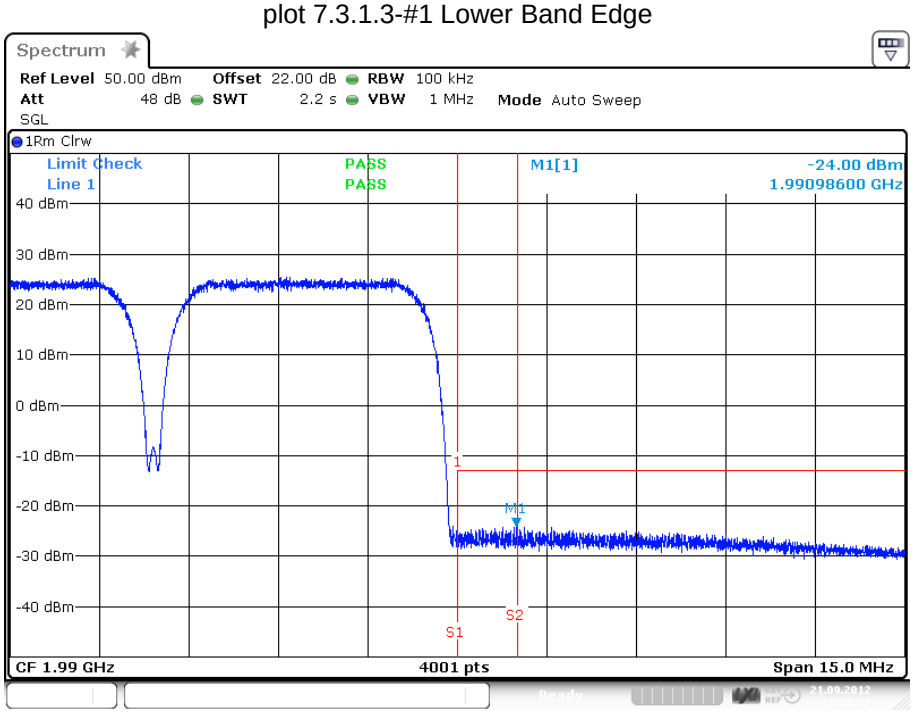
plot 7.3.1.2-#2 Upper Band Edge

7.3.1.3 W-CDMA < 1MHz to band edge



Date: 21.SEP.2012 13:27:15

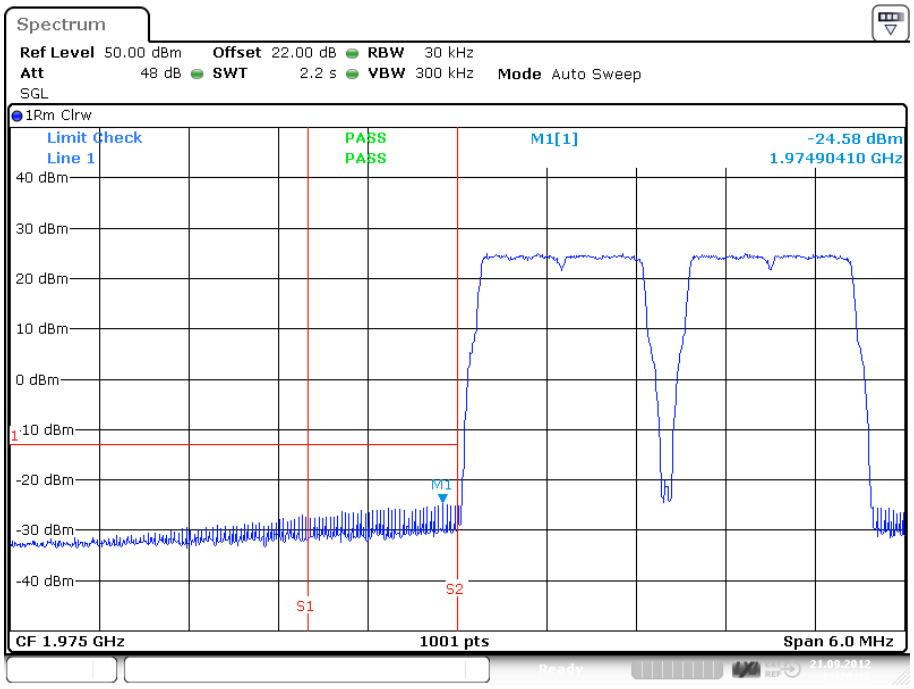
plot 7.3.1.3-#1 Lower Band Edge



Date: 21.SEP.2012 13:28:37

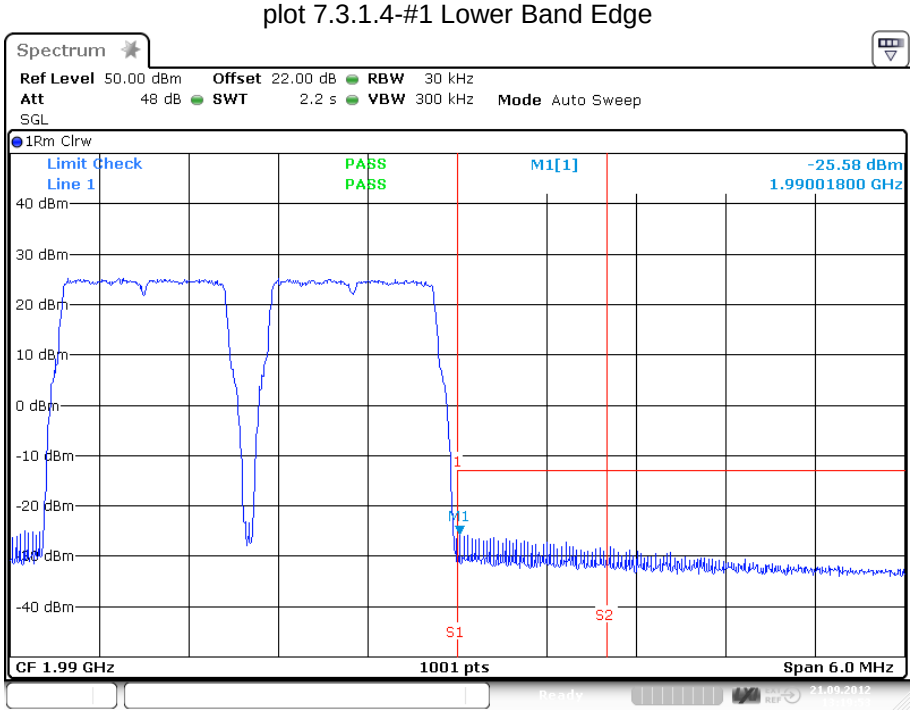
plot 7.3.1.3-#2 Upper Band Edge

7.3.1.4 LTE < 1MHz to band edge



Date: 21.SEP.2012 13:20:36

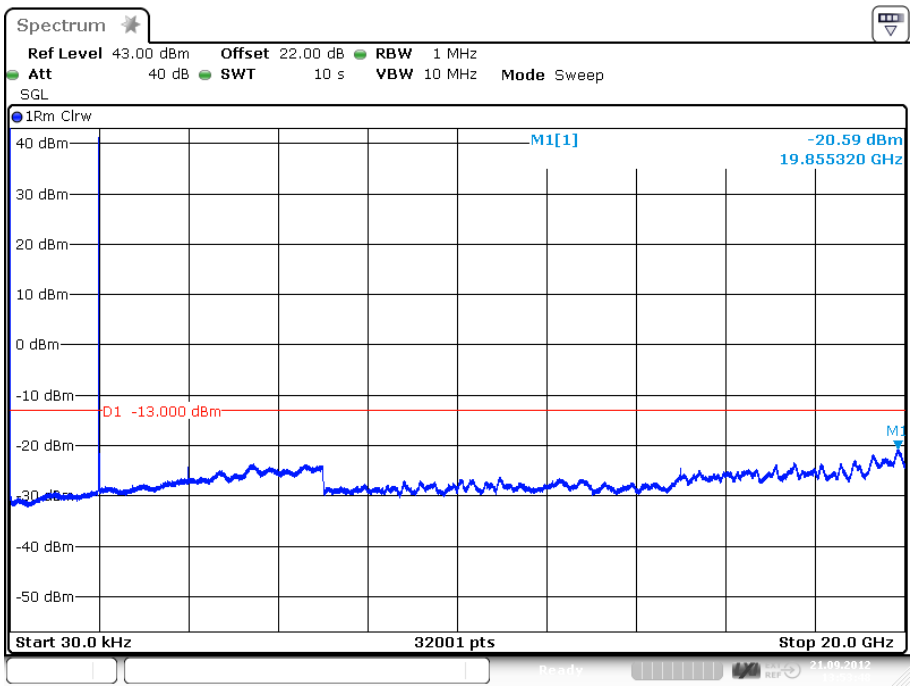
plot 7.3.1.4-#1 Lower Band Edge



Date: 21.SEP.2012 13:19:53

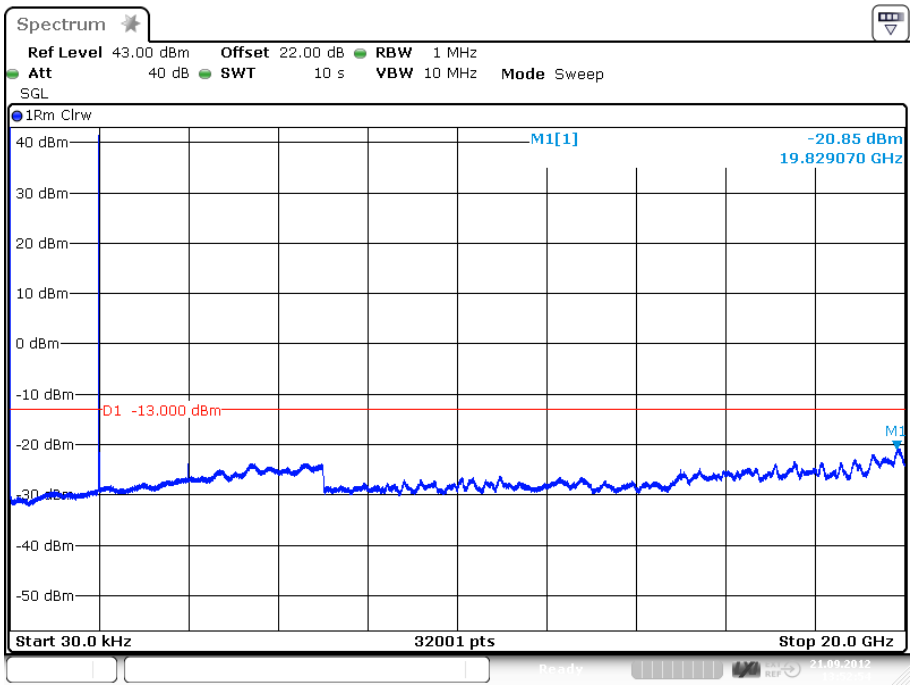
plot 7.3.1.4-#2 Upper Band Edge

7.3.1.5 GSM > 1MHz to band edge



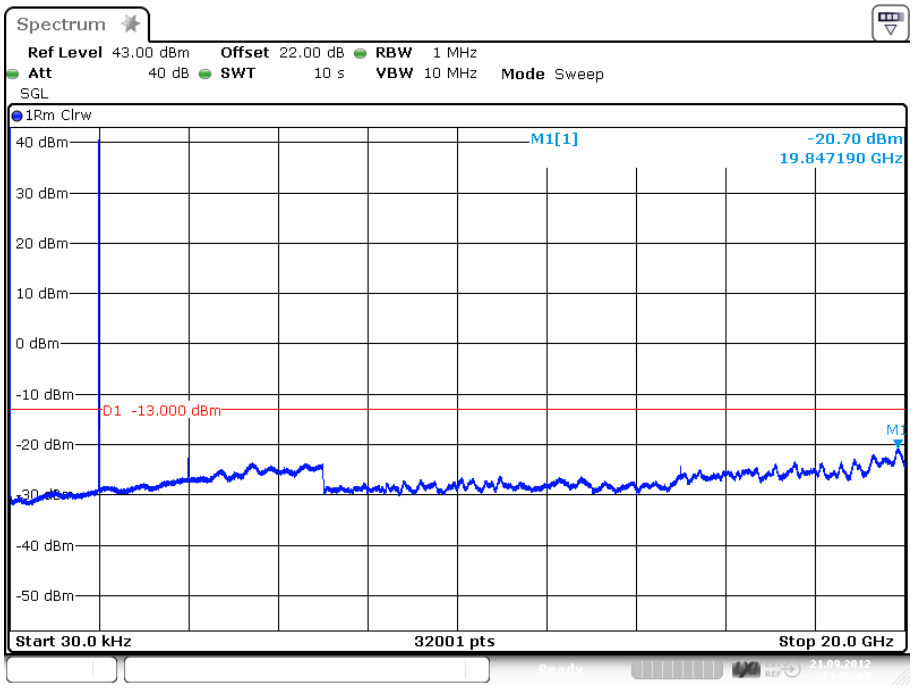
plot 7.3.1.5-#1 emission 30kHz – 20GHz

7.3.1.6 GSM-EDGE > 1MHz to band edge



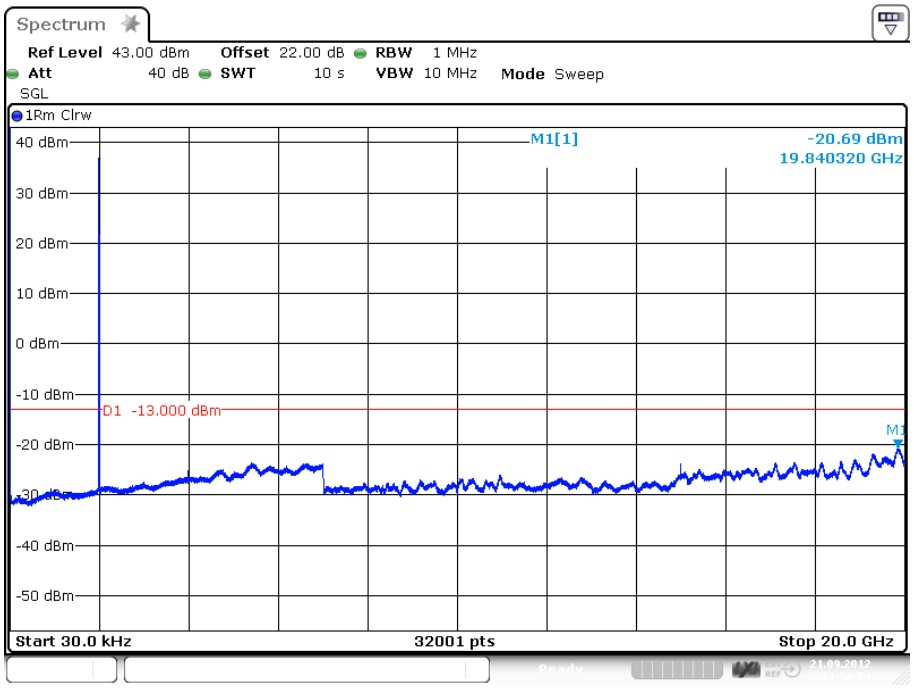
plot 7.3.1.6-#1 emission 30kHz – 20GHz

7.3.1.7 CDMA > 1MHz to band edge



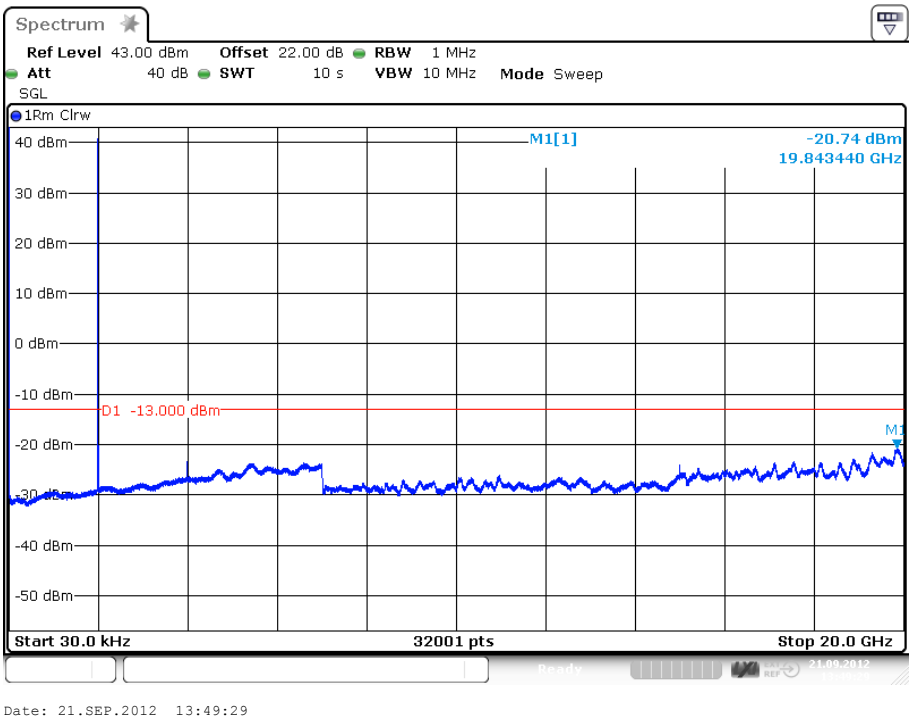
plot 7.3.1.7-#1 emission 30kHz – 20GHz

7.3.1.8 W-CDMA > 1MHz to band edge



plot 7.3.1.8-#1 emission 30kHz – 20GHz;

7.3.1.9 LTE > 1MHz to band edge



plot 7.3.1.9-#1 emission 30kHz – 20GHz;

7.3.2 Uplink

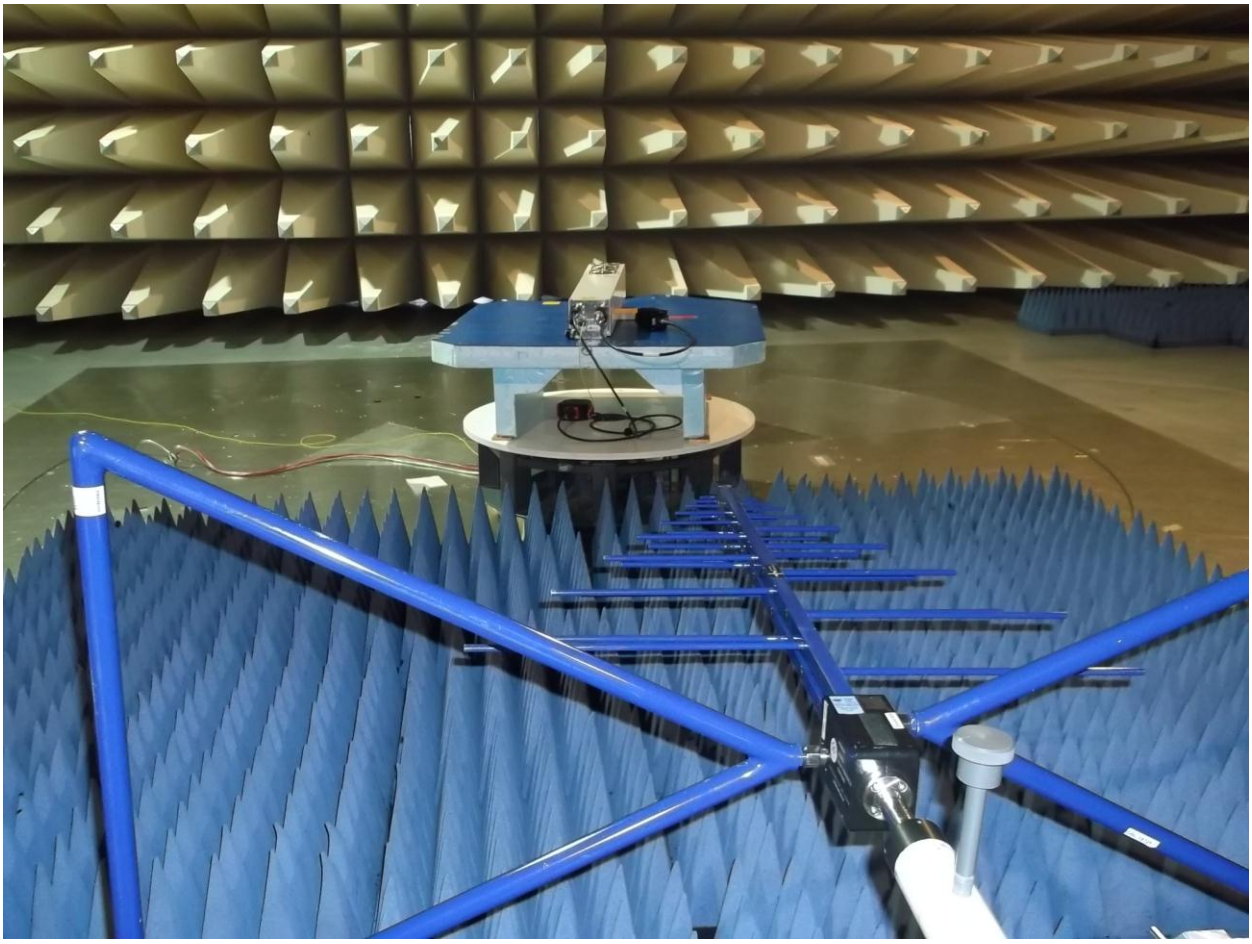
n.a.
Note: The EUT does not transmit over the air in the uplink direction.

7.4 Summary test result

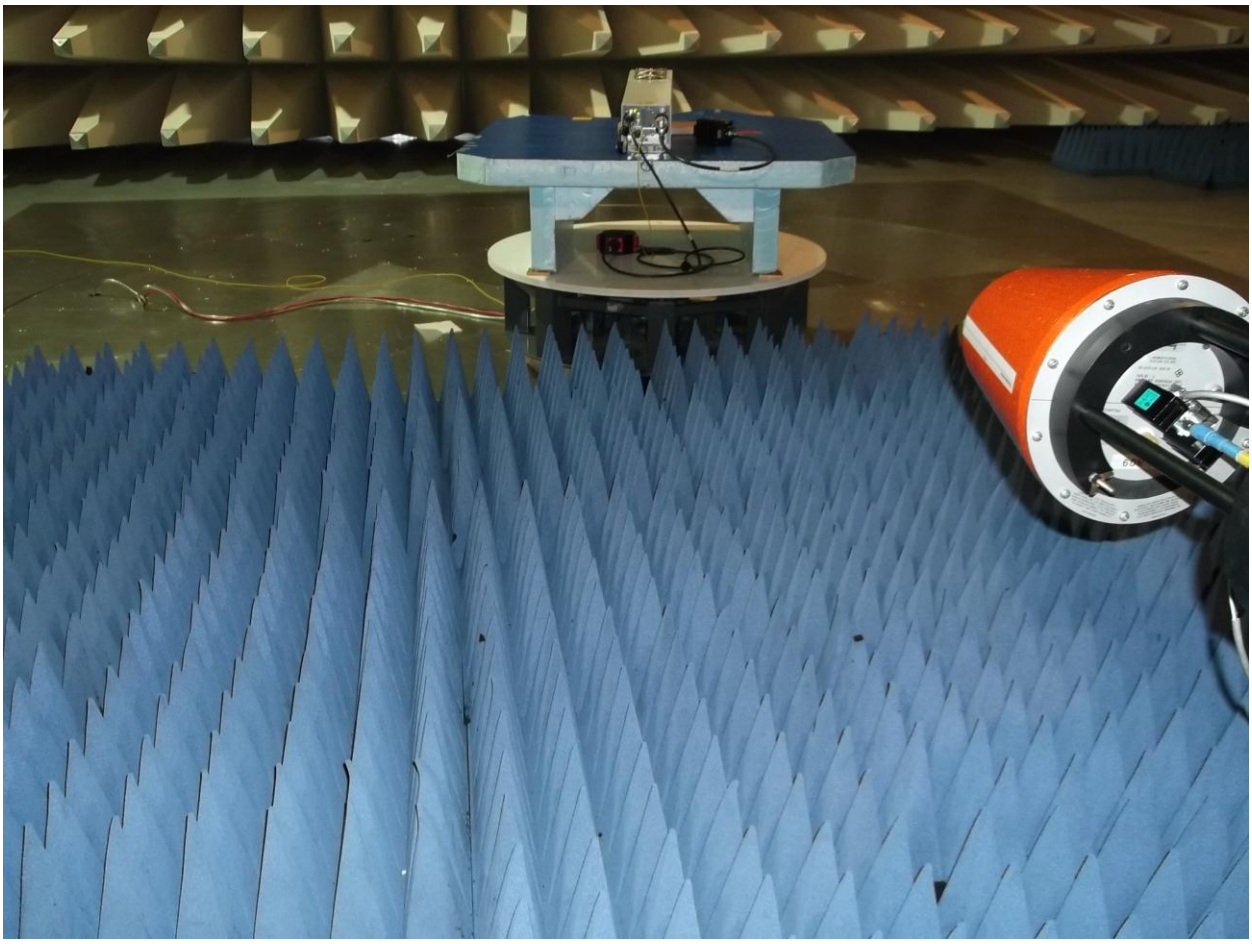
Test result	complies, according the plots above
Tested by:	M. Leinfelder
Date:	21.09.2012

8 Radiated Spurious Emissions: §24.238, §2.1053, RSS-133

picture 8.1: label



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



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

This clause specifies requirements for the measurement of radiated emission.

Frequency range	Distance: EUT <-> antenna / location	Limit	Test method
30 MHz - 1 GHz	3 metres / SAC	FCC 47 CFR Part 24.238	TIA/EIA-603-C:2004
		IC RSS-133 sec. 6.5	
1 GHz – 22 GHz	3 metres / SAC	FCC 47 CFR Part 24.238	
		IC RSS-133 sec. 6.5	

Test equipment used:

Designation	Type	Manufacturer	Invent.-no.	Cal.-date	due Cal.-date	used
EMI test receiver	ESI40	Rohde & Schwarz	E1607	02.07.2012	02.07.2013	X
Antenna	CBL 6111	Chase	K1026	29.03.2012	29.03.2013	X
Antenna	HL 025	R&S	K809	19.12.2011	19.12.2012	X
Preamplifier	AFS4-00102000	Miteq	K817	13.10.2012	13.10.2013	X
RF Cable	Sucoflex 100	Suhner	K1742	23.05.2012	23.05.2013	X
RF Cable	RG214	-	K1738	23.05.2012	23.05.2013	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 §24.238

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

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

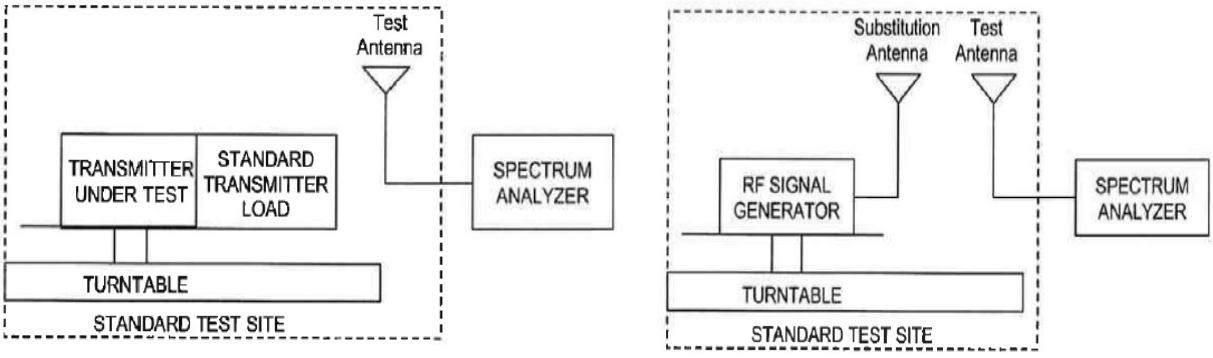
Measurement procedure. **TIA-603-C**

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

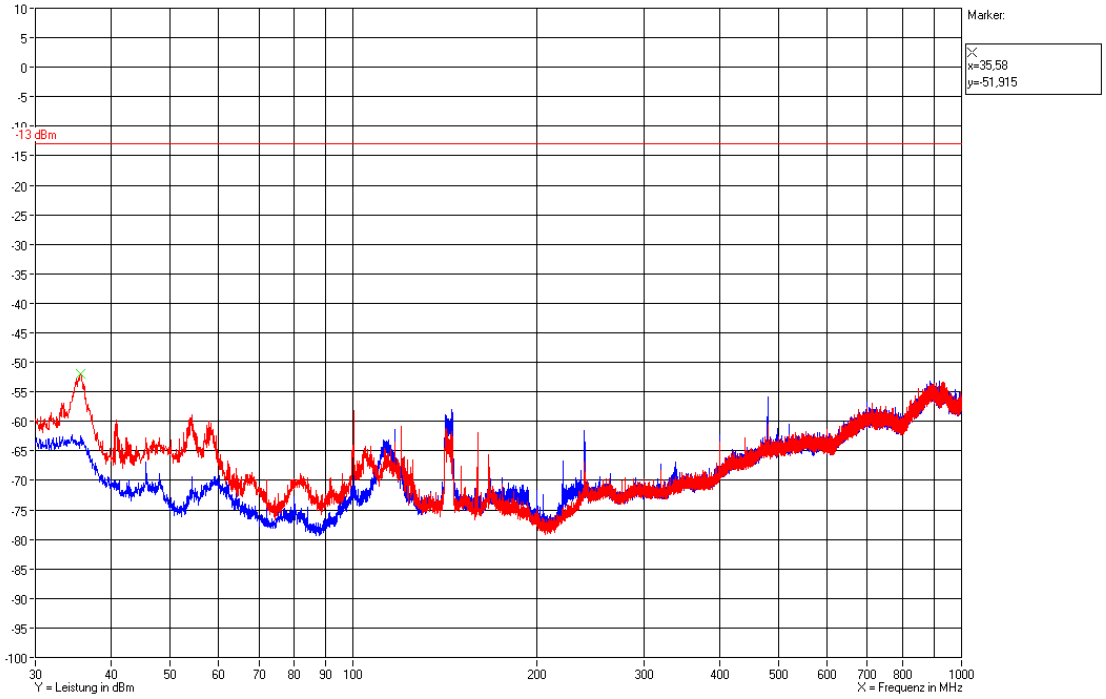
Temperature:	20°
Relative Humidity:	45%
Air-pressure:	1009hPa

8.4 Test results

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

Bottom 1975 MHz; Middle 1982.5 MHz; Top 1990 MHz

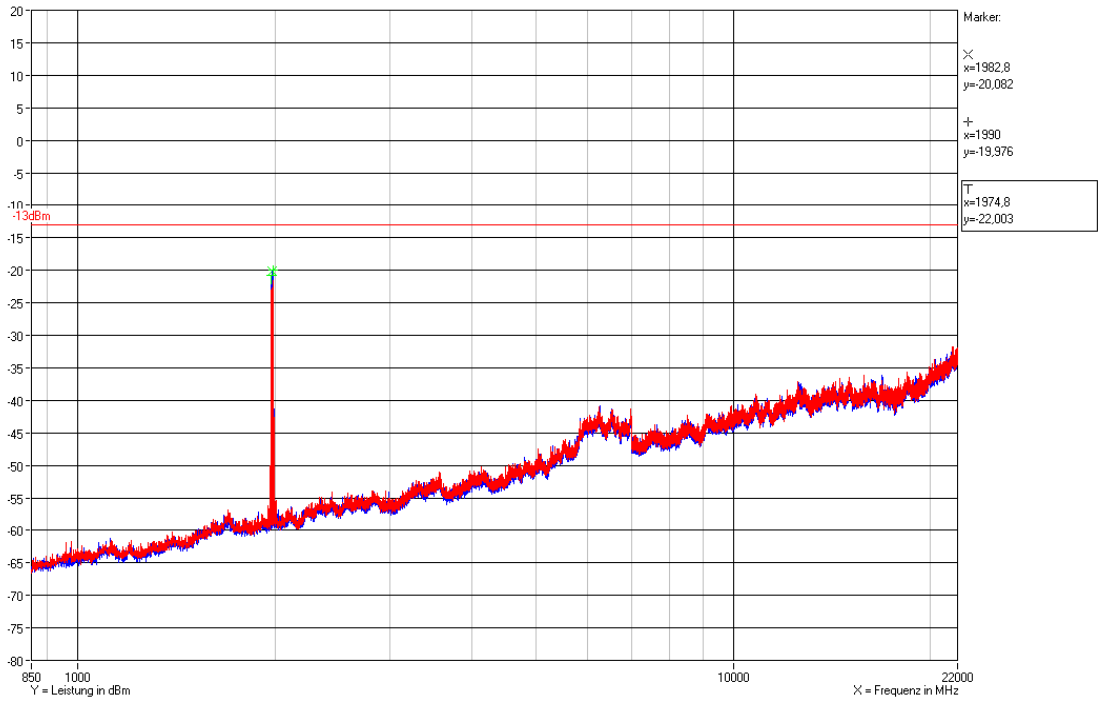
Horizontal / Vertikal



8.4.2 20 GHz -22 GHz Downlink (Bottom – Middle – Top)

Bottom 1975 MHz; Middle 1982.5 MHz; Top 1990 MHz

Horizontal / Vertikal



There were no spurious emissions detected other than noise and the fundamental.

8.4.3 History

Revision	Modification	Date	Name
V01.00	Initial Report	10.10.2012	Tom Zahlmann

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