

Test Site:  
FCC Test Site No.: 96997  
IC OATS No.: IC3475A-1



## ECL-EMC Test Report No.: 10-208

**Equipment under test:** ION M 19P EU  
**FCC ID:** XS5-ION-M19PEU  
**IC ID:** 2237E- IONM19PEU  
**Type of test:** **FCC 47 CFR Part 24 Subpart E**  
Broadband PCS  
**RSS-Gen:2007, RSS-131:2003**  
2 GHz Personal Communications Services

**Measurement Procedures:** 47 CFR Parts 2 (*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:	31.08.10			Signature:
Issue-No.:	01	Author:	<b>M. Lehmann</b> Test engineer	
Date of delivery:	14.07.10	Checked:	<b>M. Grytz</b> Operational manager	
Test dates:	15.07. – 05.08.10			
Pages:	38			



**Manufacturer:** ANDREW Wireless Systems GmbH  
Industriering 10

D-86675 Buchdorf

Tel.: +49 (0)9099 69 0

Fax: +49 (0)9099 69 140

**Test Location:** TEMPTON Service Plus GmbH  
European Compliance Laboratory (ECL)

Thurn-und-Taxis-Straße 18

D-90411 Nürnberg

Tel.: +49 0911 59835 0

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 24E 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 .....	5
2	EQUIPMENT UNDER TEST (E.U.T.) .....	6
2.1	DESCRIPTION .....	6
2.1.1	DOWNLINK .....	6
2.1.2	UPLINK .....	6
2.1.3	DESCRIPTION OF EUT .....	6
2.1.4	SYSTEM DIAGRAMS .....	7
2.1.5	BLOCK DIAGRAM OF MEASUREMENT REFERENCE POINTS .....	8
3	TEST SITE (ANDREW BUCHDORF) .....	9
3.1	TEST ENVIRONMENT .....	9
3.2	TEST EQUIPMENT .....	9
3.3	INPUT AND OUTPUT LOSSES .....	9
3.4	MEASUREMENT UNCERTAINTY .....	9
4	TEST SITE (TEMPTON SERVICE PLUS GMBH) .....	10
4.1	TEST ENVIRONMENT .....	10
5	RF POWER OUT: §24.232, §2.1046; RSS-133, RSS-GEN .....	11
5.1	LIMIT .....	11
5.2	TEST METHOD .....	11
5.3	TEST RESULTS .....	12
5.3.1	DOWNLINK .....	13
5.3.1.1	CDMA .....	14
5.3.1.2	W-CDMA .....	14
5.3.1.3	GSM .....	15
5.3.1.4	GSM-EDGE .....	15
5.3.2	UPLINK .....	16
5.4	SUMMARY TEST RESULT .....	16
6	OCCUPIED BANDWIDTH: §2.1049; RSS-GEN .....	17
6.1	LIMIT .....	17
6.2	TEST METHOD .....	17
6.3	TEST RESULTS .....	18
6.3.1	DOWNLINK .....	18
6.3.1.1	CDMA .....	19
6.3.1.2	W-CDMA .....	20
6.3.1.3	GSM .....	21
6.3.1.4	GSM-EDGE .....	22
6.3.2	UPLINK .....	23
6.4	SUMMARY TEST RESULT .....	23
7	SPURIOUS EMISSIONS AT ANTENNA TERMINALS: §24.238, §2.1051; RSS-132, RSS-GEN .....	24



---

7.1	LIMIT.....	24
7.2	TEST METHOD .....	24
7.3	TEST RESULTS .....	25
7.3.1	DOWNLINK .....	25
7.3.1.1	CDMA < 1MHz to band edge.....	26
7.3.1.2	W-CDMA < 1MHz to band edge.....	27
7.3.1.3	GSM < 1MHz to band edge.....	28
7.3.1.4	GSM-EDGE < 1MHz to band edge.....	29
7.3.1.5	CDMA > 1MHz to band edge.....	30
7.3.1.6	W-CDMA > 1MHz to band edge.....	30
7.3.1.7	GSM > 1MHz to band edge.....	31
7.3.1.8	GSM-EDGE > 1MHz to band edge.....	31
7.3.2	UPLINK .....	32
7.4	SUMMARY TEST RESULT.....	32
8	RADIATED SPURIOUS EMISSIONS: §24.238, §2.1051; RSS-131, RSS-GEN.....	33
8.1	LIMIT.....	35
8.1.1	TEST METHOD .....	35
8.2	TEST RESULTS .....	36
8.2.1	30 MHz TO 1 GHz DOWNLINK (BOTTOM – MIDDLE – TOP).....	36
8.2.2	1GHz TO 20GHz DOWNLINK (BOTTOM – MIDDLE – TOP).....	37
8.2.3	UPLINK .....	37
8.3	SUMMARY TEST RESULT.....	37
9	HISTORY.....	38

## 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-131	RSS-GEN 4.8	Complies
Occupied Bandwidth		RSS-GEN 4.6.1	Complies
Spurious Emissions at Antenna Terminals	RSS-131	RSS-GEN 4.9	Complies
Field Strength of Spurious Emissions	RSS-131	RSS-GEN 4.10	Complies
Frequency Stability	RSS-131	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-M19P EU	
Andrew Ident. Number	7620304-0001	
Serial no.(SN)	11	
Revision	00	
Software version and ID	V3.19.0.4; 7162793	
Type of modulation and Designator	CDMA (F9W)	<input checked="" type="checkbox"/>
	W-CDMA (F9W)	<input checked="" type="checkbox"/>
	GSM (GXW)	<input checked="" type="checkbox"/>
	GSM-EDGE (G7W)	<input checked="" type="checkbox"/>
Frequency Translation	F1-F1	<input checked="" type="checkbox"/>
	F1-F2	<input type="checkbox"/>
	N/A	<input type="checkbox"/>
Band Selection	Software	<input type="checkbox"/>
	Duplexer	<input checked="" type="checkbox"/>
	Fullband	<input type="checkbox"/>

#### 2.1.1 Downlink

Pass band	1930 MHz – 1995 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	1850 MHz – 1915 MHz
Max. composite output power based on one carrier (rated)	n.a.
Gain max.	n.a.

#### 2.1.3 Description of EUT

Andrew ION-M80-85HP/19P 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 1900 MHz Path (ION-M19P EU). The ION-M80-85HP/19P Repeater system consists of one 800/850 MHz remote unit and one 1900 MHz extension unit, with the intended use of simultaneous transmission

### 2.1.4 System diagrams

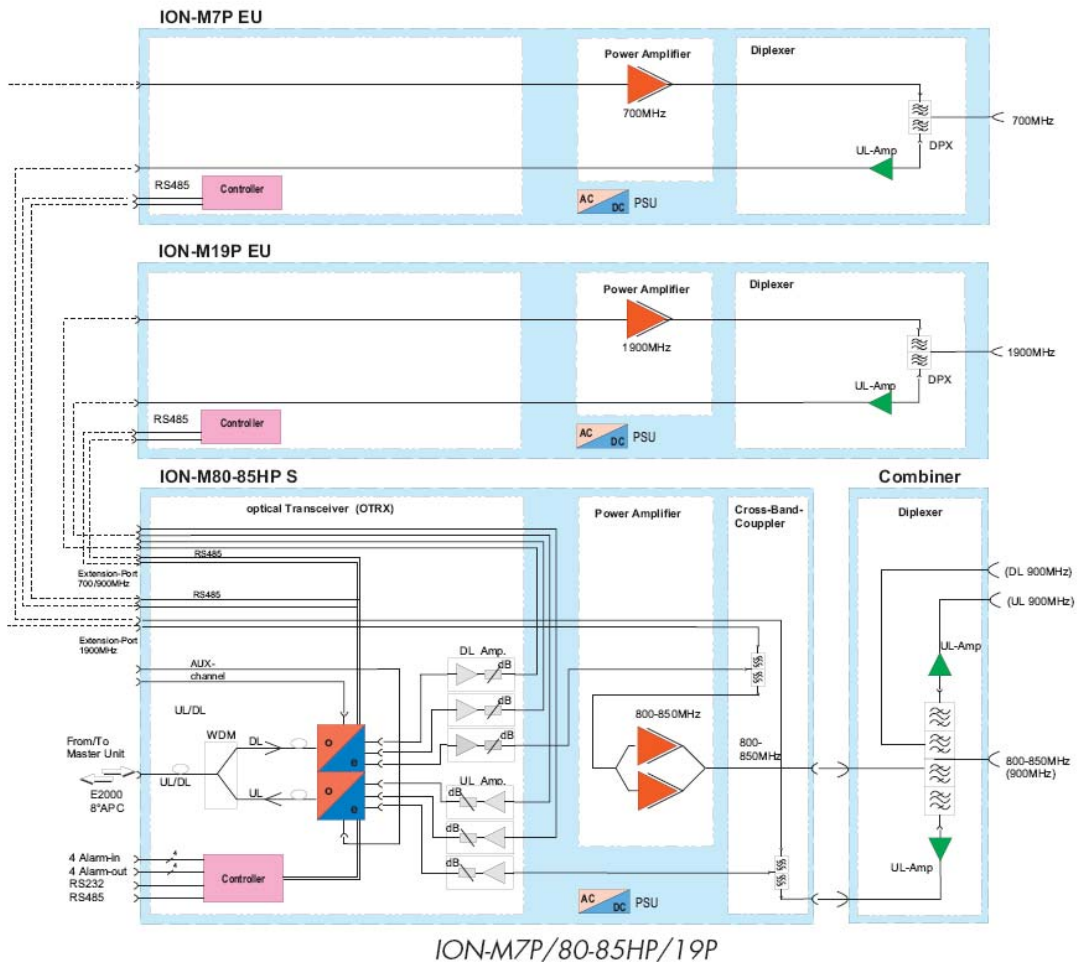


figure 2.1.4-#1 System diagrams: ION optical distribution system EUT is ION-M19P EU

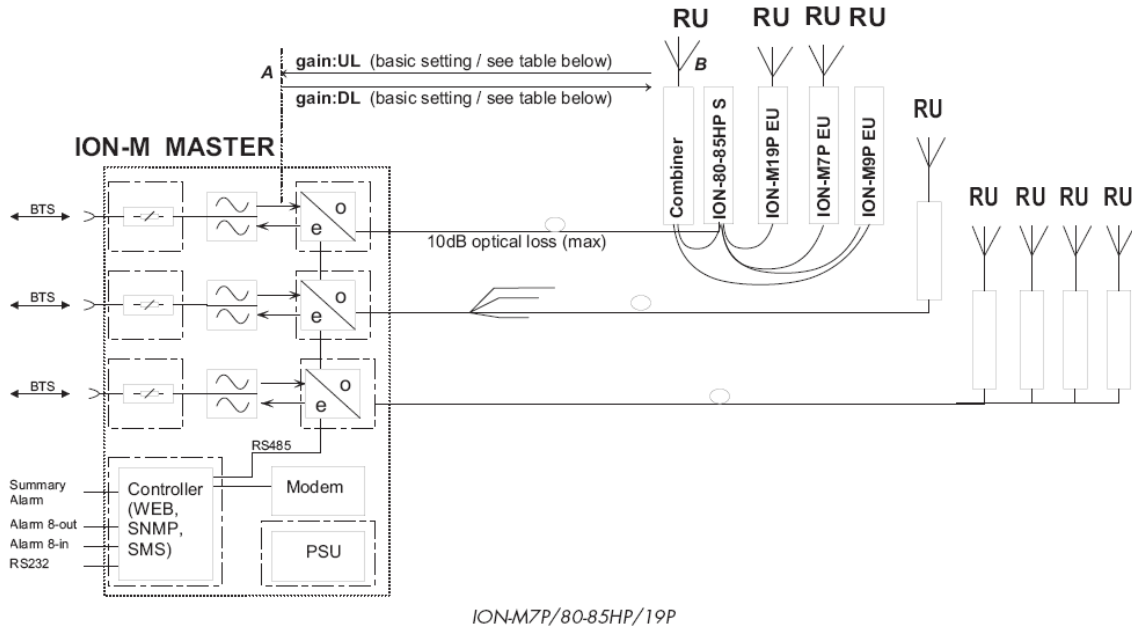


figure 2.1.4-#2 System diagrams

### 2.1.5 Block diagram of measurement reference points

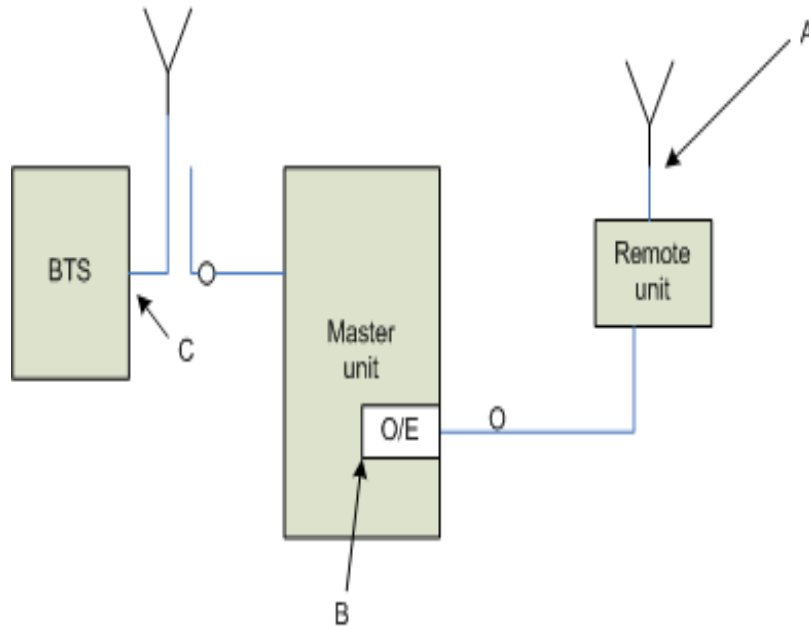


figure 2.1.5-#1 Block diagram of measurement reference points

Remote Unit is the EUT  
 O/E Optcal/Electrical converter  
 SRMU SubRackMaster Unit

Reference point A, Remote Unit DL output, UL input  
 Reference point B, SRMU UL output, DL input  
 Reference point C, BTS DL output, 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
8961	Spectrum Analyzer	FSP13	R&S	837747/023	10/10
8736	Signal Analyzer	FSIQ26	R&S	100290	12/10
8984	Signal Generator	E4438C	Agilent	MY45094089	11/10
8998	Signal Generator	SMIQ06B	R&S	100874	09/10
8689	Power Meter	E4418B	Agilent	GB40203847	08/10
8670	Power Sensor	E9300H	Agilent	MY41090174	08/10
7119	Divider	2way	Mikom	3512	CIU
7323	Circulator	E10-1FFF	AEROTEK	25357	CIU
7315	Circulator	E10-1FFF	AEROTEK	25344	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
7373	RF-Cable	Multiflex141 0,6m	Andrew	---	CIU
7374	RF-Cable	Multiflex141 0,6m	Andrew	---	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 Service Plus GmbH)

Test Site:

FCC Test Site No.: 96997  
IC OATS No.: IC3475A-1

### 4.1 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	

Measurements see section 8.

## 5 RF Power Out: §24.232, §2.1046; RSS-133, RSS-GEN

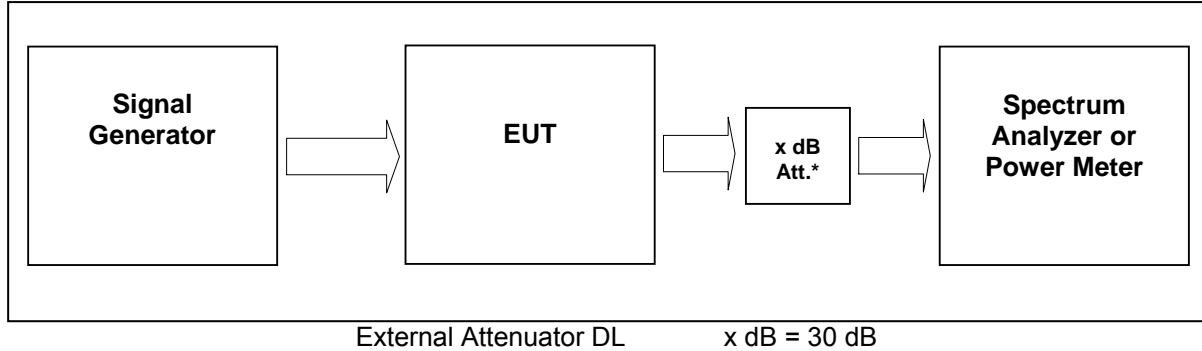


figure 4.1-#1 Test setup: RF Power Out: §24.232, §2.1046; RSS-133, RSS-GEN

Measurement uncertainty	± 0,38 dB
Test equipment used	8984,8961,8689,8670,7363,7364,7365

### 5.1 Limit

Minimum standard:

Para. No.24.232(a)

a) Base stations are limited to 1640 watts peak equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT, except as described in paragraph (b) below. See §24.53 for HAAT calculation method. Base station antenna heights may exceed 300 meters with a corresponding reduction in power; see Table 1 of this section. The service area boundary limit and microwave protection criteria specified in §§24.236 and 24.237 apply.

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 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 TS45.004

Test signal GSM EDGE:

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

Test signal CDMA2000:

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 clause 6.1.1.1 of standard specification 3GPP TS25.141 v8.8.0 (2009-09). 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 -
CDMA	1962,500 MHz	3MHz 10MHz 15MHz	43	20	5.3.1.1 #1
WCDMA	1962,500 MHz	10MHz 10MHz 50MHz	43	20	5.3.1.2 #1
GSM	1962,500 MHz	1MHz 3MHz 10MHz	43	20	5.3.1.3 #1
GSM- EDGE	1962,500 MHz	1MHz 3MHz 10MHz	43	20	5.3.1.4 #1
Maximum output power = 43 dBm -> 20 W					
Limit Maximum output power = 160 W -> 52,04 dBm					

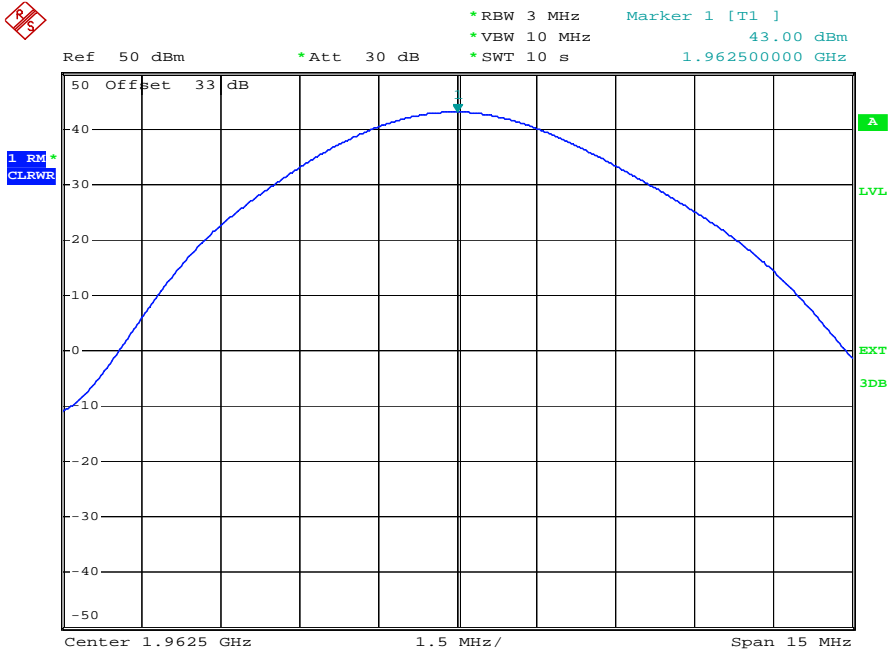
table 5.3.1-#1 RF Power Out: §24.232, §2.1046; RSS-133, RSS-GEN Test results Downlink

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

table 5.3.1-#2 RF Power Out: §24.232, §2.1046; RSS-133, RSS-GEN Test results Downlink Input power



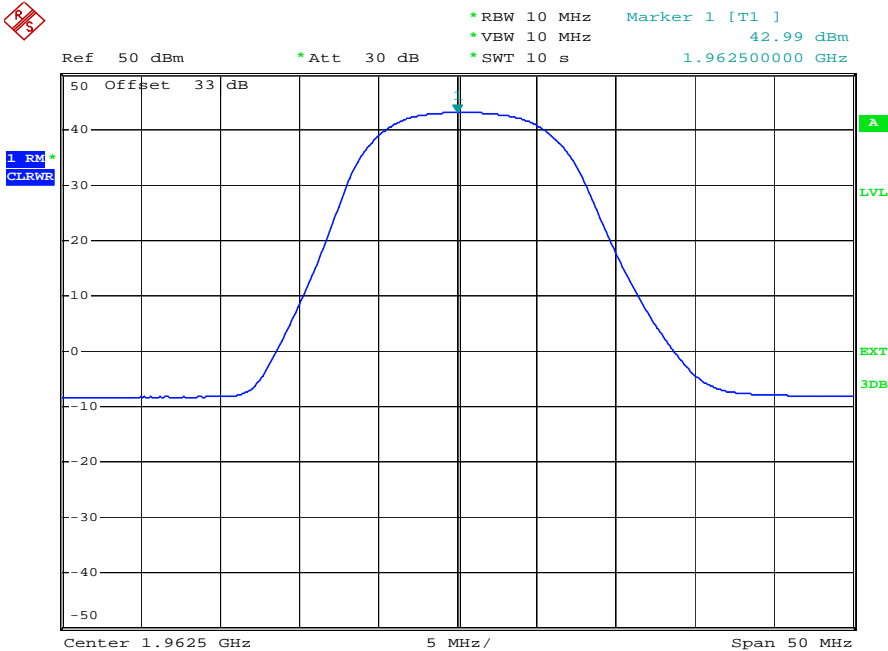
### 5.3.1.1 CDMA



Date: 14.JUL.2010 10:16:13

plot 5.3.1.1-#1 RF Power Out: §24.232, §2.1046; RSS-133, RSS-GEN; Test results; Downlink; CDMA

### 5.3.1.2 W-CDMA

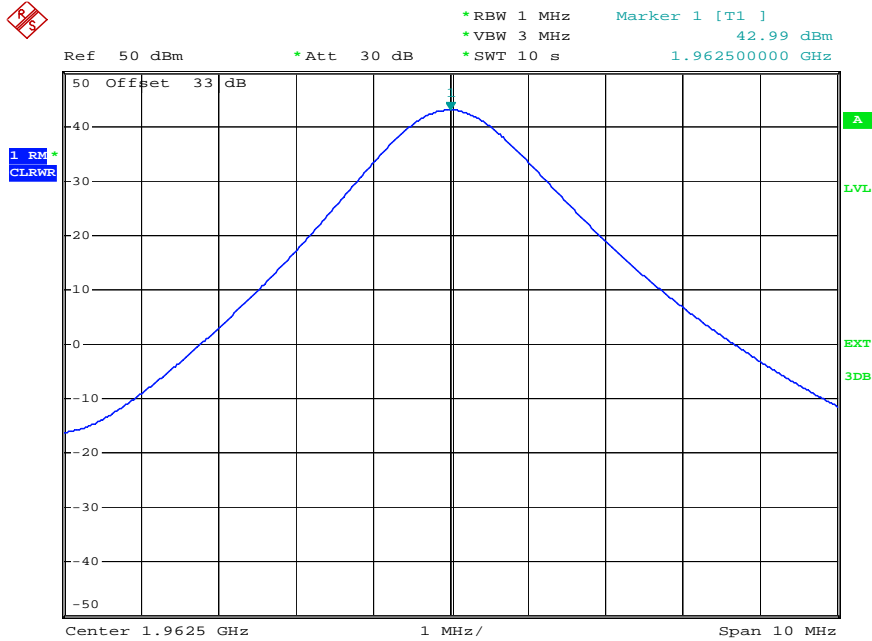


Date: 14.JUL.2010 10:18:11

plot 5.3.1.2-#1 RF Power Out: §24.232, §2.1046; RSS-133, RSS-GEN; Test results; Downlink; W-CDMA



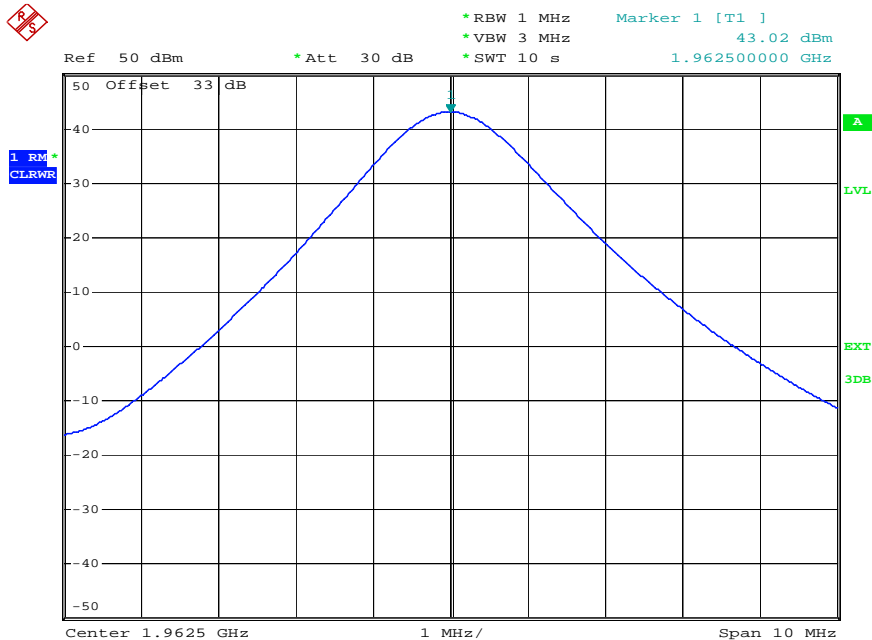
### 5.3.1.3 GSM



Date: 14.JUL.2010 10:13:59

plot 5.3.1.3-#1 RF Power Out: §24.232, §2.1046; RSS-133, RSS-GEN; Test results; Downlink; GSM

### 5.3.1.4 GSM-EDGE



Date: 14.JUL.2010 10:14:30

plot 5.3.1.4-#1 RF Power Out: §24.232, §2.1046; RSS-133, RSS-GEN; Test results; Downlink; GSM-EDGE



### 5.3.2 Uplink

n.a.

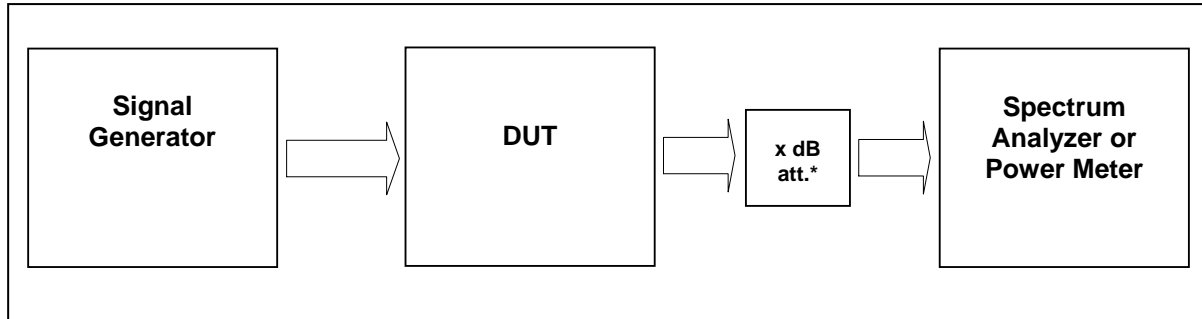
Note: The EUT does not transmit over the air in the uplink direction.

### 5.4 Summary test result

Test result	complies, according the plots above
Tested by:	R. Friedrich
Date:	15.07.2010



## 6 Occupied Bandwidth: §2.1049; RSS-GEN



External Attenuator DL      x dB = 30 dB  
figure 5.4-#1 Test setup: Occupied Bandwidth: §2.1049; RSS-GEN

Measurement uncertainty	± 0,38 dB
Test equipment used	8984,8961,8689,8670,7363,7364,7365

### 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**

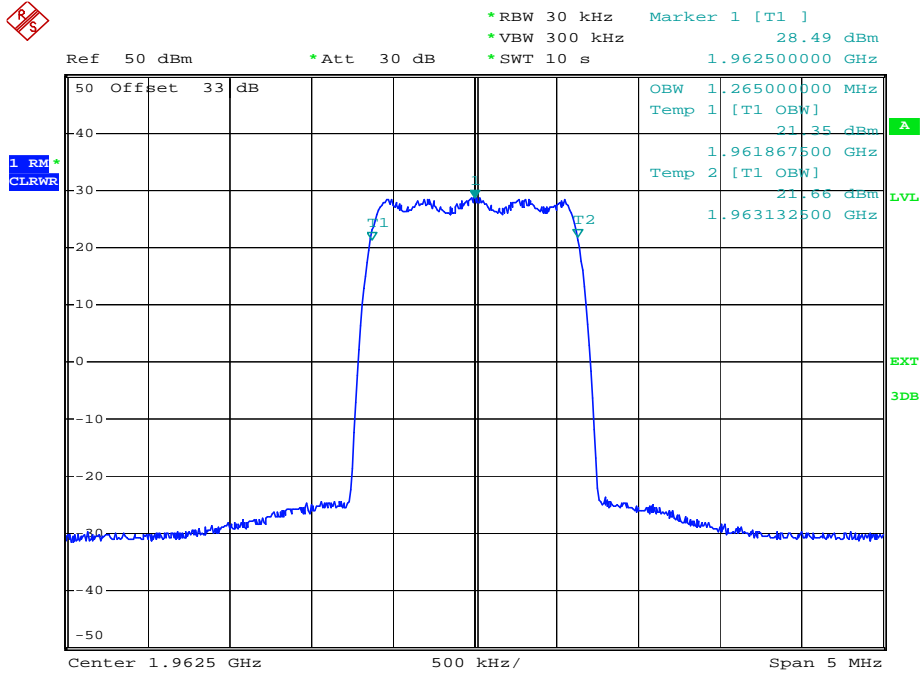
Detector RMS.

Modulation	Measured at		RBW VBW Span	Occupied Bandwidth / MHz	Plot #
CDMA	Middle	1962,5 MHz	30kHz 300kHz 5MHz	1.265	6.3.1.1 #1, #2
WCDMA	Middle	1962,5 MHz	100kHz 1MHz 10MHz	4.18	6.3.1.2 #1, #2
GSM	Middle	1962,5 MHz	3kHz 30kHz 1MHz	0.2465	6.3.1.3 #1, #2
GSM-EDGE	Middle	1962,5 MHz	3kHz 30kHz 1MHz	0.246	6.3.1.4 #1, #2

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

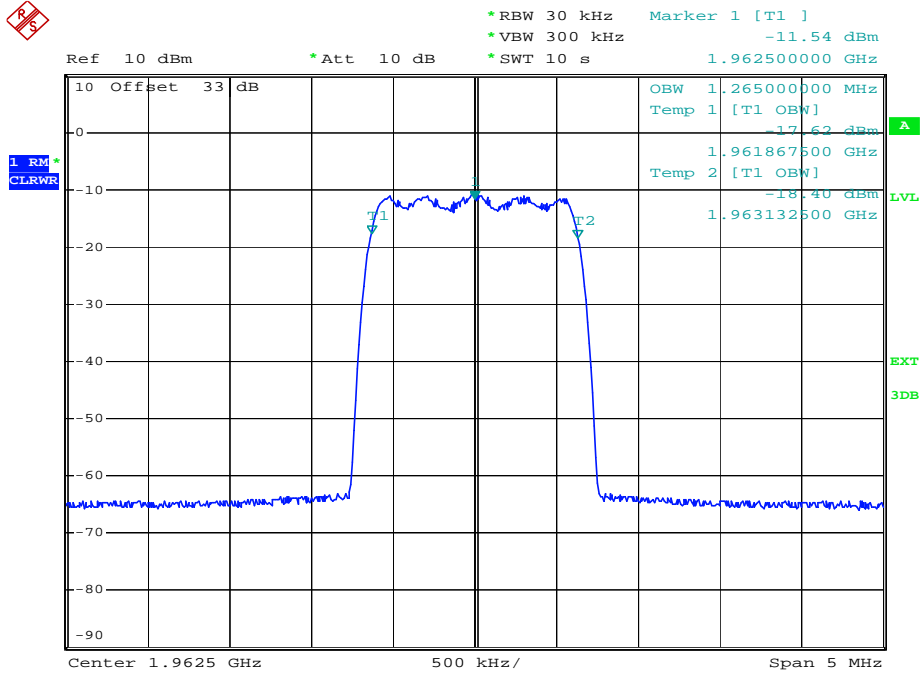


6.3.1.1 CDMA



Date: 14.JUL.2010 10:23:34

plot 6.3.1.1-#1 Occupied Bandwidth: \$2.1049; RSS-GEN; Test results; Downlink; CDMA Output

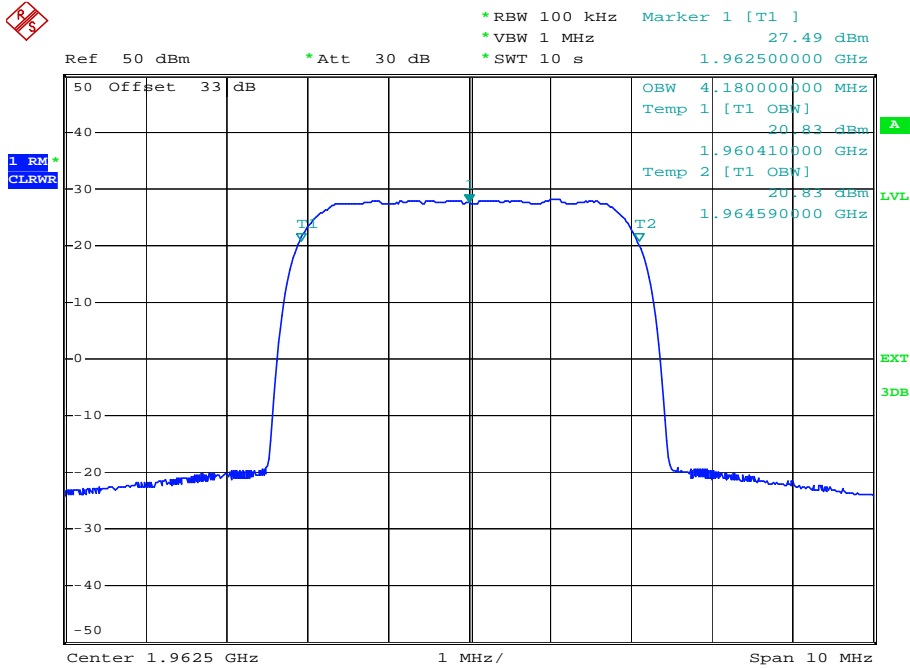


Date: 14.JUL.2010 10:26:54

plot 6.3.1.1-#2 Occupied Bandwidth: \$2.1049; RSS-GEN; Test results; Downlink; CDMA Input

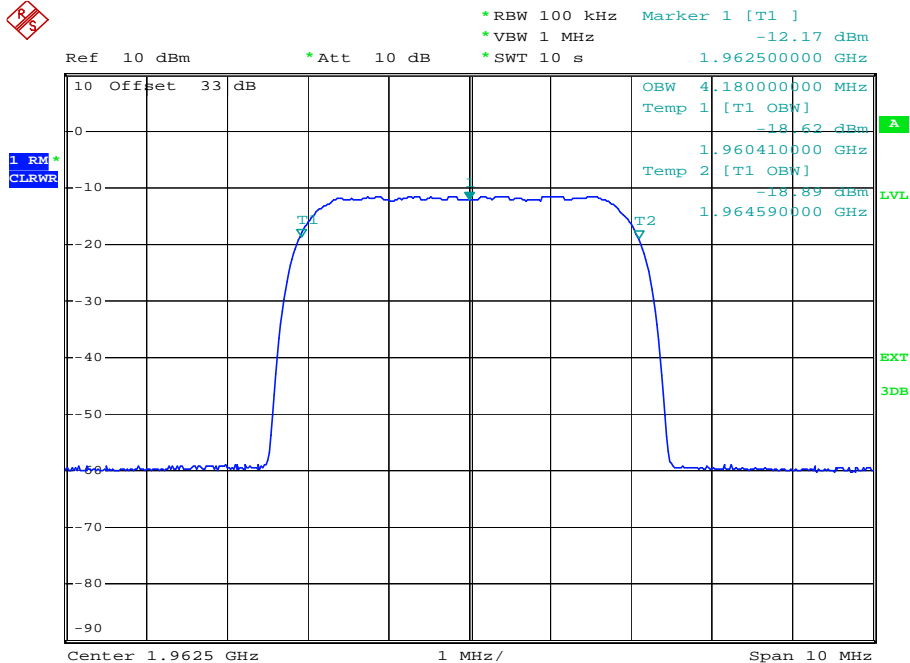


6.3.1.2 W-CDMA



Date: 14.JUL.2010 10:22:26

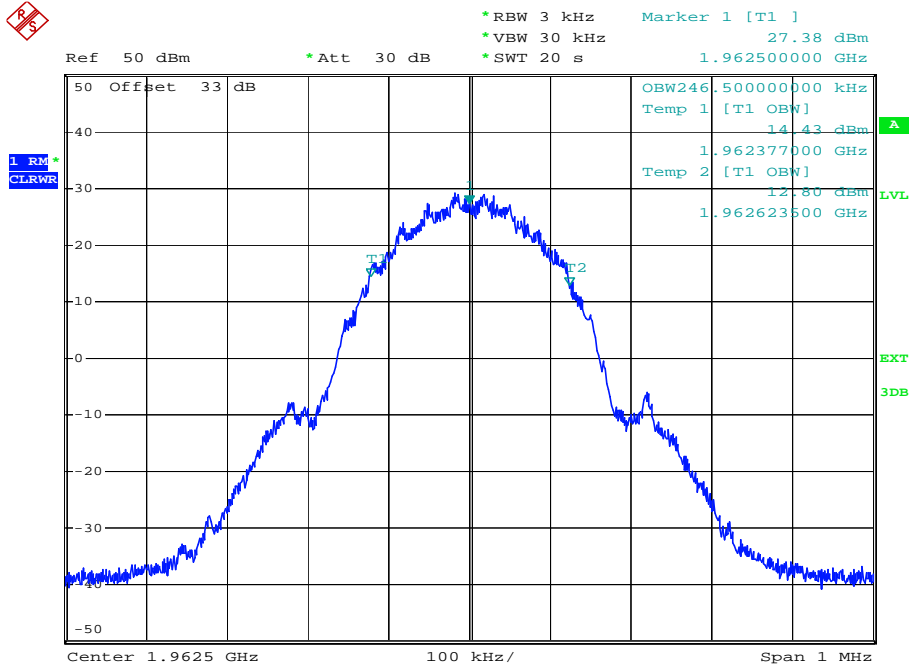
plot 6.3.1.2-#1 Occupied Bandwidth: §2.1049; RSS-GEN; Test results; Downlink; W-CDMA Output



Date: 14.JUL.2010 10:28:37

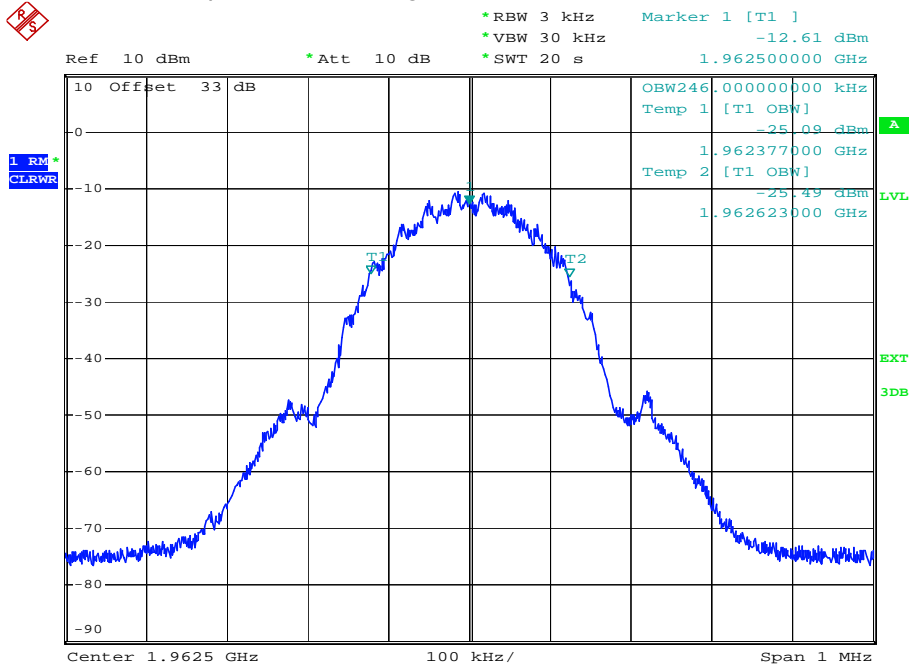
plot 6.3.1.2-#2 Occupied Bandwidth: §2.1049; RSS-GEN; Test results; Downlink; W-CDMA Input

6.3.1.3 GSM



Date: 14.JUL.2010 10:36:35

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

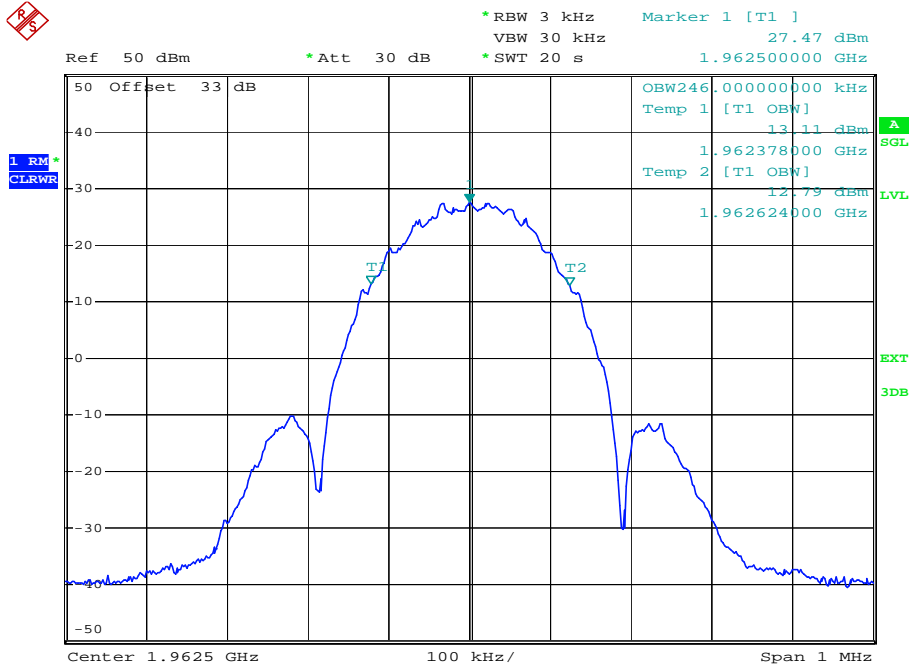


Date: 14.JUL.2010 10:42:18

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

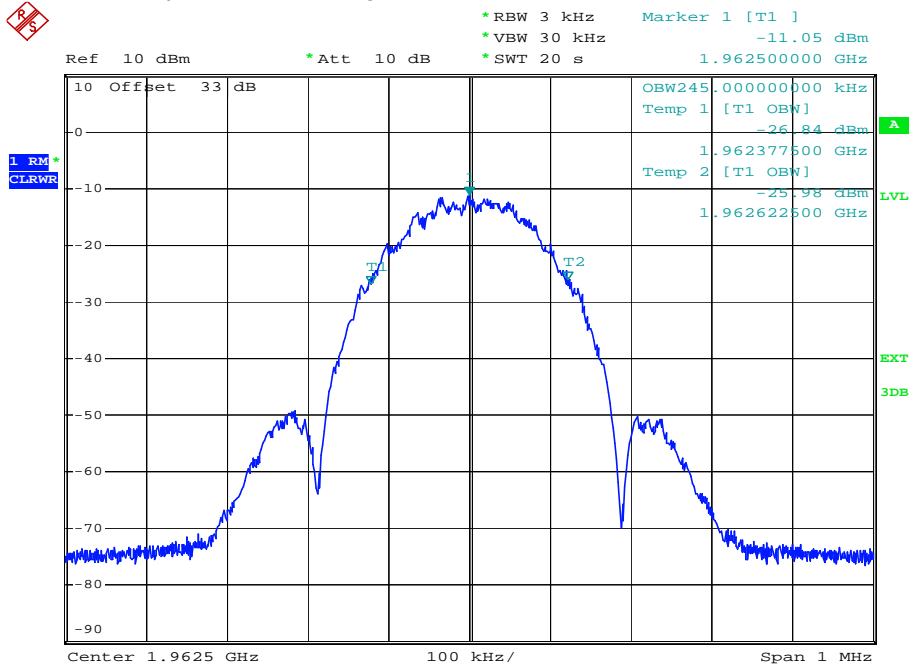


6.3.1.4 GSM-EDGE



Date: 15.JUL.2010 08:15:24

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



Date: 14.JUL.2010 10:32:12

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



---

### 6.3.2 Uplink

n.a.

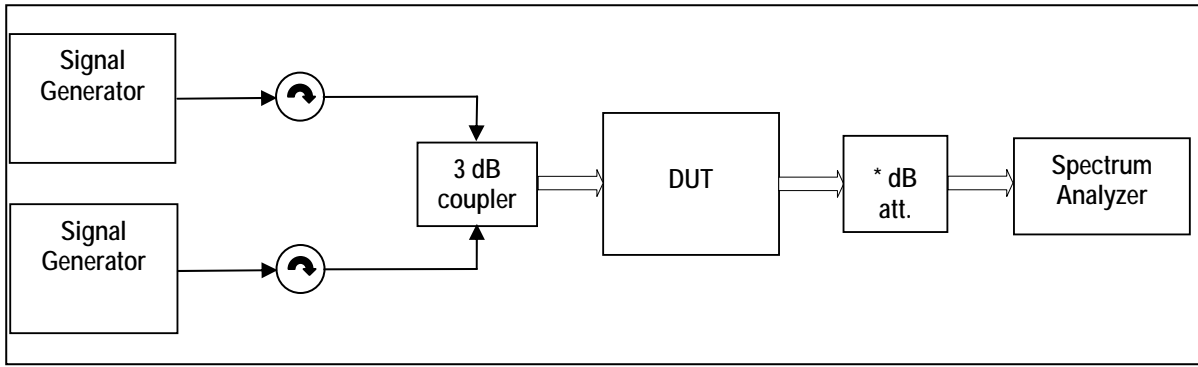
Note: The EUT does not transmit over the air in the uplink direction.

### 6.4 Summary test result

Test result	complies, according the plots above
Tested by:	R. Friedrich
Date:	14.07.2010



## 7 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN



Multisignal-Generator used, External Attenuator DL x dB = 10 dB  
 figure 7-#1 Test setup: Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, 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	8984,8961,8689,8670,7363,7364;7323, 7315,7119;8998	

### 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 and amended 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 -
CDMA	Lower Edge	1930,75 MHz	30kHz 300kHz 6MHz	-21,9	7.3.1.1 #1
	Upper Edge	1932,00 MHz 1993,00 MHz 1994,25 MHz		-23,5	#2
WCDMA	Lower Edge	1932,40 MHz	100kHz 300kHz 15MHz	-18,9	7.3.1.2 #1
	Upper Edge	1937,40 MHz 1987,60 MHz 1992,60 MHz		-19,5	#2
GSM	Lower Edge	1930,2 MHz	3kHz 30kHz 2MHz	-14,0	7.3.1.3 #1
	Upper Edge	1930,4 MHz 1989,6 MHz 1989,8 MHz		-13,7	#2
GSM-EDGE	Lower Edge	1930,2 MHz	3kHz 30kHz 2MHz	-14,3	7.3.1.4 #1
	Upper Edge	1930,4 MHz 1989,6 MHz 1989,8 MHz		-15,7	#2

table 7.3-#1 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN Test results Downlink <1MHz from Band Edge

#### >1MHz from Band Edge

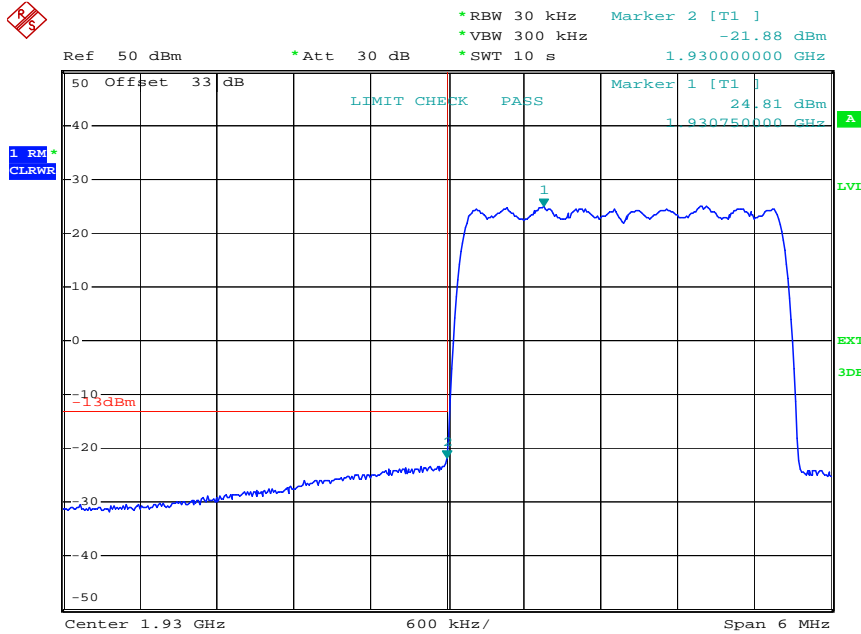
Detector: RMS.

Modulation	Carrier at	Carrier	Max. level (dBm)	RBW VBW Frequency range	Plot -
CDMA	Middle	1962,5 MHz	-24,7	1MHz 3MHz 30MHz – 20GHz	7.3.1.5 #1
WCDMA	Middle	1962,5 MHz	-24,6	1MHz 3MHz 30MHz – 20GHz	7.3.1.6 #1
GSM	Middle	1962,5 MHz	-24,7	1MHz 3MHz 30MHz – 20GHz	7.3.1.7 #1
GSM-EDGE	Middle	1962,5 MHz	-24,7	1MHz 3MHz 30MHz – 20GHz	7.3.1.8 #1

table 7.3-#2 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN Test results Downlink >1MHz from Band Edge

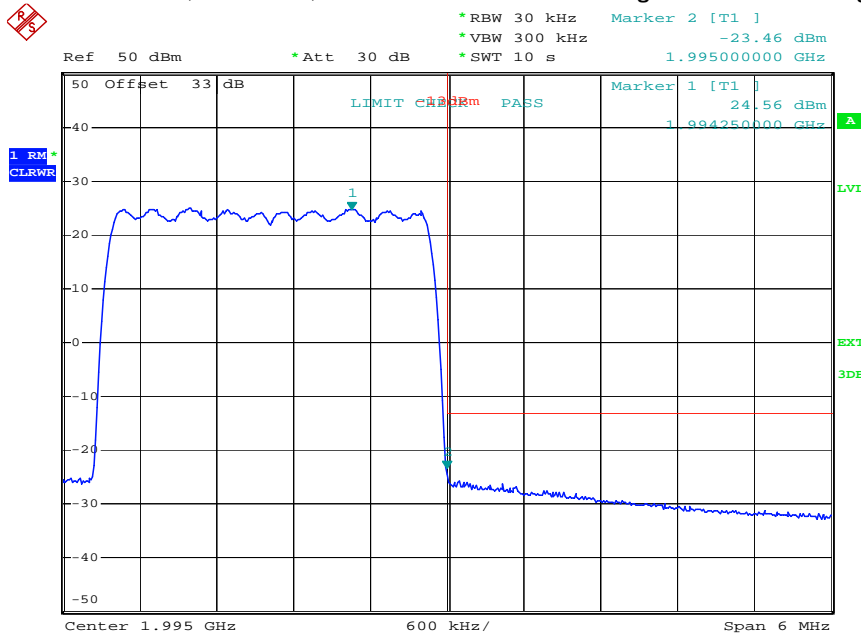


7.3.1.1 CDMA < 1MHz to band edge



Date: 14.JUL.2010 13:46:29

plot 7.3.1.1-#1 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN; Test results; Downlink; CDMA < 1MHz to band edge Lower Band Edge

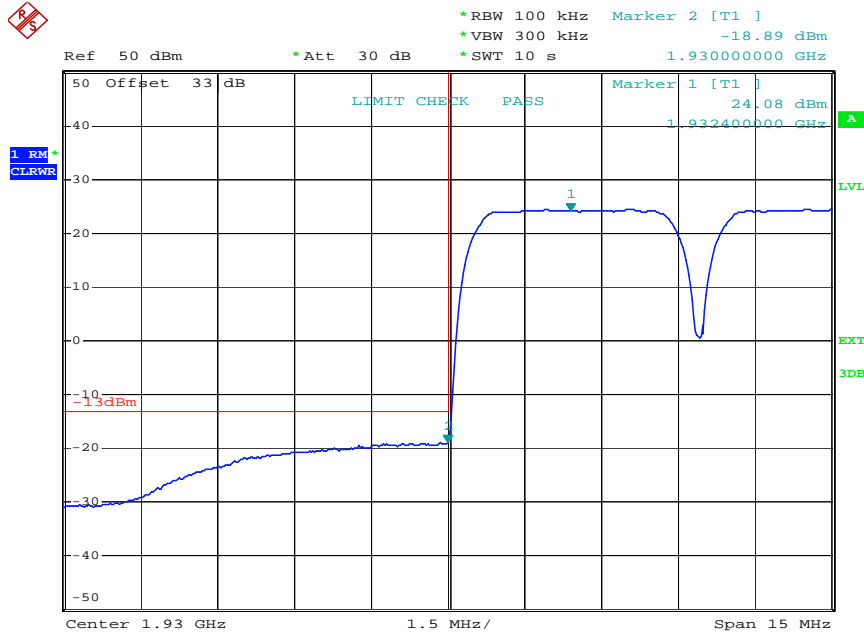


Date: 14.JUL.2010 14:02:29

plot 7.3.1.1-#2 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN; Test results; Downlink; CDMA < 1MHz to band edge Upper Band Edge

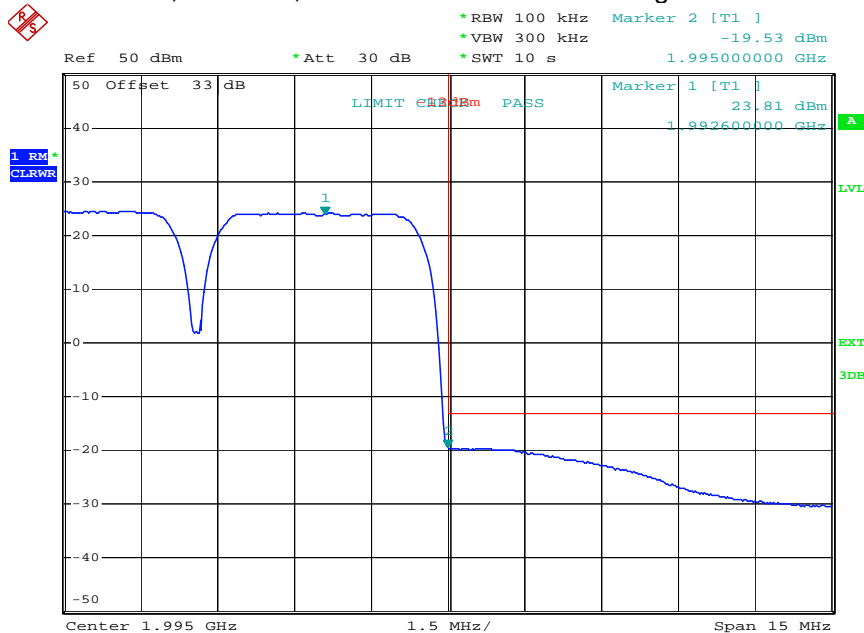


### 7.3.1.2 W-CDMA < 1MHz to band edge



Date: 14.JUL.2010 15:43:27

plot 7.3.1.2-#1 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN; Test results; Downlink; W-CDMA < 1MHz to band edge Lower Band Edge

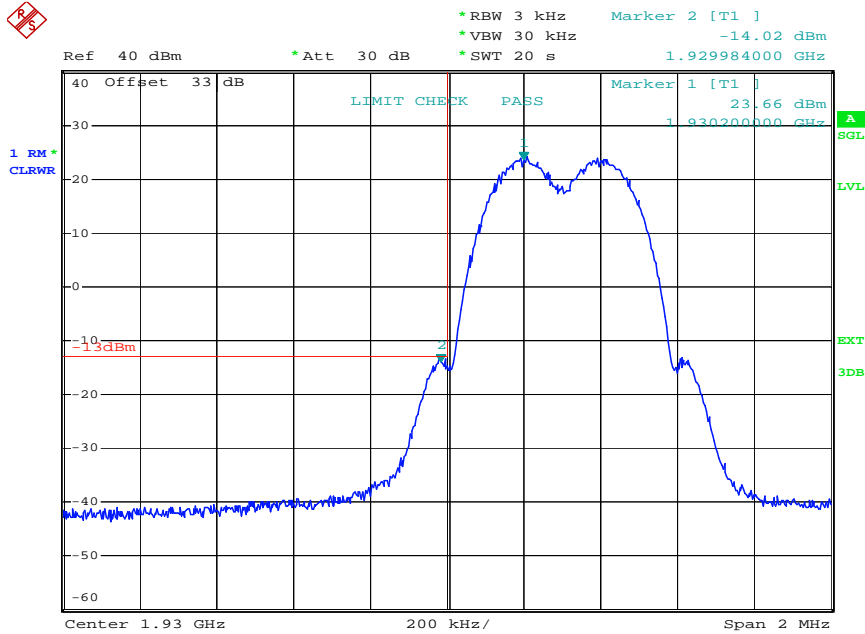


Date: 14.JUL.2010 15:47:17

plot 7.3.1.2-#2 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN; Test results; Downlink; W-CDMA < 1MHz to band edge Upper Band Edge

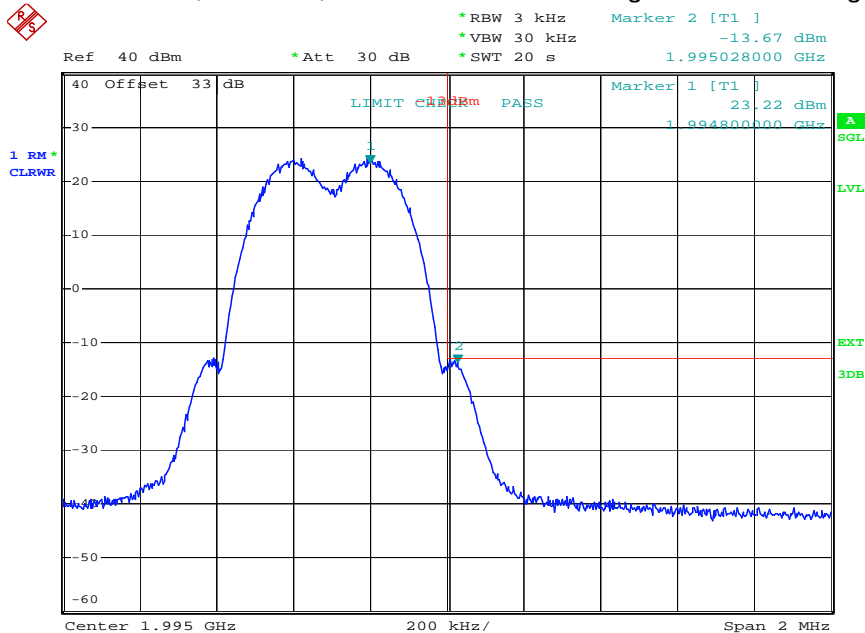


7.3.1.3 GSM < 1MHz to band edge



Date: 14.JUL.2010 16:32:14

plot 7.3.1.3-#1 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN; Test results; Downlink; GSM < 1MHz to band edge Lower Band Edge

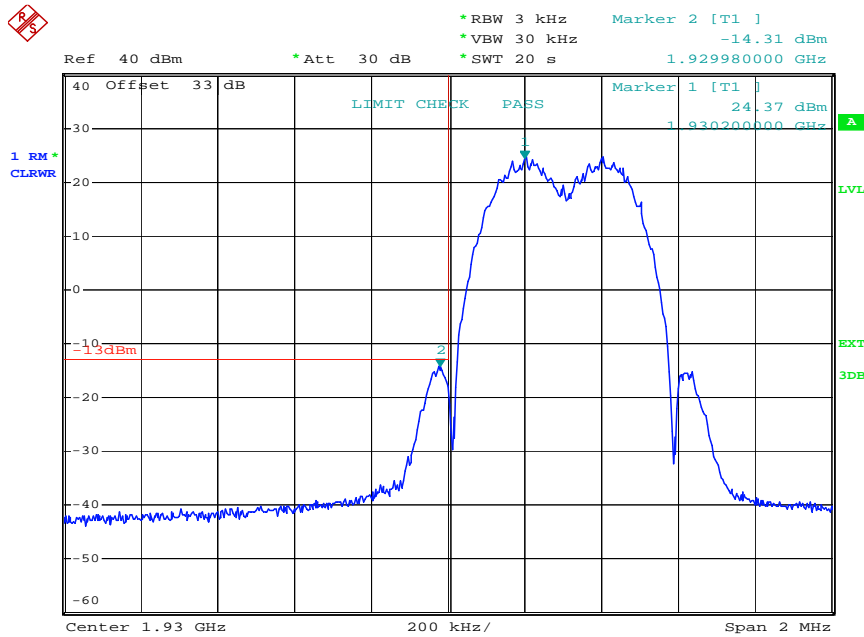


Date: 14.JUL.2010 16:20:36

plot 7.3.1.3-#2 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN; Test results; Downlink; GSM < 1MHz to band edge Upper Band Edge

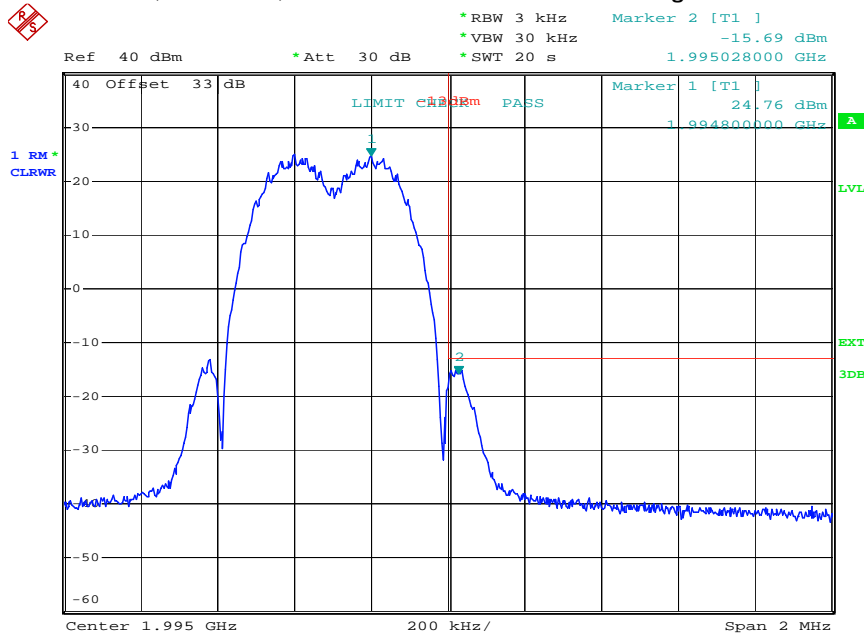


### 7.3.1.4 GSM-EDGE < 1MHz to band edge



Date: 14.JUL.2010 16:29:37

plot 7.3.1.4-#1 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN; Test results; Downlink; GSM-EDGE < 1MHz to band edge Lower Band Edge

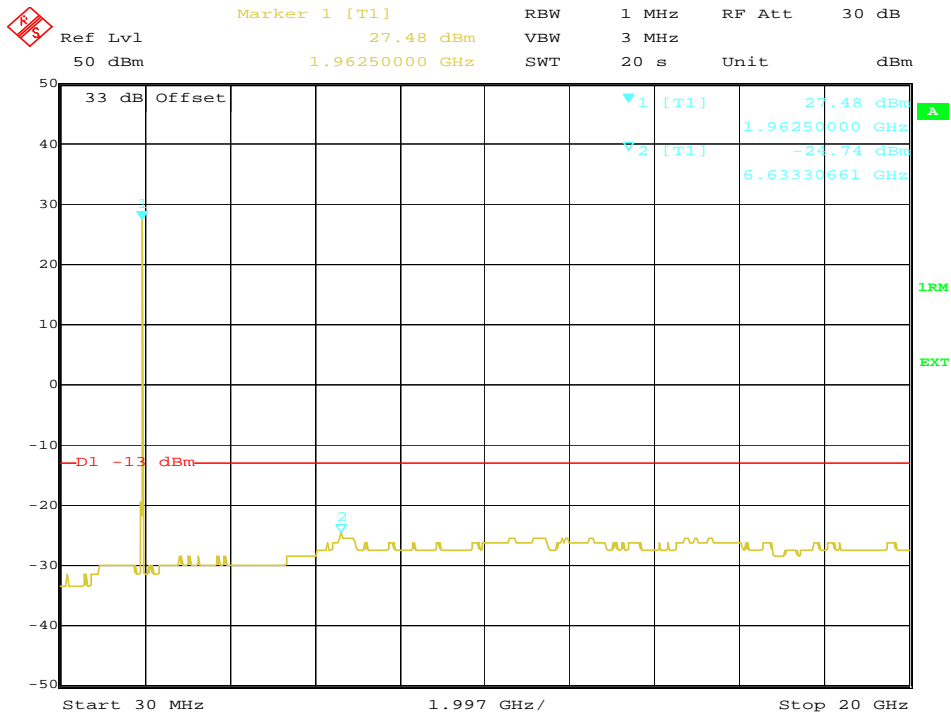


Date: 14.JUL.2010 16:26:56

plot 7.3.1.4-#2 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN; Test results; Downlink; GSM-EDGE < 1MHz to band edge Upper Band Edge



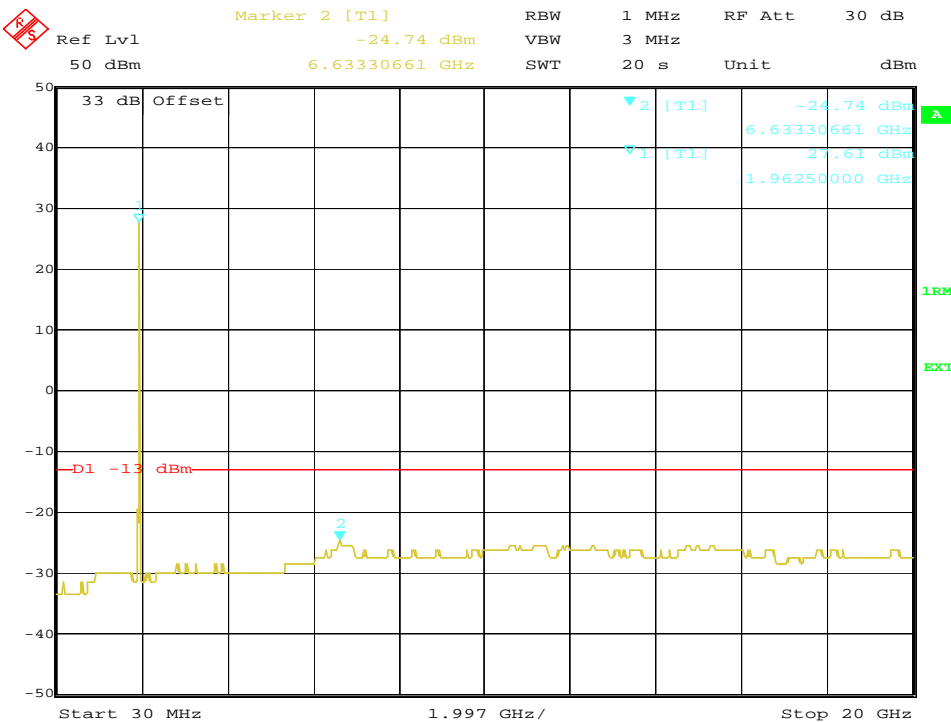
### 7.3.1.5 CDMA > 1MHz to band edge



Date: 15.JUL.2010 11:44:39

plot 7.3.1.5-#1 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN; Test results; Downlink; CDMA > 1MHz to band edge;

### 7.3.1.6 W-CDMA > 1MHz to band edge

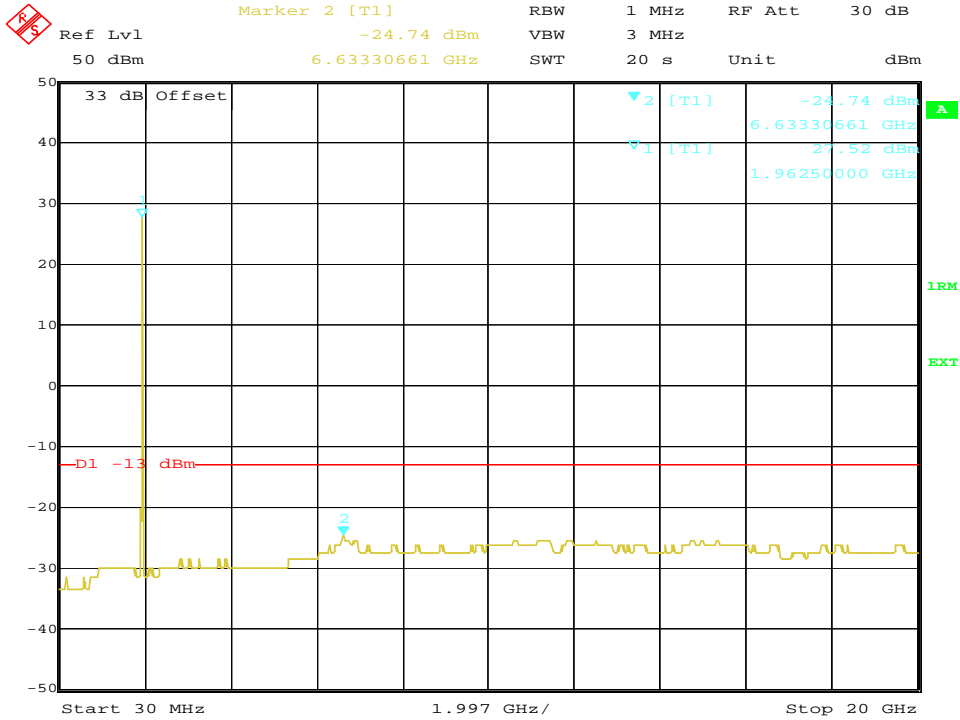


Date: 15.JUL.2010 11:51:50

plot 7.3.1.6-#1 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN; Test results; Downlink; W-CDMA > 1MHz to band edge;

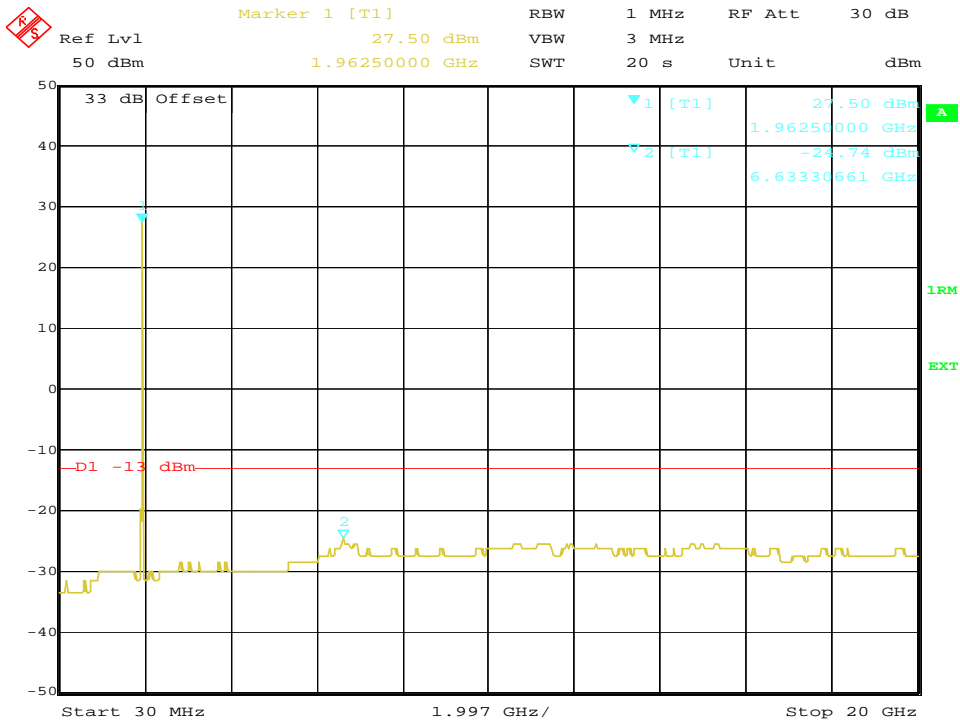


7.3.1.7 GSM > 1MHz to band edge



plot 7.3.1.7-#1 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN; Test results; Downlink; GSM > 1MHz to band edge;

7.3.1.8 GSM-EDGE > 1MHz to band edge



plot 7.3.1.8-#1 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN; Test results; Downlink; GSM-EDGE > 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

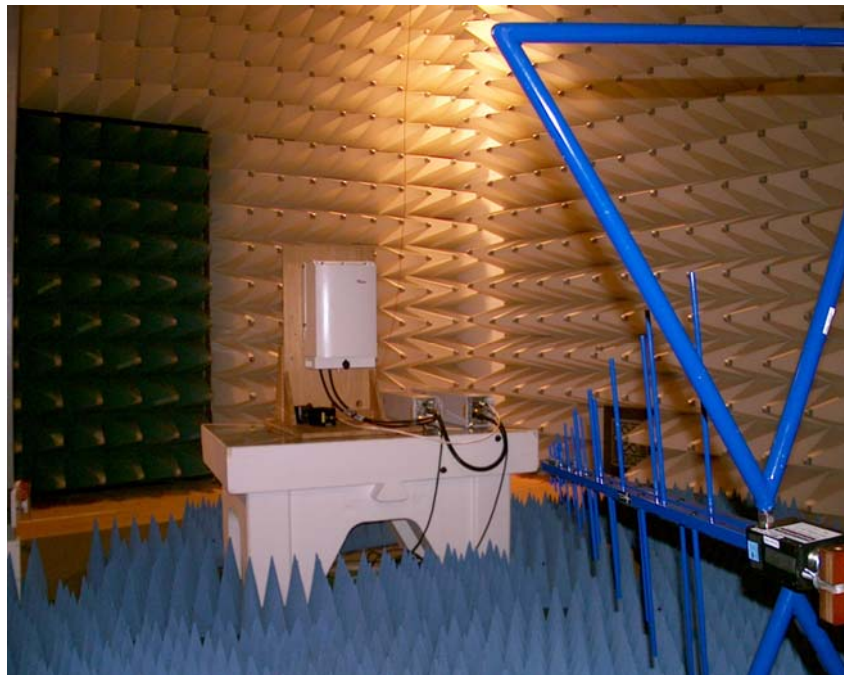
Test result	complies, according the plots above
Tested by:	Rainer Friedrich
Date:	15.07.2010



## 8 Radiated Spurious Emissions: §24.238, §2.1051; RSS-131, RSS-GEN



picture 7.1: Test setup: Field Strength Emission >1 GHz @3m in the FAC



picture 7.2: 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 - 1 GHz	3 metres / FAC	FCC 47 CFR Part 24.238 IC RSS-131	TIA-603-C:2004
1 GHz – 20 GHz	3 metres / FAC		

#### 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	04.02.2010	04.02.2011	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	X
Preamplifier	AFS4-00102000	Miteq	K838	06.10.2009	06.10.2010	
Preamplifier	JS43-1800-4000	Miteq	K1104	26.08.2010	26.08.2011	
RF Cable	Sucoflex 100	Suhner	K1742	09.04.20010	09.04.2011	X

The REMI Version 2.135 has been used to maximize radiated emission from the EUT in the frequency area up to 1 GHz. Above 1 GHz the REMI version 2.135 has been used for max search.

#### Test set-up:

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

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 Emission limitations for Broadband PCS equipment.

(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.

The limit is -13dBm.

### 8.1.1 Test method

#### §24.238 Emission limitations for Broadband PCS equipment

(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.

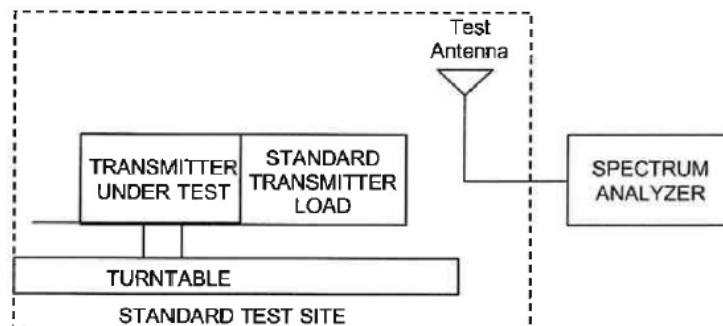
The antenna substitution method is used to determine the equivalent radiated power at spurious frequencies. The spurious emissions are measured at a distance of 3 meters. The EUT is then replaced with a reference substitution antenna with a known gain referenced to a dipole. This antenna is fed with a signal at the spurious frequency. The level of the signal is adjusted to repeat the previously measured level. The resulting erp is the signal level fed to the reference antenna corrected for gain referenced to a 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 ( $\pm 180$  degrees) as like defined in ANSI C63.4.

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.



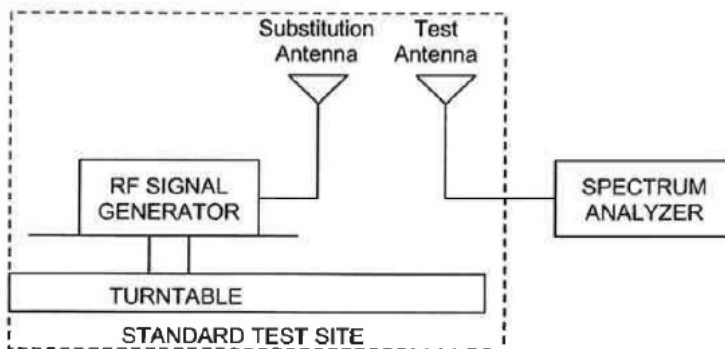


Figure #7.2 Substitution methods TIA-603-C

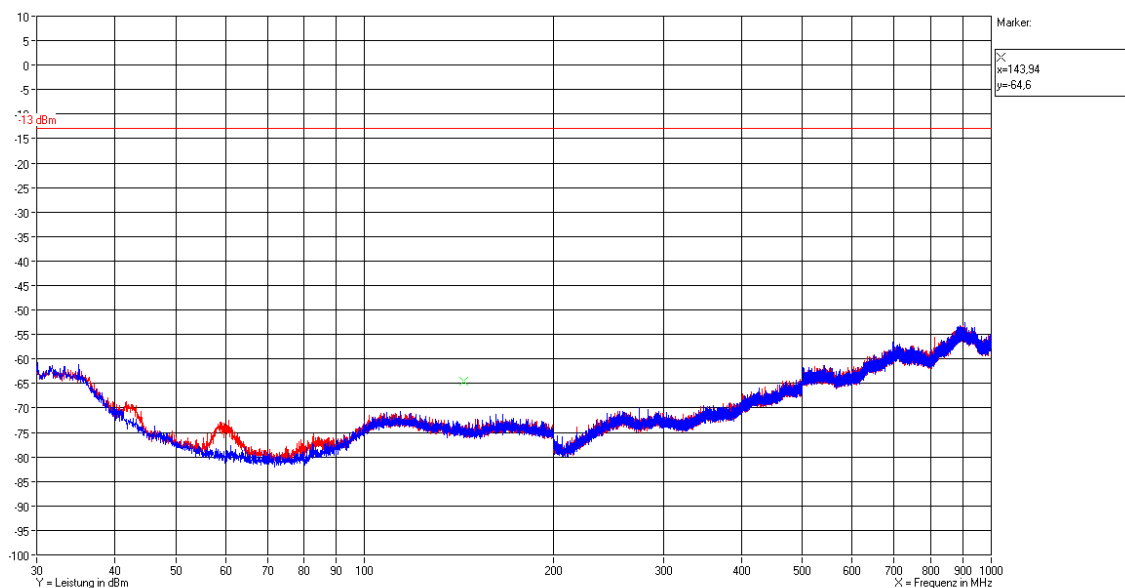
## 8.2 Test results

### 8.2.1 30 MHz to 1 GHz Downlink (Bottom – Middle – Top)

B/M/T: 1932MHz – 1961,5MHz – 1993MHz

Polarisation: horizontal/vertical

Detector: Peak

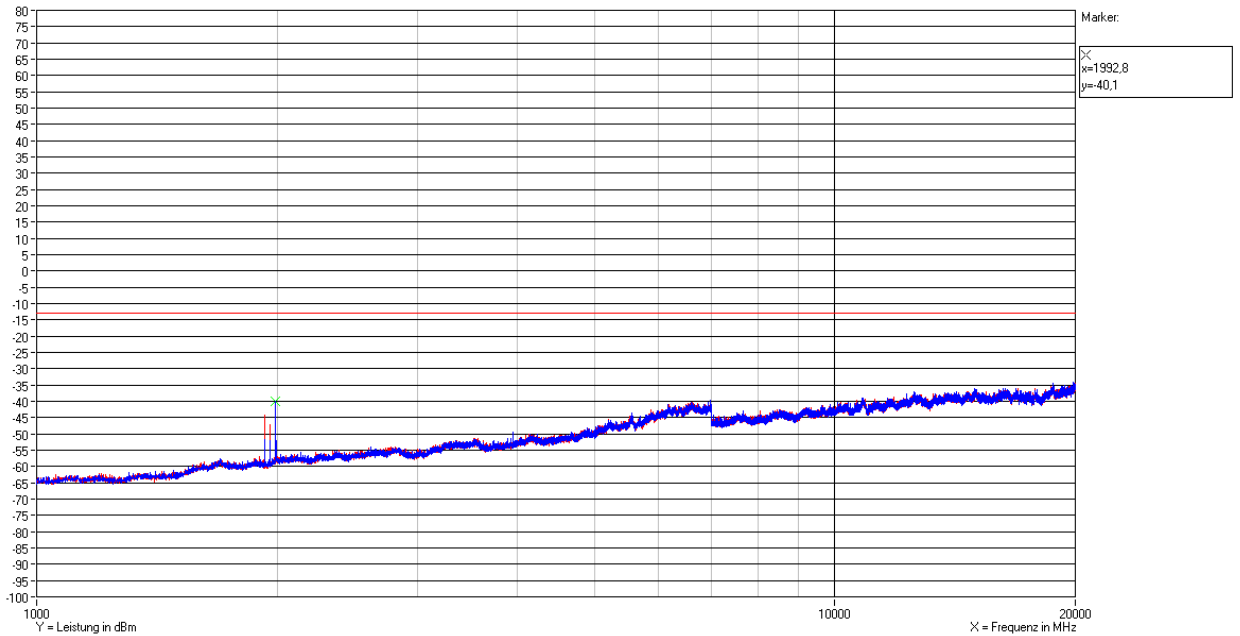


### 8.2.2 1GHz to 20GHz Downlink (Bottom – Middle – Top)

B/M/T: 1932MHz – 1961,5MHz – 1993MHz

Polarisation: horizontal/vertical

Detector: Peak



No signals could be measured other than the fundamentals.

### 8.2.3 Uplink

n.a.

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

### 8.3 Summary test result

Test result	complies, according the plots above
Tested by:	Mario Lehmann
Date:	05.08.2010



## 9 History

Revision	Modification	Date	Name
V01.00	Initial	05.08.2010	Lehmann

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