

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



ECL-EMC Test Report No.: 11-117

Equipment under test: ION-M80/90/19P (1900MHz path)
FCC ID: XS5-IONM8919P
IC ID: 2237E-IONM8919P
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:	05.05.11			Signature:
Issue-No.:	01	Author:	T. Zahlmann Test engineer	
Date of delivery:	24.04.11	Checked:	M. Lehmann Head of ECL	
Test dates:	05.04. – 26.04.11			
Pages:	49			



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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.



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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-M80/90/19P
Andrew Ident. Number	7547041-0001
Serial no.(SN)	48
Revision	00
Software version and ID	V3.19.0.12; 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"/> LTE (QPSK) <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"/> Full band <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-M80/90/19P 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.

The ION-M80/90/19P Repeater system consists of one 800 MHz remote unit, one 900 MHz remote unit and one 1900 MHz remote unit, with the intended use of simultaneous transmission.

The antenna(s) used with device must be fixed-mounted on permanent structures.

2.1.4 System diagrams

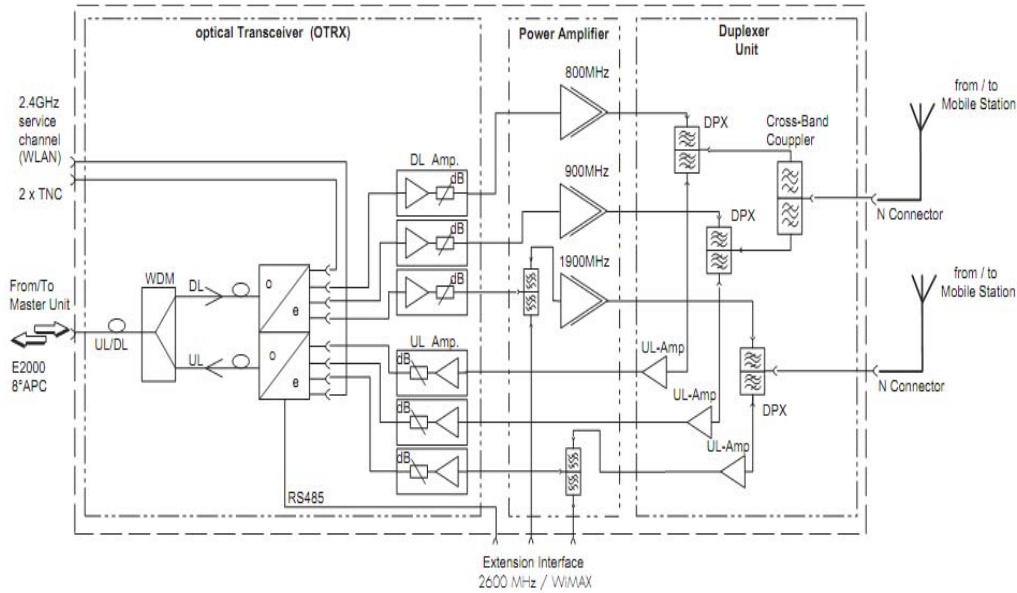


figure 2.1.4-#1 System diagrams: ION optical distribution system EUT is ION-M19P EU

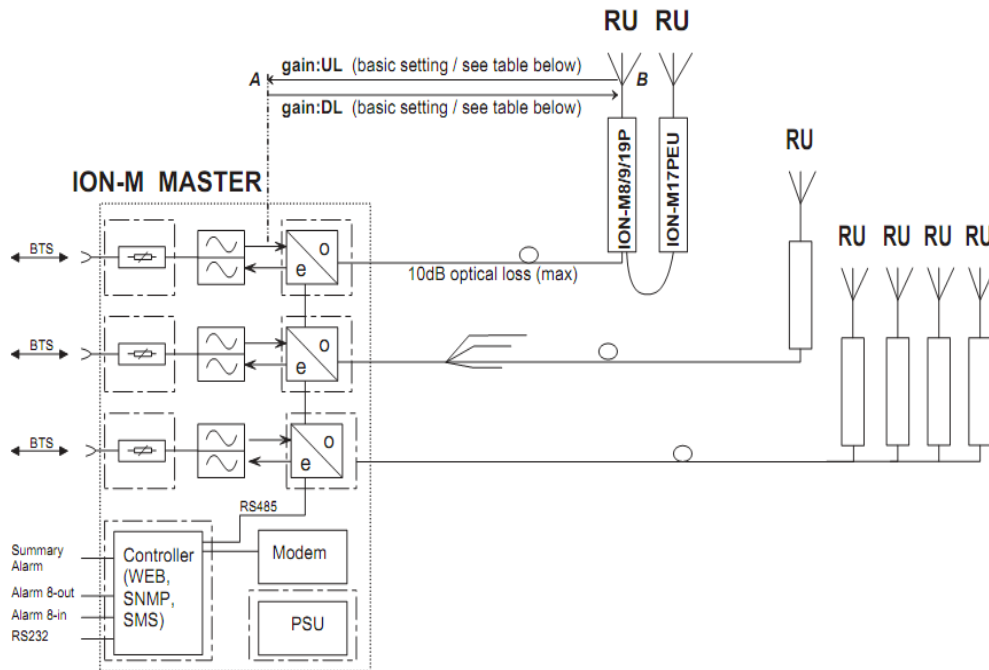


figure 2.1.4-#2 System diagrams

2.1.5 Block diagram of measurement reference points

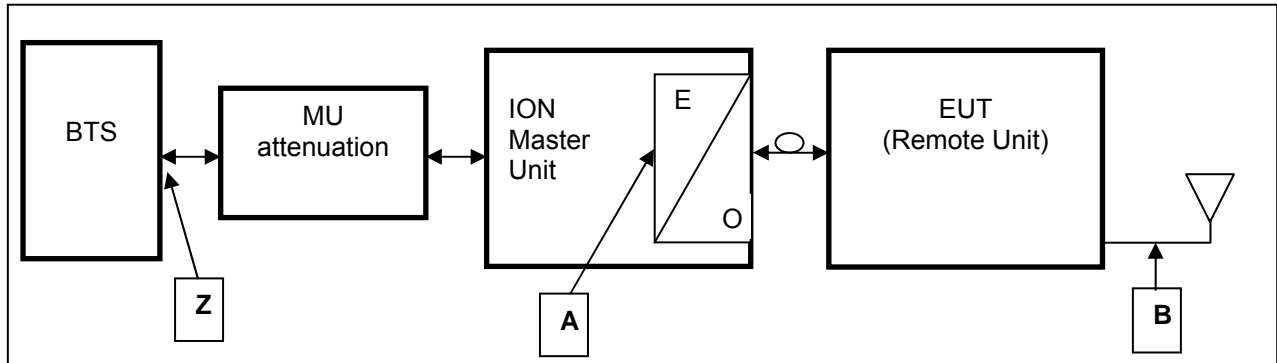


figure 2.1.5-#2 Block diagram of measurement reference points

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



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
8741	Network Analyzer	ZVRE	R&S	100034	02/2012
8890	Spectrum Analyzer	FSP	R&S	100674	07/2011
8798	Spectrum Analyzer	FSQ26	R&S	100340	09/2012
9069	Generator	SMBV100A	R&S		08/2011
8799	Generator	SMIQ	R&S	My45092504	12/2011
8667	Power Meter	E4418A	Agilent	GB38273230	04/2011
8668	Power Sensor	E8481H	Agilent	US3318A19208	04/2011
7157	RF-Cable	Succoflex	Suhner	36180/4P	CIU
7158	RF-Cable	Succoflex	Suhner	36182/4P	CIU
7289	RF-Cable	Succoflex	Suhner	28443/4PE	CIU
7290	RF-Cable	Succoflex	Suhner	28444/4PE	CIU
7385	RF-Cable	Succoflex	Suhner	36267/4P	CIU
7387	RF-Cable	Succoflex	Suhner	36267/4P	CIU
7390	RF-Cable	Succoflex	Suhner	40193/4P	CIU
7381	RF-Cable	Succoflex	Suhner	40200/4P	CIU
7384	RF-Cable	Succoflex	Suhner	40448/4P	CIU
7294	RF-Cable	Succoflex	Suhner	40448/4P	CIU
7382	RF-Cable	Succoflex	Suhner	40221/4P	CIU
7406	Matrix	-----	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

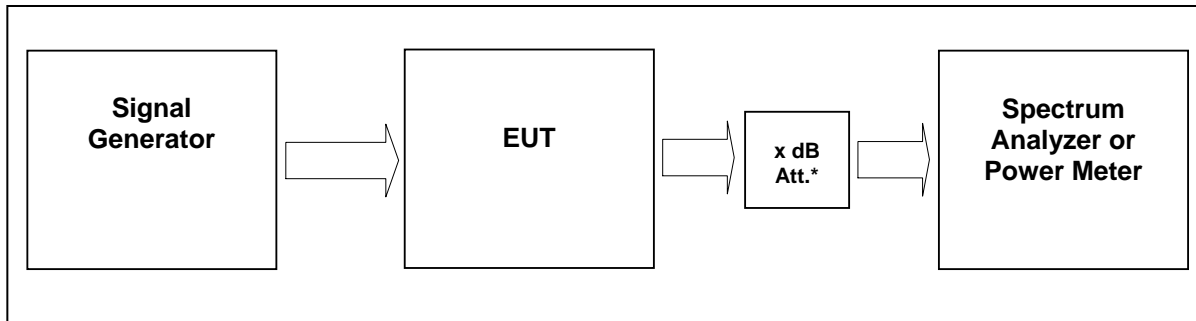
All tests were performed under the following environmental conditions:

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



External Attenuator DL x dB = 40 dB

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	8890; 9069; 8799; 8667; 8668; 7406

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.

Test signal LTE:

Signal waveform according to Test Model 1.1, E-TM1.1, clause 6.1.1.1, table 6.1.1.1-1 of standard specification 3GPP TS 36.141.



5.3.1 Downlink

Modulation	Measured at [MHz]	RBW VBW Span	RF Power [dBm]	RF Power [W]	Plot -
CDMA	1962,500	3MHz 10MHz 15MHz	43,00	20,00	5.3.1.1 #1
WCDMA	1962,500	10MHz 10MHz 50MHz	43,00	20,00	5.3.1.2 #1
GSM	1962,500	1MHz 3MHz 10MHz	43,00	20,00	5.3.1.3 #1
GSM-EDGE	1962,500	1MHz 3MHz 10MHz	43,00	20,00	5.3.1.4 #1
LTE	1962,500	3MHz 10MHz	43,00	20,00	5.3.1.5 #1
Maximum output power = 43 dBm -> 20 W					
Limit Maximum output power = 160 W -> 52,04 dBm					

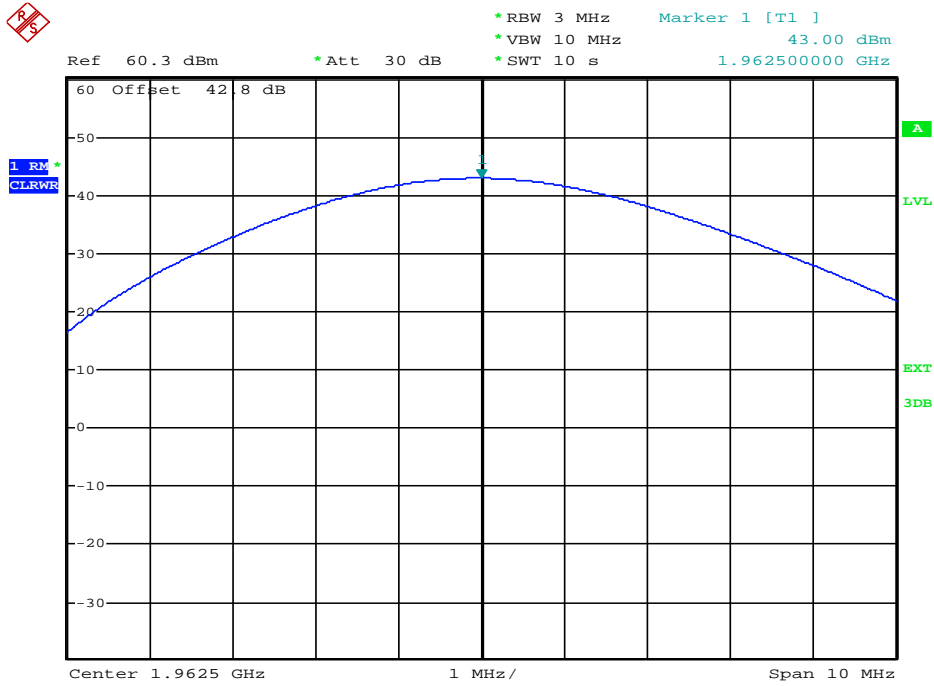
table 5.3.1-#1 RF Power Out: §24.232, §2.1046; RSS-133, RSS-GEN Test results Downlink

Modulation	Pin / dBm (Ref. point B)
GSM	3,6
EDGE	3,4
CDMA	3,5
WCDMA	3,6
LTE	3,5

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



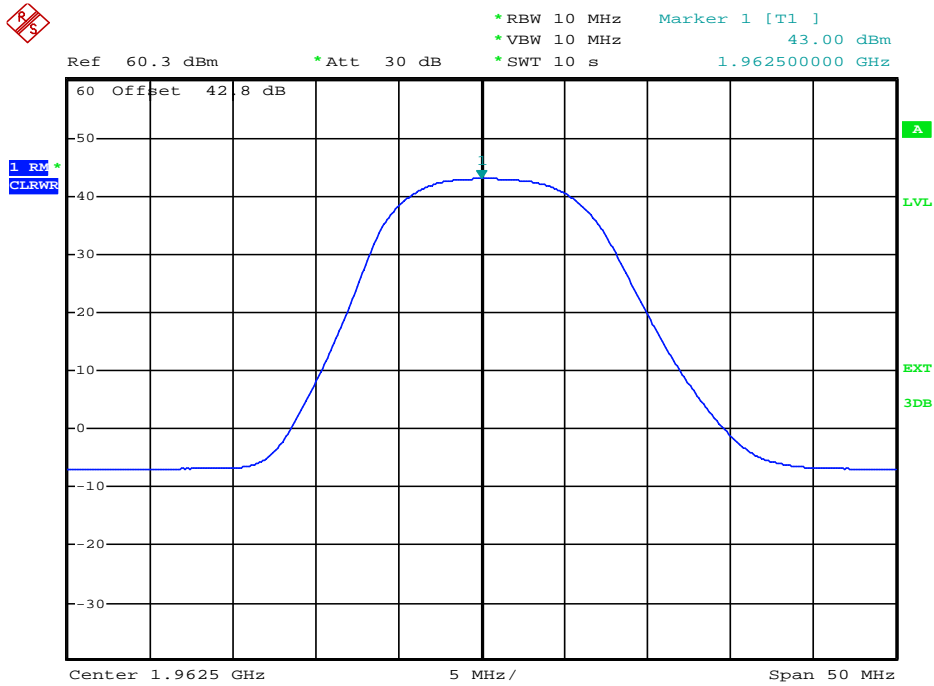
5.3.1.1 CDMA



Date: 8.APR.2011 14:06:58

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

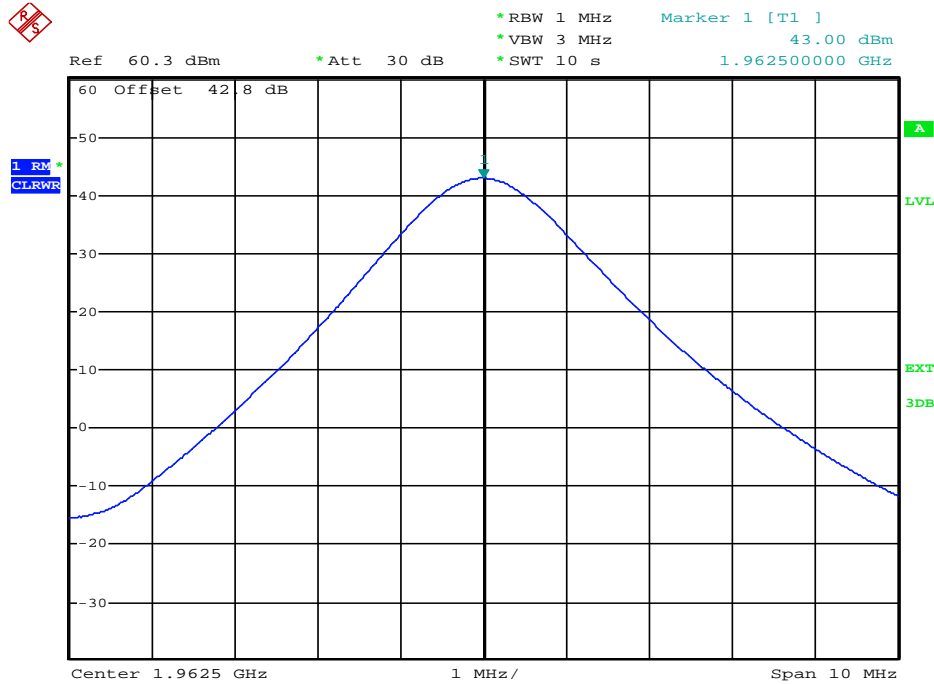


Date: 8.APR.2011 14:13:47

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

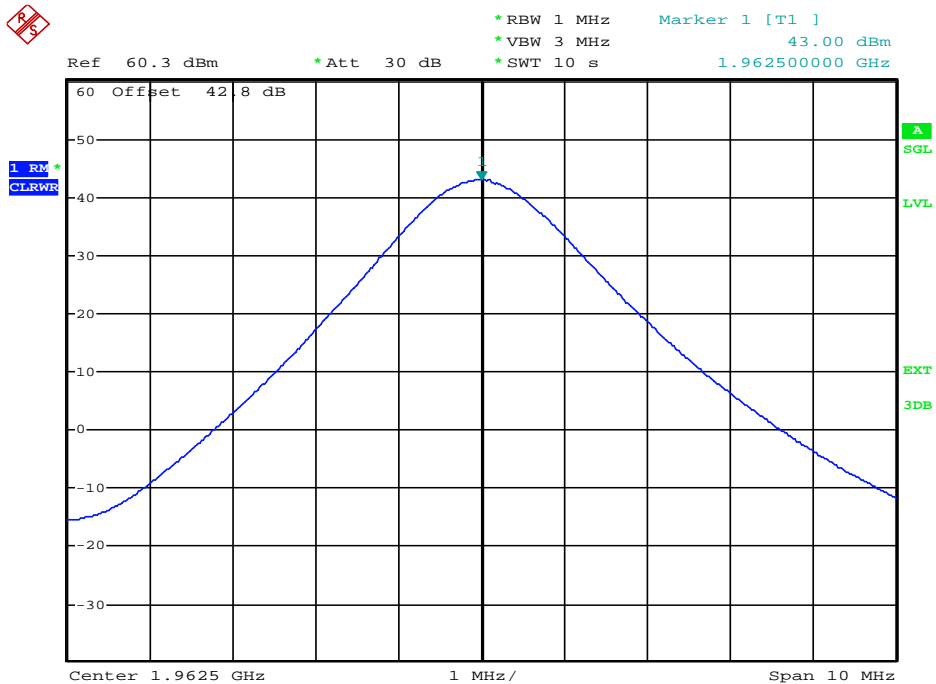


Date: 8.APR.2011 14:21:33

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

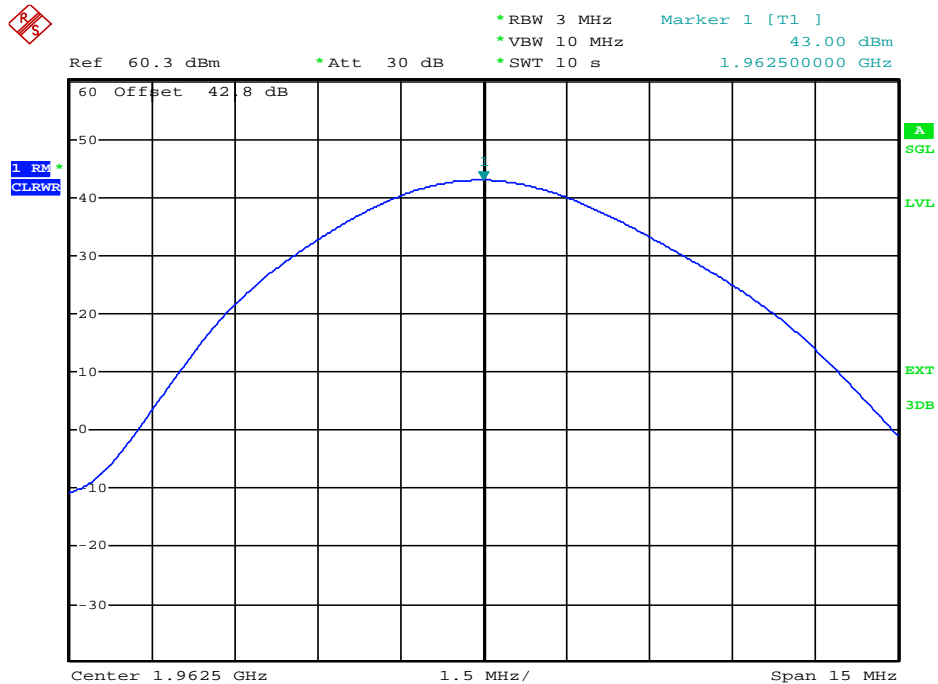


Date: 8.APR.2011 14:25:06

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



5.3.1.5 LTE



Date: 8.APR.2011 14:29:05

plot 5.3.1.5-#1 RF Power Out: §24.232, §2.1046; RSS-133, RSS-GEN; Test results; Downlink; LTE



5.3.2 Uplink

n.a.

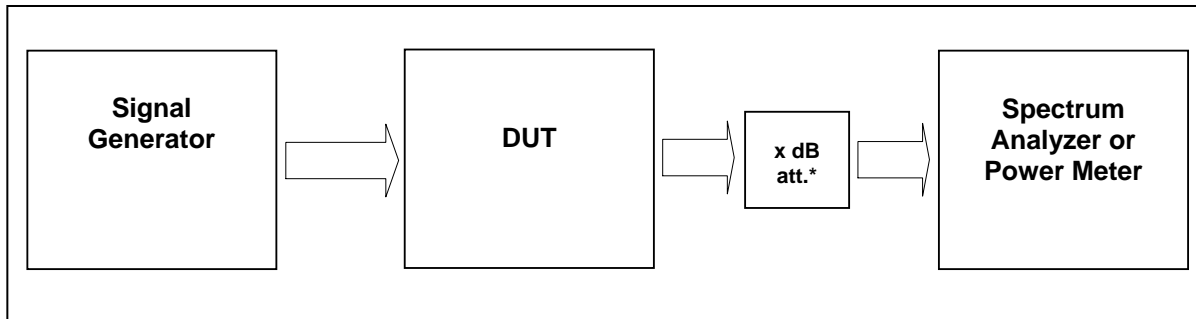
Note: The EUT does not transmit over the air in the uplink direction.

5.4 Summary test result

Test result	complies, according the plots above
Tested by:	W. Meir
Date:	8.04.2011



6 Occupied Bandwidth: §2.1049; RSS-GEN



External Attenuator DL x dB = 46 dB
 figure 5.4-#1 Test setup: Occupied Bandwidth: §2.1049; RSS-GEN

Measurement uncertainty	± 0,38 dB
Test equipment used	8890; 9069; 8799; 8667; 8668; 7406

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

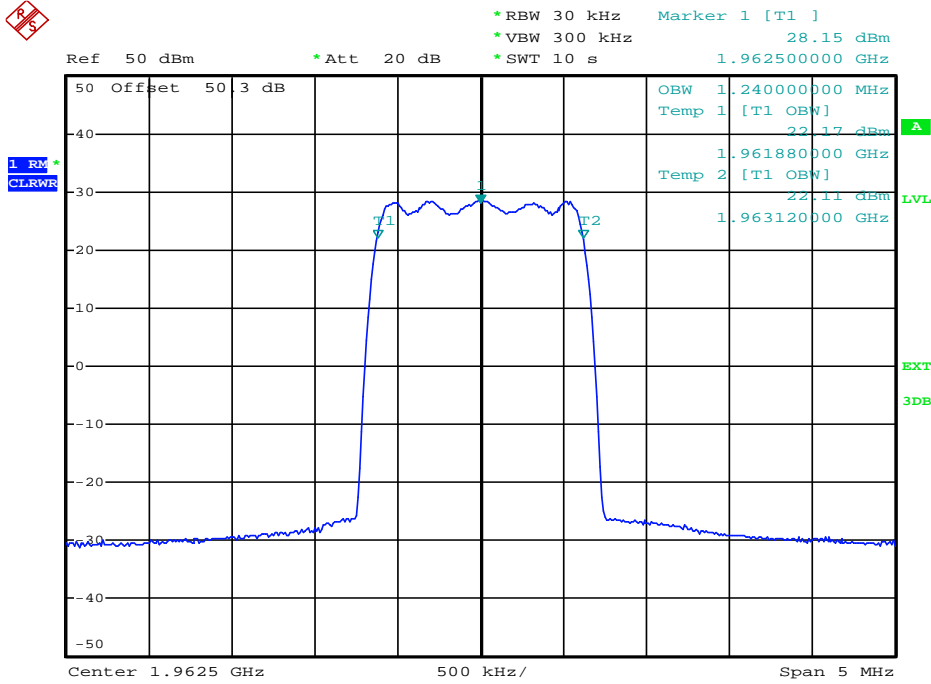
Detector RMS.

Modulation	Measured at		RBW VBW Span	Occupied Bandwidth / MHz	Plot #
CDMA	Middle	1962,5 MHz	30kHz 300kHz 5MHz	1,24	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	0,246	6.3.1.3 #1, #2
GSM-EDGE	Middle	1962,5 MHz	3kHz 30kHz 1MHz	0,245	6.3.1.4 #1, #2
LTE	Middle	1962,5 MHz	30kHz 300kHz 5MHz	1,10	6.3.1.5 #1, #2

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

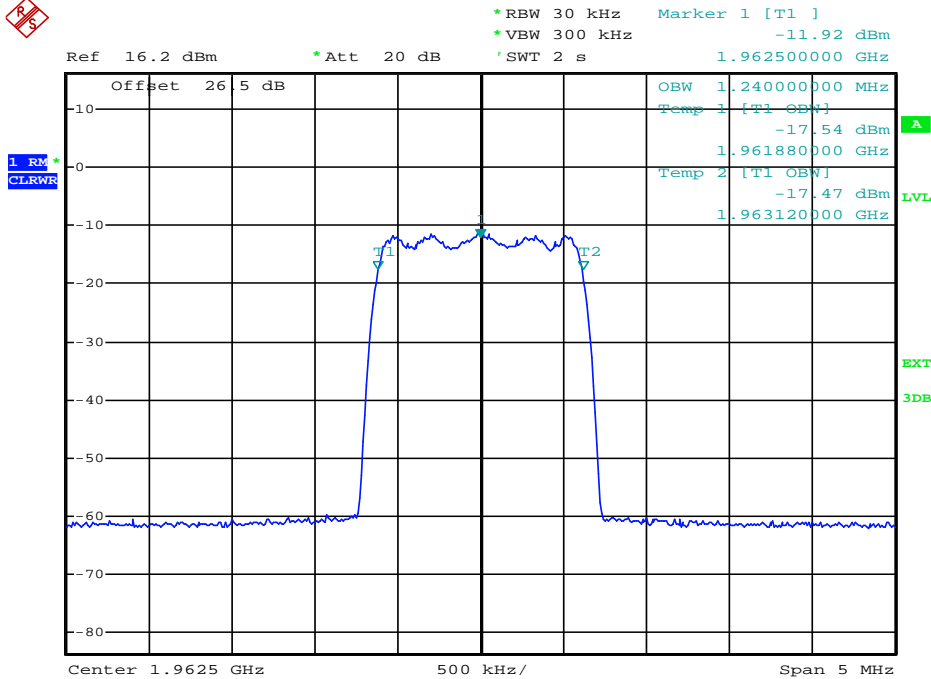


6.3.1.1 CDMA



Date: 13.APR.2011 18:03:49

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

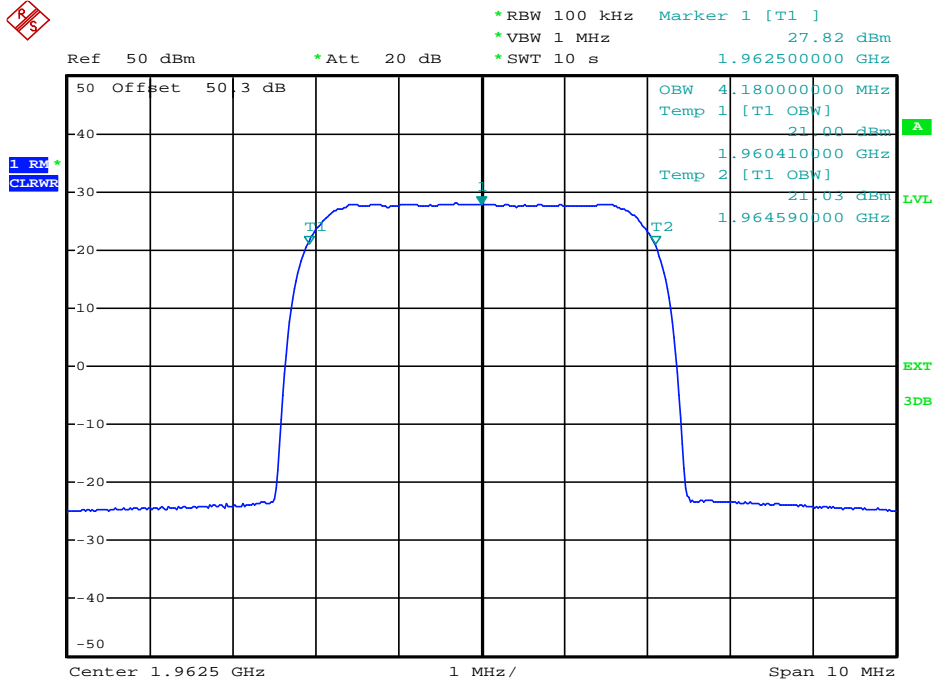


Date: 13.APR.2011 17:59:17

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

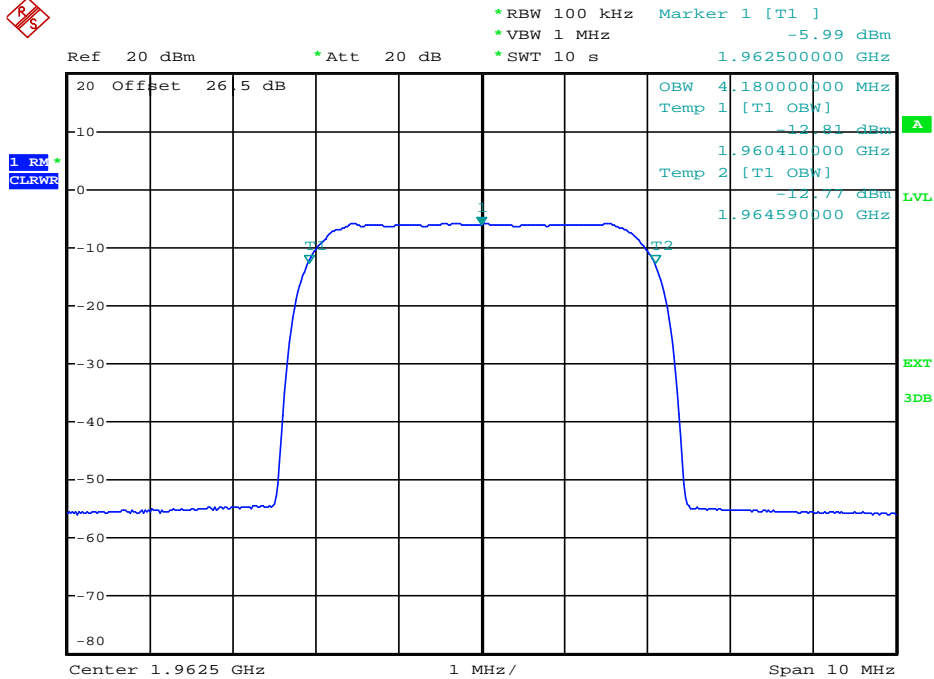


6.3.1.2 W-CDMA



Date: 14.APR.2011 11:48:21

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

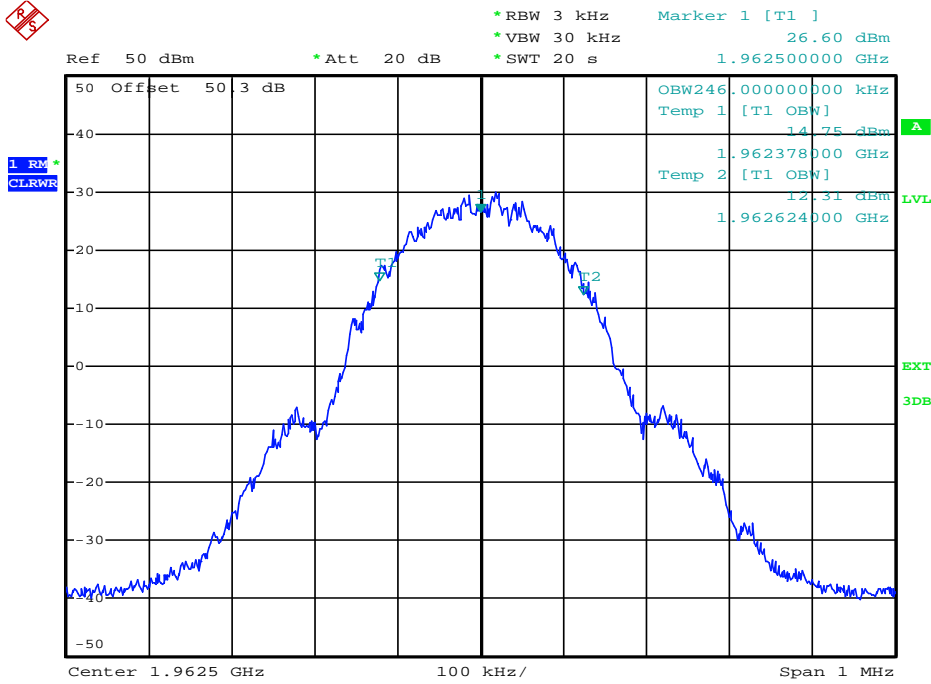


Date: 14.APR.2011 11:50:40

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

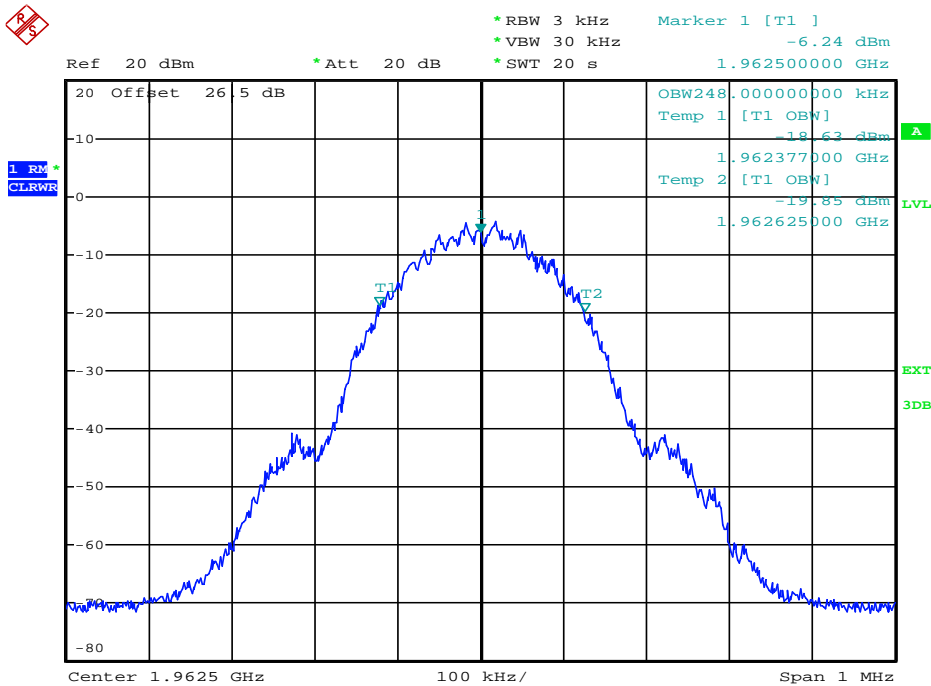


6.3.1.3 GSM



Date: 14.APR.2011 11:56:59

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

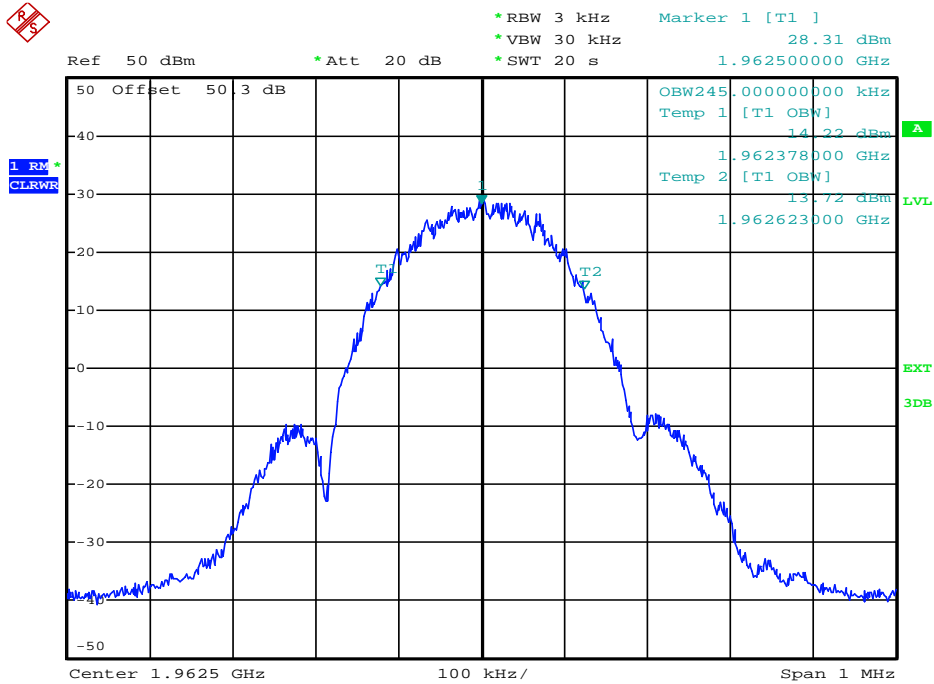


Date: 14.APR.2011 11:53:56

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

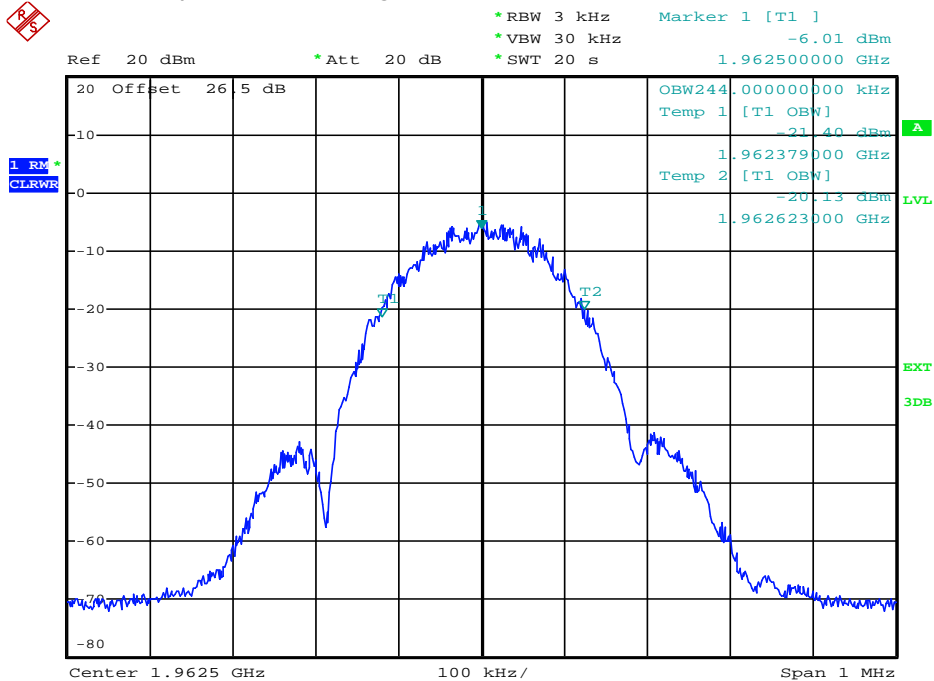


6.3.1.4 GSM-EDGE



Date: 14.APR.2011 12:01:15

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

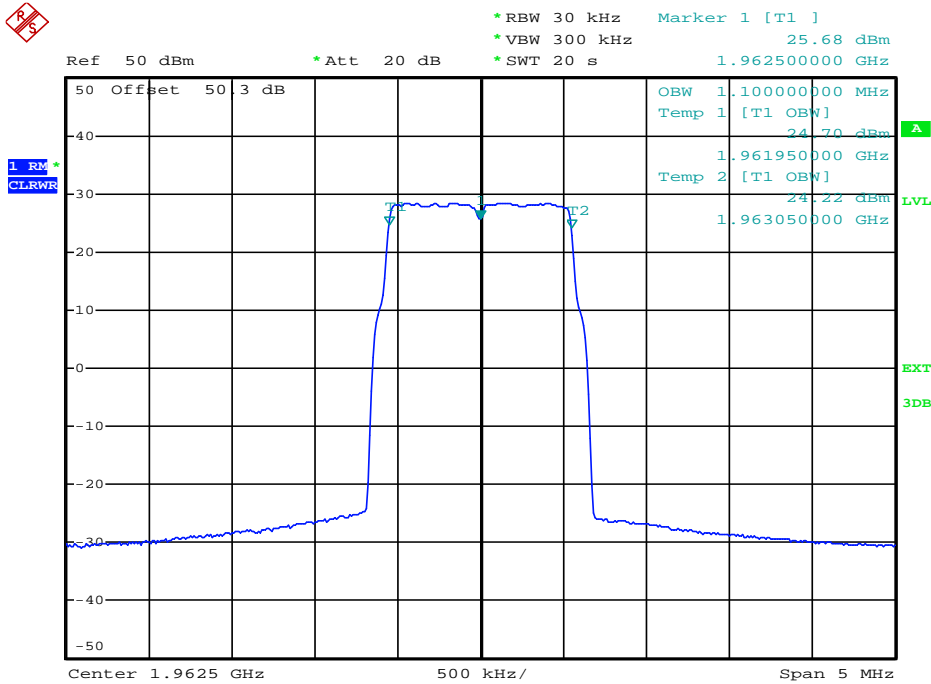


Date: 14.APR.2011 12:03:13

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

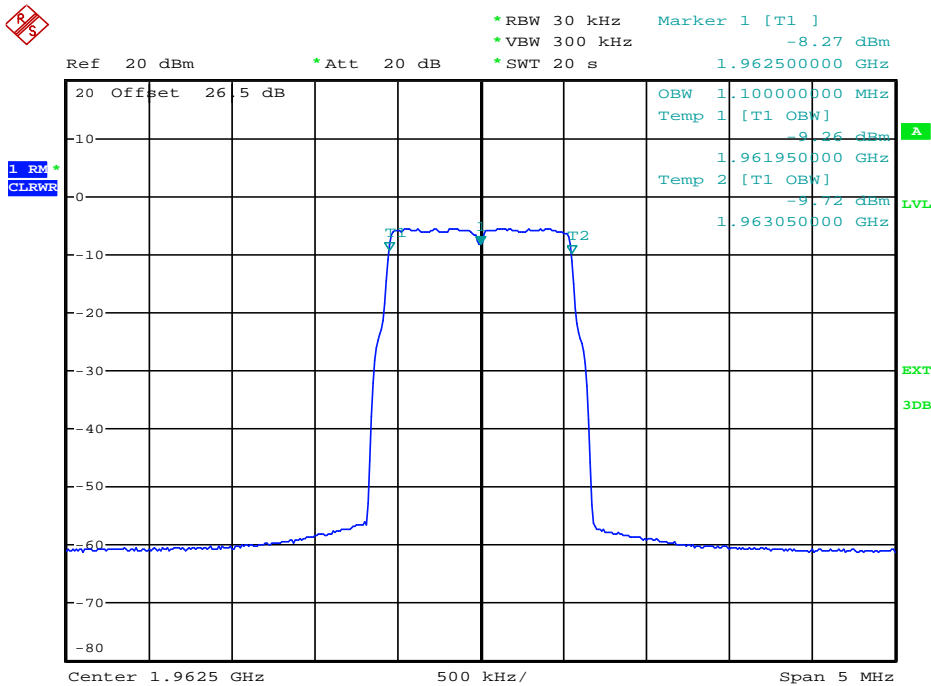


6.3.1.5 LTE



Date: 14.APR.2011 12:12:50

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



Date: 14.APR.2011 12:07:37

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



6.3.2 Uplink

n.a.

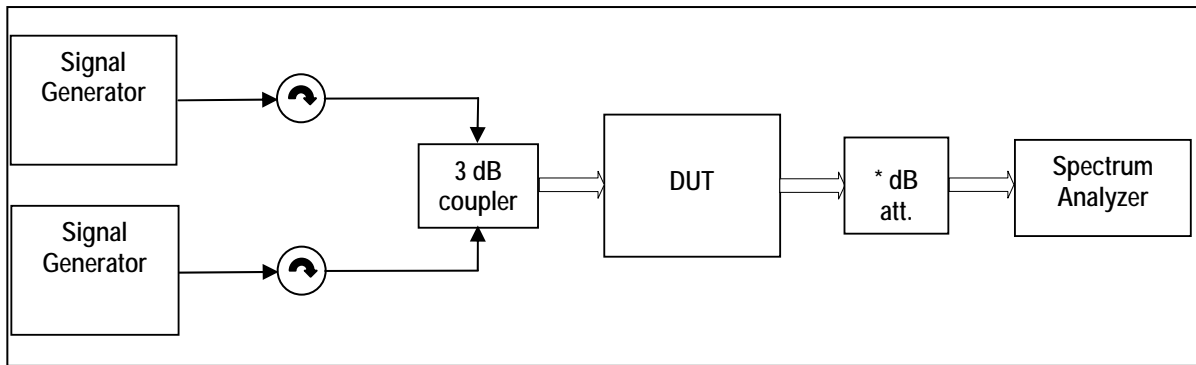
Note: The EUT does not transmit over the air in the uplink direction.

6.4 Summary test result

Test result	complies, according the plots above
Tested by:	W. Meir
Date:	14.04.2011



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



Multisignal-Generator used, External Attenuator DL x dB = 46 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	8890; 9069; 8799; 8667; 8668; 7406	

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 Upper Edge	1930,775 MHz 1932,025 MHz 1992,975 MHz 1994,225 MHz	30kHz 300kHz 6MHz	- 15,0	7.3.1.1 #1 #2
WCDMA	Lower Edge Upper Edge	1932,6 MHz 1937,6 MHz 1987,4 MHz 1992,4 MHz	100kHz 300kHz 15MHz	- 15,0	7.3.1.2 #1 #2
GSM	Lower Edge Upper Edge	1930,3 MHz 1930,7 MHz 1994,3 MHz 1994,7 MHz	3kHz 30kHz 2MHz	-27,5	7.3.1.3 #1 #2
GSM-EDGE	Lower Edge Upper Edge	1930,3 MHz 1930,7 MHz 1994,3 MHz 1994,7 MHz	3kHz 30kHz 2MHz	-29,8	7.3.1.4 #1 #2
LTE	Lower Edge Upper Edge	1930,8 MHz 1932,2 MHz 1993,0 MHz 1994,2 MHz	30kHz 300kHz 6MHz	-23,8	7.3.1.5 #1 #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

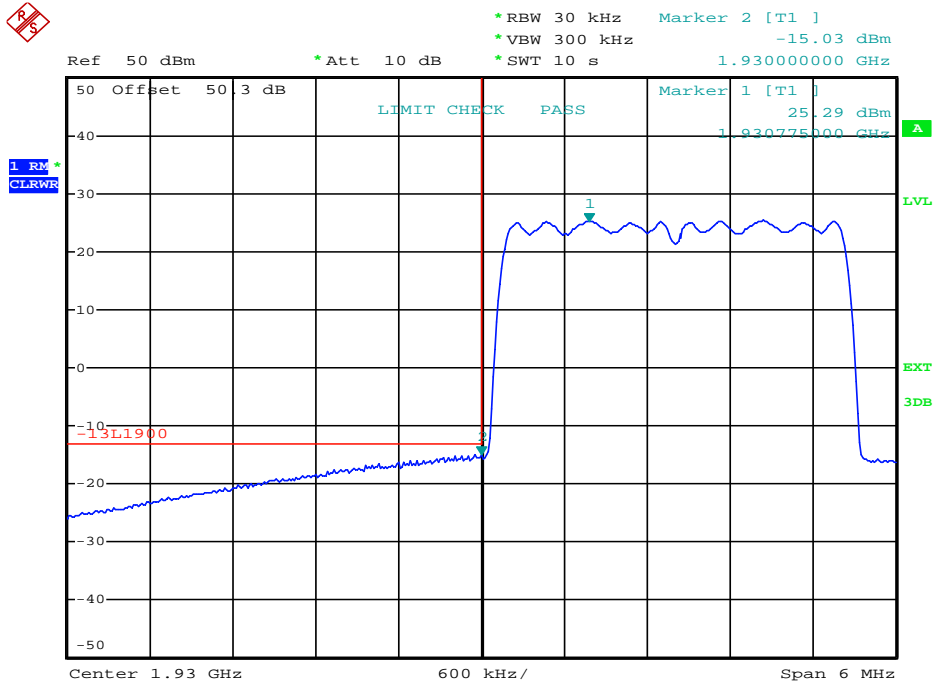
Detector: RMS.

Modulation	Carrier at	Carrier	Max. level (dBm)	RBW VBW Frequency range	Plot -
CDMA	Middle	1962,5 MHz	<-33	1MHz 3MHz 30MHz – 20GHz	7.3.1.6 #1
WCDMA	Middle	1962,5 MHz	<-33	1MHz 3MHz 30MHz – 20GHz	7.3.1.7 #1
GSM	Middle	1962,5 MHz	<-33	1MHz 3MHz 30MHz – 20GHz	7.3.1.8 #1
GSM-EDGE	Middle	1962,5 MHz	<-33	1MHz 3MHz 30MHz – 20GHz	7.3.1.9 #1
LTE	Middle	1962,5 MHz	<-33	1MHz 3MHz 30MHz – 20GHz	7.3.1.10 #1

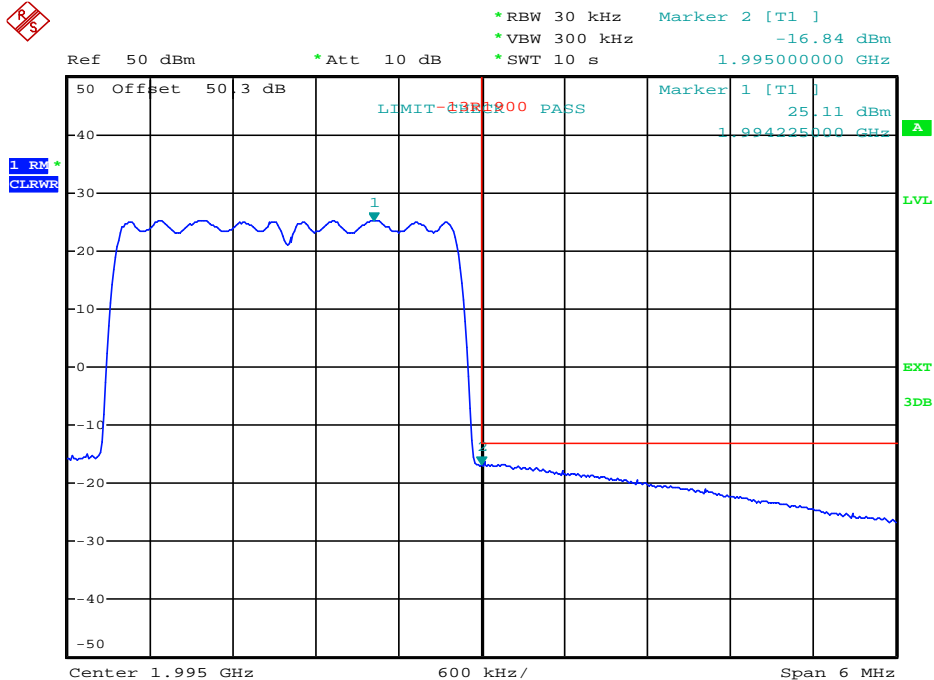
table 7.3-#2 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN Test results Downlink >1MHz from Band Edge



7.3.1.1 CDMA < 1MHz to band edge



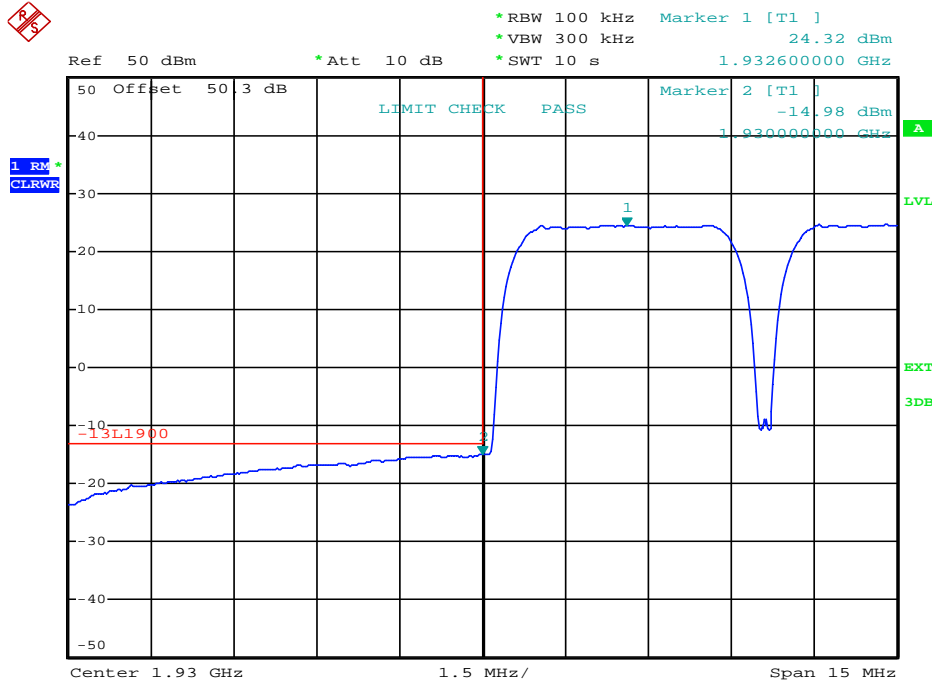
plot 7.3.1.1-#1 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN; Test results; Downlink; CDMA < 1MHz to band edge Lower Band Edge



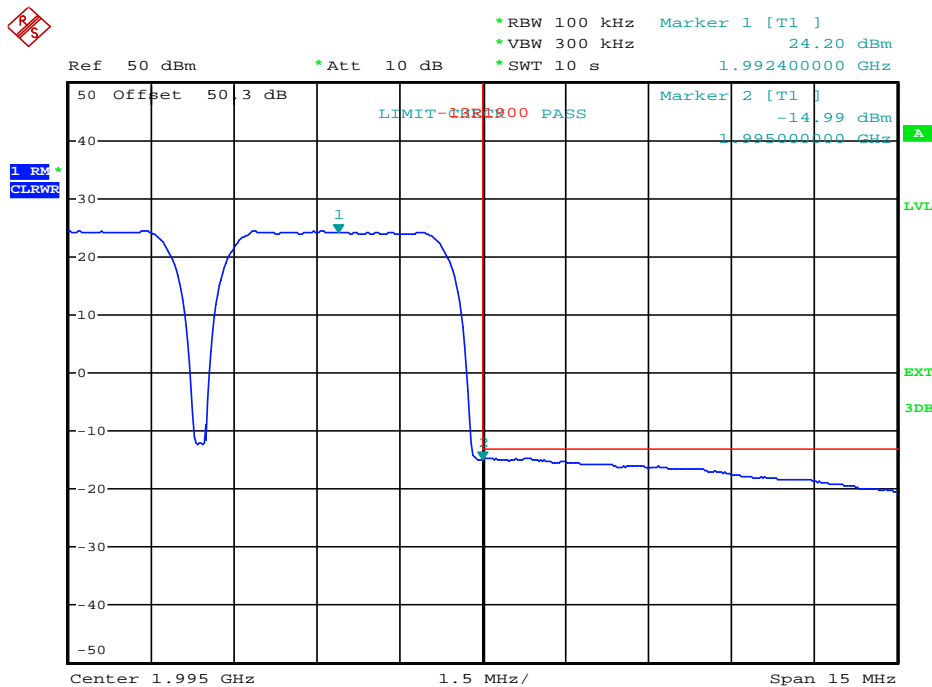
plot 7.3.1.1-#2 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN; Test results; Downlink; CDMA < 1MHz to band edge Upper Band Edge



7.3.1.2 W-CDMA < 1MHz to band edge



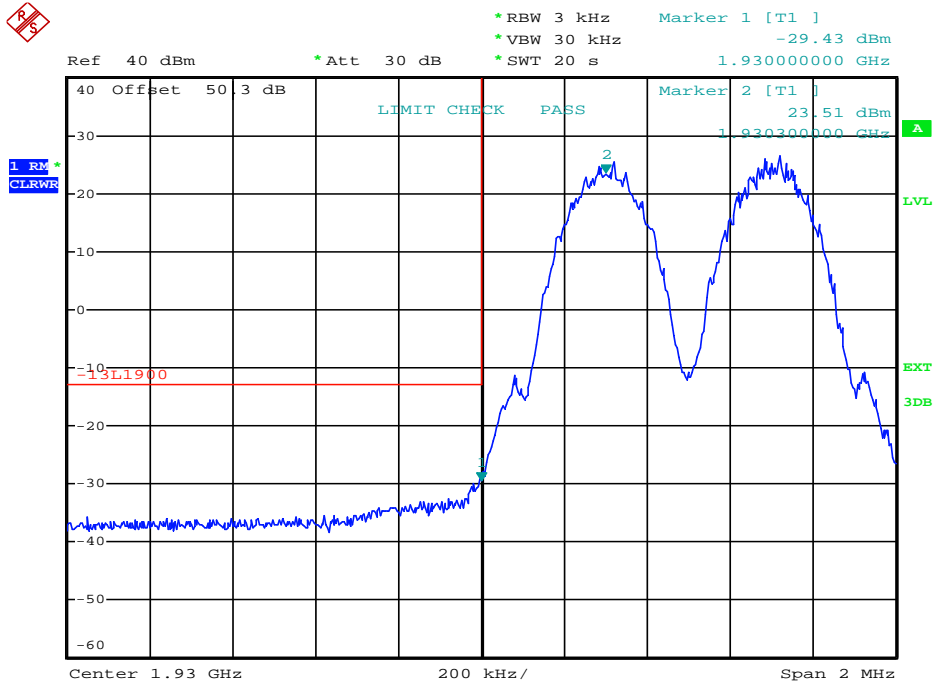
plot 7.3.1.2-#1 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN; Test results; Downlink; W-CDMA < 1MHz to band edge Lower Band Edge



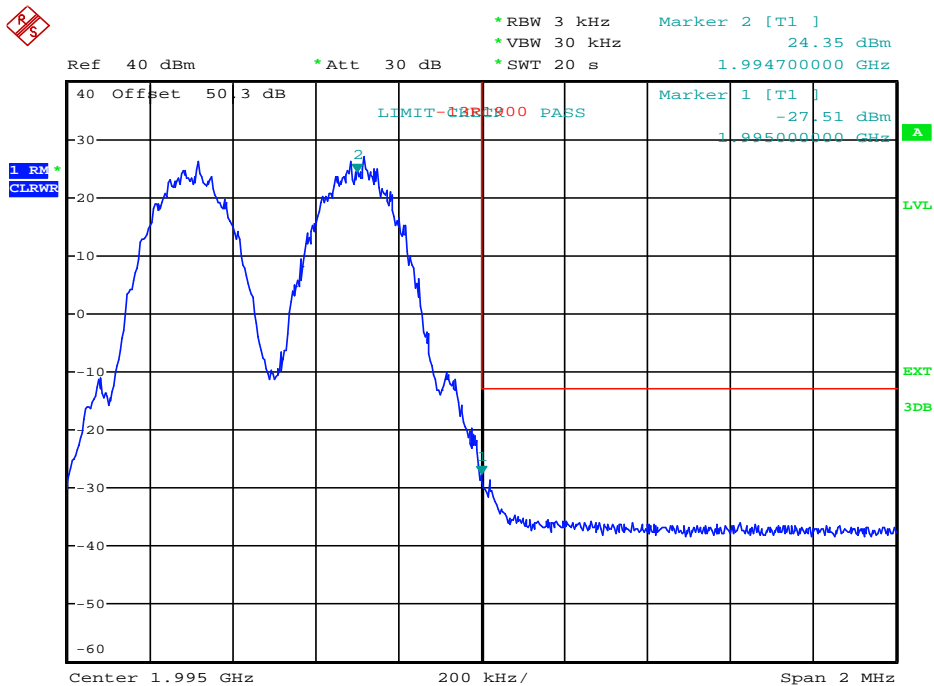
plot 7.3.1.2-#2 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN; Test results; Downlink; W-CDMA < 1MHz to band edge Upper Band Edge



7.3.1.3 GSM < 1MHz to band edge



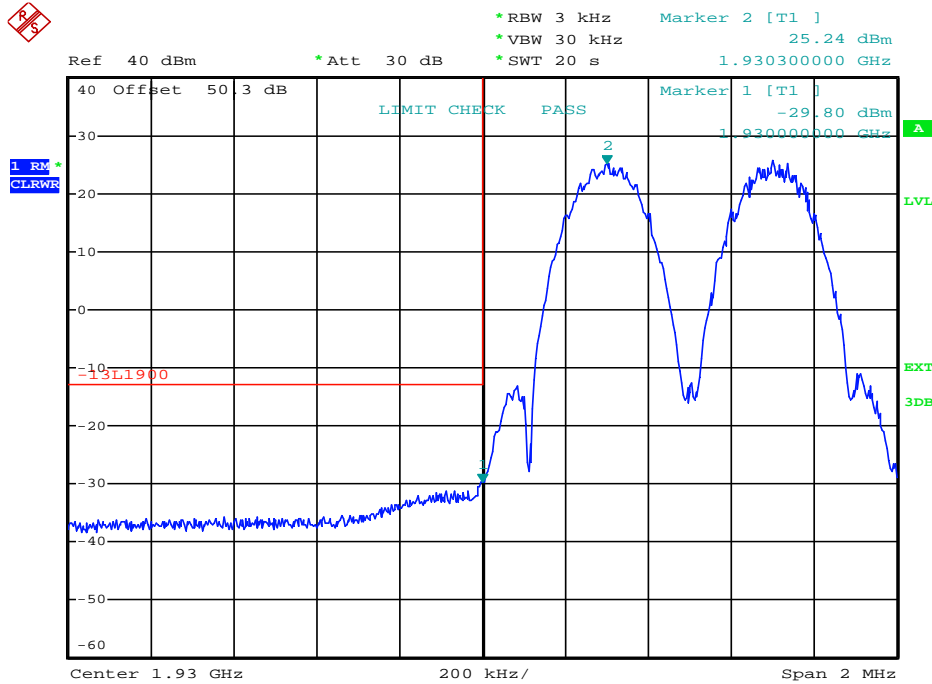
plot 7.3.1.3-#1 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN; Test results; Downlink; GSM < 1MHz to band edge Lower Band Edge



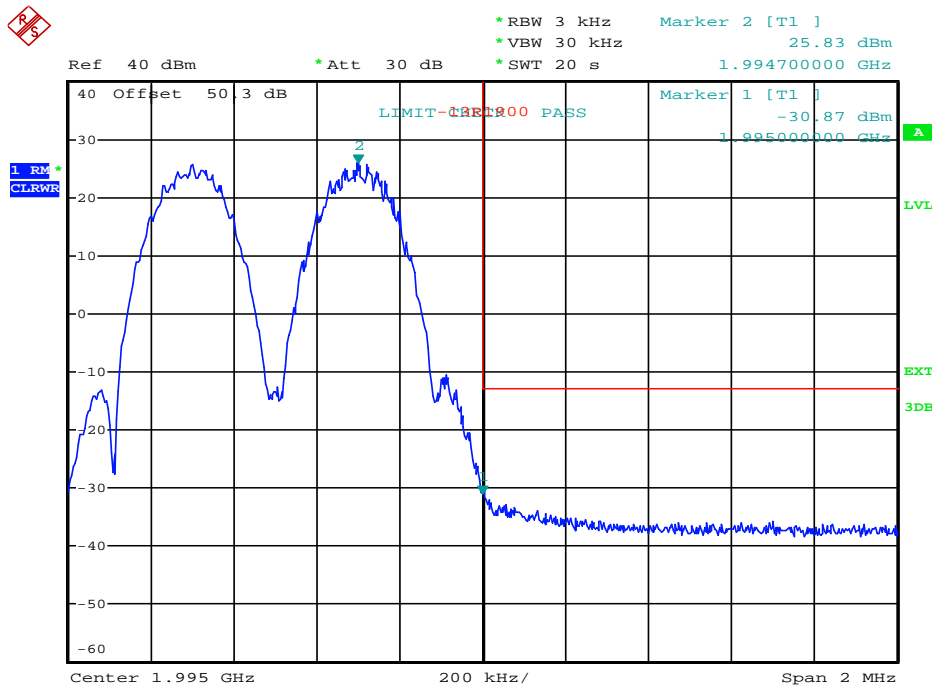
plot 7.3.1.3-#2 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN; Test results; Downlink; GSM < 1MHz to band edge Upper Band Edge



7.3.1.4 GSM-EDGE < 1MHz to band edge



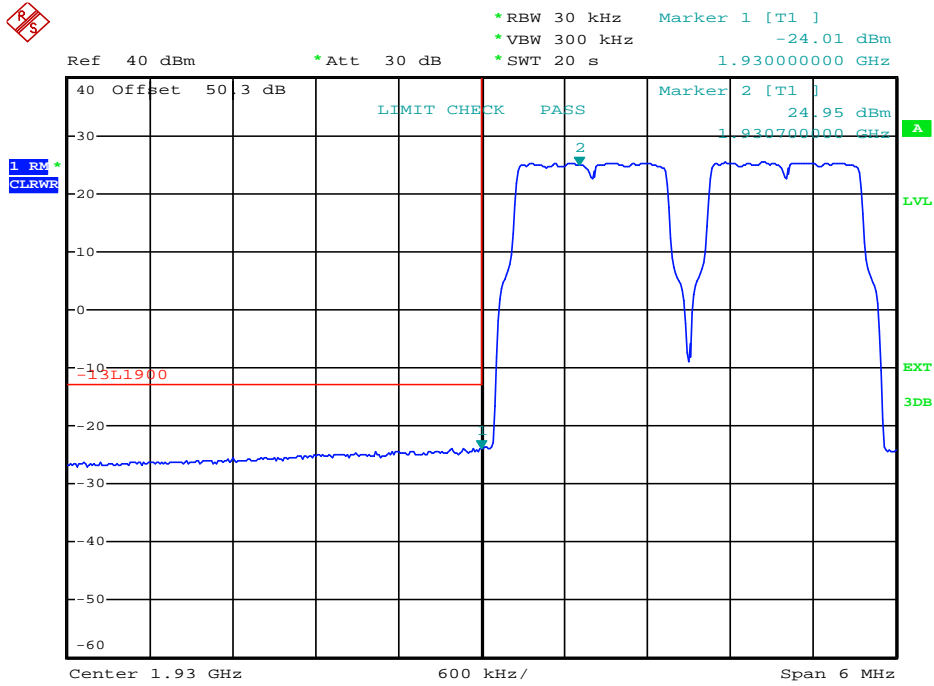
plot 7.3.1.4-#1 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN; Test results; Downlink; GSM-EDGE < 1MHz to band edge Lower Band Edge



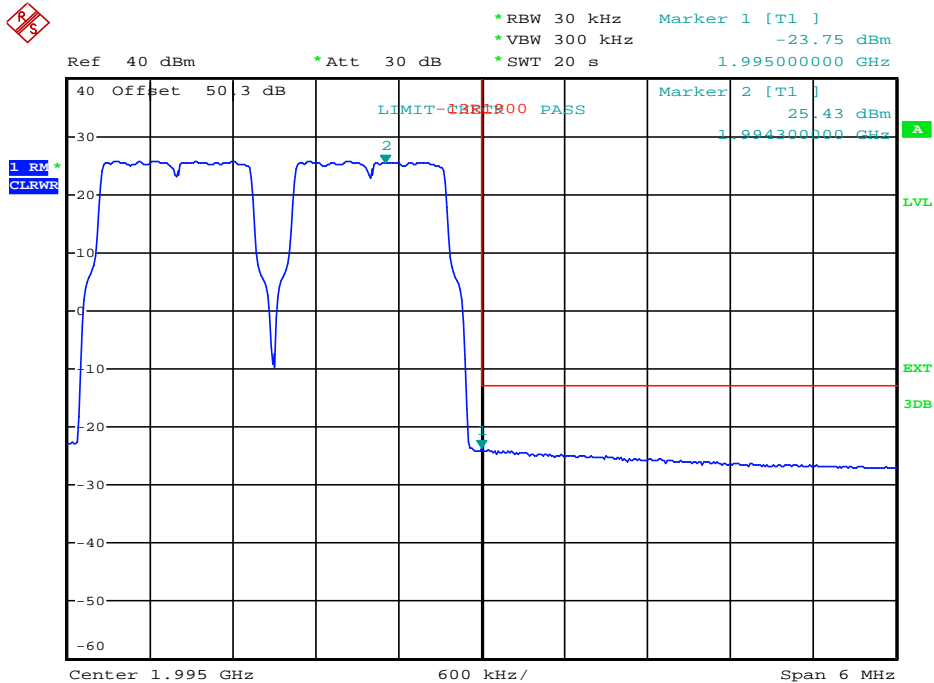
plot 7.3.1.4-#2 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN; Test results; Downlink; GSM-EDGE < 1MHz to band edge Upper Band Edge



7.3.1.5 LTE < 1MHz to band edge



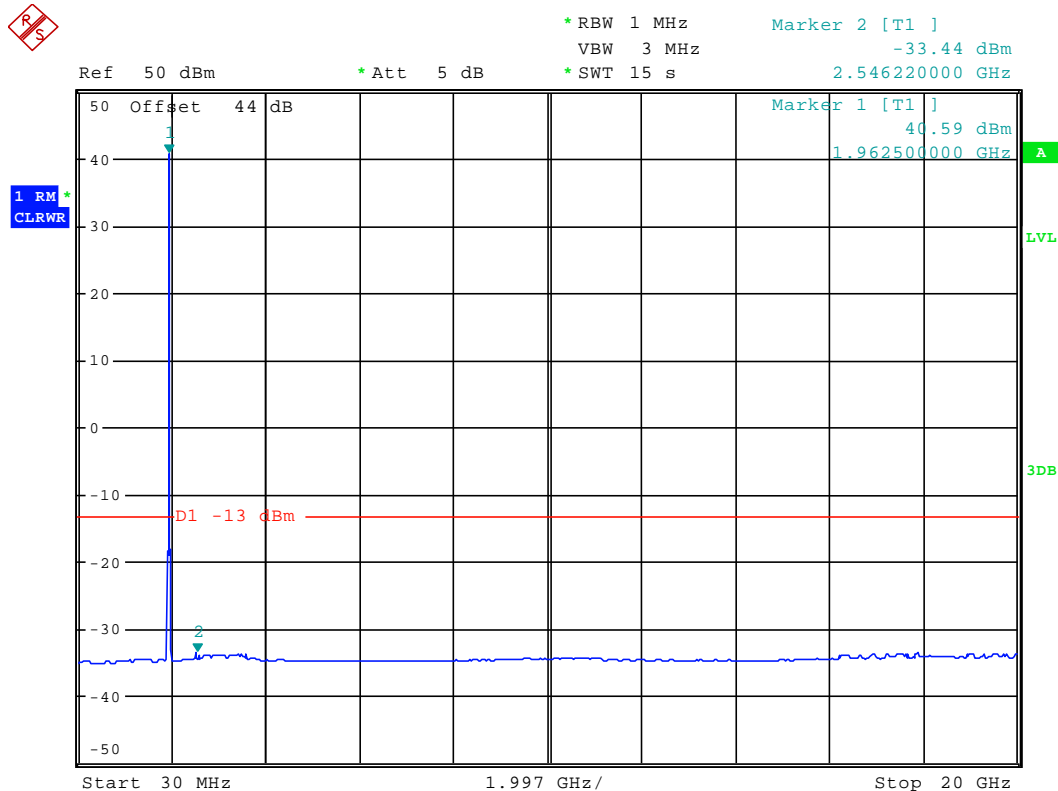
plot 7.3.1.5-#1 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN; Test results; Downlink; LTE < 1MHz to band edge Lower Band Edge



plot 7.3.1.5-#2 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN; Test results; Downlink; LTE < 1MHz to band edge Upper Band Edge



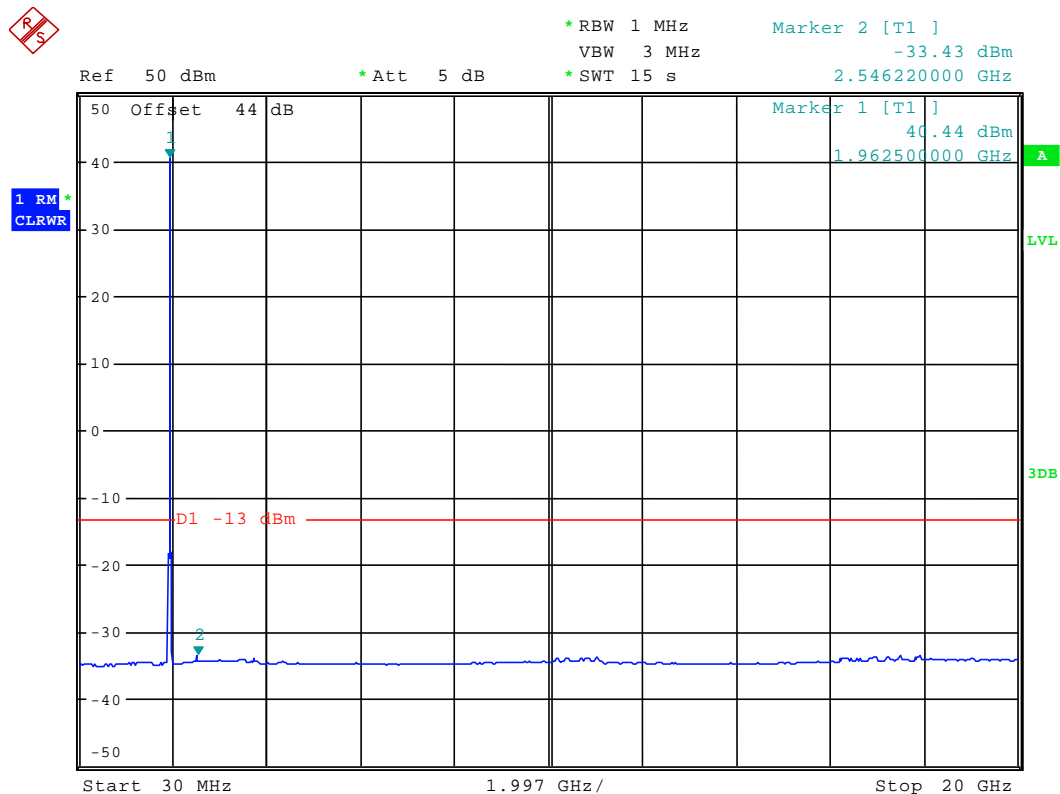
7.3.1.6 CDMA > 1MHz to band edge



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



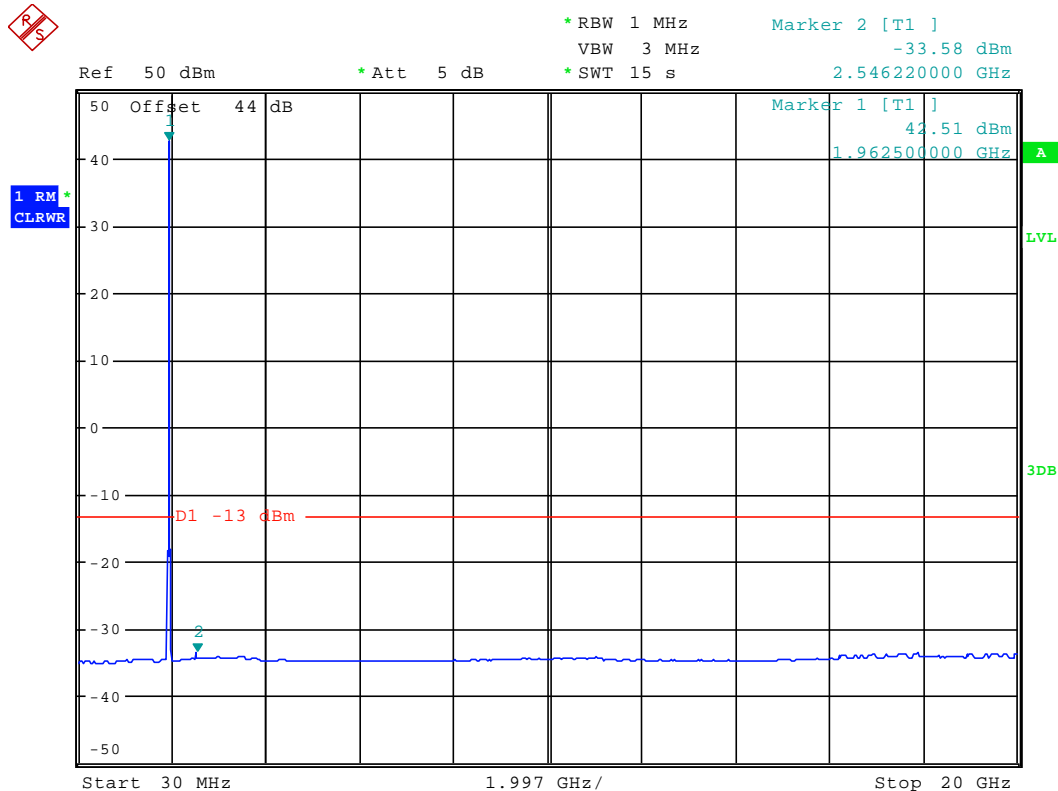
7.3.1.7 W-CDMA > 1MHz to band edge



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



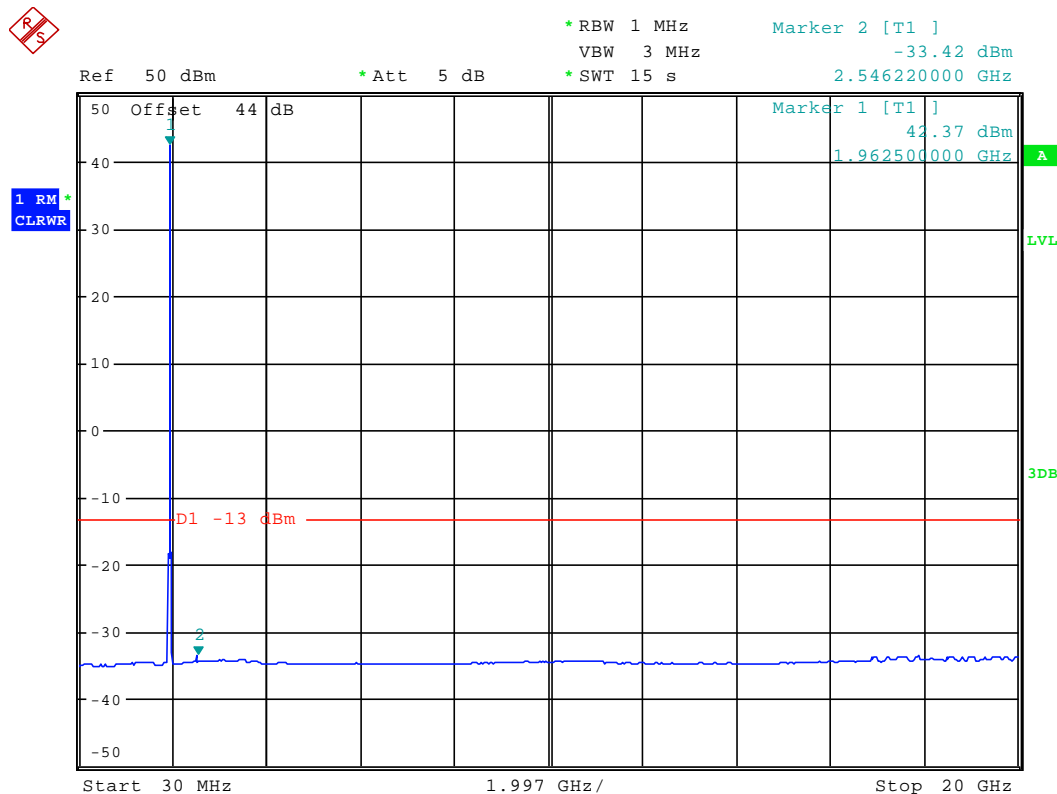
7.3.1.8 GSM > 1MHz to band edge



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



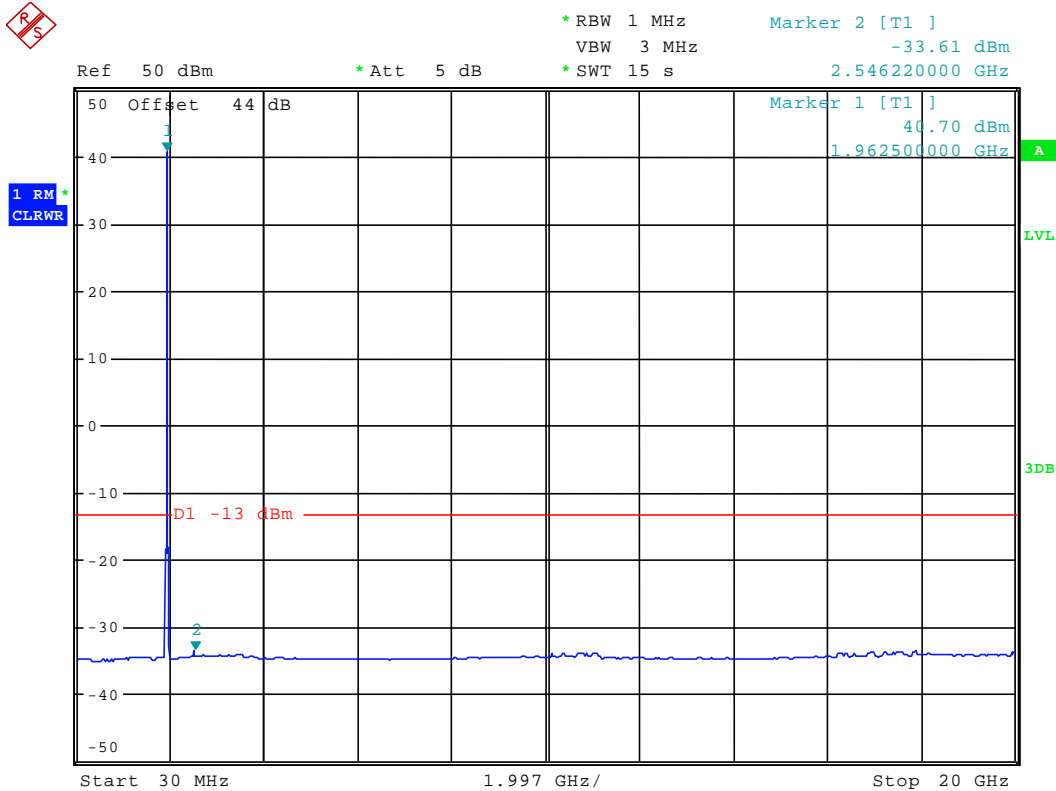
7.3.1.9 GSM-EDGE > 1MHz to band edge



plot 7.3.1.9-#1 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN; Test results; Downlink; GSM-EDGE > 1MHz to band edge;



7.3.1.10 LTE > 1MHz to band edge



plot 7.3.1.10-#1 Spurious Emissions at Antenna Terminals: §24.238, §2.1051; RSS-132, RSS-GEN; Test results; Downlink; LTE > 1MHz to band edge;

7.3.2 Uplink

n.a.

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

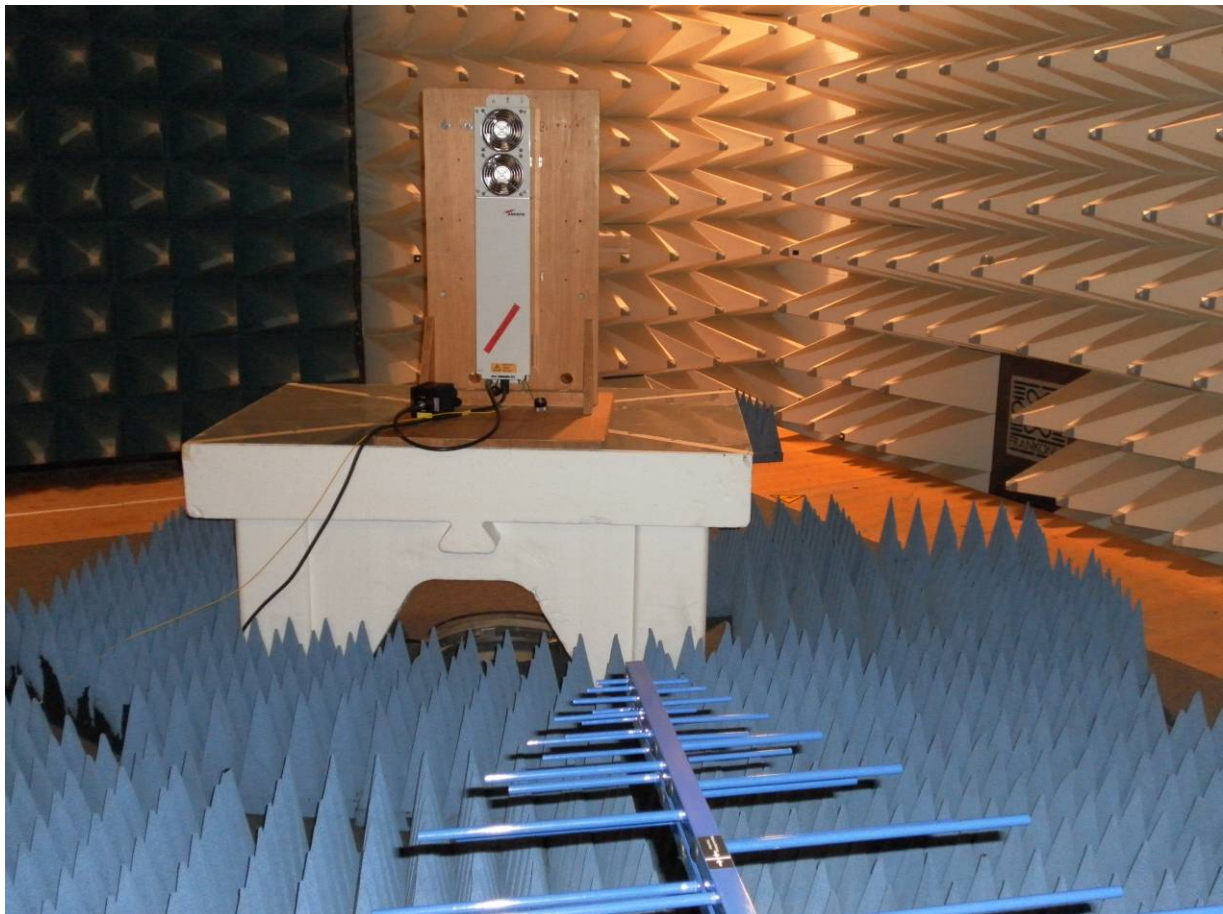
7.4 Summary test result

Test result	complies, according the plots above
Tested by:	W. Meir
Date:	19.04.2011

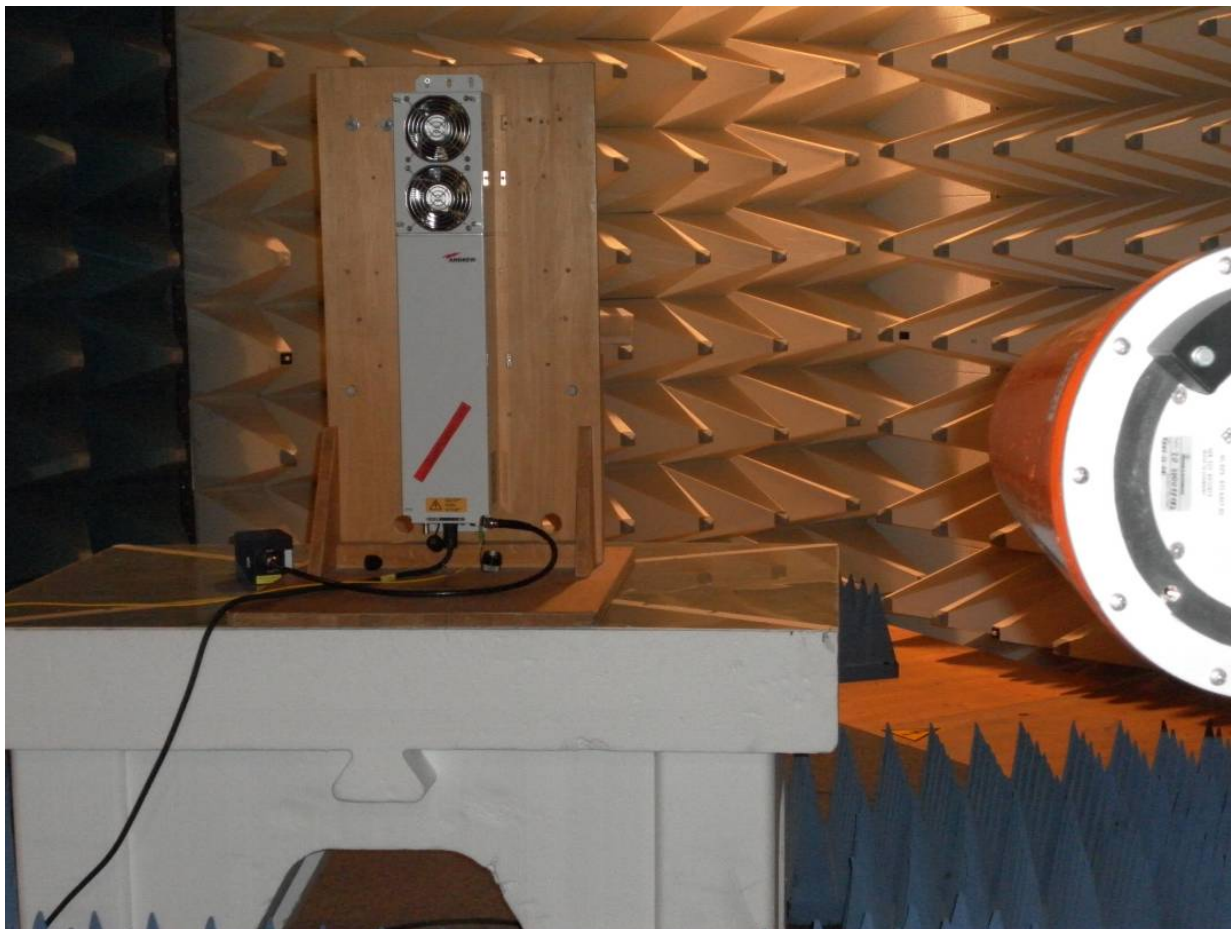
8 Radiated Spurious Emissions: §24.238, §2.1051; RSS-131, RSS-GEN



picture 8.1: label



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



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



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	21.12.2010	21.12.2011	X
Antenna	CBL 6111	Chase	K1149	24.09.2010	24.09.2011	X
RF Cable		Frankonia	K1121 SET	01.07.2010	01.07.2011	X
Pre amplifier	AM1431	Miteq	K1721	02.07.2010	02.07.2011	X
Antenna	HL 025	R&S	K809	28.09.2010	28.09.2011	X
Preamplifier	AFS4-00102000	Miteq	K838	09.02.2011	09.02.2012	X
RF Cable	Sucoflex 100	Suhner	K1742	05.04.2011	05.04.2012	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
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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 (±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.

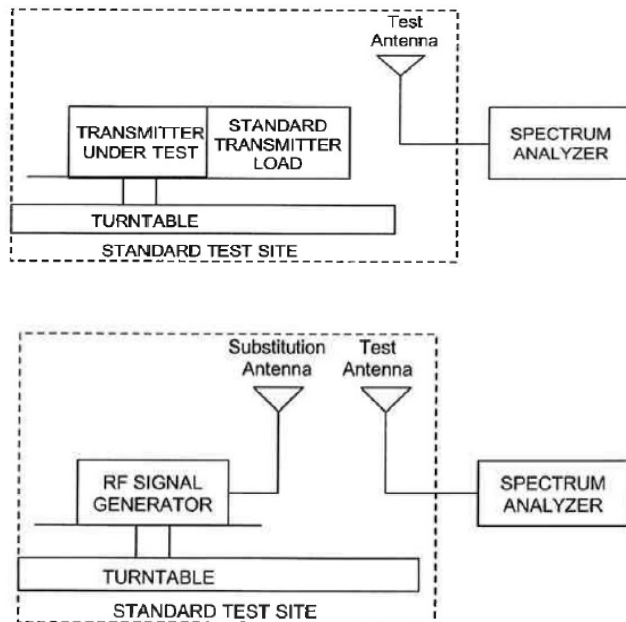


Figure #7.2 Substitution methods TIA-603-C



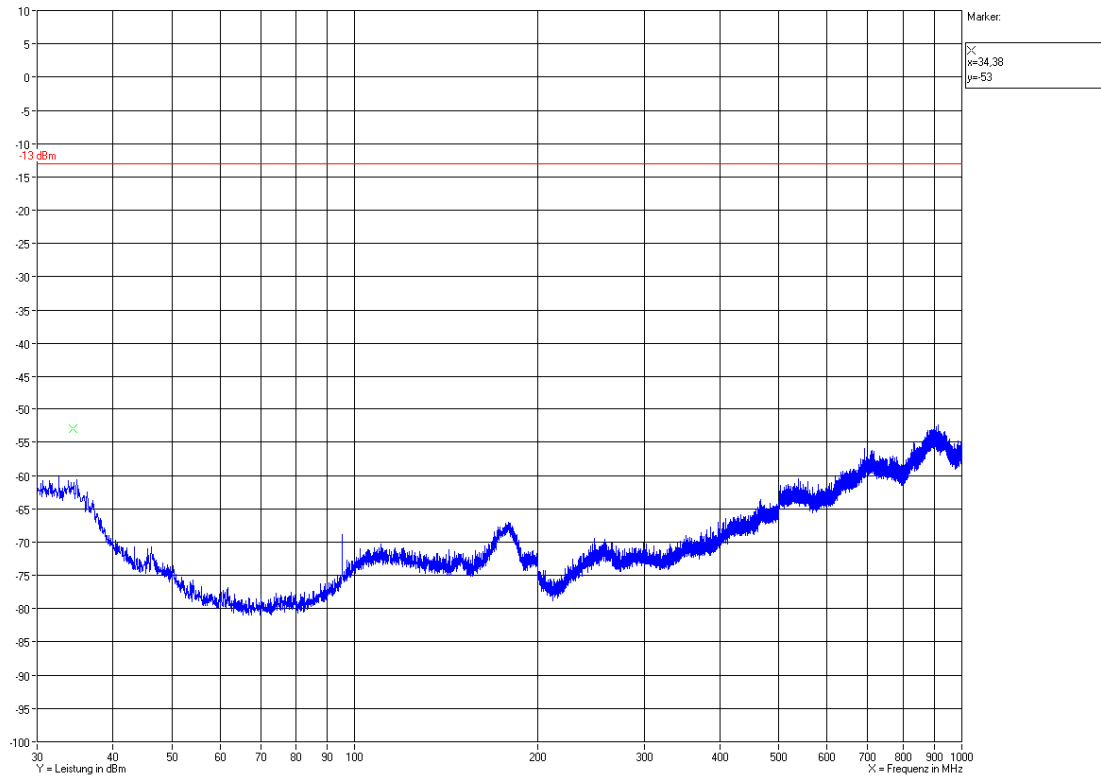
8.2 Test results

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

B/M/T: 1932MHz – 1962,5MHz – 1995MHz

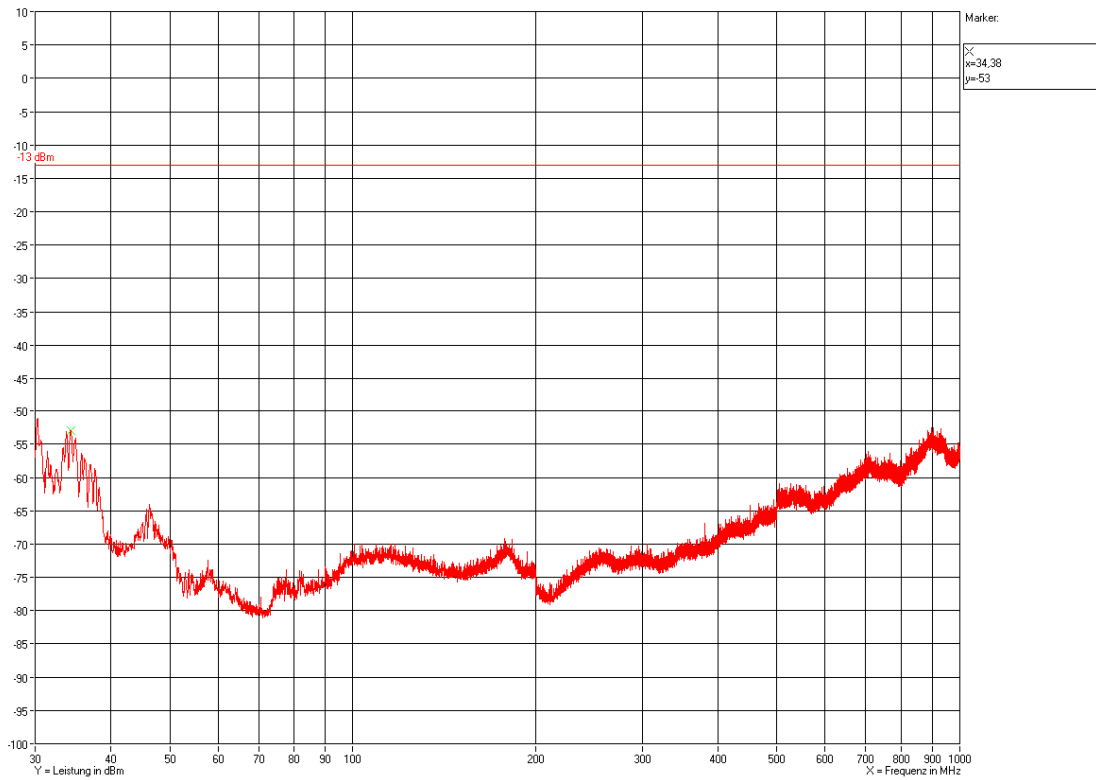
Polarisation: horizontal

Detector: Peak





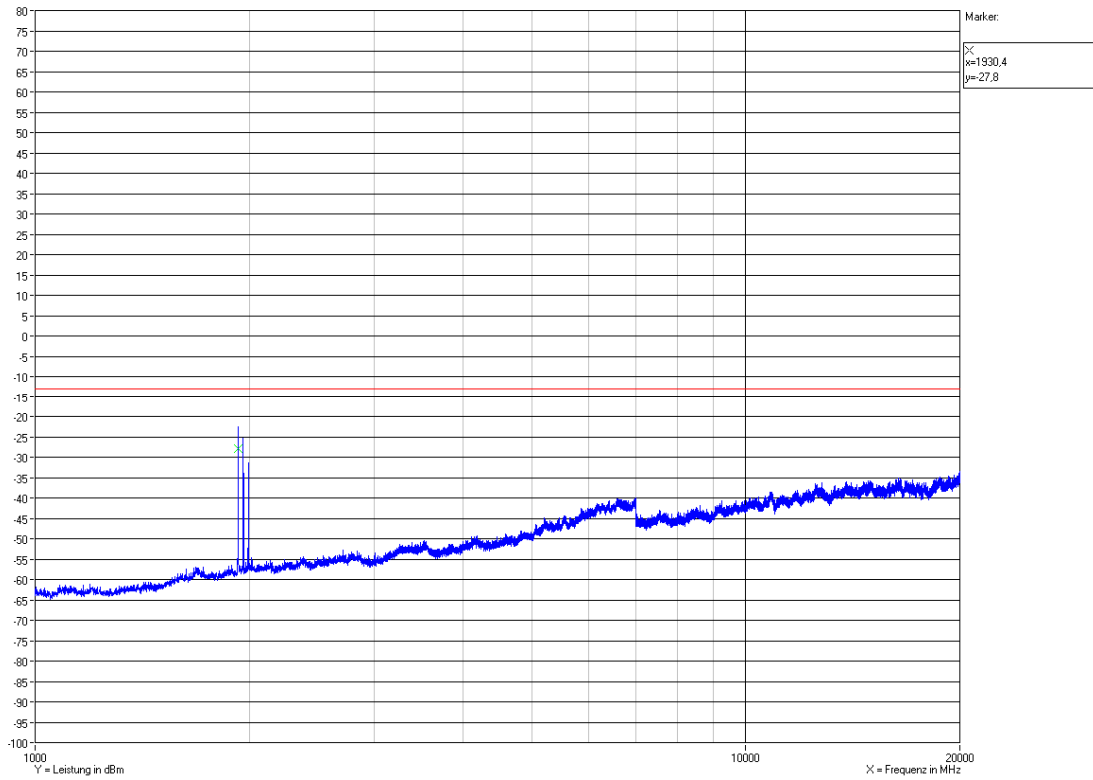
B/M/T: 1932MHz – 1962,5MHz – 1995MHz
Polarisation: **Vertical**
Detector: Peak





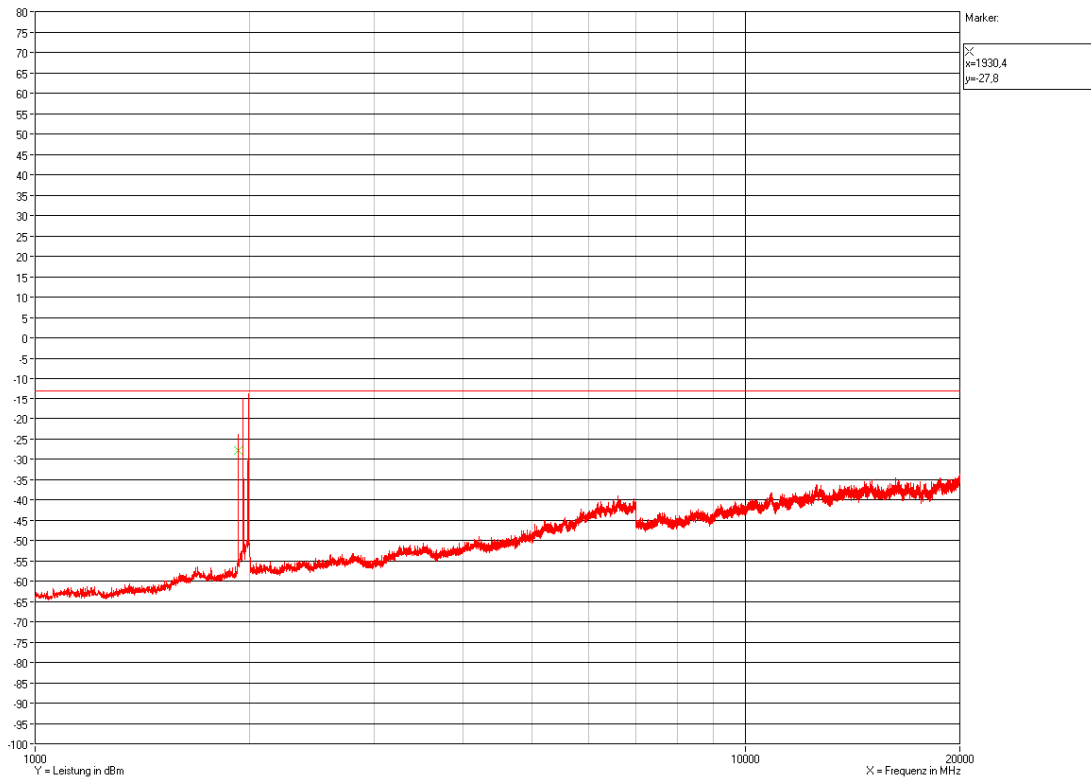
8.2.2 1GHz to 20GHz Downlink (Bottom – Middle – Top)

B/M/T: 1932MHz – 1961,5MHz – 1993MHz
Polarisation: horizontal
Detector: Peak





B/M/T: 1932MHz – 1961,5MHz – 1993MHz
 Polarisation: vertical
 Detector: Peak



No signals could be measured other than the fundamentals nearly the limits.

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:	Tom Zahlmann
Date:	26.04.2011



9 History

Revision	Modification	Date	Name
V01.00	Initial	05.05.2011	Zahlmann

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