CETECOM ICT Services GmbH

Radio Satellite Communication
Untertürkheimer Straße 6-10, D-66117 Saarbrücken
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Test report No.: 2-4917-01-02/08 This test report consists of 107 pages

Recognized by the
Federal Communications Commission and Industry Canada
Anechoic chamber registration No.: 90462 (FCC)
Anechoic chamber registration No.: 3463 (IC)
TCB ID: DE0001

Accredited by the
German Accreditation Council
DAR-Registration Number
DAT-P-176/94-D1

Accredited Bluetooth® Test Facility (BQTF)

Test report No. 2-4917-01-02/08
Applicant: Siemens Home and Office Communication Devices GmbH & Co.KG
Type: Gigaset SX682 / SE681 WIMAX
Standard: FCC part 27 / FCC part 15

Table of contents

1 General information

1.1 Notes

The test results of this test report relate exclusively to the test item specified in 1.5.

CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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Test Laboratory Manager:

2008-05-31	Nicolas Stamber	
Date	Name	Signature

Technical responsibility for area of testing:

2008-05-31	Karsten Geraldy	
Date	Name	Signature

CETECOM
Cetecom ICT Services
Accredited Test Laboratory
Untertürkheimer Str. 6-10
D-66117 Saarbrücken

1.2 Testing laboratory

CETECOM ICT Services GmbH
Untertürkheimerstraße 6-10
66117 Saarbrücken
Germany

CETECOM ICT Services GmbH
P.O. - Box 65 01 55
66140 Saarbrücken
Germany

Telefon : + 49 (0) 681 598-0
Telefax : + 49 (0) 681 598-9075

State of accreditation:
The test laboratory is accredited according to DIN EN ISO/IEC 17025.
DAR-registration number: DAT-P-176/94-D1

Testing location, if different from CETECOM ICT Services GmbH: not applicable

1.3 Details of applicant

Name : Siemens Home and Office Communication Devices GmbH & Co.KG
Street : Frankenstr. 2
Town : 46395 Bocholt
Country : Germany
Phone : +49 (0) 2871 91-0
Fax : +49 (0) 2871 91-24 95

Contact person
Name : Mr. Uwe Alt
Phone : +49 (0) 2871 91-28 57
Fax : +49 (0) 2871 91 62 857
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1.4 Application details

Date of receipt of application : 2008-04-10
Date of receipt of test item : 2008-04-21
Date of test : 2008-04-21 - 2008-04-24, 2008-05-31
Representations of applicant : Mr. Jürgen Voigt

Test item (EUT)

Description	:	Point to multipoint, Digital Microwave Fixed Link
Type designation	:	Gigaset SX682 WIMAX / Gigaset SE681 WIMAX
Manufacturer	:	Siemens Home and Office Communication Devices GmbH & Co.KG Frankenstr. 2 46395 Bocholt Germany

Technical data (5 MHz channel spacing)

Tx Frequency range EUT	:	2.504250 – 2.686750 GHz
Frequency EUT	:	2.504250, 2.593000, 2.686750 GHz
Channel spacing	:	5.0 MHz
Modulation	:	OFDM (with QPSK, 16QAM, 64QAM)
Radio Output Power (Peak)	:	+33 dBm (with 9dB crest factor)
Radio Output Power (Average)	:	+24 dBm
Power supply U_{DC} (Nominal)	:	115.0 V
Power supply U_{DC} (Minimum)	:	103.5 V
Power supply U_{DC} (Maximum)	:	126.5 V

Technical data (10 MHz channel spacing)

Tx Frequency range EUT	:	2.507500 – 2.684500 GHz
Frequency EUT	:	2.507500, 2.596000, 2.684500 GHz
Channel spacing	:	10.0 MHz
Modulation	:	OFDM (with QPSK, 16QAM, 64QAM)
Radio Output Power (Peak)	:	+33 dBm (with 9dB crest factor)
Radio Output Power (Average)	:	+24 dBm
Power supply U_{DC} (Nominal)	:	115.0 V
Power supply U_{DC} (Minimum)	:	103.5 V
Power supply U_{DC} (Maximum)	:	126.5 V

1.4.1 Operation conditions

Operation: FCC CFR 47 Part 27: Uninterrupted operation for TX
FCC CFR 47 Part 15: Idle Mode for RX

1.4.2 Equipment under test

Indoor unit

Gigaset SX682 WIMAX			
Gigaset SE681 WIMAX			

All measurements were performed with the Gigaset SX682 WIMAX with the external antenna S25015P. This combination represents the worst case. Both EUT are the same, except the phone connector at the front panel, which is removed at the Gigaset SE681 WIMAX. Therefore, the SE681 was only retested in idle mode.

Antenna

Name:	Product Code	Gain [dBi]
external antenna 2.5 - 2.7 GHz	S25015P	15
external antenna 2.5 - 2.7 GHz	S2509P39NM	9

1.5 Test standards

FEDERAL COMMUNICATIONS COMMISSION

CFR 47 Part 15	2007-09-20	Subpart B – Unintentional Radiators
CFR 47 Part 27	2007-10-01	Subpart C – Technical standards

Technical test

1.6 Summary of test results

Remarks on the RF tests carried out during the assessment:

Complete RF tests for all mandatory Tx and Rx parameters.

The test report:

- [X] describes the first test
- [ ] describes an additional test
- [ ] is a verification of documents
- [ ] is only valid with the test report no.:

1.7 Test environment

The environmental conditions are documented especially for each test.

Normal conditions:	Temperature	+ 23.0 °C
	Humidity	60.0 %

1.8 Measurement and test set-up

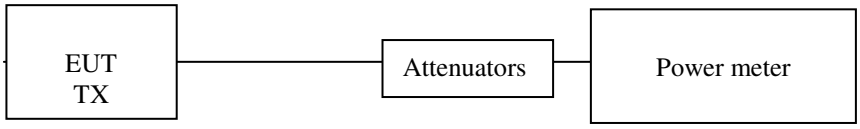
The measurement and test set-up is defined in the technical specification FCC.

Measurement uncertainties:	Power	± 0.4 dB
	Frequency	± 0.01ppm
	Spectrum masks	± 0.4 dB; ± 0.01ppm
	Spurious emissions	± 0.4 dB; ± 0.01ppm

Test set-up

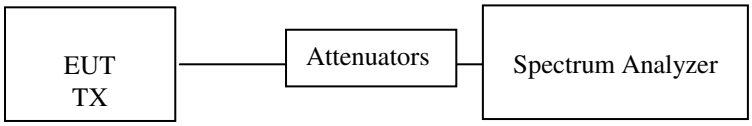
No. 1

Test set-up:



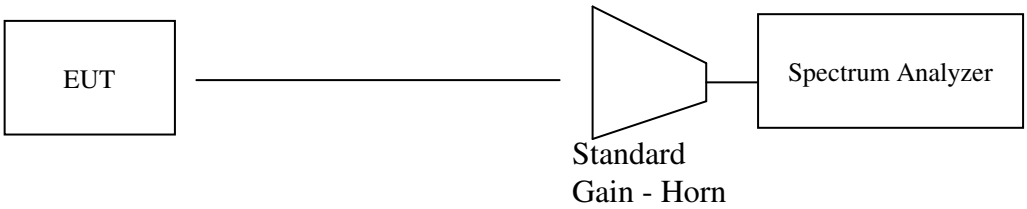
No. 2

Test set-up:



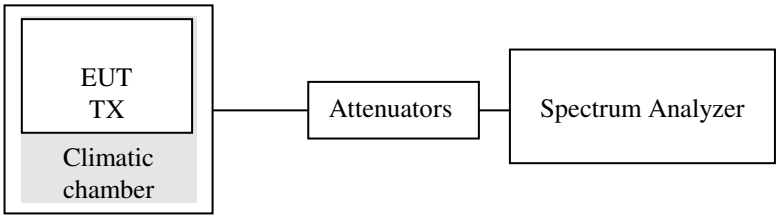
No. 3

Test set-up:



No. 4

Test set-up:



1.9 Test equipment utilized

Test equipment	Manufacturer	Type	CETECOM Ref. No.
Spectrum analyser	Rohde & Schwarz	FSP	300003575
Power meter	Hewlett Packard	E4419B	300002627
Power sensor	Hewlett Packard	R8485A	300001668
Climatic test chambers	Vötsch	VUK 04/500	029730000
Spectrum analyser	HP	HP 85660B	300000999
Analyser display	HP	HP 85662A	300002297
Quasi peak adapter	HP	HP 85650A	30000999a
RF-preselector	HP	HP 85685A	300001000
Biconical antenna	Emco	3104	300001603a
Log.-per.-antenna	Emco	3146	300001603b
Double ridge horn	Emco	3115	300001603c
Amplifier	Tron-Tech	P42-GA29	300001040
Amplifier	Hewlett Packard	83017A	300002268
Standard Gain Horn	Narda	639	300000786
Standard Gain Horn	Narda	638	300000785
Power supply	Hewlett Packard	6038A	300001174
Power supply	Zentro Elektrik	6032A	300000501
Power supply	Zentro Elektrik	6032A	300000505
Power controller	Fluke	45	300001532
RF-cable	Hewlett Packard	5061-5359	300002033
RF-cable	Insulated Wire Inc.	2-PS1401-788-2PS	300002855

Test Equipment 10 meter chamber

Receiver:	Receiver [ESCI 3]
	@ GPIB0 (ADR 20), SN 100083/003, FW 3.32, CAL 07.01.2009
Signal Path:	no Notch
Antenna:	Chase Broadband BiLog Antenna CBL 6112
	SN 2110, FW A, CAL 07.01.2009
	Correction Table (vertical): Chase Broadband BiLog Antenna CBL 6112
	Correction Table (horizontal): Chase Broadband BiLog Antenna CBL 6112
	Correction Table: Antenna cable with switching unit(0507)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower]
	@ GPIB0 (ADR 8)
Turntable:	Turntable [EMCO Turntable]
	@ GPIB0 (ADR 9)

The calibration data was verified by CETECOM ICT Services.

1.10 Test results

1.10.1 Test result overview

This test was performed:

☐ in addition to the test report no.:

Verification of EUT:

☒ EUT is in accordance with the technical description

☐ EUT is not in accordance with the technical description

1.10.2 Test results

CFR 47 Part 2.1046 Measurements required: RF power output
CFR 47 Part 27.50 Power and antenna height limits, subpart (h)

Transmitter characteristics: 5 MHz channel spacing

Conducted output power

Measurement conditions:

Frequency	f_{min}	= 2.504250 GHz
Frequency	f_{nom}	= 2.593000 GHz
Frequency	f_{max}	= 2.686750 GHz
Channel spacing	CS	= 5.0 MHz
Modulation	D	= QPSK, 16QAM, 64QAM
Temperature	t	= see table
Power supply	U_{DC}	= see table
Measurement at	C'	

Test set-up: see page 9 / no. 1

Limit: see test standard

Test measurement:

U_{DC}	T	Modulation	Frequency	RF power
[V]	[°C]	[°C]	[GHz]	[dBm]
115.0	+ 23.0	QPSK	2.504250	23.7
115.0	+ 23.0	QPSK	2.593000	23.9
115.0	+ 23.0	QPSK	2.686750	23.7
115.0	+ 23.0	16QAM	2.504250	23.1
115.0	+ 23.0	16QAM	2.593000	23.8
115.0	+ 23.0	16QAM	2.686750	23.5
115.0	+ 23.0	64QAM	2.504250	23.3
115.0	+ 23.0	64QAM	2.593000	23.6
115.0	+ 23.0	64QAM	2.686750	23.3

Test result: Passed: [X] Failed: [ ]

CFR 47 Part 2.1046 Measurements required: RF power output
CFR 47 Part 27.50 Power and antenna height limits, subpart (h)

Transmitter characteristics: 5 MHz channel spacing

Radiated output power EIRP

Measurement conditions:

Frequency	f_{min}	= 2.504250 GHz
Frequency	f_{nom}	= 2.593000 GHz
Frequency	f_{max}	= 2.686750 GHz
Channel spacing	CS	= 5.0 MHz
Modulation	D	= QPSK, 16QAM, 64QAM
Temperature	t	= see table
Power supply	U_{DC}	= see table
Measurement at	C'	

Test set-up: see page 9 / no. 1

Limit: see test standard

Test measurement:

Frequency	Modulation	RF power	Antenna	Antenna	Antenna	Antenna
			S2509P39NM	S2509P39NM	S25015P	S25015P
[GHz]		[dBm]	Gain [dBi]	EIRP [dBm]	Gain [dBi]	EIRP [dBm]
2.504250	QPSK	23.7	9.0	32.7	15.0	38.7
2.593000	QPSK	23.9	9.0	32.9	15.0	38.9
2.686750	QPSK	23.7	9.0	32.7	15.0	38.7
2.504250	16QAM	23.1	9.0	32.1	15.0	38.1
2.593000	16QAM	23.8	9.0	32.8	15.0	38.8
2.686750	16QAM	23.5	9.0	32.5	15.0	38.5
2.504250	64QAM	23.3	9.0	32.3	15.0	38.3
2.593000	64QAM	23.6	9.0	32.6	15.0	38.6
2.686750	64QAM	23.3	9.0	32.3	15.0	38.3

Test result: Passed: [X] Failed: [ ]

CFR 47 Part 2.1046 Measurements required: RF power output
CFR 47 Part 27.50 Power and antenna height limits, subpart (h)

Transmitter characteristics: 10 MHz channel spacing

Conducted output power

Measurement conditions:

Frequency	f_{min}	= 2.507500 GHz
Frequency	f_{nom}	= 2.596000 GHz
Frequency	f_{max}	= 2.684500 GHz
Channel spacing	CS	= 10.0 MHz
Modulation	D	= QPSK, 16QAM, 64QAM
Temperature	t	= see table
Power supply	U_{DC}	= see table
Measurement at	C'	

Test set-up: see page 9 / no. 1

Limit: see test standard

Test measurement:

U_{DC}	T	Modulation	Frequency	RF power
				p
[V]	[°C]	[°C]	[GHz]	[dBm]
115.0	+ 23.0	QPSK	2.507500	23.1
115.0	+ 23.0	QPSK	2.596000	23.3
115.0	+ 23.0	QPSK	2.684500	23.8
115.0	+ 23.0	16QAM	2.507500	23.0
115.0	+ 23.0	16QAM	2.596000	23.5
115.0	+ 23.0	16QAM	2.684500	23.6
115.0	+ 23.0	64QAM	2.507500	22.5
115.0	+ 23.0	64QAM	2.596000	23.1
115.0	+ 23.0	64QAM	2.684500	23.2

Test result: Passed: [X] Failed: [ ]

CFR 47 Part 2.1046 Measurements required: RF power output
CFR 47 Part 27.50 Power and antenna height limits, subpart (h)

Transmitter characteristics: 10 MHz channel spacing

Radiated output power EIRP

Measurement conditions:

Frequency	f_{min}	= 2.507500 GHz
Frequency	f_{nom}	= 2.596000 GHz
Frequency	f_{max}	= 2.684500 GHz
Channel spacing	CS	= 10.0 MHz
Modulation	D	= QPSK, 16QAM, 64QAM
Temperature	t	= see table
Power supply	U_{DC}	= see table
Measurement at	C'	

Test set-up: see page 9 / no. 1

Limit: see test standard

Test measurement:

Frequency	Modulation	RF power	Antenna	Antenna	Antenna	Antenna
			S2509P39NM	S2509P39NM	S25015P	S25015P
[GHz]		[dBm]	Gain [dBi]	EIRP [dBm]	Gain [dBi]	EIRP [dBm]
2.507500	QPSK	23.1	9.0	32.1	15.0	38.1
2.596000	QPSK	23.3	9.0	32.3	15.0	38.3
2.684500	QPSK	23.8	9.0	32.8	15.0	38.8
2.507500	16QAM	23.0	9.0	32.0	15.0	38.0
2.596000	16QAM	23.5	9.0	32.5	15.0	38.5
2.684500	16QAM	23.6	9.0	32.6	15.0	38.6
2.507500	64QAM	22.5	9.0	32.5	15.0	38.5
2.596000	64QAM	23.1	9.0	32.1	15.0	38.1
2.684500	64QAM	23.2	9.0	32.2	15.0	38.2

Test result: Passed: [X] Failed: [ ]

CFR 47 Part 2.1049 Measurements required: **Occupied bandwidth**
CFR 47 Part 27.53 Emission limits, subpart (l) (6)

Transmitter characteristics: 5 / 10 MHz channel spacing

Measurement conditions:

Frequency	f_{nom}	= 2.593 GHz / 2.596 GHz
Channel spacing	CS	= 5.0 MHz / 10 MHz
Modulation	D	= QPSK, 16QAM, 64QAM
Temperature	t	= see table
Power supply	U_{DC}	= see table
Measurement at	C'	

Test set-up: see page 9 / no. 2

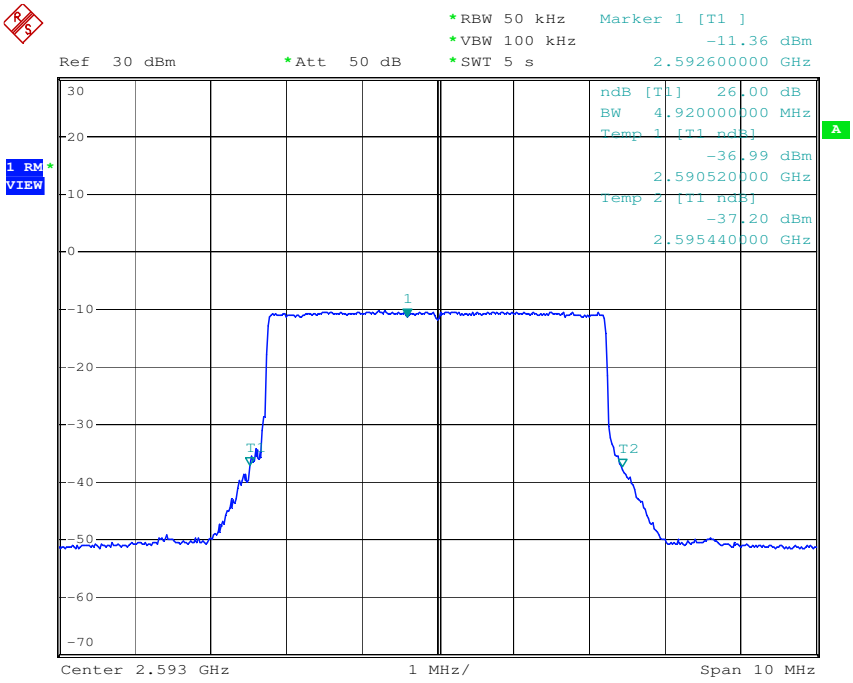
Limit: see plot

Test measurement:

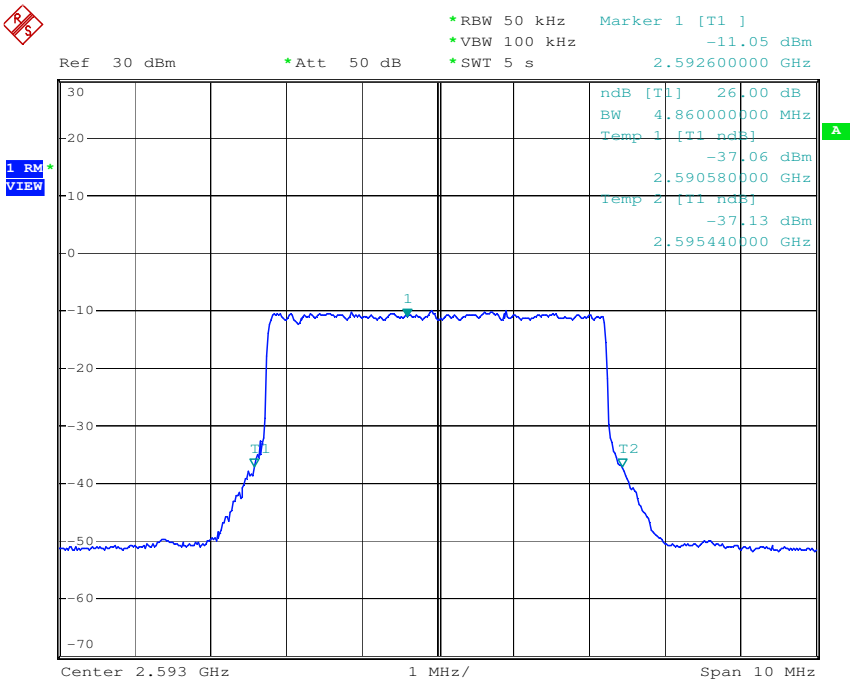
U_{DC}	T	Channel spacing	Modulation	Frequency	Occupied bandwidth	Plot
[V]	[°C]	[MHz]	[°C]	[GHz]	[MHz]	
115.0	+ 23.0	5	QPSK	2.593000	4.92	1
115.0	+ 23.0	5	16QAM	2.593000	4.86	2
115.0	+ 23.0	5	64QAM	2.593000	4.84	3
115.0	+ 23.0	10	QPSK	2.596000	9.52	4
115.0	+ 23.0	10	16QAM	2.596000	9.60	5
115.0	+ 23.0	10	64QAM	2.596000	9.68	6

Test result: Passed: [X] Failed: [ ]

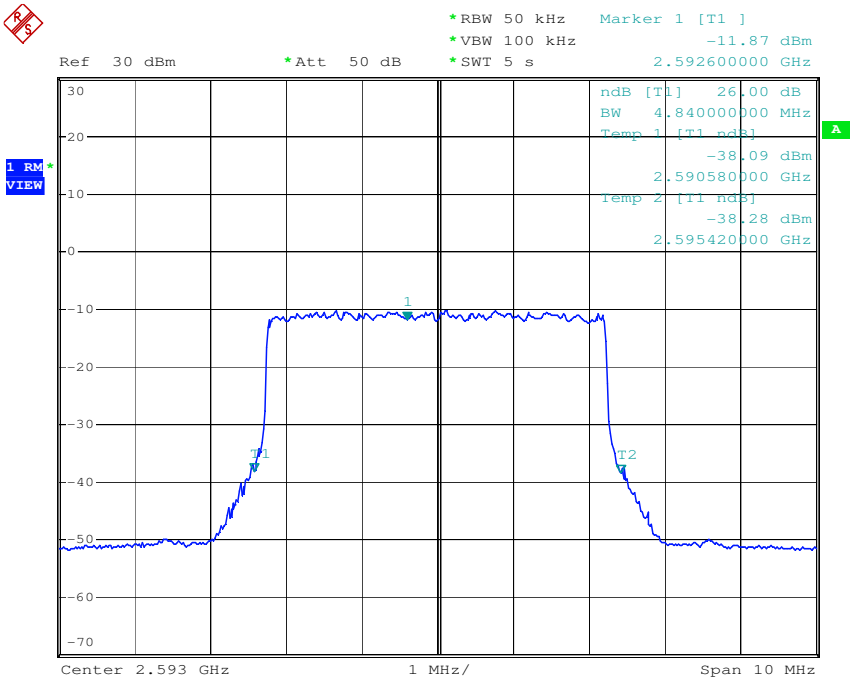
Plot 1:


*RBW 50 kHz
*VBW 100 kHz
*SWT 5 s
Marker 1 [T1]
-11.36 dBm
2.592600000 GHz
Ref 30 dBm
*Att 50 dB
ndB [T1] 26.00 dB
BW 4.920000000 MHz
Temp 1 [T1 ndB]
-36.99 dBm
2.590520000 GHz
Temp 2 [T1 ndB]
-37.20 dBm
2.595440000 GHz
1 RM VIEW
A
Center 2.593 GHz
1 MHz/
Span 10 MHz
Date: 21.APR.2008 13:11:31

Plot 2:


*RBW 50 kHz
*VBW 100 kHz
*SWT 5 s
Marker 1 [T1]
-11.05 dBm
2.592600000 GHz
Ref 30 dBm
*Att 50 dB
ndB [T1] 26.00 dB
BW 4.860000000 MHz
Temp 1 [T1 ndB]
-37.06 dBm
2.590580000 GHz
Temp 2 [T1 ndB]
-37.13 dBm
2.595440000 GHz
1 RM VIEW
A
Center 2.593 GHz
1 MHz/
Span 10 MHz
Date: 21.APR.2008 13:13:43

Plot 3:



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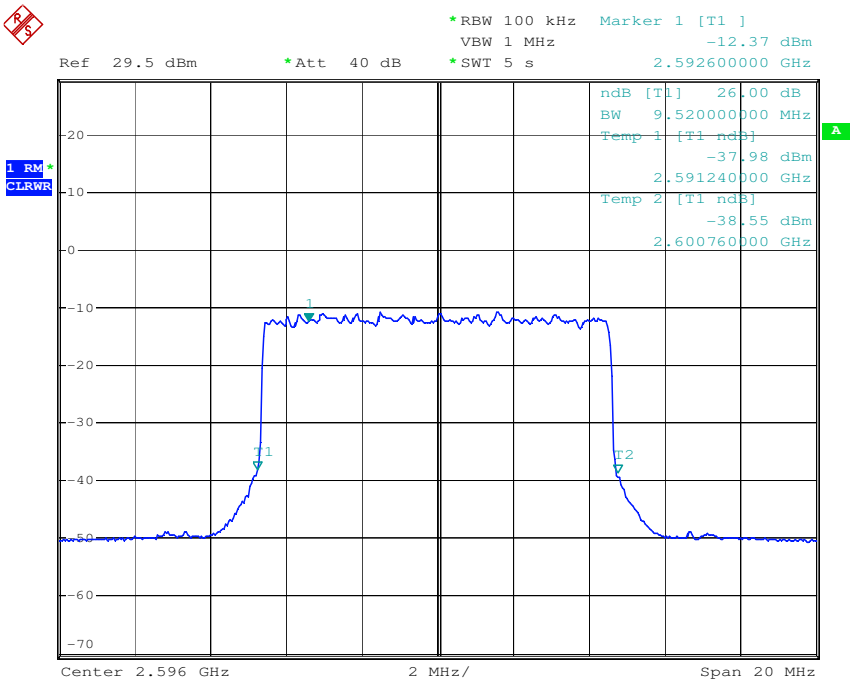
Plot 4:



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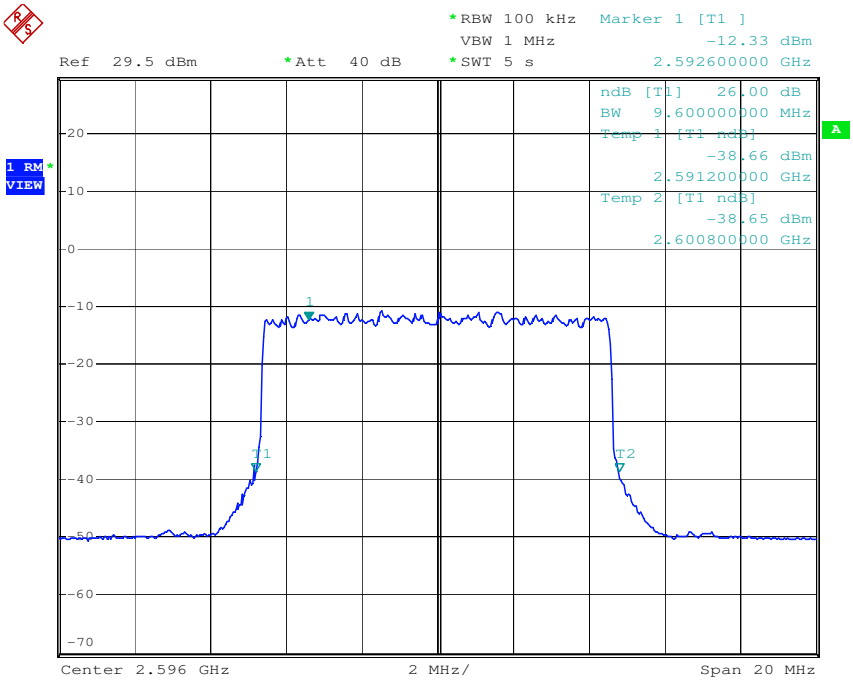
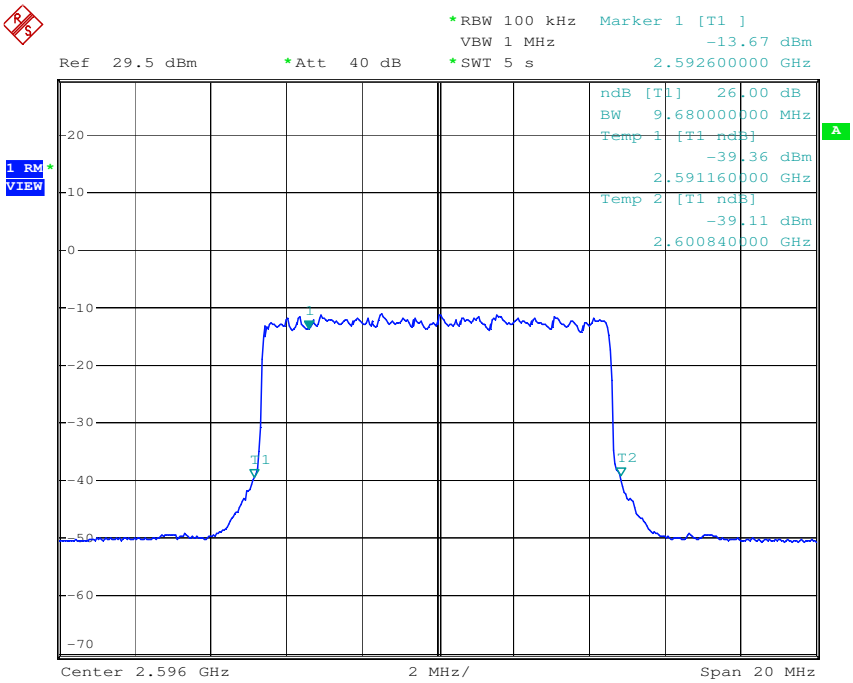
Plot 5:



Date: 21.APR.2008 13:41:57

Plot 6:



Date: 21.APR.2008 13:43:30

CFR 47 Part 2.1051 Measurements required: **Spurious emissions at antenna terminals**
CFR 47 Part 27.53 Emission limits, subpart (l) (2)

Transmitter characteristics: 5 MHz channel spacing

Measurement conditions:

Frequency	f_{min}	= 2.504250 GHz
Frequency	f_{nom}	= 2.593000 GHz
Frequency	f_{max}	= 2.686750 GHz
Channel spacing	CS	= 5.0 MHz
Modulation	D	= QPSK, 16QAM, 64QAM
Temperature	t	= + 23.0 °C
Nominal power supply	U_{DC}	= 115.0 V
Measurement at	C'	

Test set-up: see page 9 / no. 2

Limit: see table

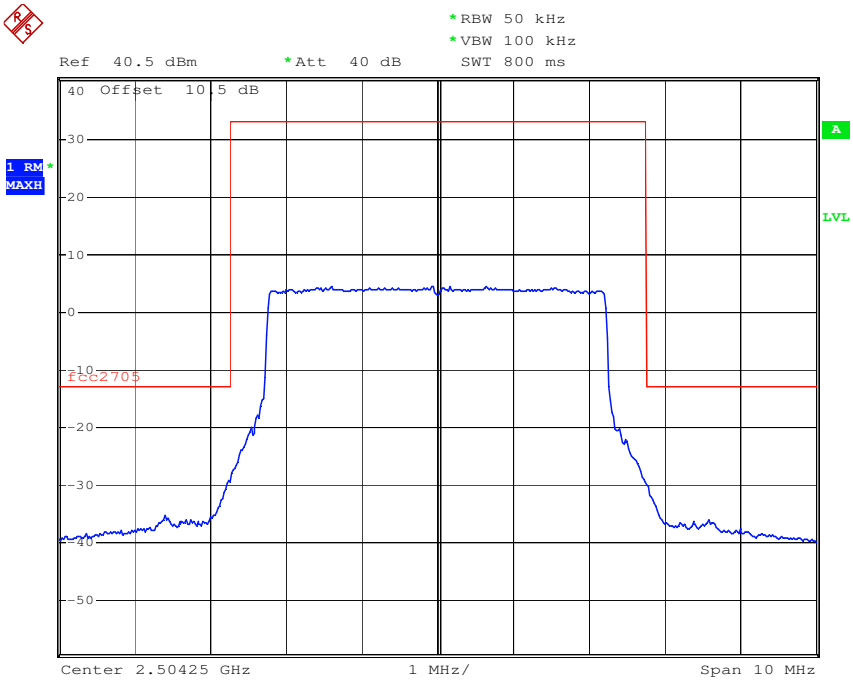
Test measurement:

Frequency Range [GHz]	$f_{carrier}$ [GHz]	Modulation	Limit [dBm]	Res. BW [MHz]	Spurious Frequency [GHz]	Emissions P [dBm]	see plot no.
0.030 – 27.000	2.504250	QPSK	-13.0	1.0	n.f.	< limit	7/8
0.030 – 27.000	2.593000	QPSK	-13.0	1.0	n.f.	< limit	9/10
0.030 – 27.000	2.686750	QPSK	-13.0	1.0	n.f.	< limit	11/12
0.030 – 27.000	2.504250	16QAM	-13.0	1.0	n.f.	< limit	13/14
0.030 – 27.000	2.593000	16QAM	-13.0	1.0	n.f.	< limit	15/16
0.030 – 27.000	2.686750	16QAM	-13.0	1.0	n.f.	< limit	17/18
0.030 – 27.000	2.504250	64QAM	-13.0	1.0	n.f.	< limit	19/20
0.030 – 27.000	2.593000	64QAM	-13.0	1.0	n.f.	< limit	21/22
0.030 – 27.000	2.686750	64QAM	-13.0	1.0	n.f.	< limit	23/24

n.f. = nothing found

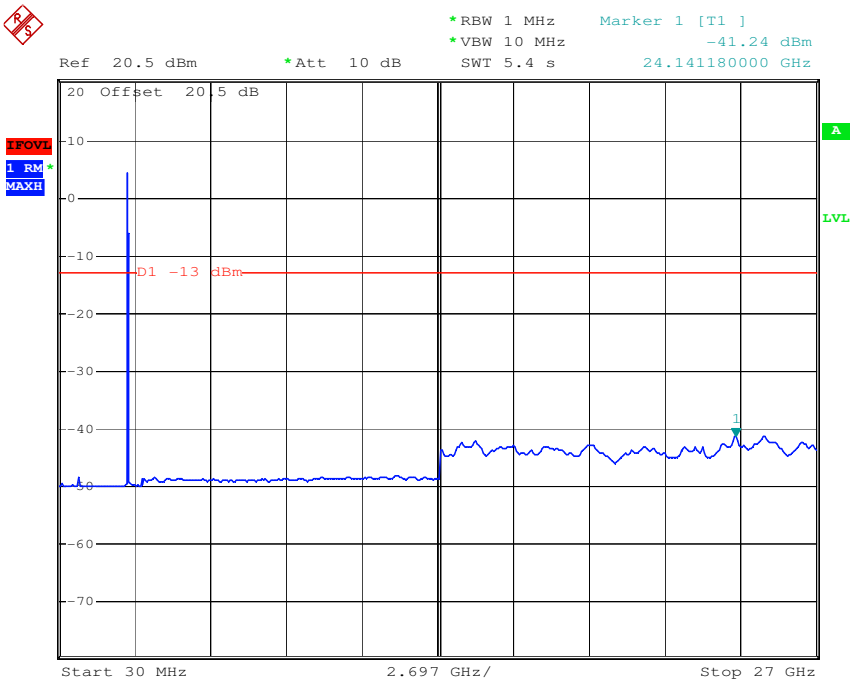
Test result: Passed: [X] Failed: [ ]

Plot 7:



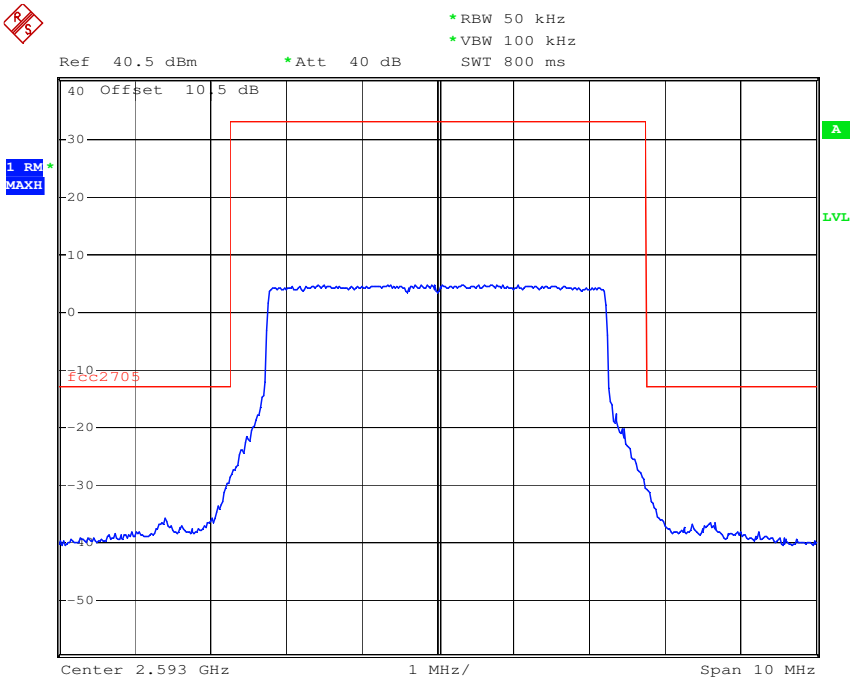
Date: 22.APR.2008 14:32:57

Plot 8:



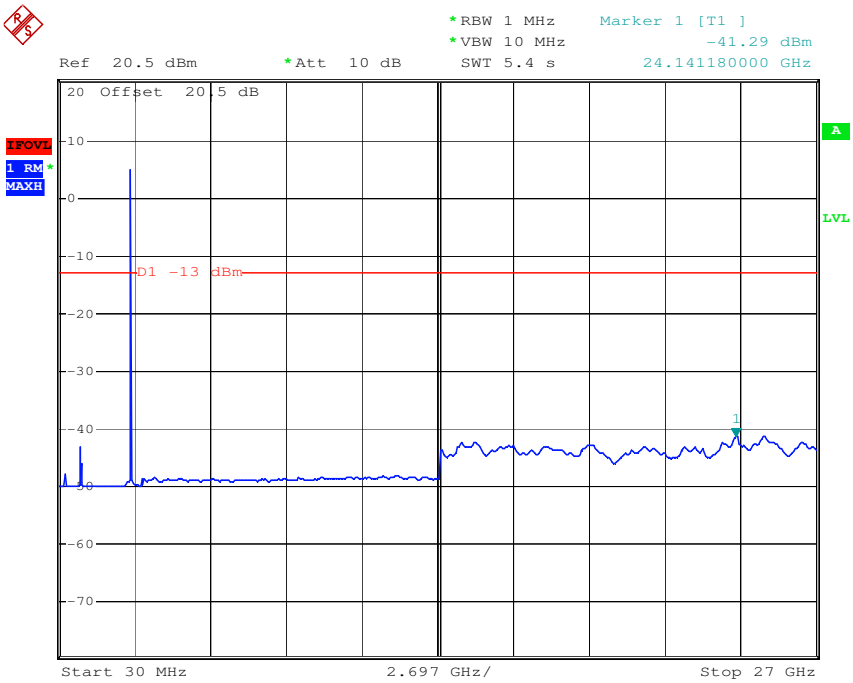
Date: 22.APR.2008 16:09:49

Plot 9:



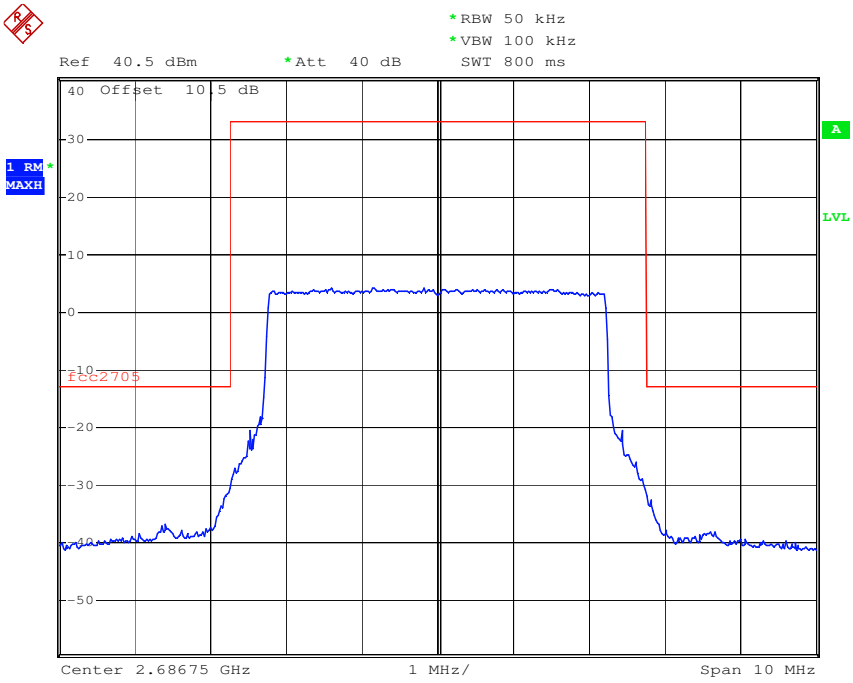
Date: 22.APR.2008 14:33:40

Plot 10:



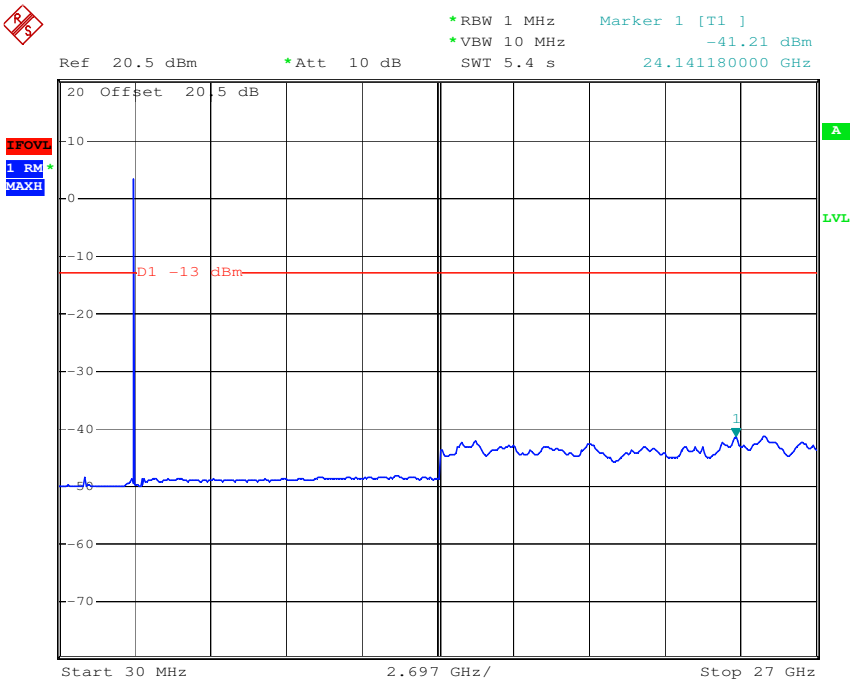
Date: 22.APR.2008 16:10:23

Plot 11:



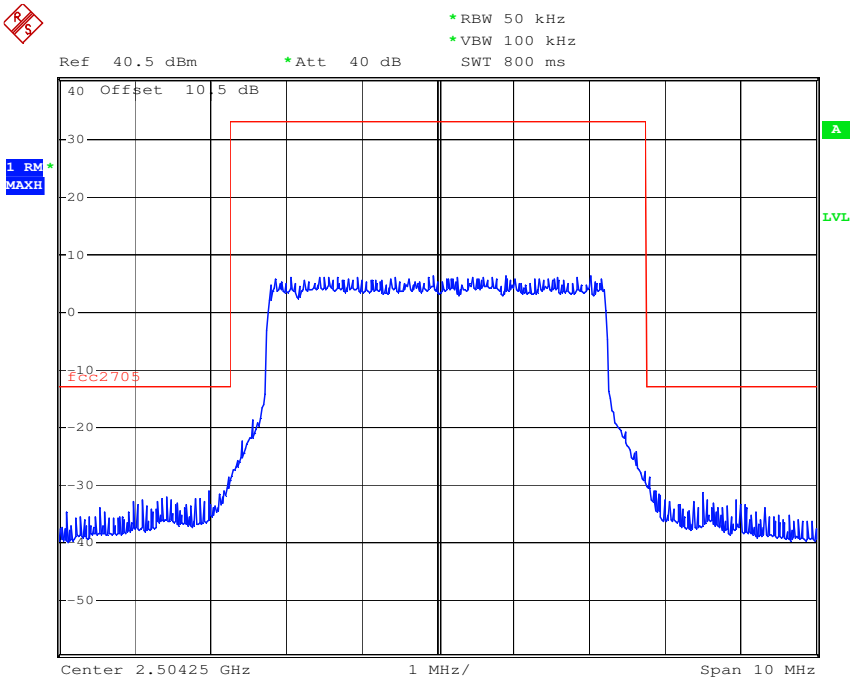
Date: 22.APR.2008 14:34:42

Plot 12:



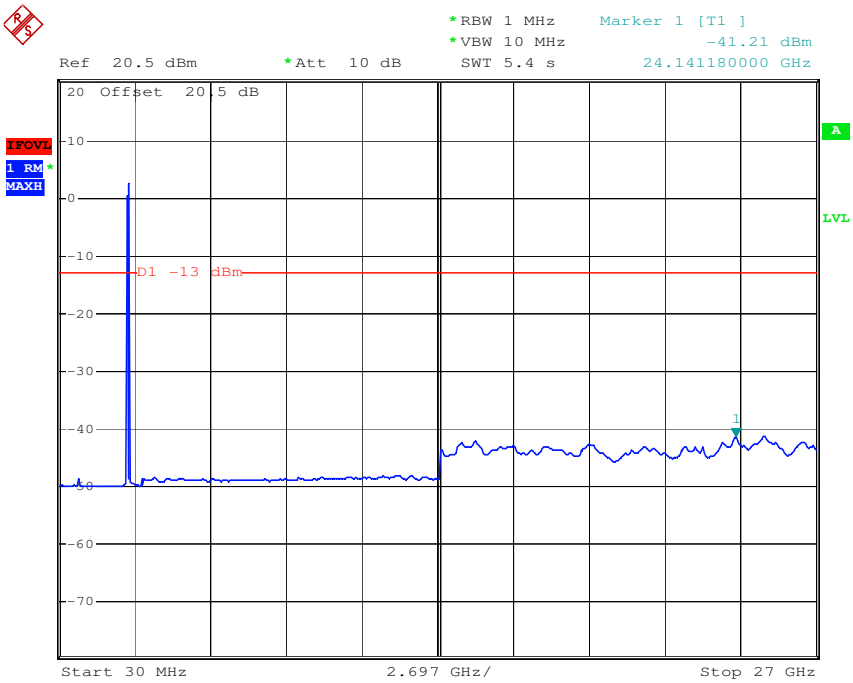
Date: 22.APR.2008 16:10:50

Plot 13:



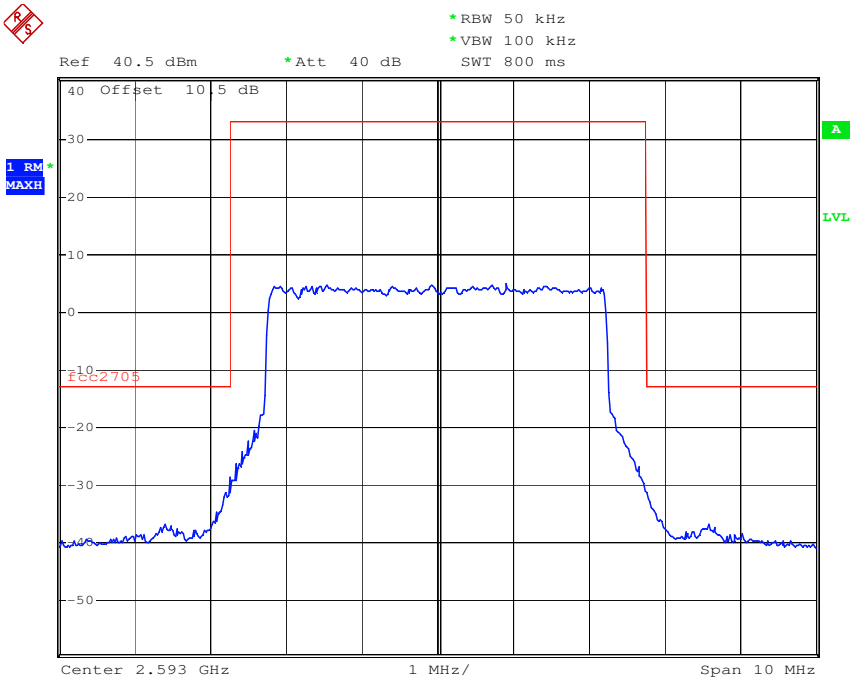
Date: 22.APR.2008 14:36:48

Plot 14:



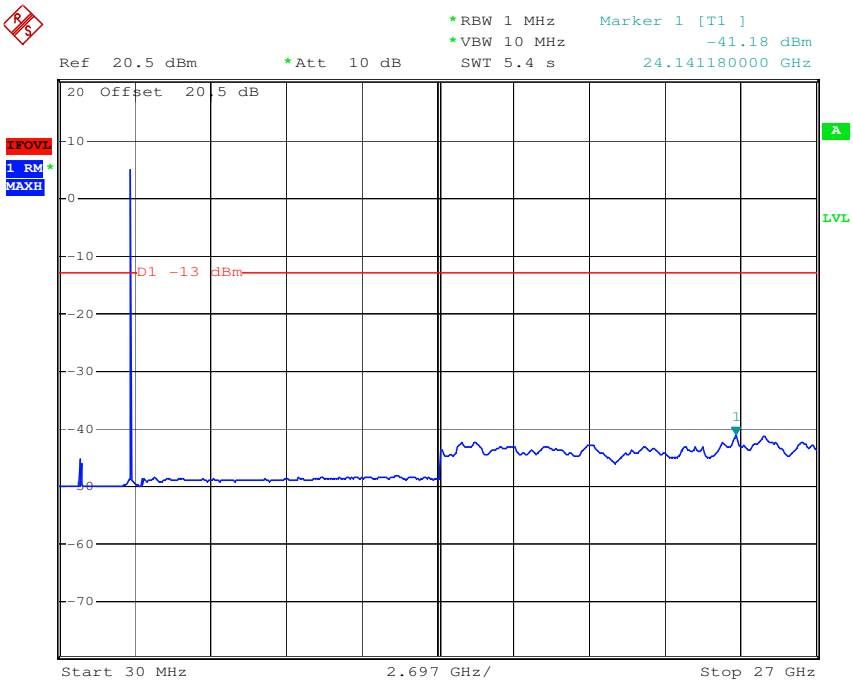
Date: 22.APR.2008 16:21:04

Plot 15:



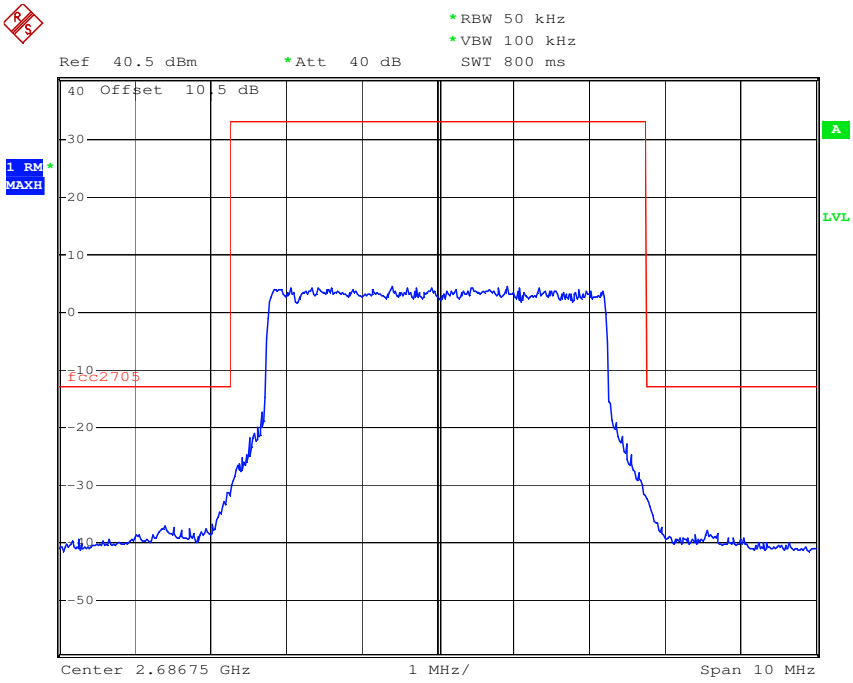
Date: 22.APR.2008 14:37:17

Plot 16:



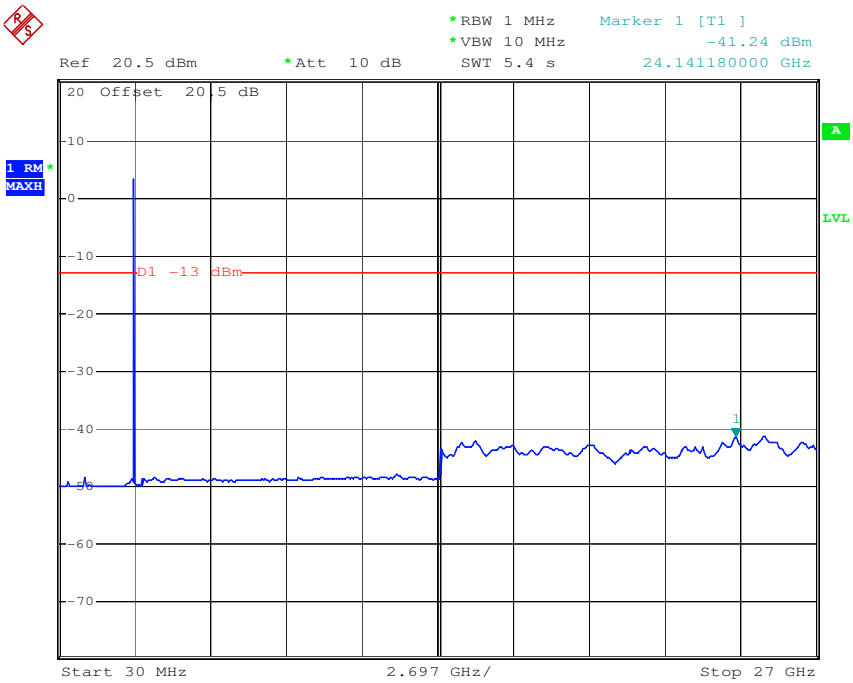
Date: 22.APR.2008 16:12:56

Plot 17:



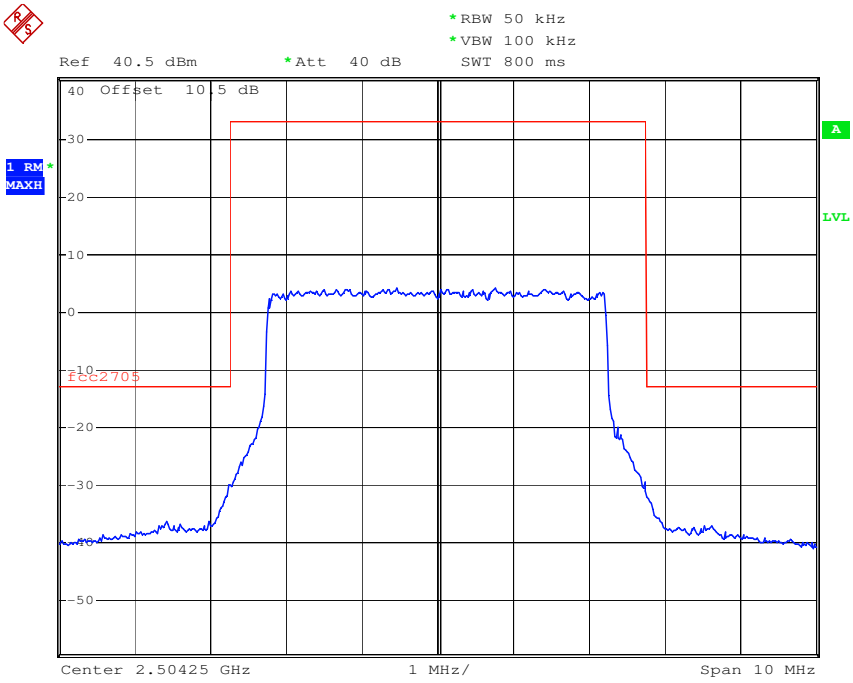
Date: 22.APR.2008 14:37:47

Plot 18:



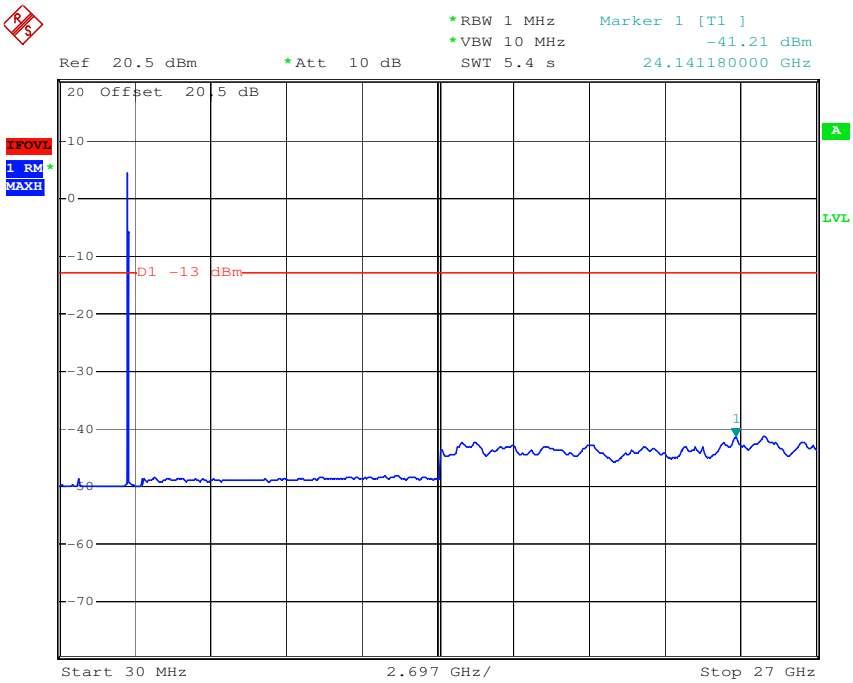
Date: 22.APR.2008 16:13:50

Plot 19:



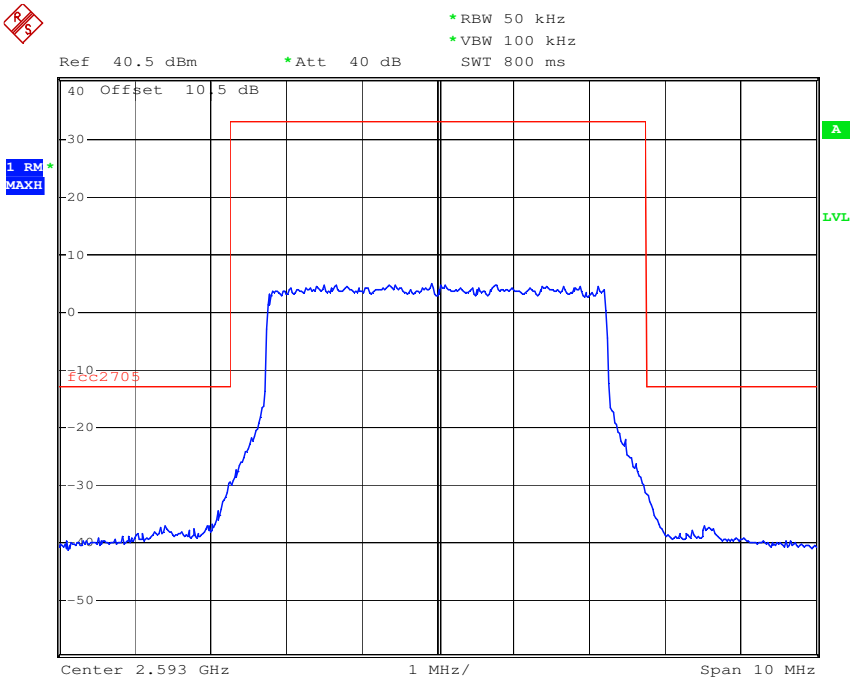
Date: 22.APR.2008 14:39:13

Plot 20:



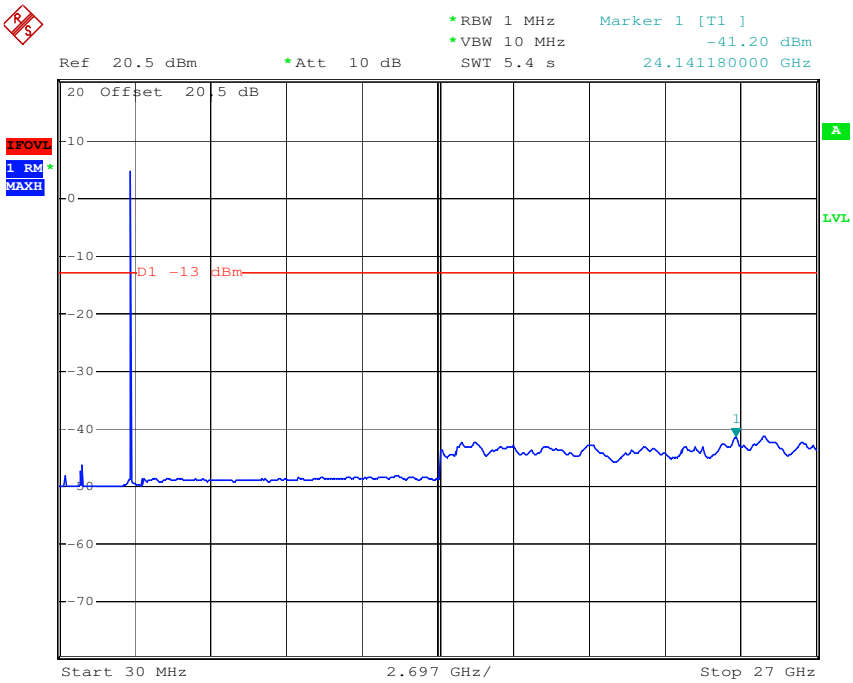
Date: 22.APR.2008 16:14:52

Plot 21:



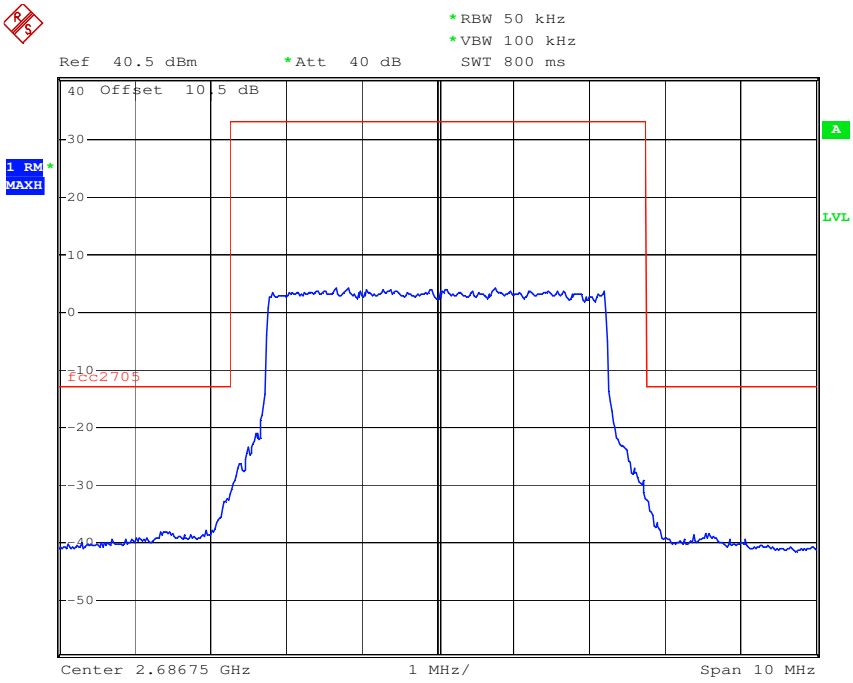
Date: 22.APR.2008 14:40:09

Plot 22:



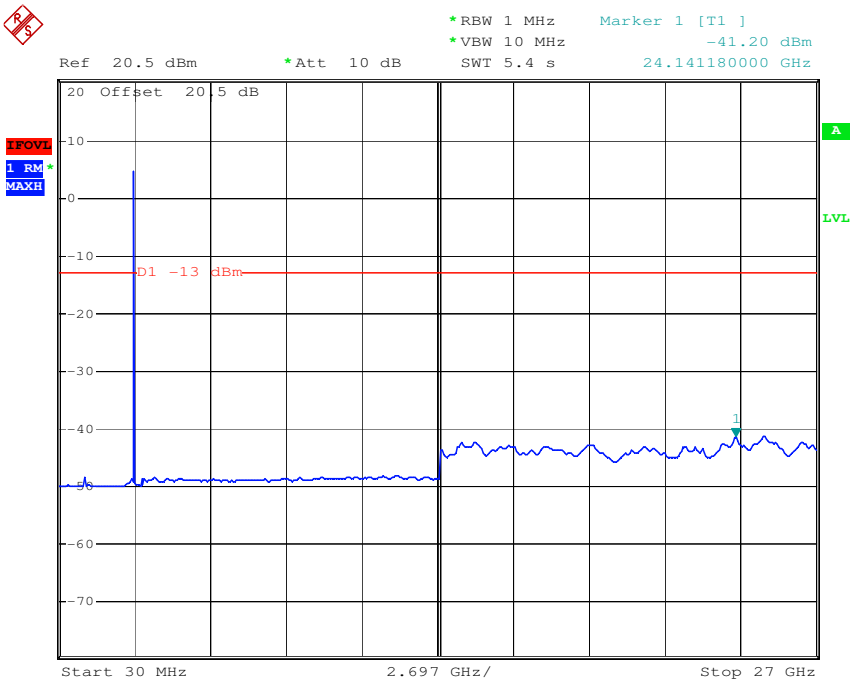
Date: 22.APR.2008 16:15:26

Plot 23:



Date: 22.APR.2008 14:40:53

Plot 24:



Date: 22.APR.2008 16:16:04

CFR 47 Part 2.1051 Measurements required: **Spurious emissions at antenna terminals**
CFR 47 Part 27.53 Emission limits, subpart (l) (2)

Transmitter characteristics: 10 MHz channel spacing

Measurement conditions:

Frequency	f_{min}	= 2.507500 GHz
Frequency	f_{nom}	= 2.596000 GHz
Frequency	f_{max}	= 2.684500 GHz
Channel spacing	CS	= 10.0 MHz
Modulation	D	= QPSK, 16QAM, 64QAM
Temperature	t	= + 23.0 °C
Nominal power supply	U_{DC}	= 115.0 V
Measurement at	C'	

Test set-up: see page 9 / no. 2

Limit: see table

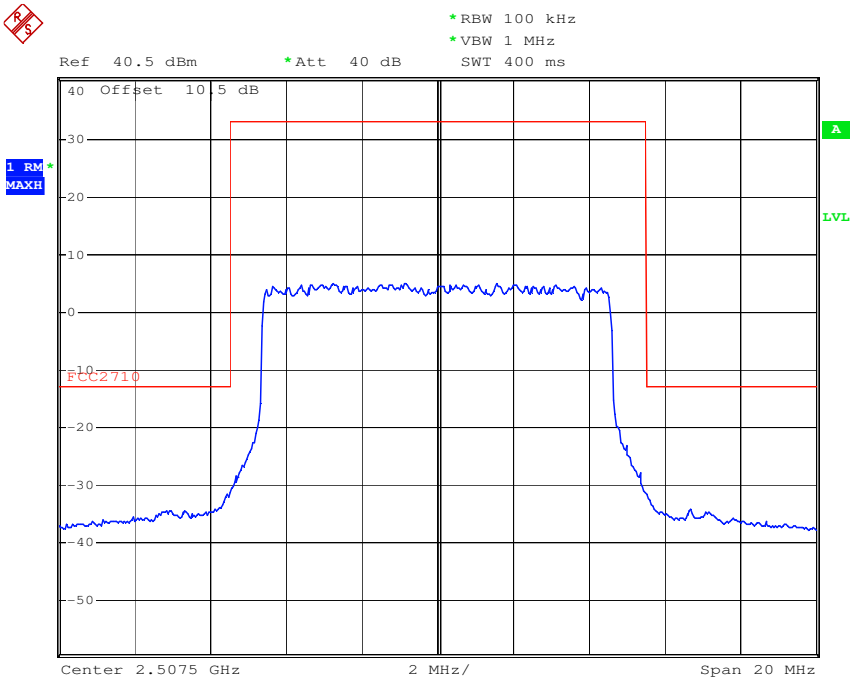
Test measurement:

Frequency Range [GHz]	$f_{carrier}$ [GHz]	Modulation	Limit [dBm]	Res. BW [MHz]	Spurious Frequency [GHz]	Emissions [dBm]	see plot no.
0.030 – 27.000	2.507500	QPSK	-13.0	1.0	n.f.	< limit	25/26
0.030 – 27.000	2.596000	QPSK	-13.0	1.0	n.f.	< limit	27/28
0.030 – 27.000	2.684500	QPSK	-13.0	1.0	n.f.	< limit	29/30
0.030 – 27.000	2.507500	16QAM	-13.0	1.0	n.f.	< limit	31/32
0.030 – 27.000	2.596000	16QAM	-13.0	1.0	n.f.	< limit	33/34
0.030 – 27.000	2.684500	16QAM	-13.0	1.0	n.f.	< limit	35/36
0.030 – 27.000	2.507500	64QAM	-13.0	1.0	n.f.	< limit	37/38
0.030 – 27.000	2.596000	64QAM	-13.0	1.0	n.f.	< limit	39/40
0.030 – 27.000	2.684500	64QAM	-13.0	1.0	n.f.	< limit	41/42

n.f. = nothing found

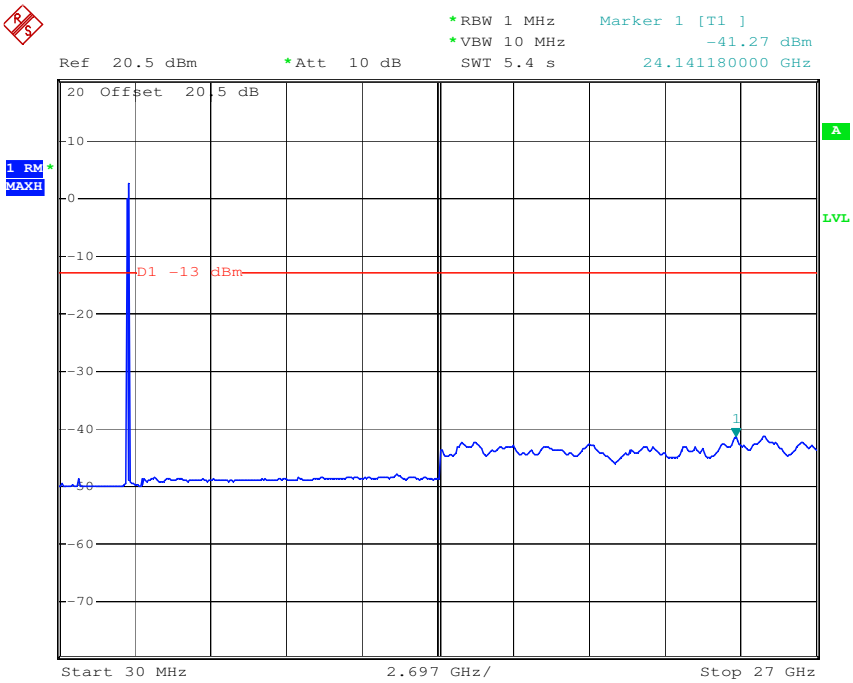
Test result: Passed: [X] Failed: [ ]

Plot 25:



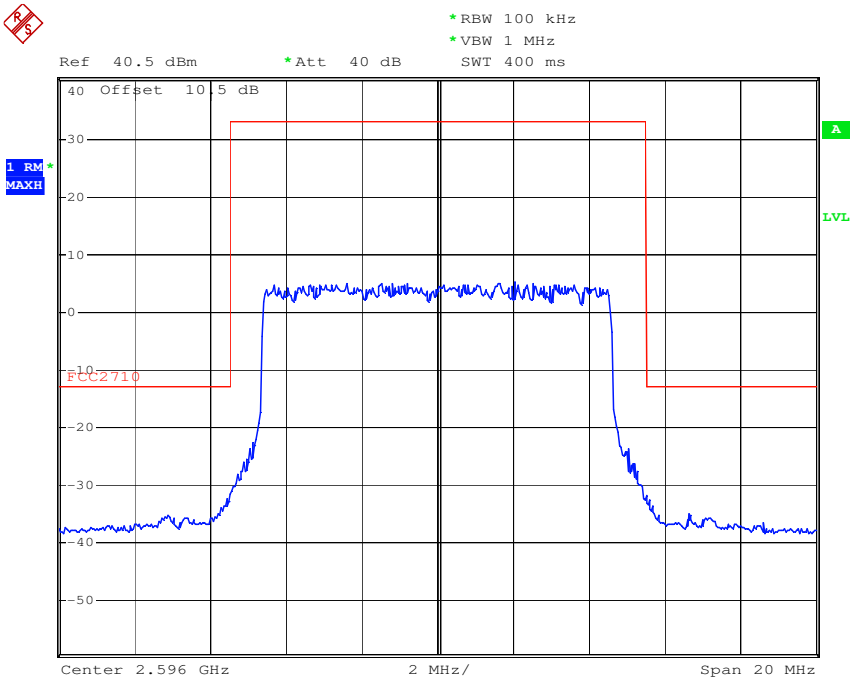
Date: 22.APR.2008 14:45:06

Plot 26:



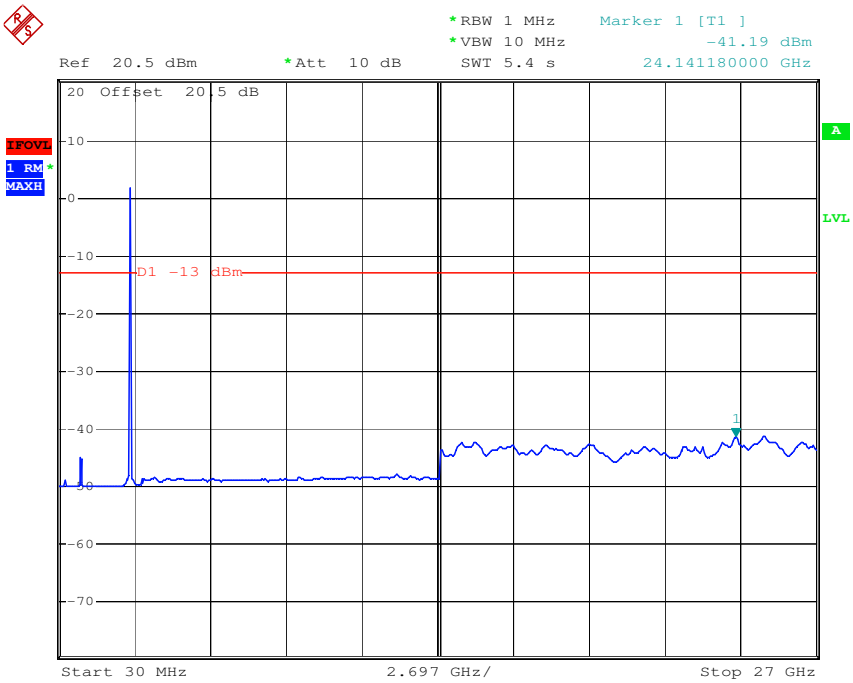
Date: 22.APR.2008 16:18:21

Plot 27:



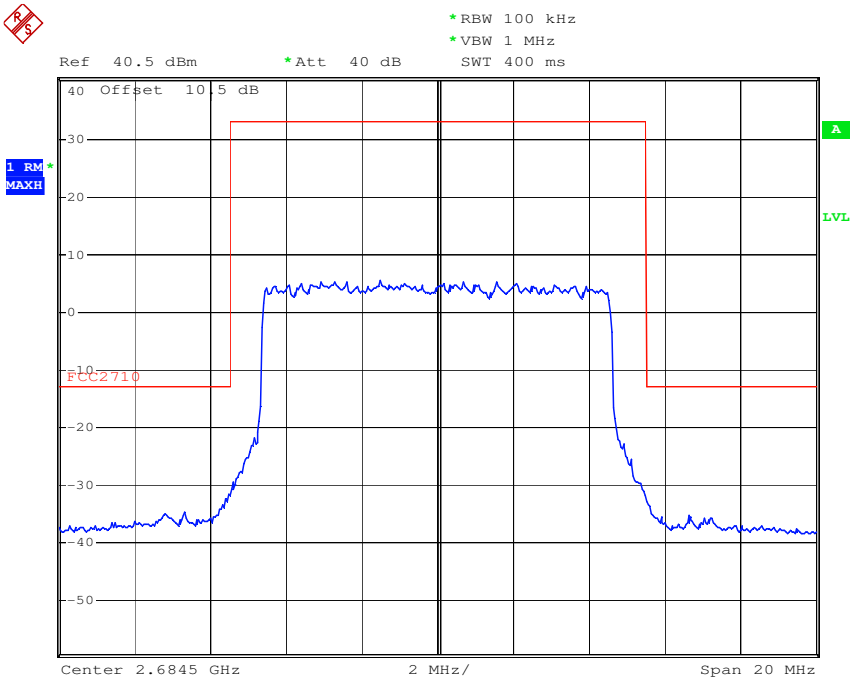
Date: 22.APR.2008 14:45:43

Plot 28:



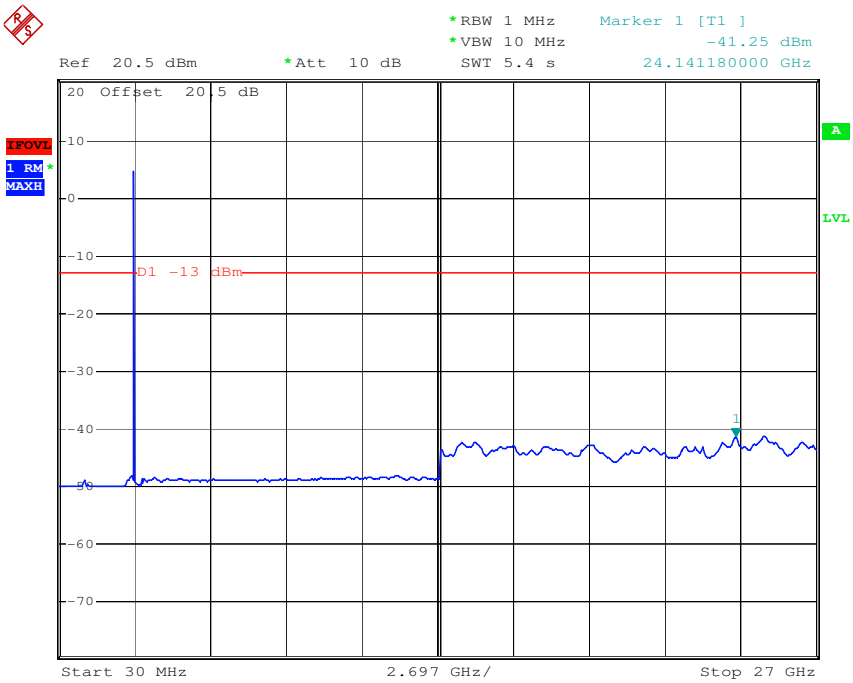
Date: 22.APR.2008 16:19:24

Plot 29:



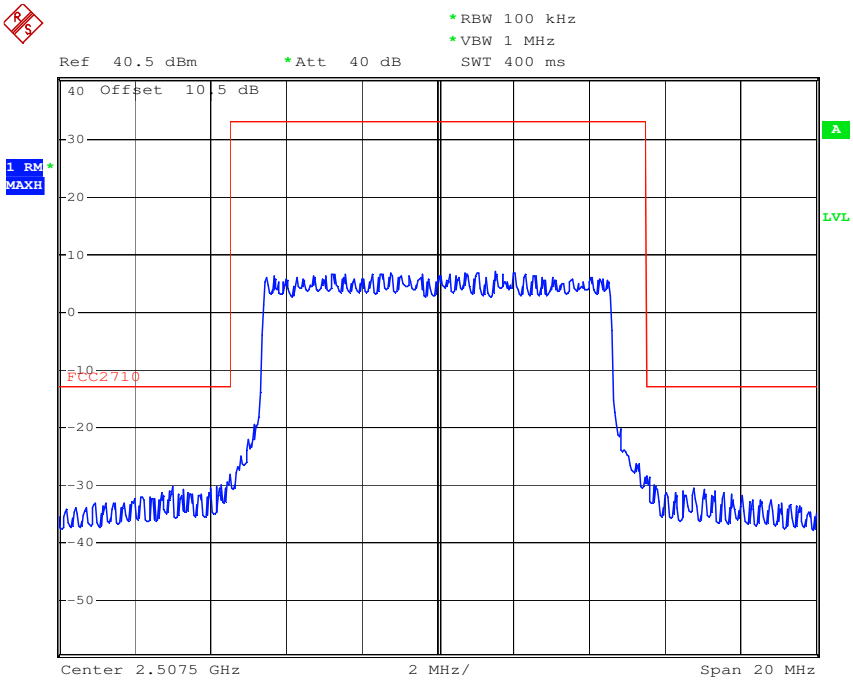
Date: 22.APR.2008 14:46:09

Plot 30:



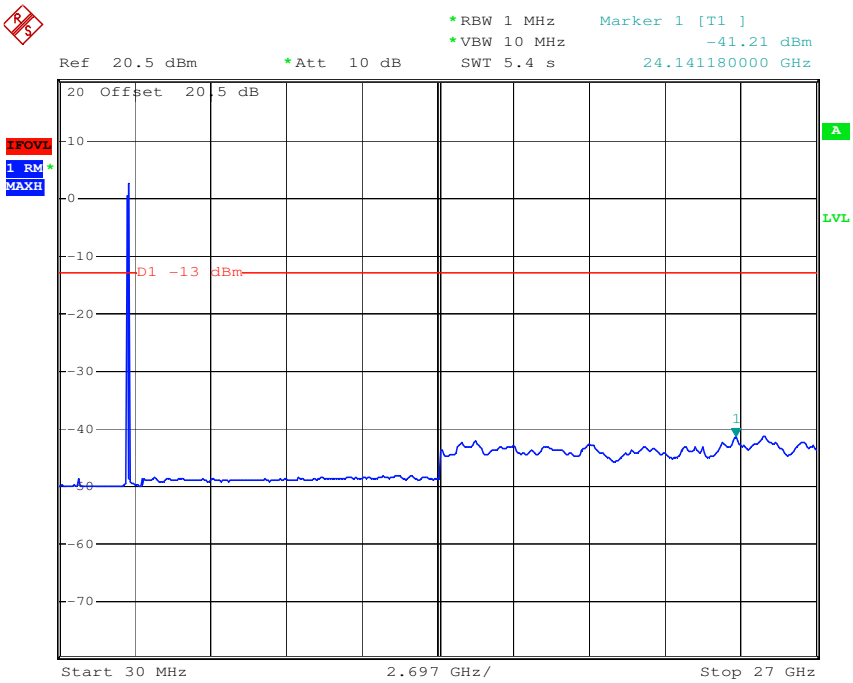
Date: 22.APR.2008 16:19:55

Plot 31:



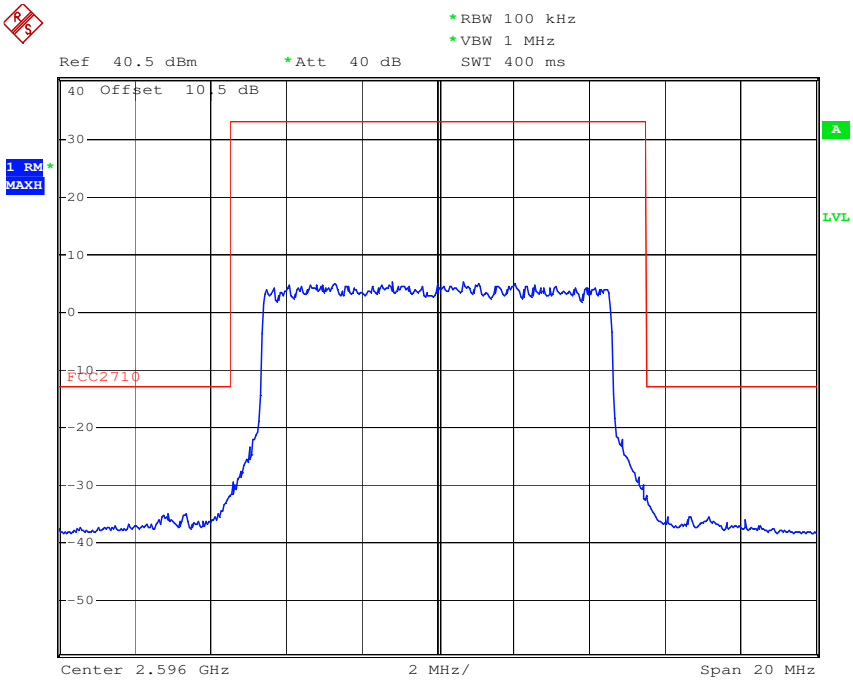
Date: 22.APR.2008 14:47:20

Plot 32:



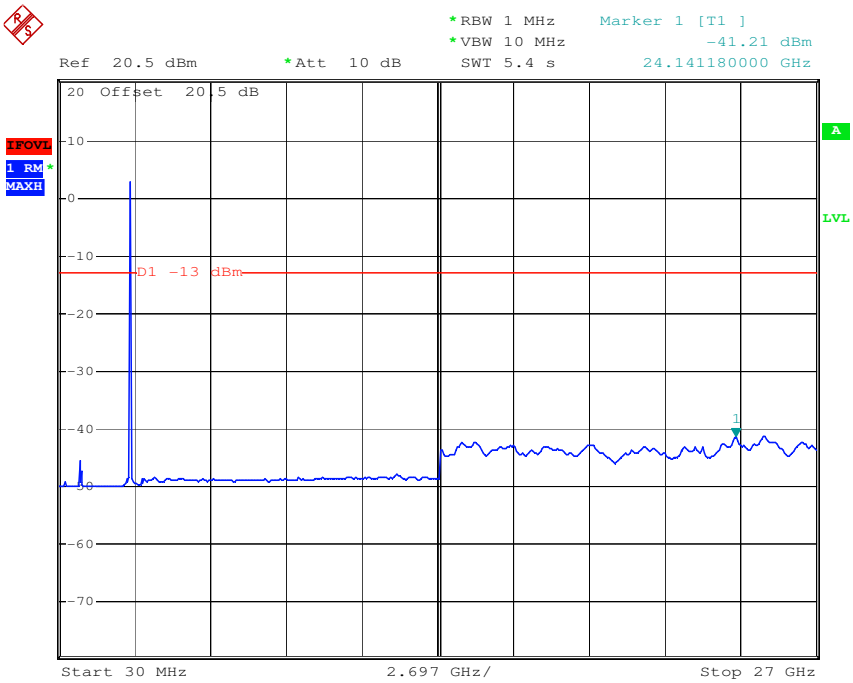
Date: 22.APR.2008 16:21:04

Plot 33:



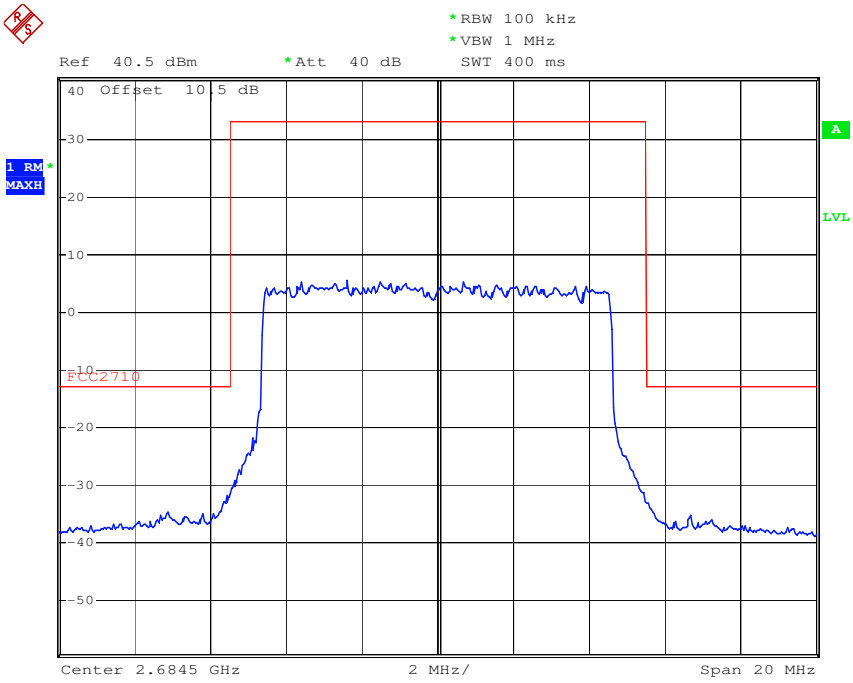
Date: 22.APR.2008 14:48:12

Plot 34:



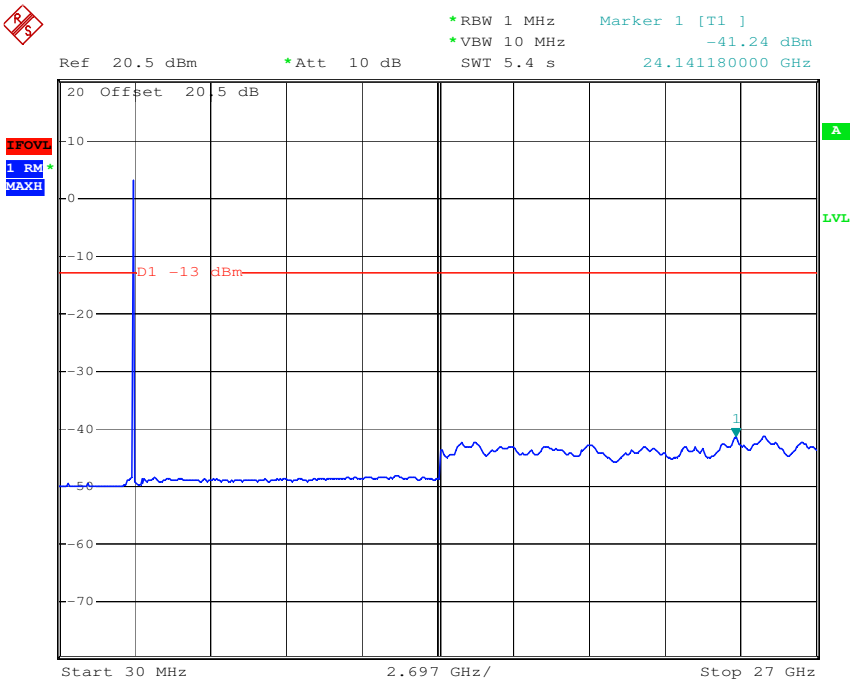
Date: 22.APR.2008 16:21:38

Plot 35:



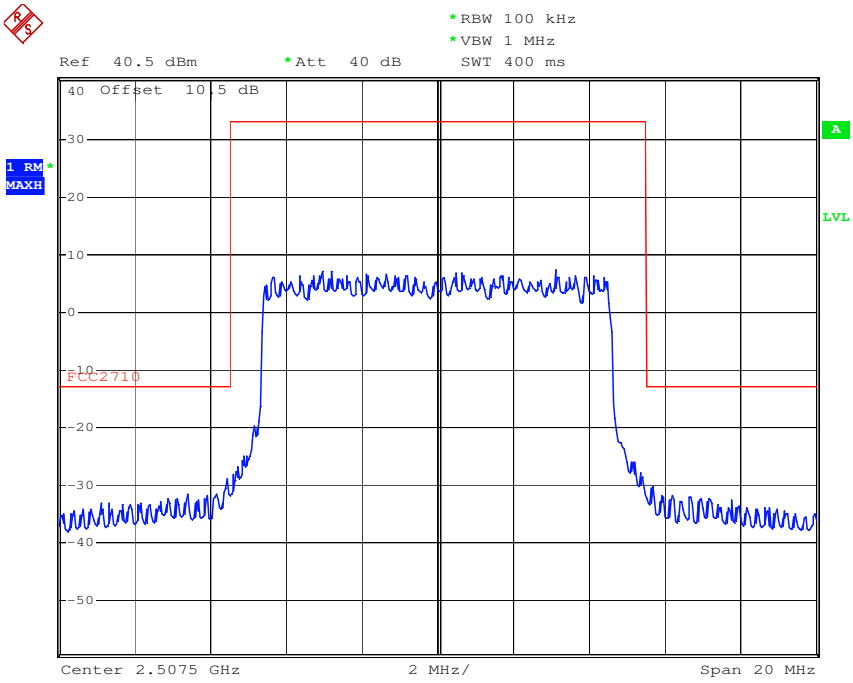
Date: 22.APR.2008 14:48:46

Plot 36:



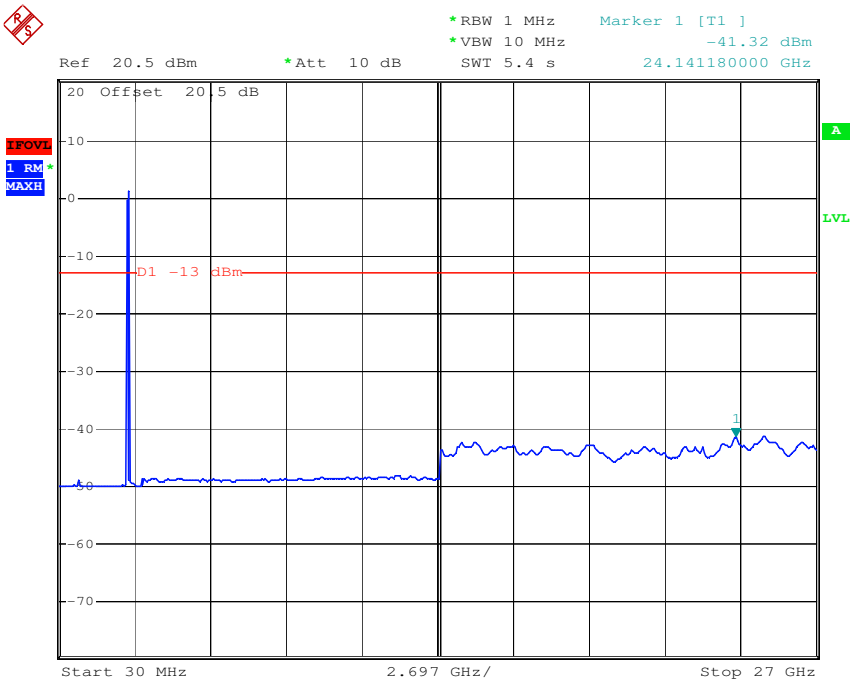
Date: 22.APR.2008 16:22:13

Plot 37:



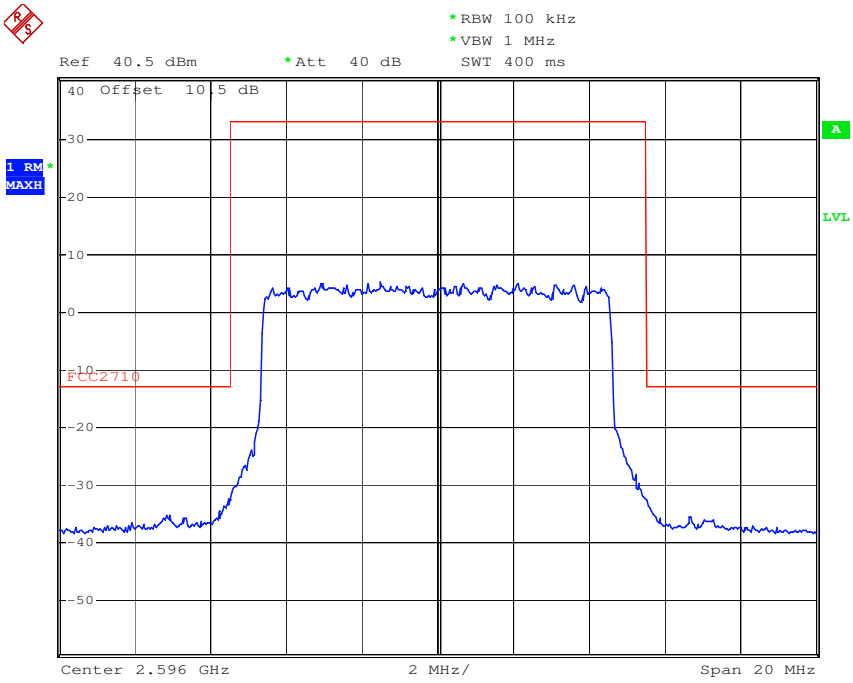
Date: 22.APR.2008 14:49:42

Plot 38:



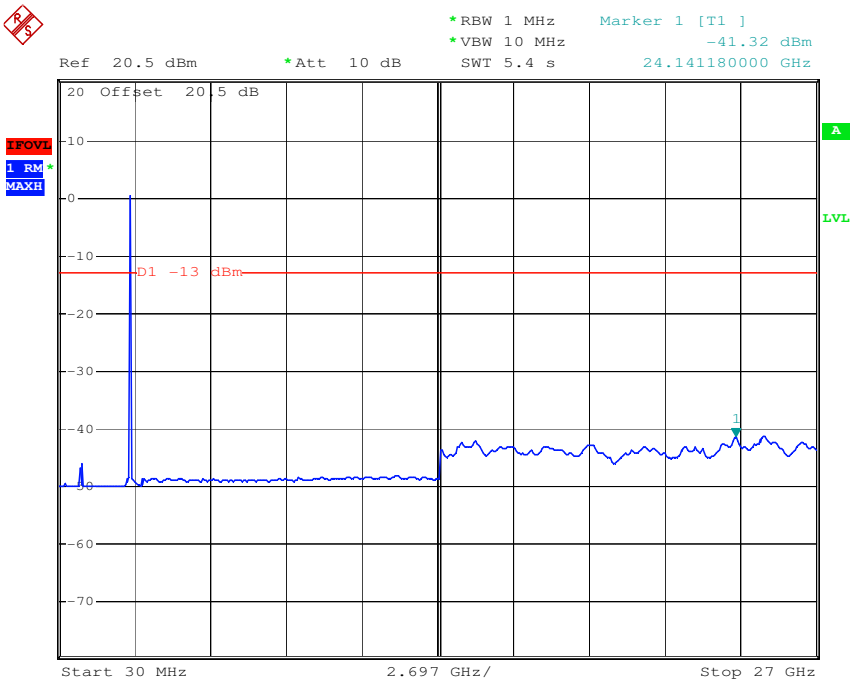
Date: 22.APR.2008 16:23:02

Plot 39:



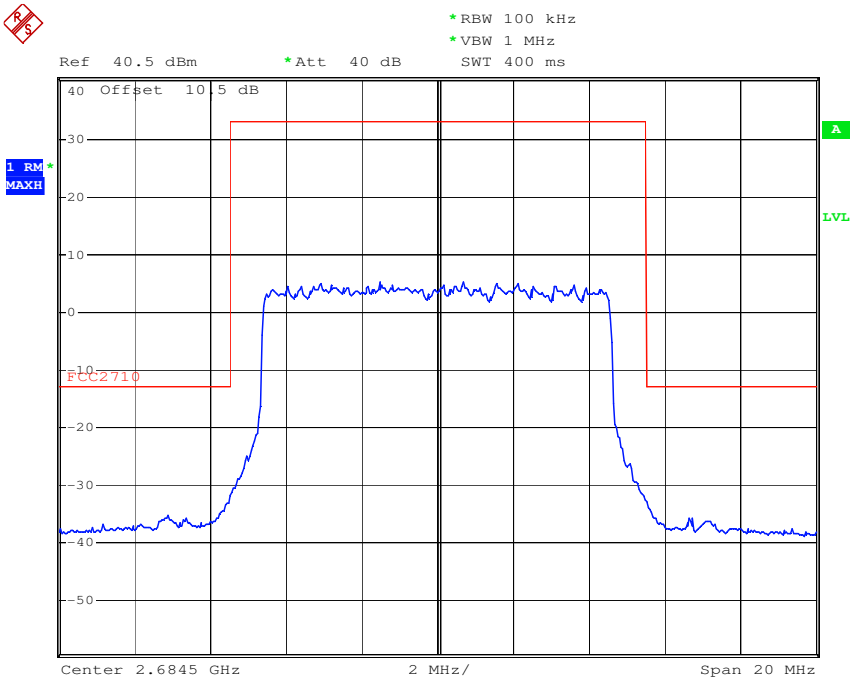
Date: 22.APR.2008 14:50:29

Plot 40:



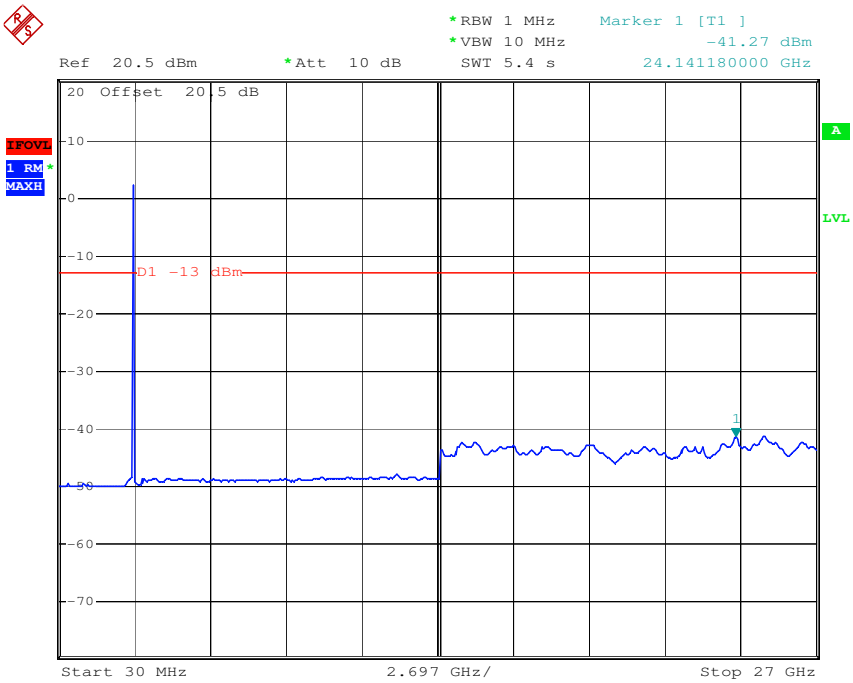
Date: 22.APR.2008 16:23:38

Plot 41:



Date: 22.APR.2008 14:51:00

Plot 42:



Date: 22.APR.2008 16:24:16

CFR 47 Part 2.1053 Measurements required: **Field strength of spurious radiation**
CFR 47 Part 27.53 Emission limits, subpart (l) (2)

Transmitter characteristics: 5 MHz channel spacing

Measurement conditions:

Frequency	f_{min}	= 2.504250 GHz
Frequency	f_{nom}	= 2.593000 GHz
Frequency	f_{max}	= 2.686750 GHz
Channel spacing	CS	= 5.0 MHz
Modulation	D	= 64QAM
Temperature	t	= + 23.0 °C
Nominal power supply	U_{DC}	= 115.0 V
Measurement at	C'	

Test set-up: see page 9 / no. 3

Limit: see table

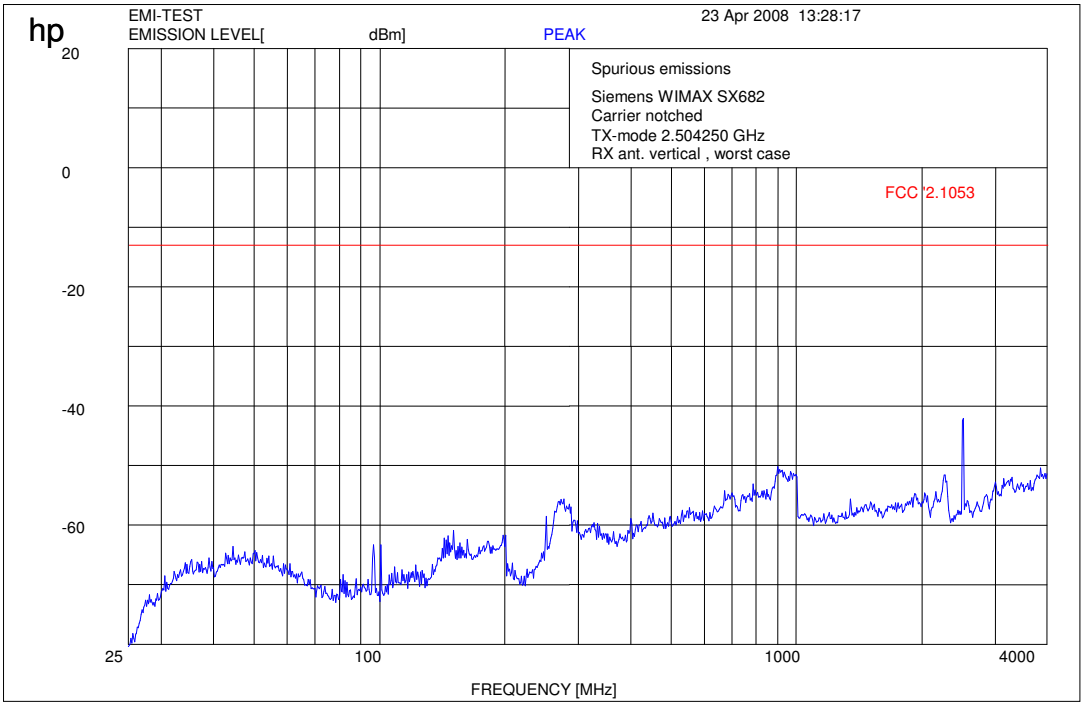
Test measurement:

Frequency Range [GHz]	$f_{carrier}$ [GHz]	Modulation	Limit [dBm]	Res. BW [MHz]	Spurious Frequency [GHz]	Emissions [dBm]	see plot no.
0.030 – 4.000	2.504250	64QAM	-13.0	1.0	n.f.	< limit	43
4.000 – 12.000	2.504250	64QAM	-13.0	1.0	n.f.	< limit	44
12.000 – 18.000	2.504250	64QAM	-13.0	1.0	n.f.	< limit	45
18.000 – 27.000	2.504250	64QAM	-13.0	1.0	n.f.	< limit	46
0.030 – 4.000	2.593000	64QAM	-13.0	1.0	n.f.	< limit	47
4.000 – 12.000	2.593000	64QAM	-13.0	1.0	n.f.	< limit	48
12.000 – 18.000	2.593000	64QAM	-13.0	1.0	n.f.	< limit	49
18.000 – 27.000	2.593000	64QAM	-13.0	1.0	n.f.	< limit	50
0.030 – 4.000	2.686750	64QAM	-13.0	1.0	n.f.	< limit	51
4.000 – 12.000	2.686750	64QAM	-13.0	1.0	n.f.	< limit	52
12.000 – 18.000	2.686750	64QAM	-13.0	1.0	n.f.	< limit	53
18.000 – 27.000	2.686750	64QAM	-13.0	1.0	n.f.	< limit	54

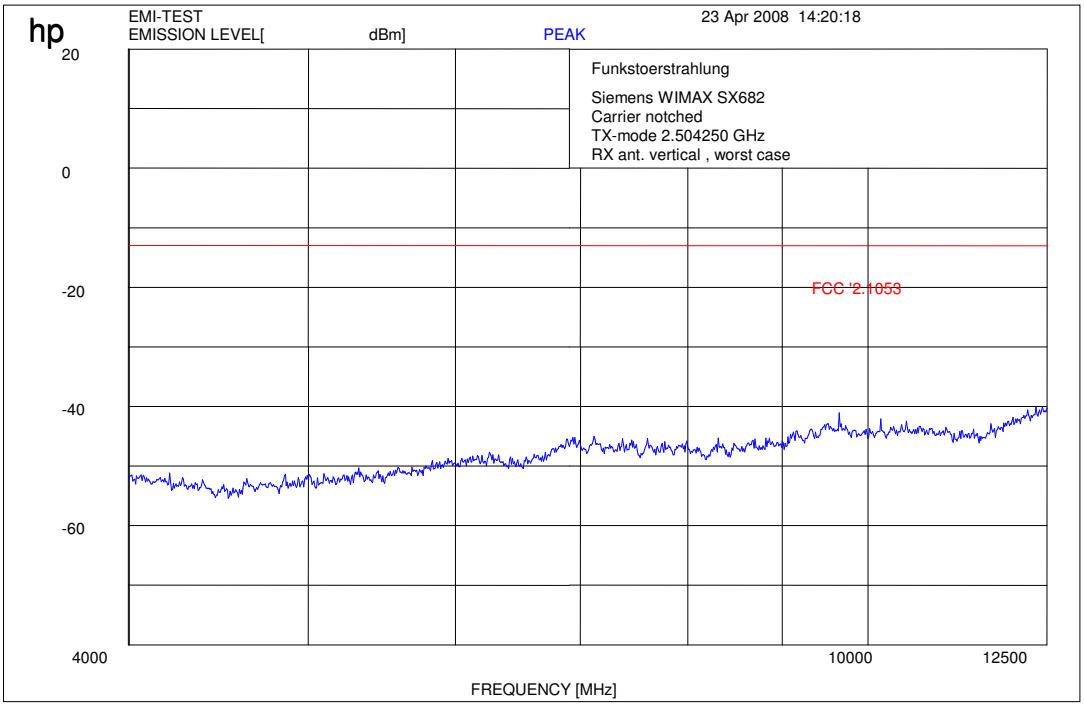
n.f. = nothing found

Test result: Passed: [X] Failed: [ ]

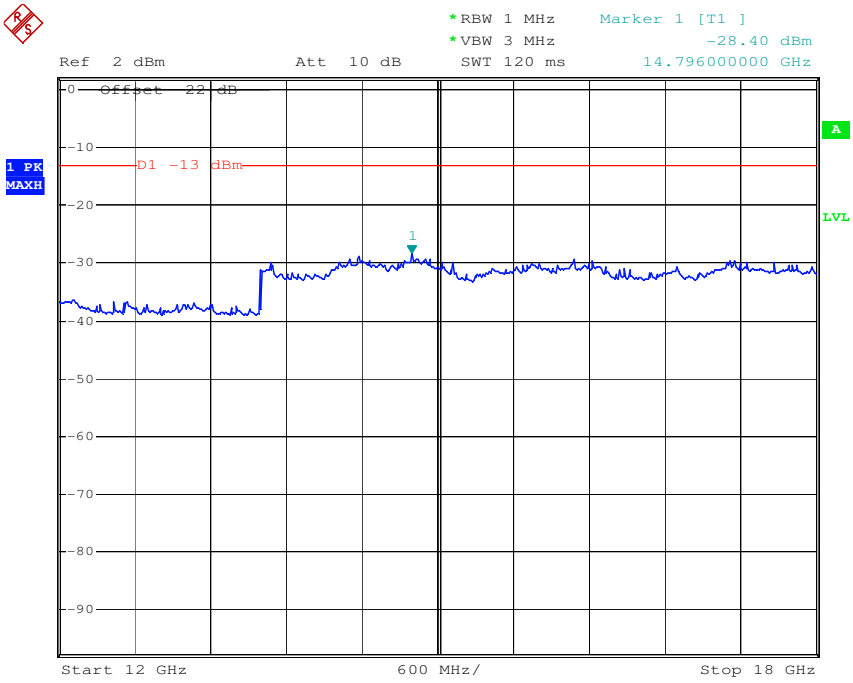
Plot 43:



Plot 44:

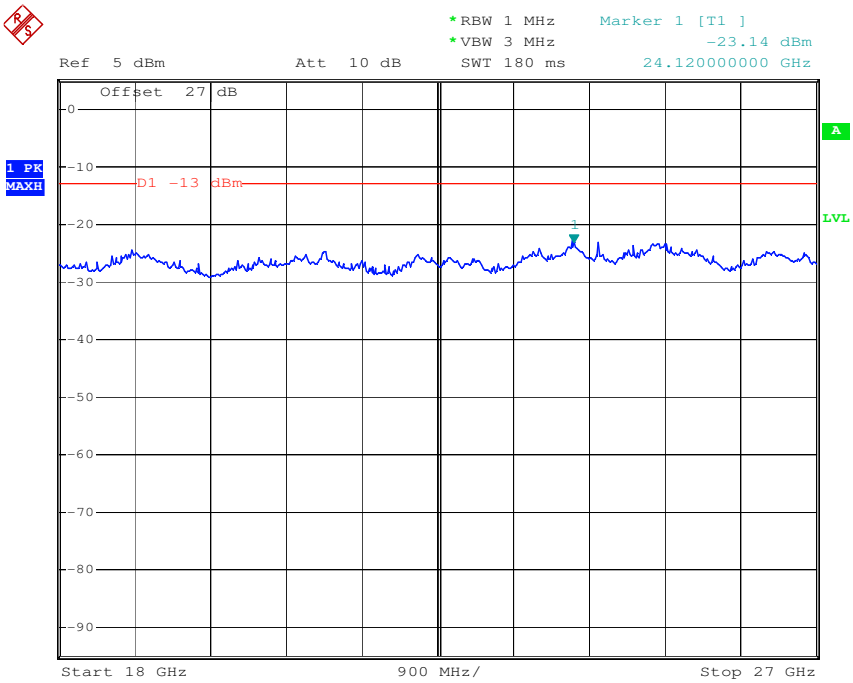


Plot 45:



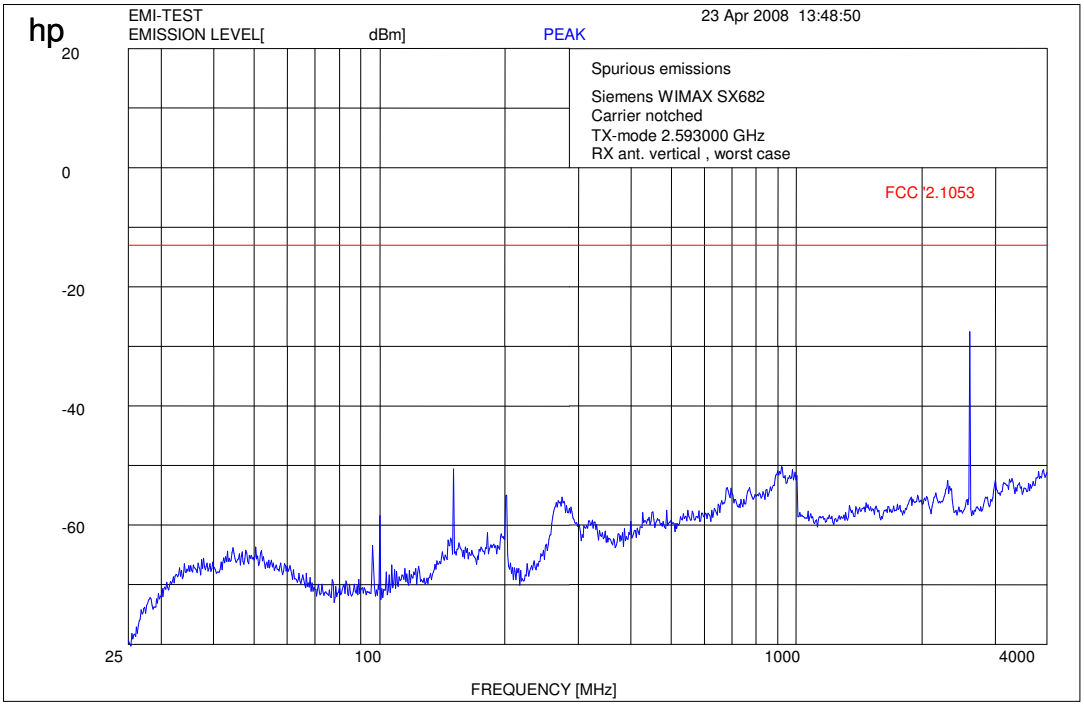
Date: 24.APR.2008 10:42:05

Plot 46:

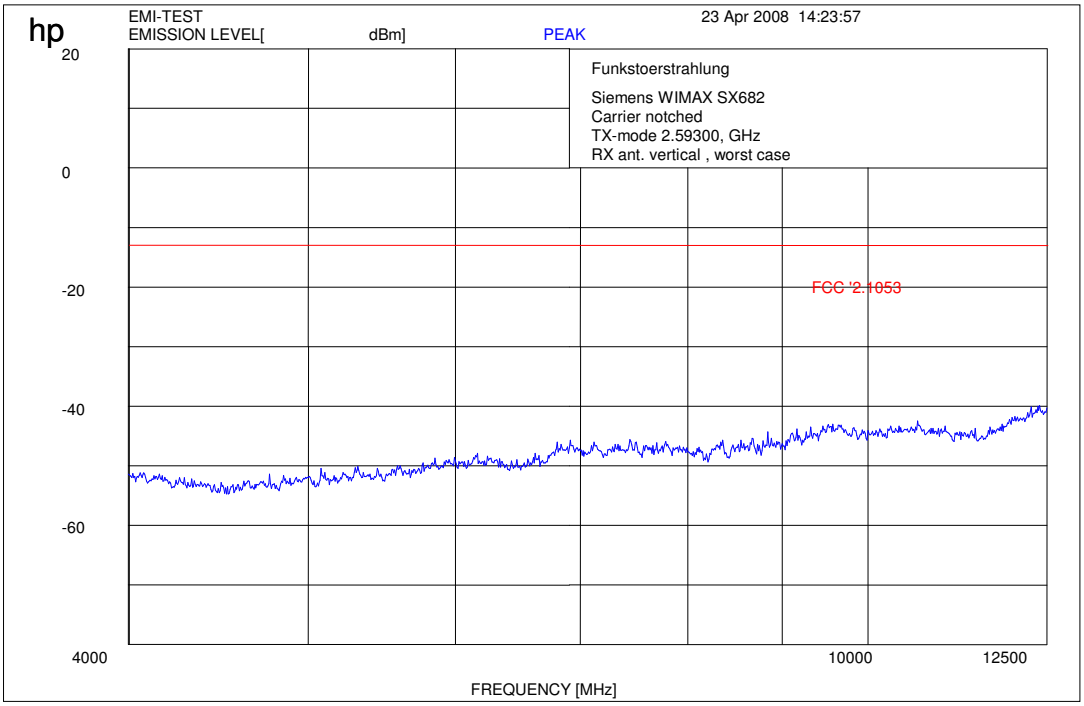


Date: 24.APR.2008 11:06:45

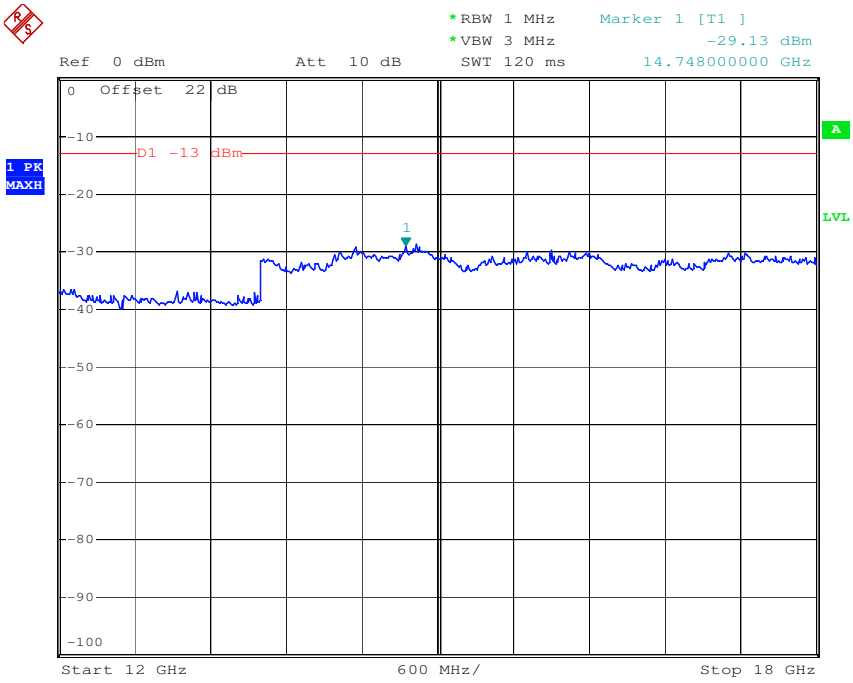
Plot 47:



Plot 48:

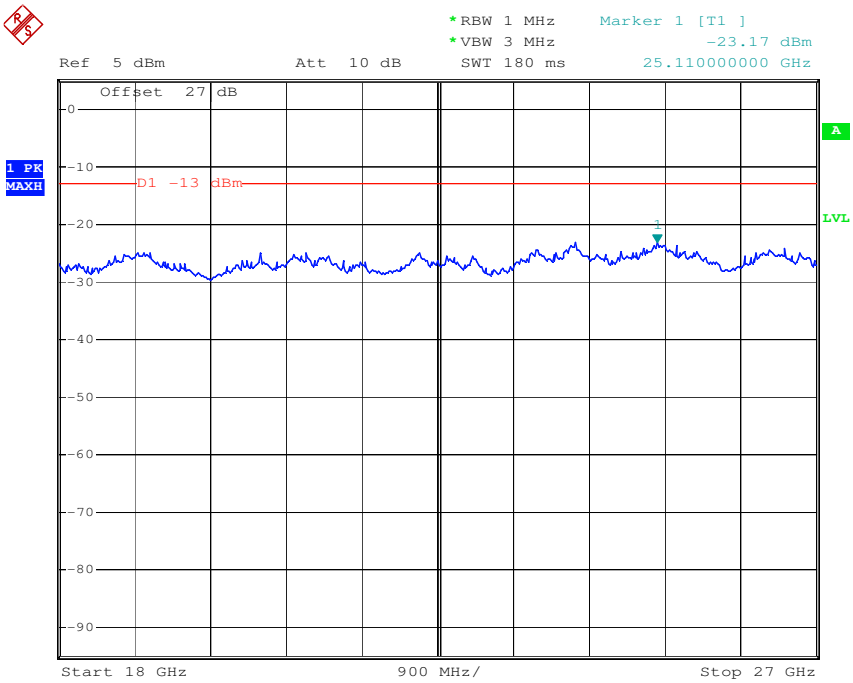


Plot 49:



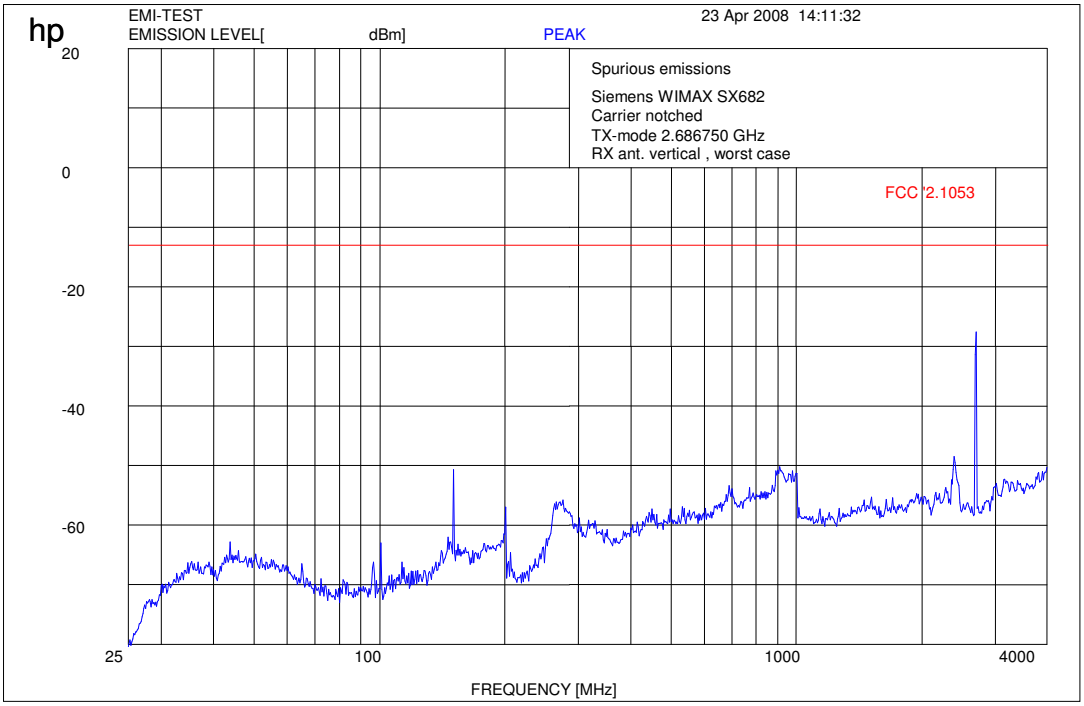
Date: 24.APR.2008 10:44:26

Plot 50:

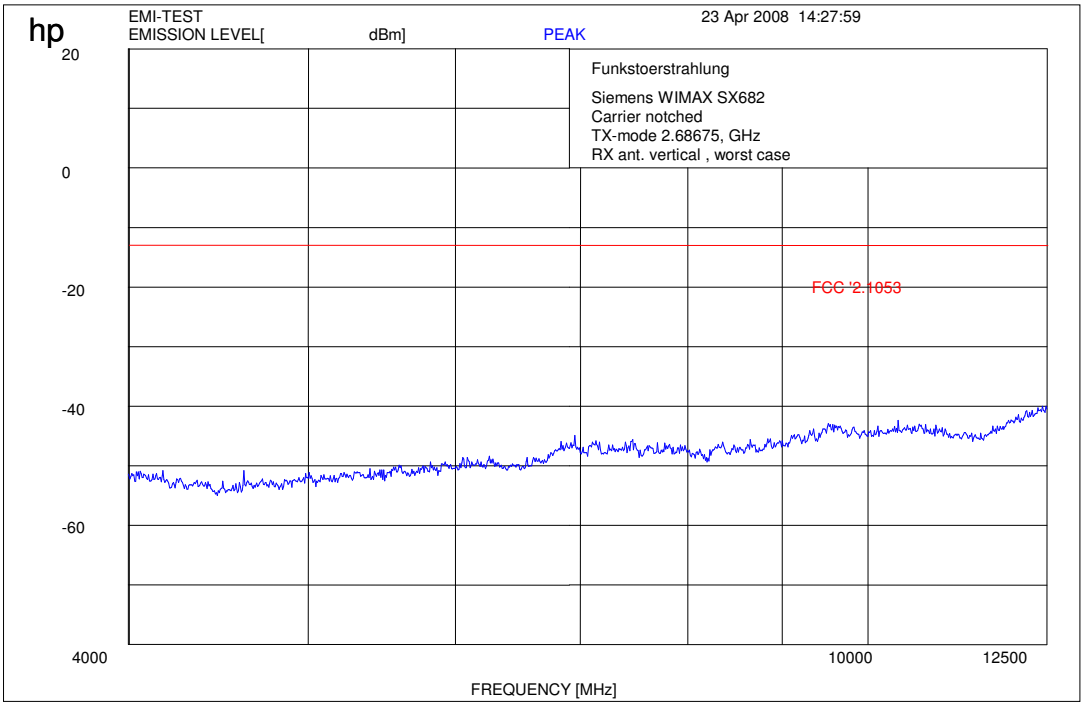


Date: 24.APR.2008 11:08:32

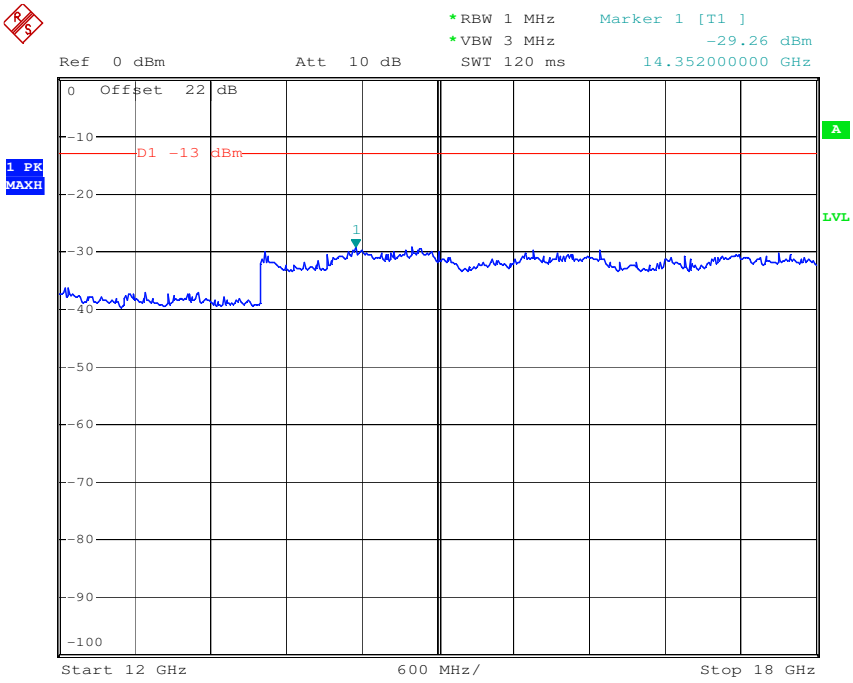
Plot 51:



Plot 52:

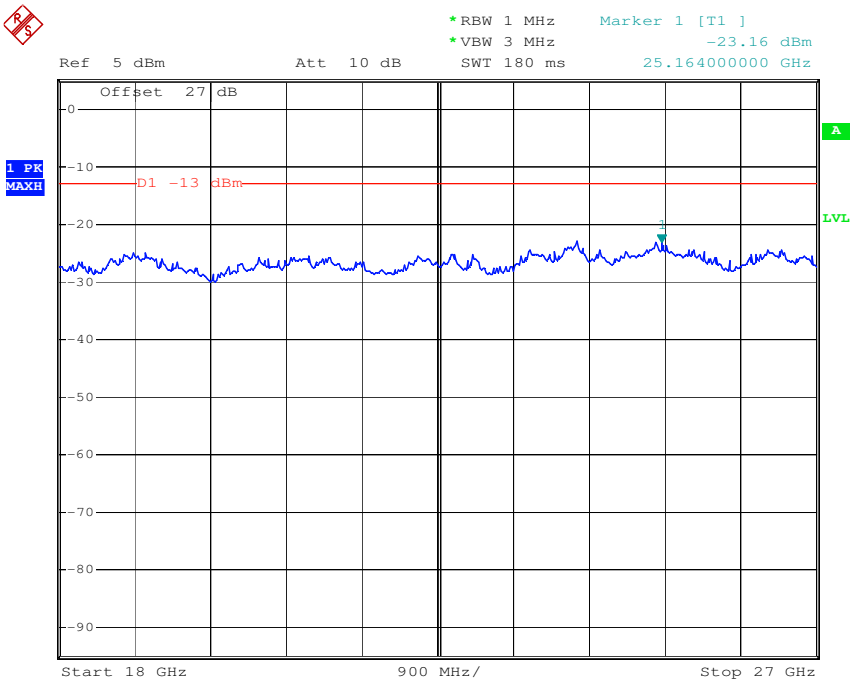


Plot 53:



Date: 24.APR.2008 10:49:07

Plot 54:



Date: 24.APR.2008 11:10:08

CFR 47 Part 2.1053 Measurements required: **Field strength of spurious radiation**
CFR 47 Part 27.53 Emission limits, subpart (l) (2)

Transmitter characteristics: 10 MHz channel spacing

Measurement conditions:

Frequency	f_{min}	= 2.507500 GHz
Frequency	f_{nom}	= 2.596000 GHz
Frequency	f_{max}	= 2.684500 GHz
Channel spacing	CS	= 10.0 MHz
Modulation	D	= 64QAM
Temperature	t	= + 23.0 °C
Nominal power supply	U_{DC}	= 115.0 V
Measurement at	C'	

Test set-up: see page 9 / no. 3

Limit: see table

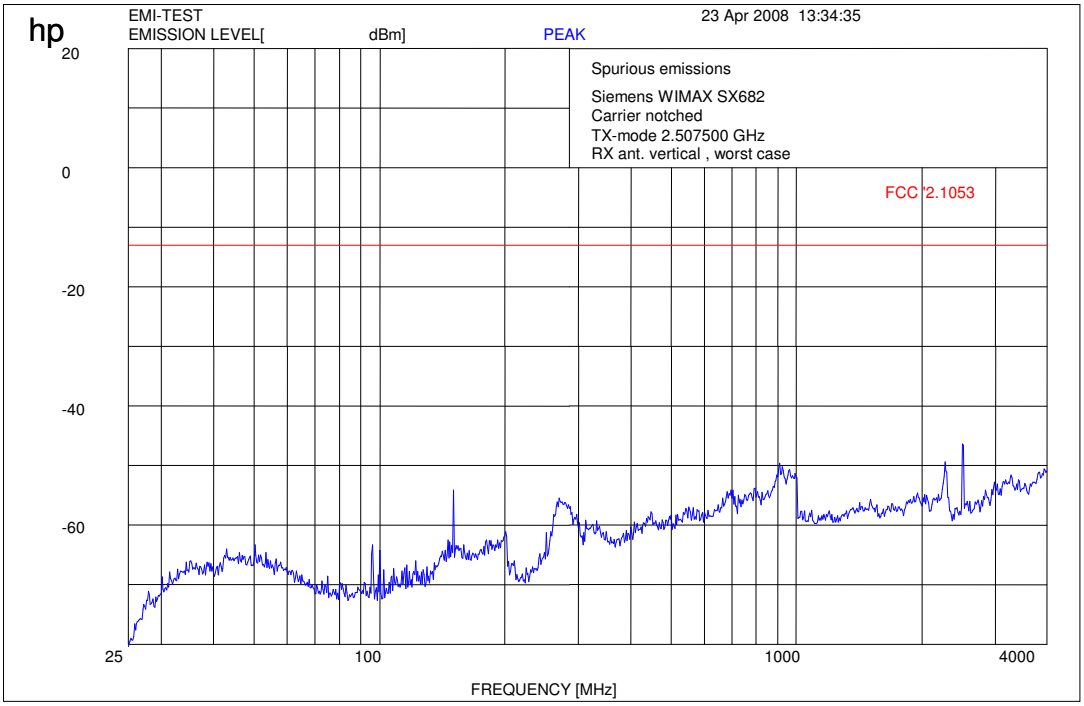
Test measurement:

Frequency Range [GHz]	$f_{carrier}$ [GHz]	Modulation	Limit [dBm]	Res. BW [MHz]	Spurious Frequency [GHz]	Emissions [dBm]	see plot no.
0.030 – 4.000	2.507500	64QAM	-13.0	1.0	n.f.	< limit	55
4.000 – 12.000	2.507500	64QAM	-13.0	1.0	n.f.	< limit	56
12.000 – 18.000	2.507500	64QAM	-13.0	1.0	n.f.	< limit	57
18.000 – 27.000	2.507500	64QAM	-13.0	1.0	n.f.	< limit	58
0.030 – 4.000	2.596000	64QAM	-13.0	1.0	n.f.	< limit	59
4.000 – 12.000	2.596000	64QAM	-13.0	1.0	n.f.	< limit	60
12.000 – 18.000	2.596000	64QAM	-13.0	1.0	n.f.	< limit	61
18.000 – 27.000	2.596000	64QAM	-13.0	1.0	n.f.	< limit	62
0.030 – 4.000	2.684500	64QAM	-13.0	1.0	n.f.	< limit	63
4.000 – 12.000	2.684500	64QAM	-13.0	1.0	n.f.	< limit	64
12.000 – 18.000	2.684500	64QAM	-13.0	1.0	n.f.	< limit	65
18.000 – 27.000	2.684500	64QAM	-13.0	1.0	n.f.	< limit	66

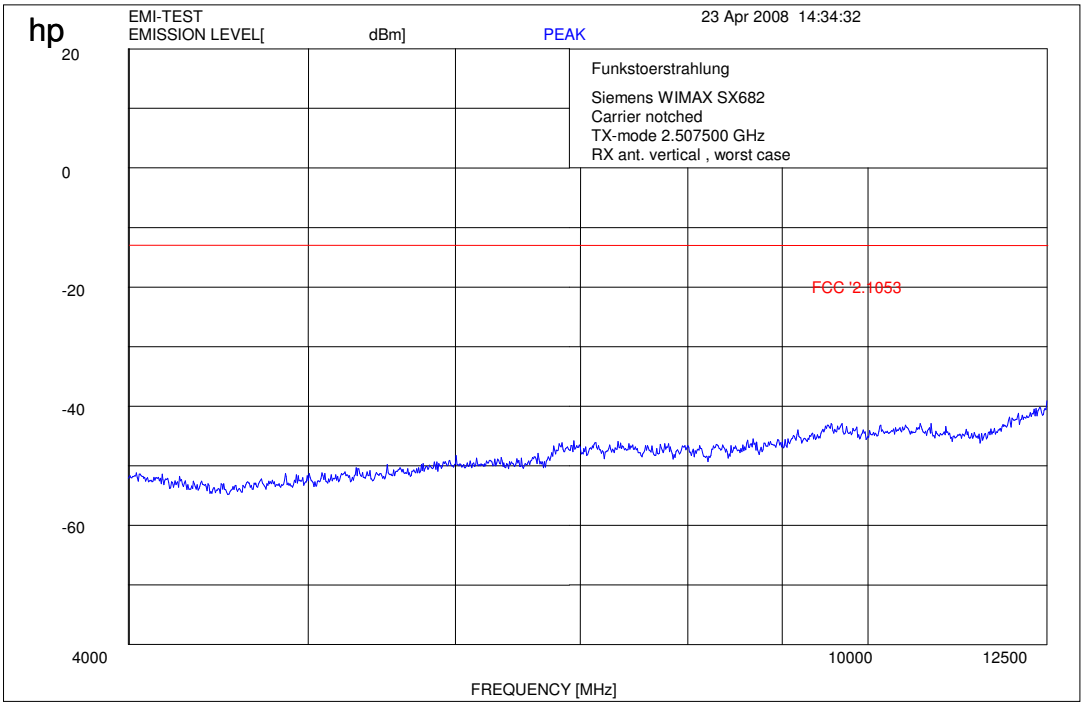
n.f. = nothing found

Test result: Passed: [X] Failed: [ ]

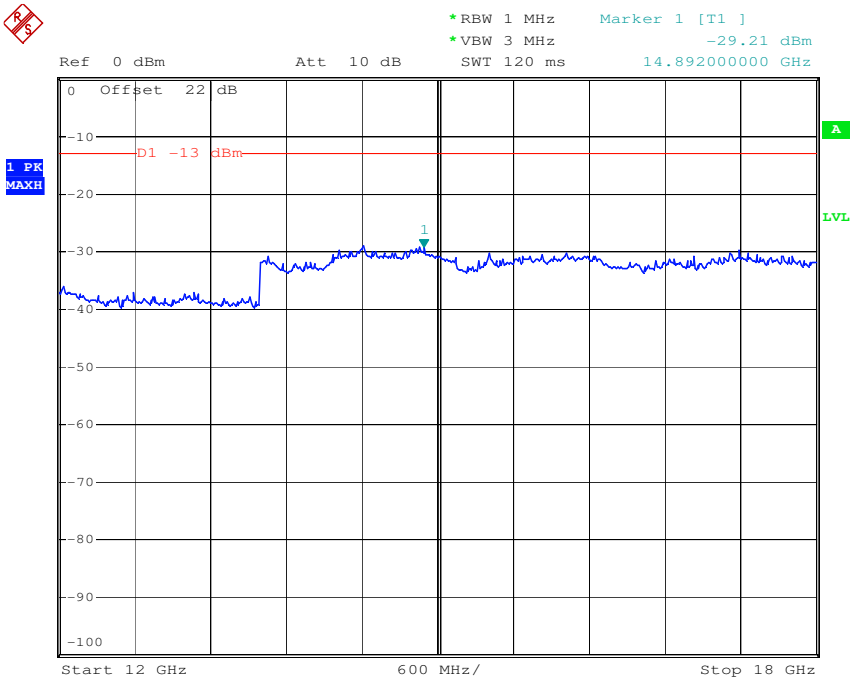
Plot 55:



Plot 56:

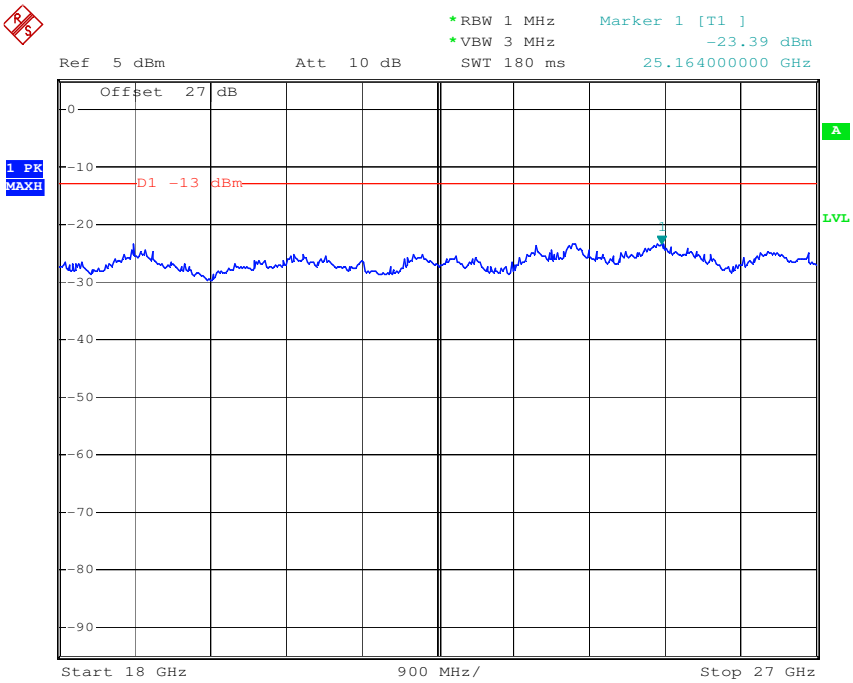


Plot 57:



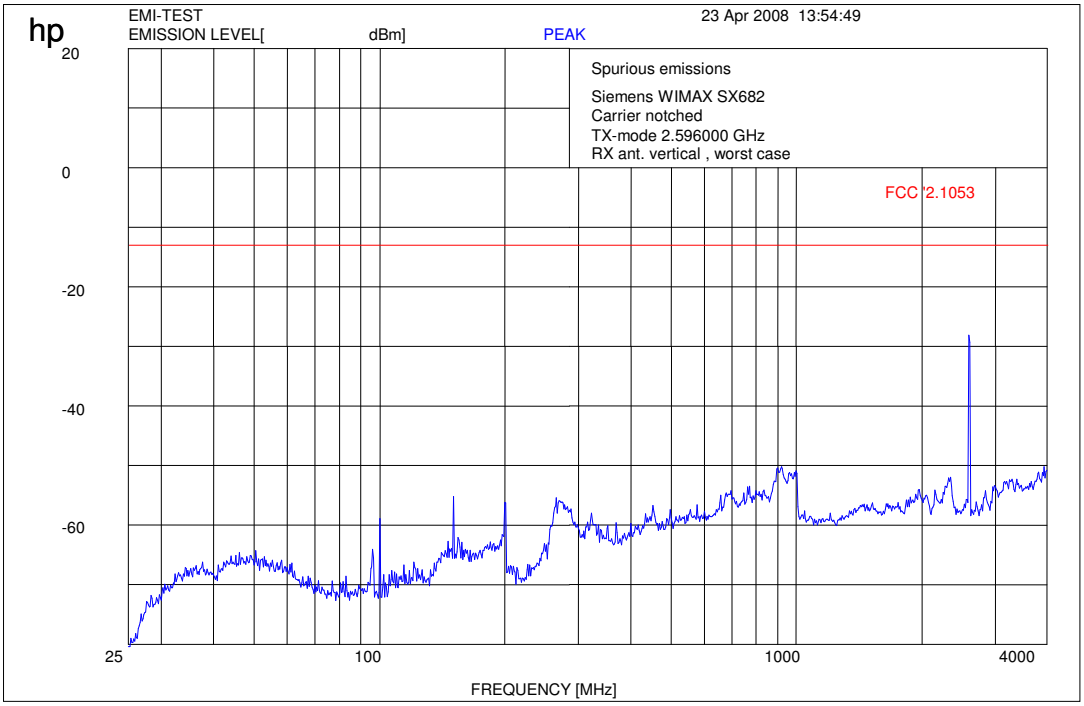
Date: 24.APR.2008 10:52:18

Plot 58:

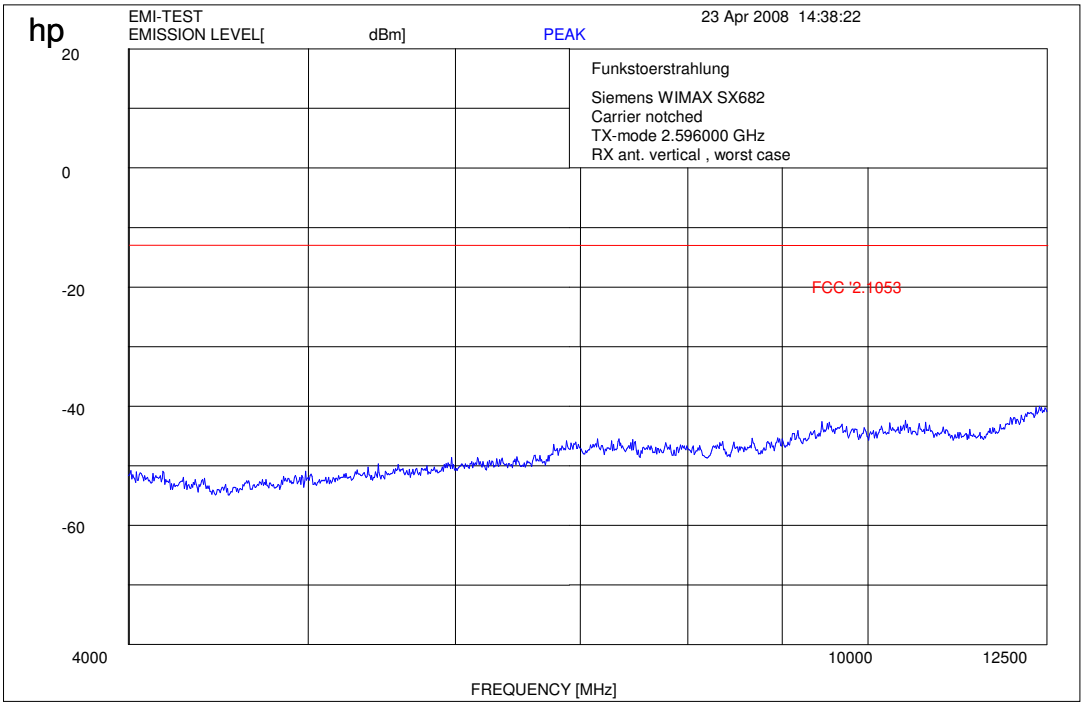


Date: 24.APR.2008 11:17:42

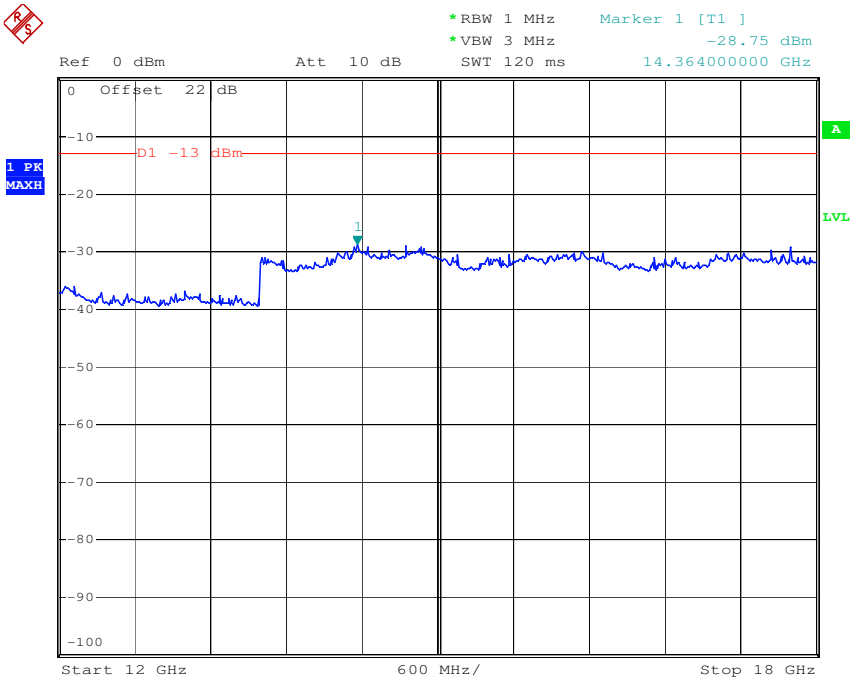
Plot 59:



Plot 60:

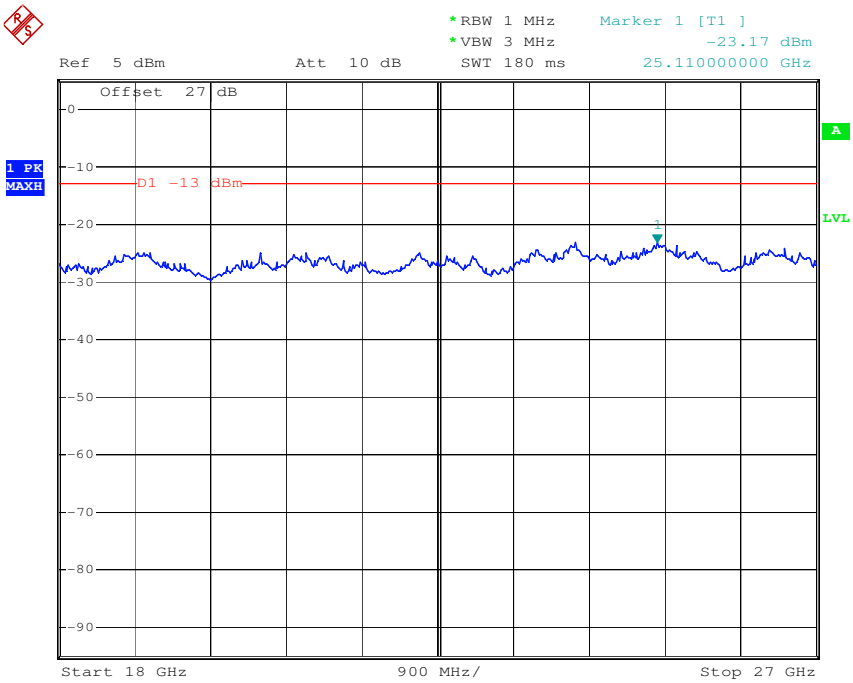


Plot 61:



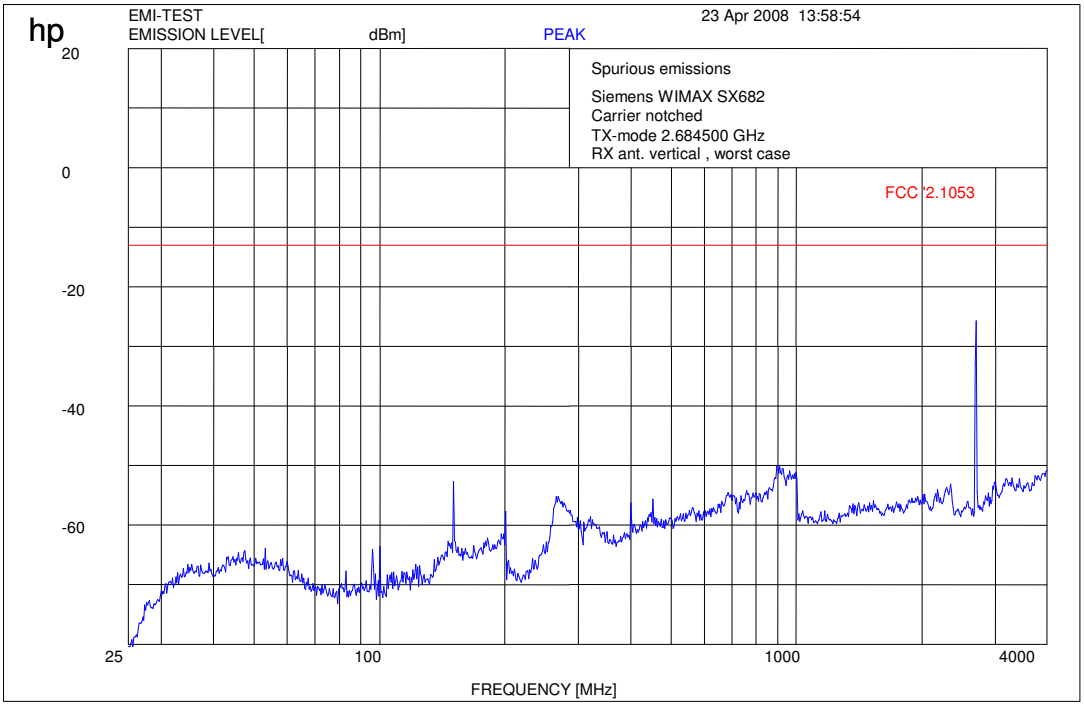
Date: 24.APR.2008 10:53:48

Plot 62:

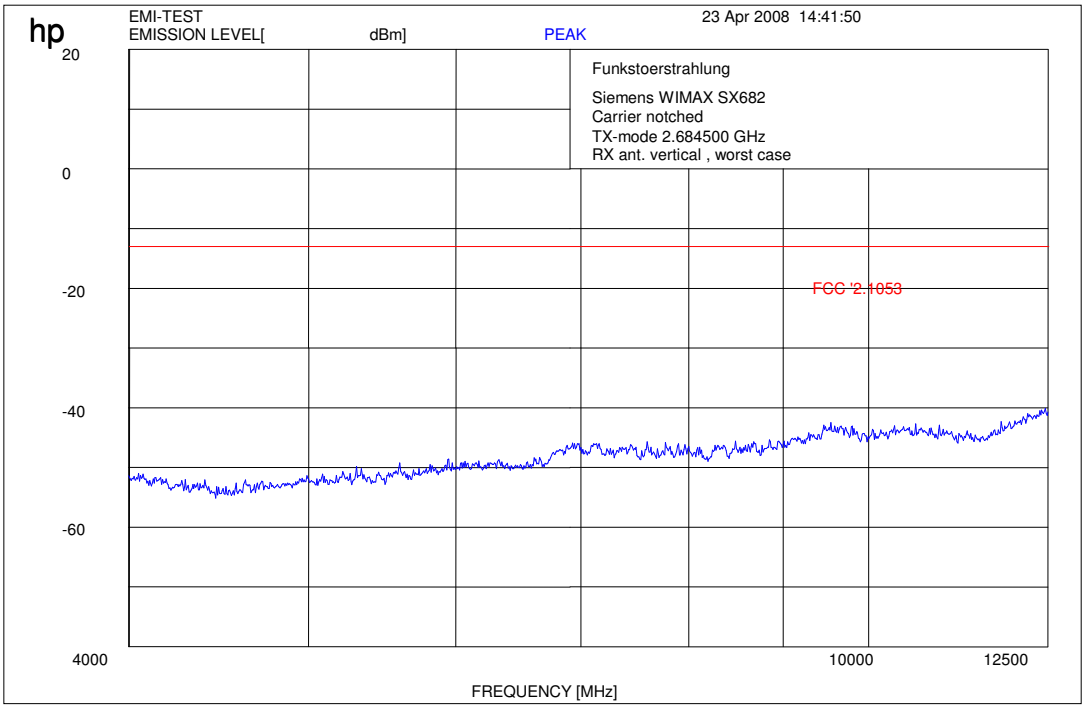


Date: 24.APR.2008 11:08:32

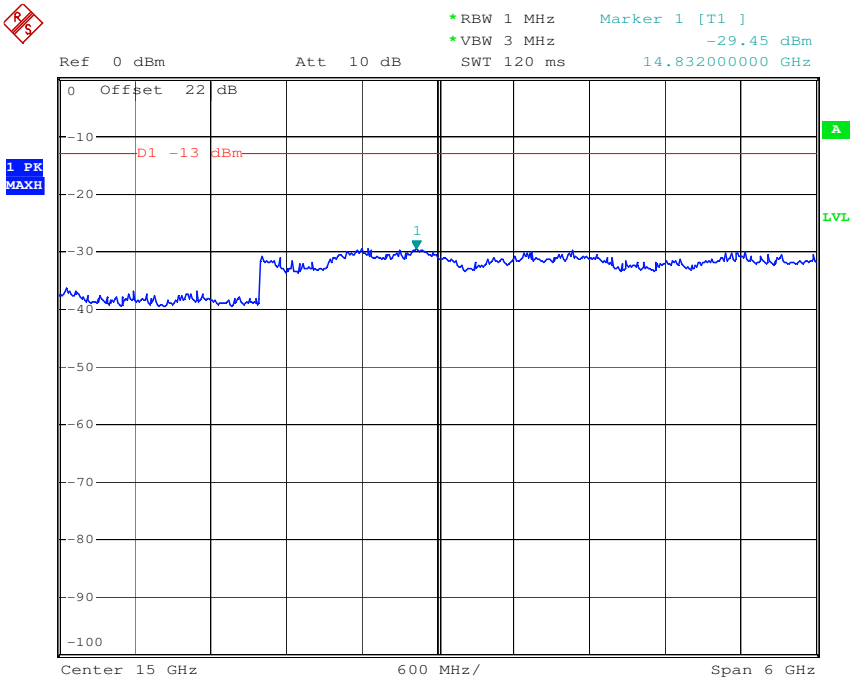
Plot 63:



Plot 64:

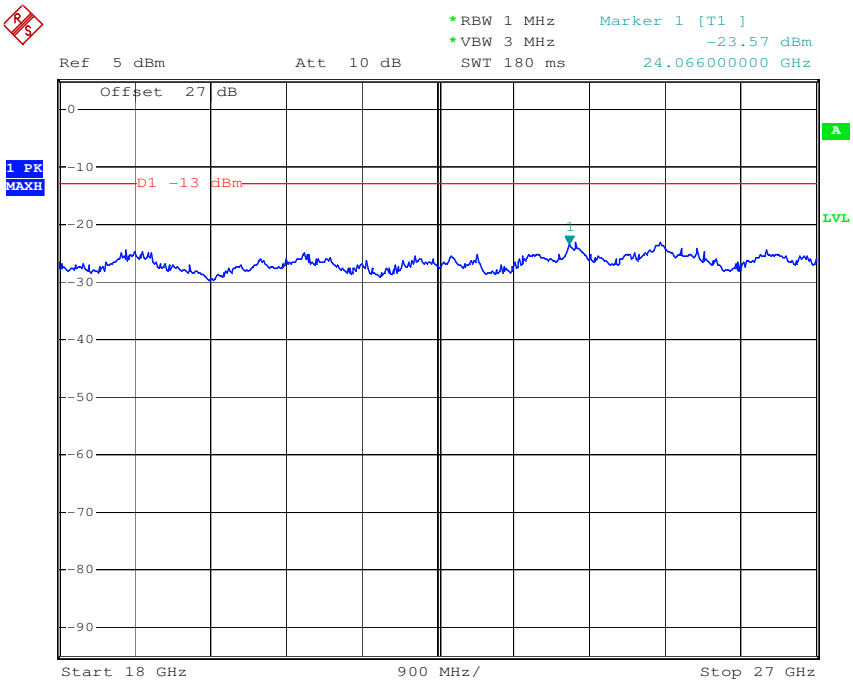


Plot 65:



Date: 24.APR.2008 10:55:08

Plot 66:



Date: 24.APR.2008 11:20:18

CFR 47 Part 2.1053 Measurements required: **Field strength of spurious radiation**
CFR 47 Part 15.109 Radiated emission limits

FCC Part 15 Idle Mode (SX682)
Transmitter characteristics: 5 MHz / 10 MHz channel spacing (only 2.593000 GHz)

Measurement conditions:

Frequency	f_{nom}	= 2.593000 GHz
Channel spacing	CS	= 10.0 MHz
Modulation	D	= 64QAM
Temperature	t	= + 23.0 °C
Nominal power supply	U_{DC}	= 115.0 V
Measurement at	C'	

Test set-up: see page 9 / no. 3

Limit: see table

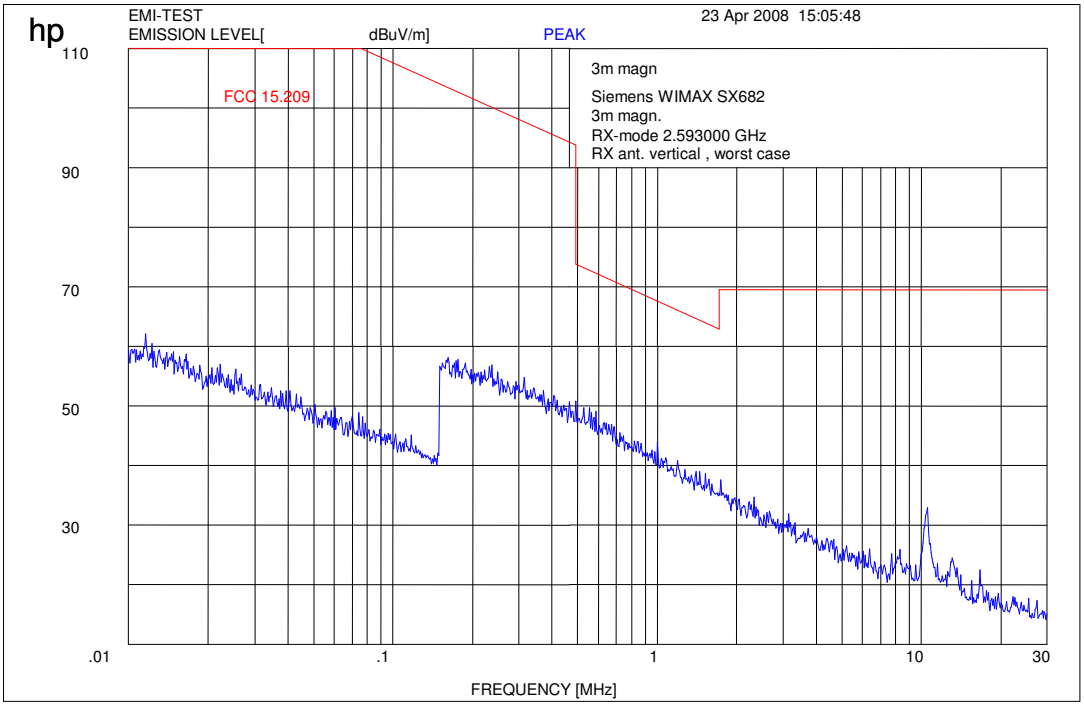
Test measurement:

Frequency Range [GHz]	$f_{carrier}$ [GHz]	Modulation	Limit [dBuV/m]	Res. BW [MHz]	Spurious Frequency [GHz]	Emissions [dBm]	see plot no.
0.000009 – 0.030	2.593000	64QAM	see plot	0.12	n.f.	< limit	67
0.030 – 1.000	2.593000	64QAM	see plot	0.12	n.f.	< limit	68
1.000 – 4.000	2.593000	64QAM	54	1.0	n.f.	< limit	69
4.000 – 12.000	2.593000	64QAM	54	1.0	n.f.	< limit	70
12.000 – 18.000	2.593000	64QAM	54	1.0	n.f.	< limit	71
18.000 – 27.000	2.593000	64QAM	54	1.0	n.f.	< limit	72

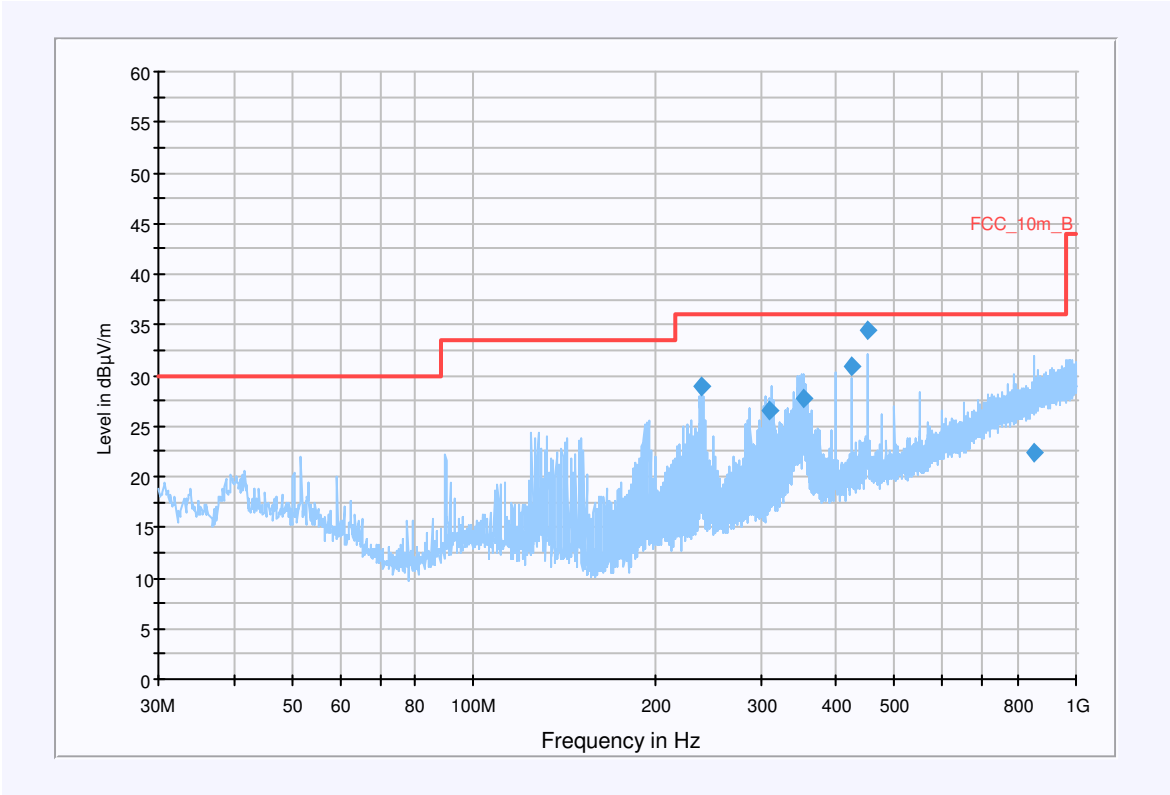
n.f. = nothing found

Test result: Passed: [X] Failed: [ ]

Plot 67:

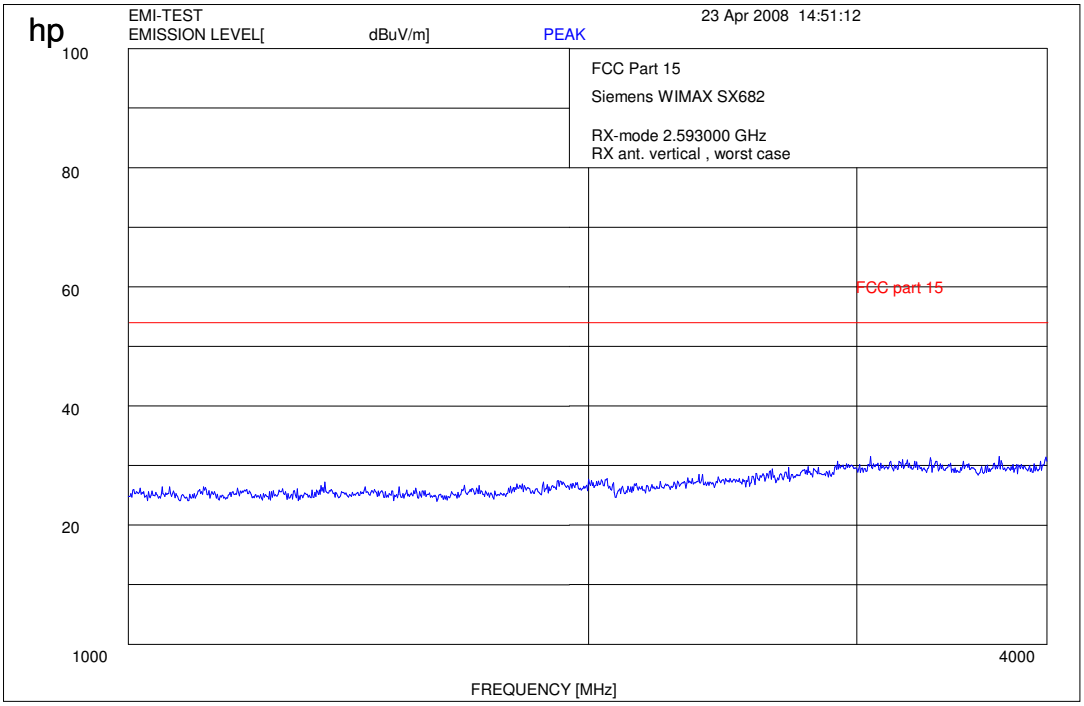

hp
EMI-TEST
EMISSION LEVEL[dBuV/m]
PEAK
23 Apr 2008 15:05:48
3m magn
Siemens WIMAX SX682
3m magn.
RX-mode 2.593000 GHz
RX ant. vertical , worst case
FCC 15.209
110
90
70
50
30
.01
.1
1
10
30
FREQUENCY [MHz]

Plot 68:

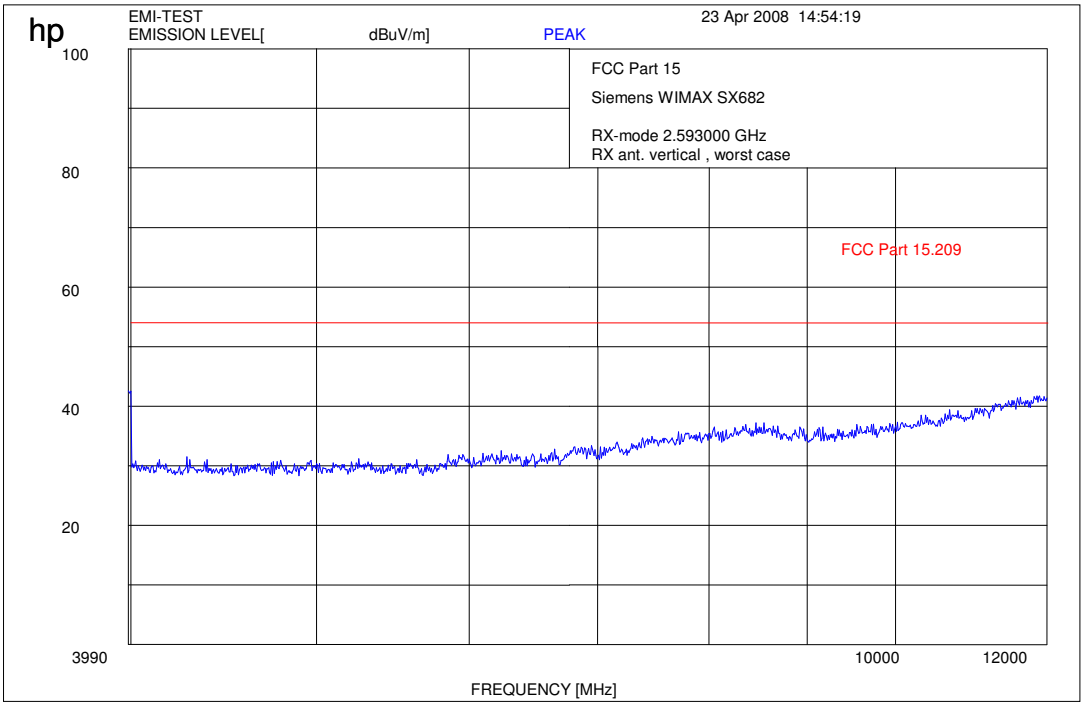


Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
239.222650	28.8	15000.000	120.000	115.0	V	62.0	13.2	7.2	36.0	
310.868600	26.5	15000.000	120.000	115.0	V	178.0	15.0	9.5	36.0	
352.849850	27.7	15000.000	120.000	265.0	H	247.0	16.3	8.3	36.0	
425.042850	30.9	15000.000	120.000	200.0	H	-1.0	17.4	5.1	36.0	
449.991100	34.4	15000.000	120.000	192.0	H	6.0	17.8	1.6	36.0	
853.469400	22.3	15000.000	120.000	200.0	V	246.0	25.4	13.7	36.0	

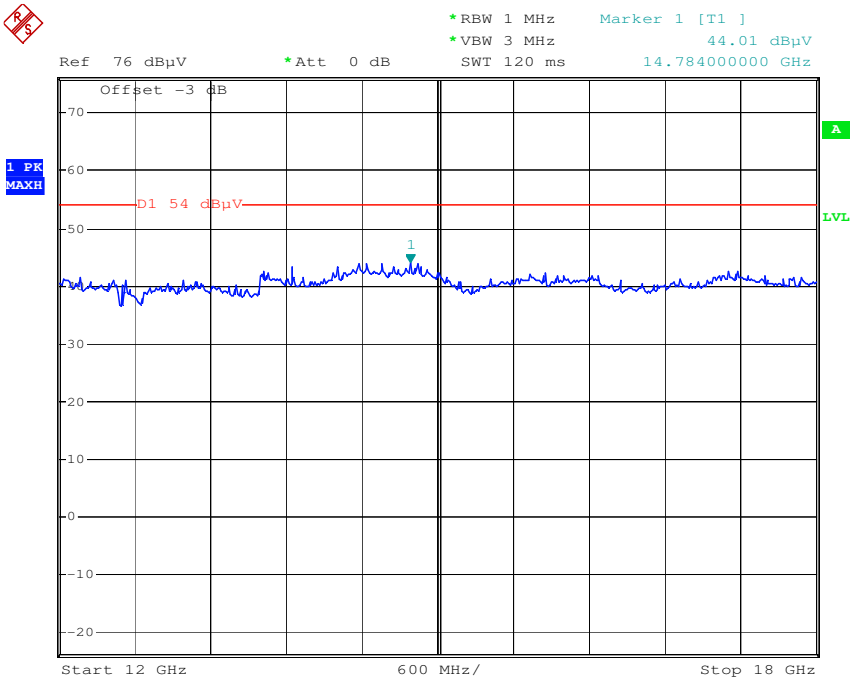
Plot 69:



Plot 70:

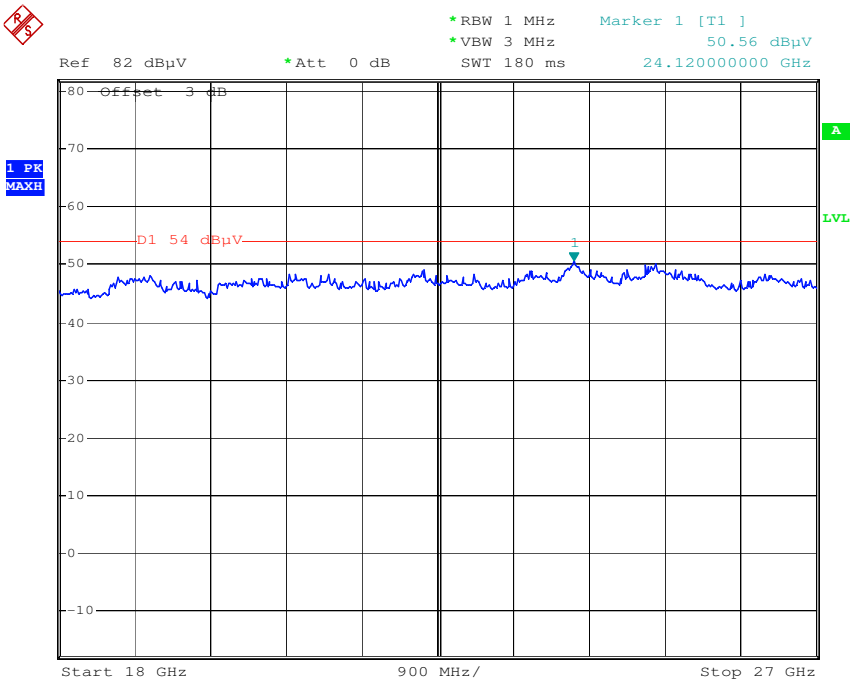


Plot 71:



Date: 24.APR.2008 14:45:11

Plot 72:



Date: 24.APR.2008 14:40:00

FCC Part 15 Idle Mode (SE681)
Transmitter characteristics: 5 MHz / 10 MHz channel spacing (only 2.593000 GHz)

Measurement conditions:

Frequency	f_{nom}	= 2.593000 GHz
Channel spacing	CS	= 10.0 MHz
Modulation	D	= 64QAM
Temperature	t	= + 23.0 °C
Nominal power supply	U_{DC}	= 115.0 V
Measurement at	C'	

Test set-up: see page 9 / no. 3

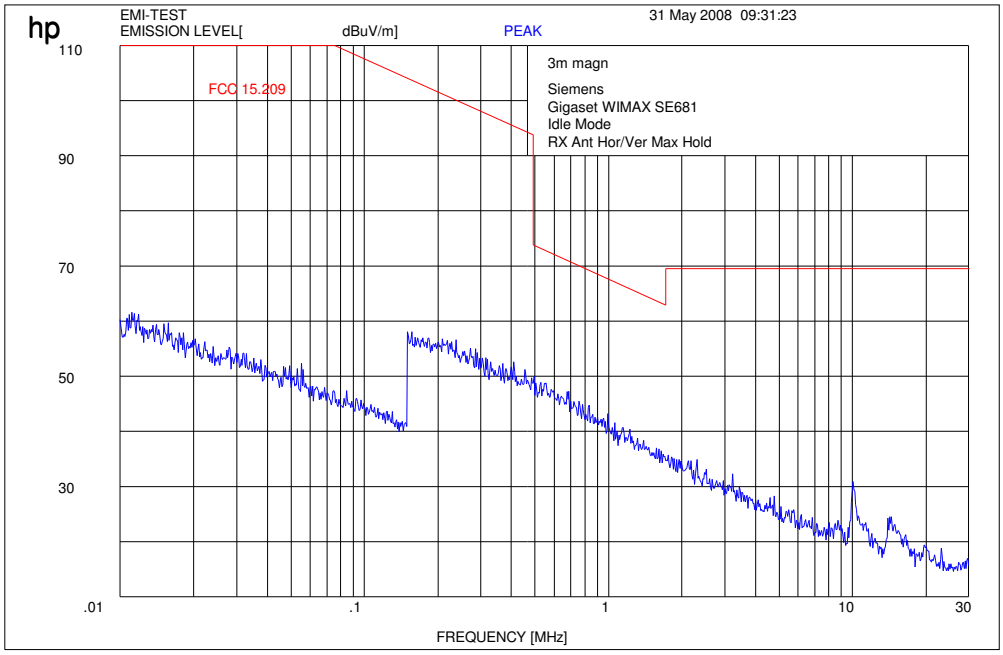
Limit: see table

Test measurement:

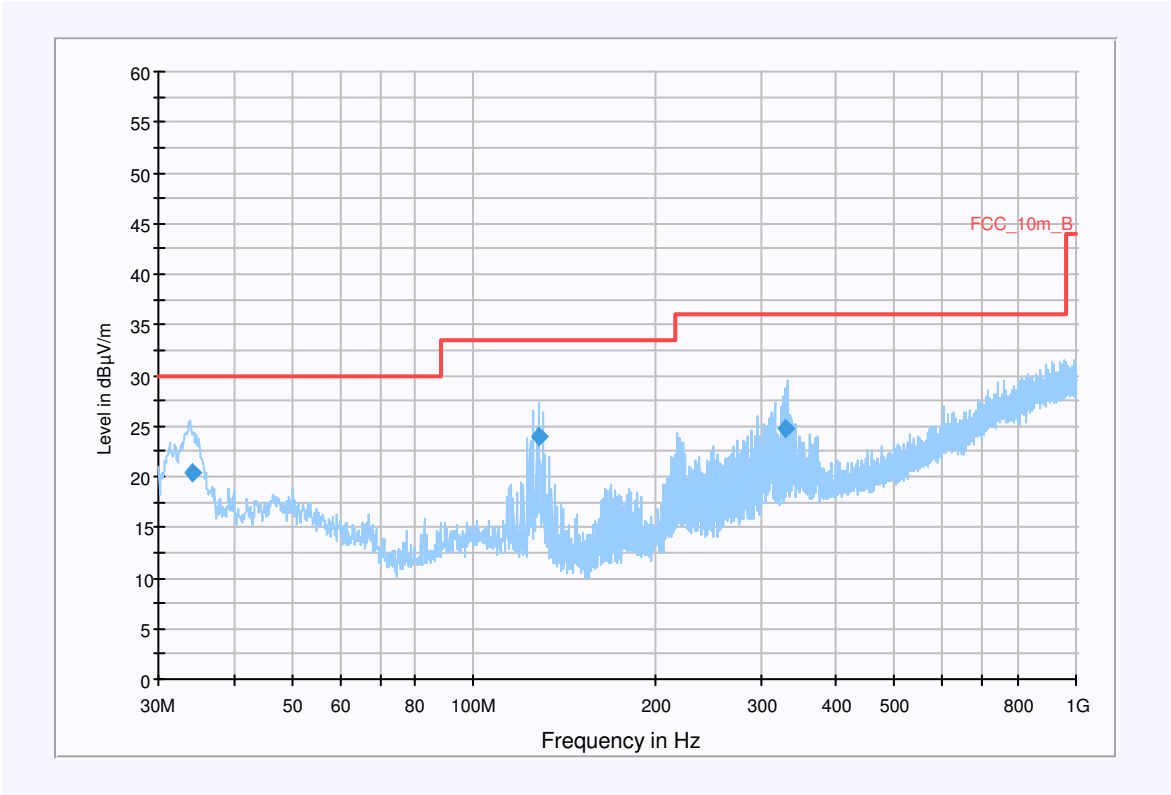
Frequency Range [GHz]	$f_{carrier}$ [GHz]	Modulation	Limit [dBuV/m]	Res. BW [MHz]	Spurious Frequency [GHz]	Emissions [dBm]	see plot no.
0.000009 – 0.030	2.593000	64QAM	see plot	0.12	n.f.	< limit	73
0.030 – 1.000	2.593000	64QAM	see plot	0.12	n.f.	< limit	74
1.000 – 4.000	2.593000	64QAM	54	1.0	n.f.	< limit	75
4.000 – 12.000	2.593000	64QAM	54	1.0	n.f.	< limit	76

n.f. = nothing found

Plot 73:

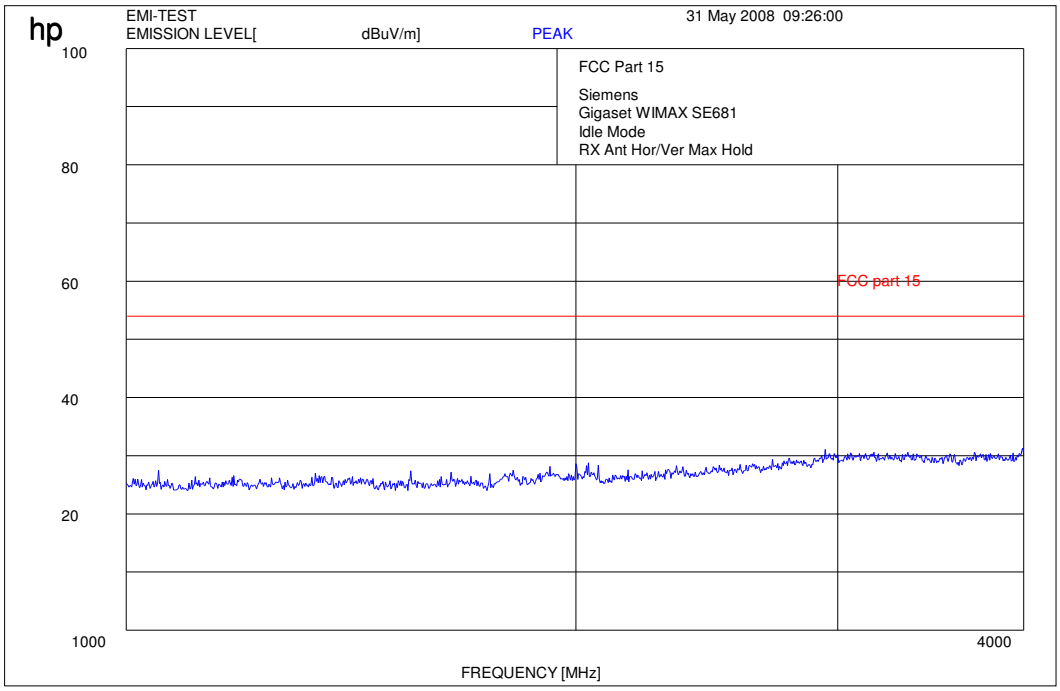


Plot 74:

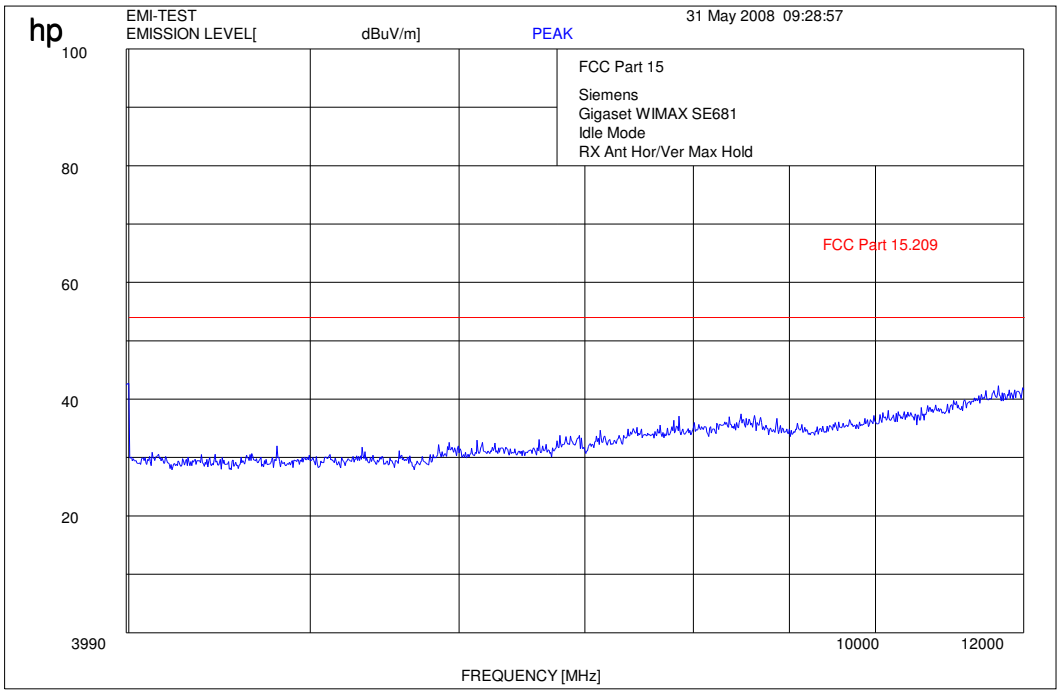


Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
34.132600	20.4	15000.000	120.000	236.0	V	0.0	13.1	9.6	30.0	
128.572600	23.9	15000.000	120.000	188.0	V	230.0	9.9	9.6	33.5	
330.765350	24.8	15000.000	120.000	115.0	V	132.0	15.7	11.2	36.0	

Plot 75:



Plot 76:



CFR 47 Part 2.1053 Measurements required: **Field strength of spurious radiation**
CFR 47 Part 15.107 Conducted limits

Measurement conditions:

Frequency	f_{nom}	= 2.593000 GHz
Channel spacing	CS	= 5.0 MHz
Modulation	D	= QPSK
Temperature	t	= + 23.0 °C
Nominal power supply	U_{DC}	= 115.0 V
Measurement at	C'	

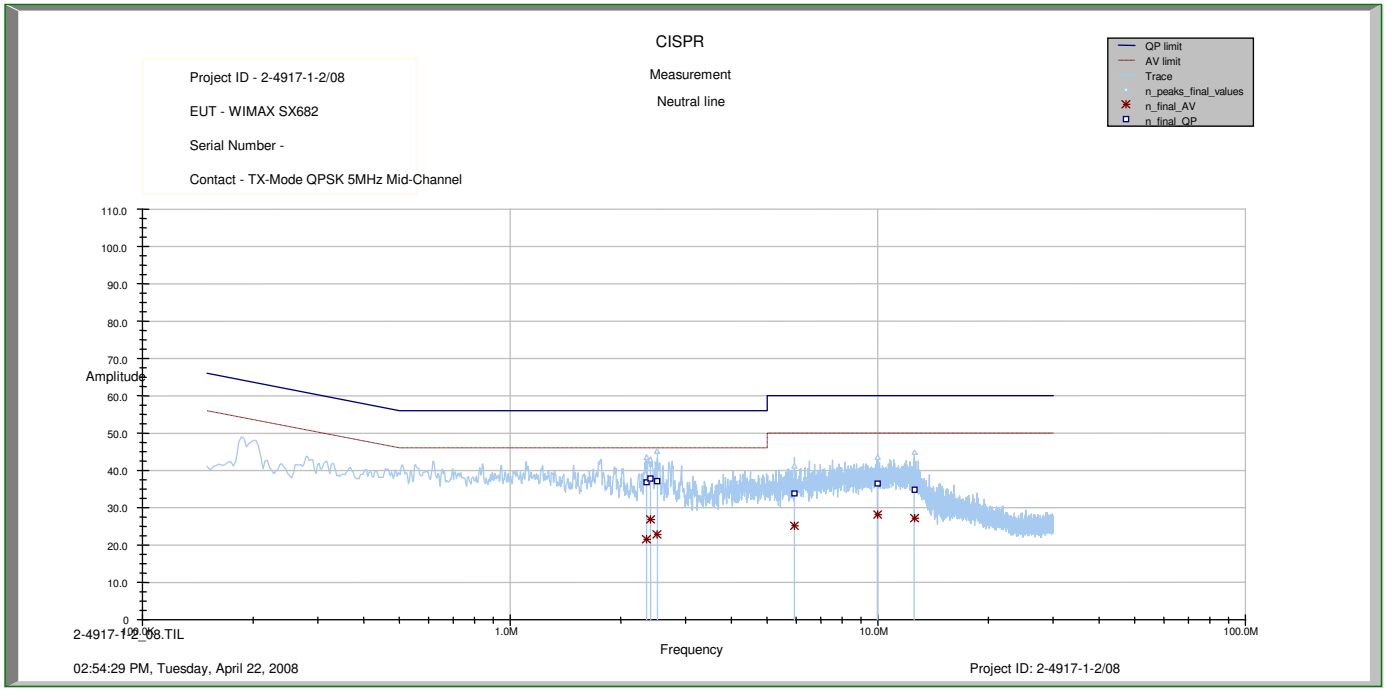
Limit: see table

Test measurement:

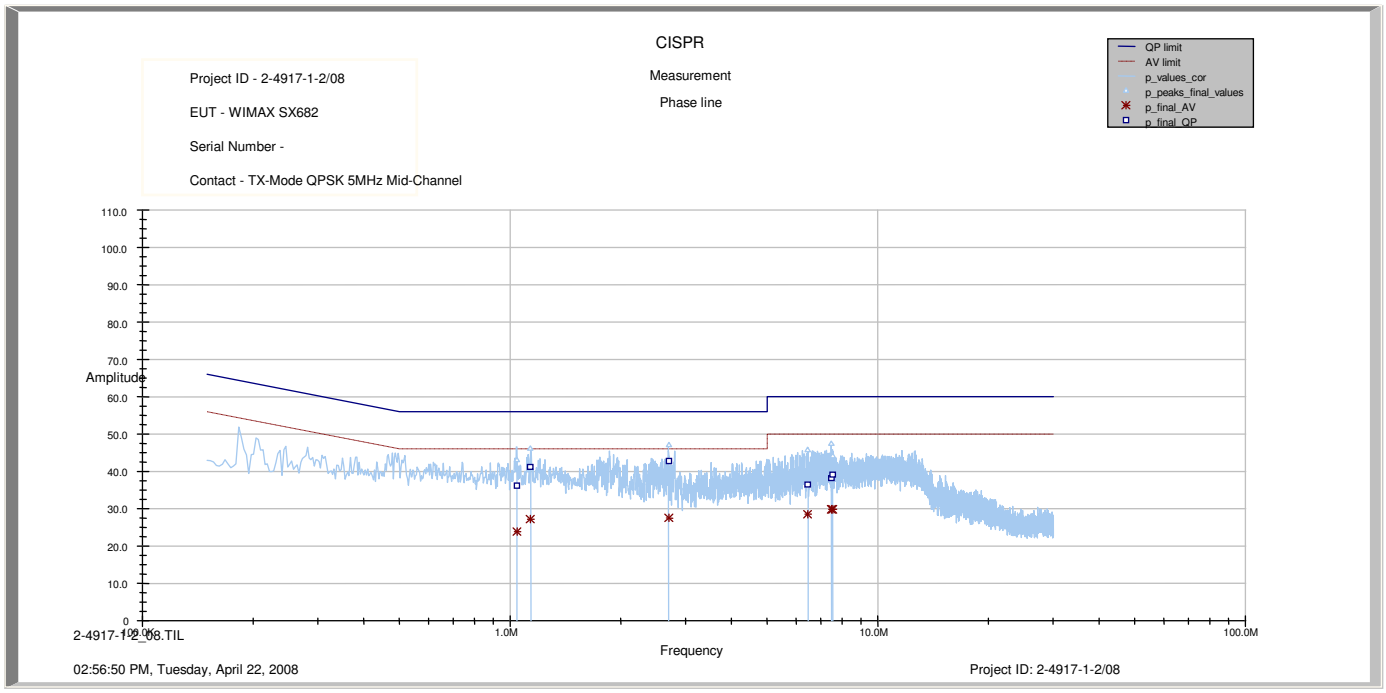
Frequency Range [GHz]	$f_{carrier}$ [GHz]	line	Limit [dBm]	Res. BW [MHz]	Spurious Frequency [GHz]	Emissions [dBm]	see plot no.
0.00015 – 30.000	2.593000	neutral	see plot	0.12	n.f.	< limit	77
0.00015 – 30.000	2.593000	phase	see plot	0.12	n.f.	< limit	78

n.f. = nothing found

Plot 77:



Plot 78:



CFR 47 Part 2.1055 Measurements required: **Frequency stability**
CFR 47 Part 27.54 Frequency stability

Transmitter characteristics: 5 MHz channel spacing

Measurement conditions:

Frequency	f_{nom}	= 2.593000 GHz
Channel spacing	CS	= 5.0 MHz
Modulation	D	= 64QAM
Temperature	t	= see table
Power supply	U_{DC}	= see table
Measurement at	C'	

Test set-up: see page 9 / no. 4

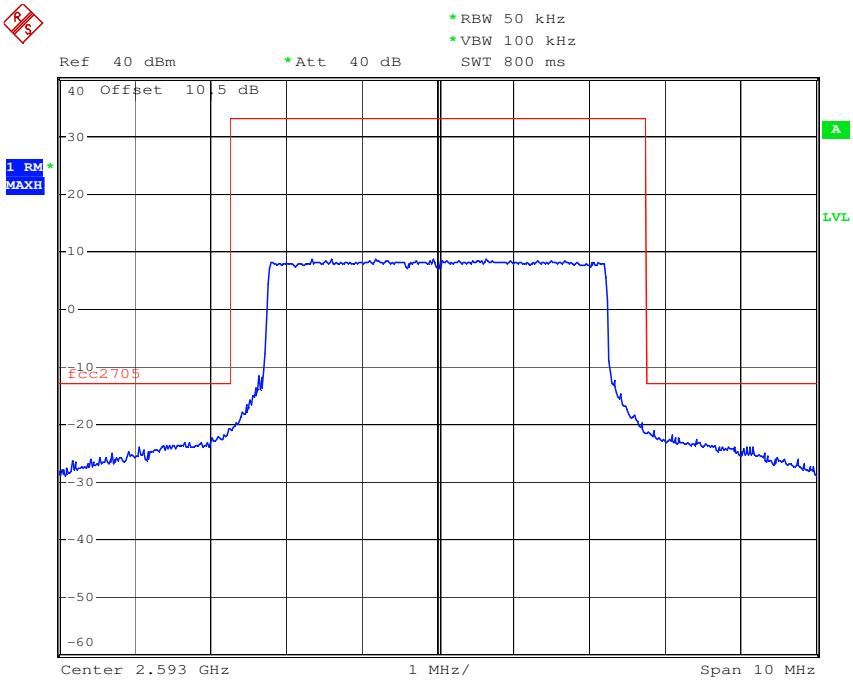
Limit: see plot

Test measurement:

U_{DC}	T	Channel spacing	Modulation	Frequency	Frequency Error	Plot
[V]	[°C]	[MHz]		[GHz]		
115.0	-30.0	5	64QAM	2.593000	see plot	79
115.0	-20.0	5	64QAM	2.593000	see plot	80
115.0	-10.0	5	64QAM	2.593000	see plot	81
115.0	0.0	5	64QAM	2.593000	see plot	82
115.0	10.0	5	64QAM	2.593000	see plot	83
103.5	20.0	5	64QAM	2.593000	see plot	84
115.0	20.0	5	64QAM	2.593000	see plot	85
126.5	20.0	5	64QAM	2.593000	see plot	86
115.0	30.0	5	64QAM	2.593000	see plot	87
115.0	40.0	5	64QAM	2.593000	see plot	88
115.0	50.0	5	64QAM	2.593000	see plot	89

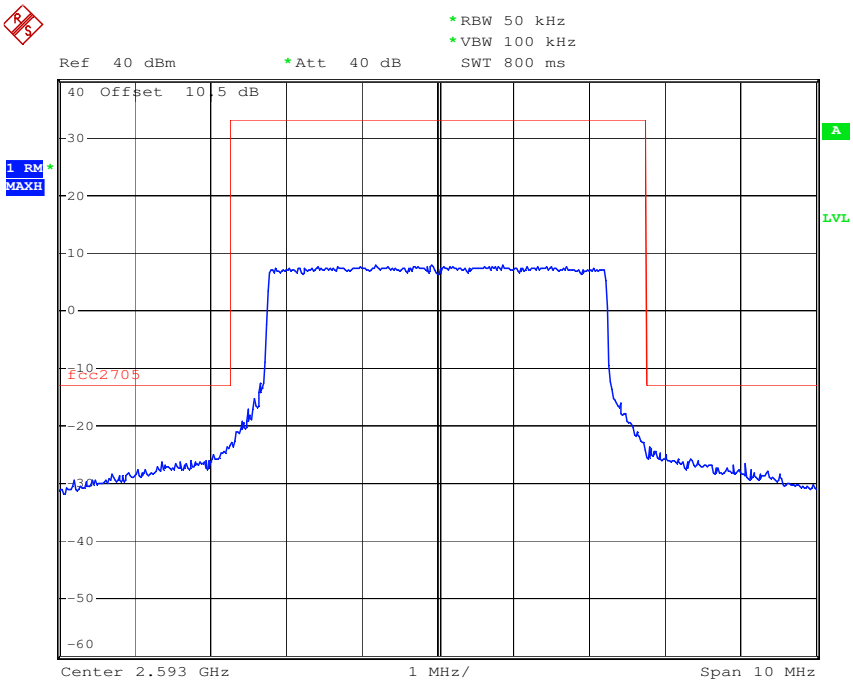
Test result: Passed: [X] Failed: [ ]

Plot 79:



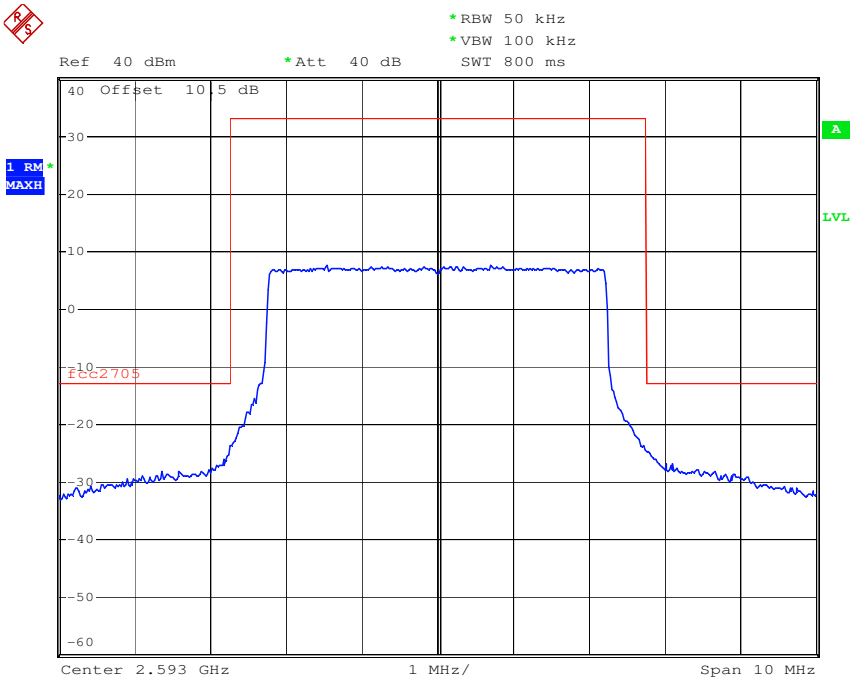
Date: 21.APR.2008 15:51:34

Plot 80:



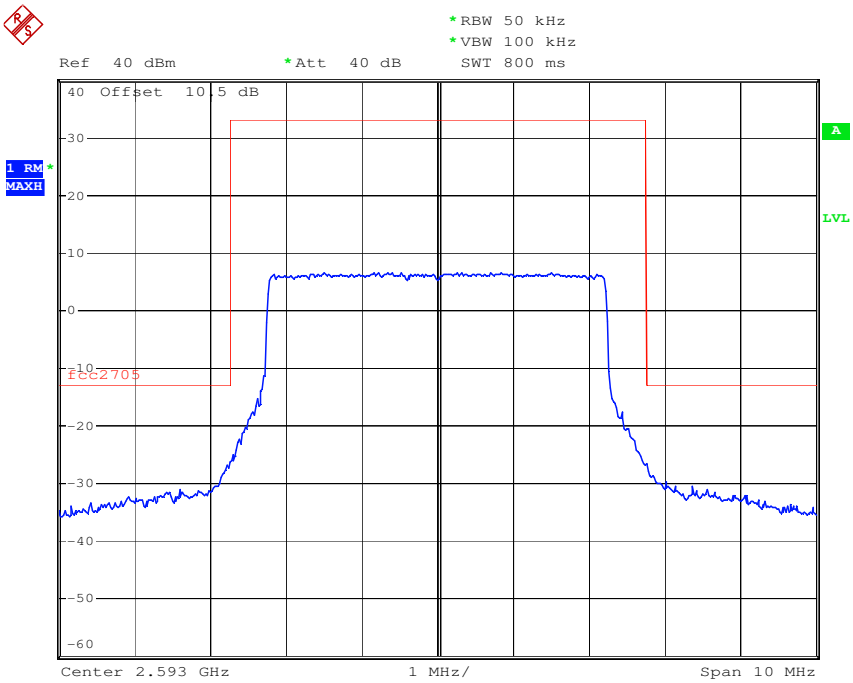
Date: 21.APR.2008 15:41:07

Plot 81:



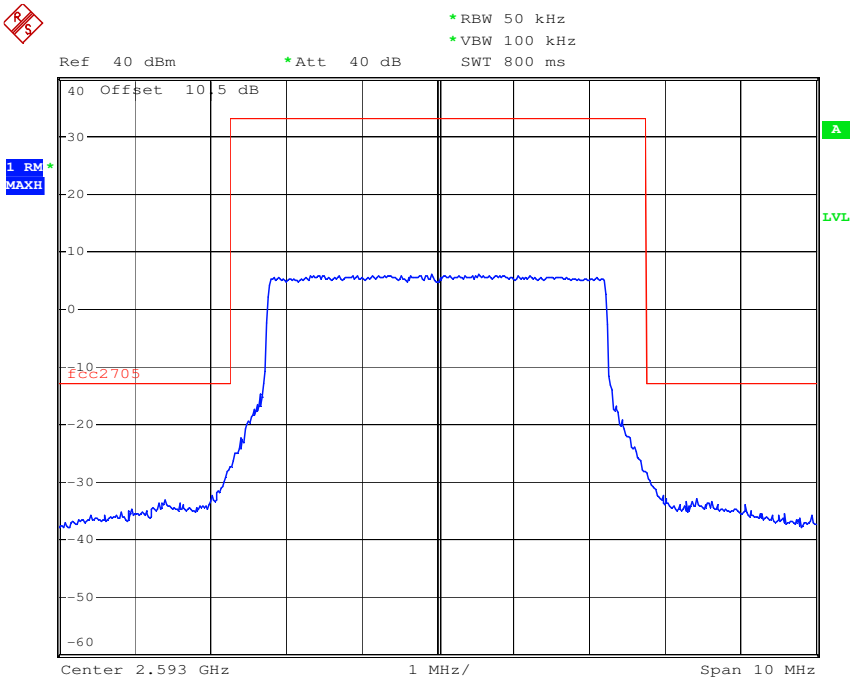
Date: 21.APR.2008 15:36:39

Plot 82:



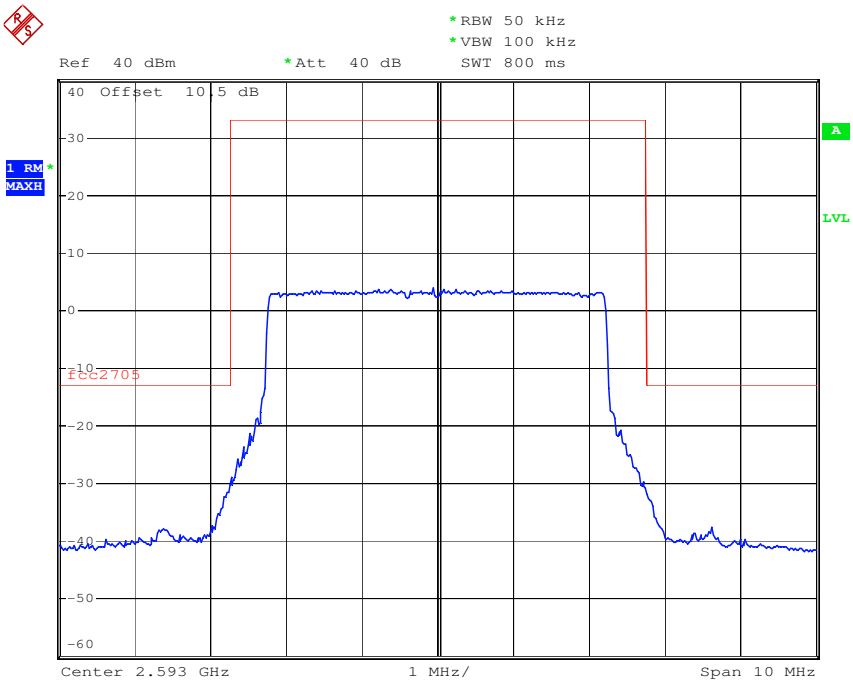
Date: 21.APR.2008 15:30:28

Plot 83:



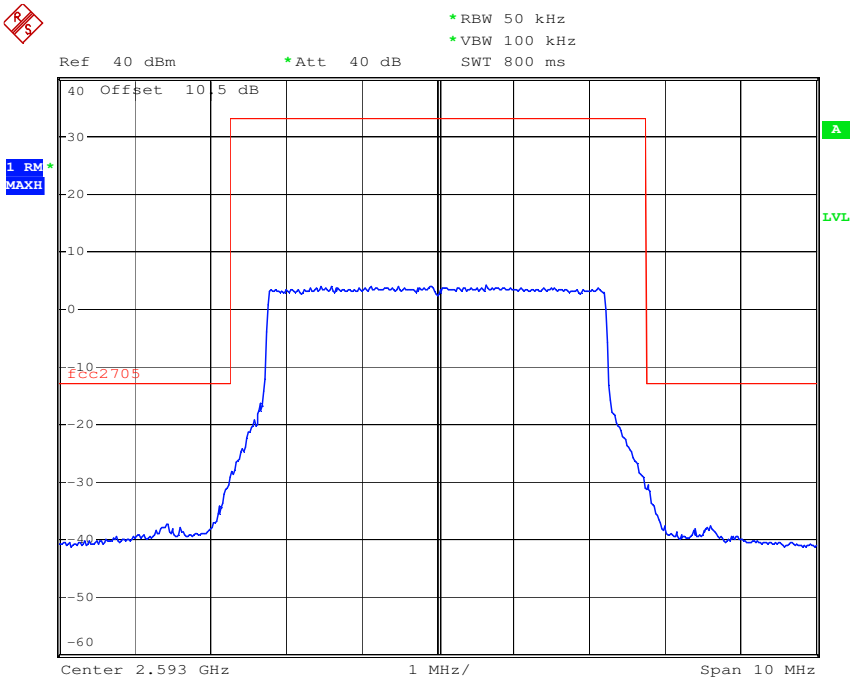
Date: 21.APR.2008 15:26:06

Plot 84:



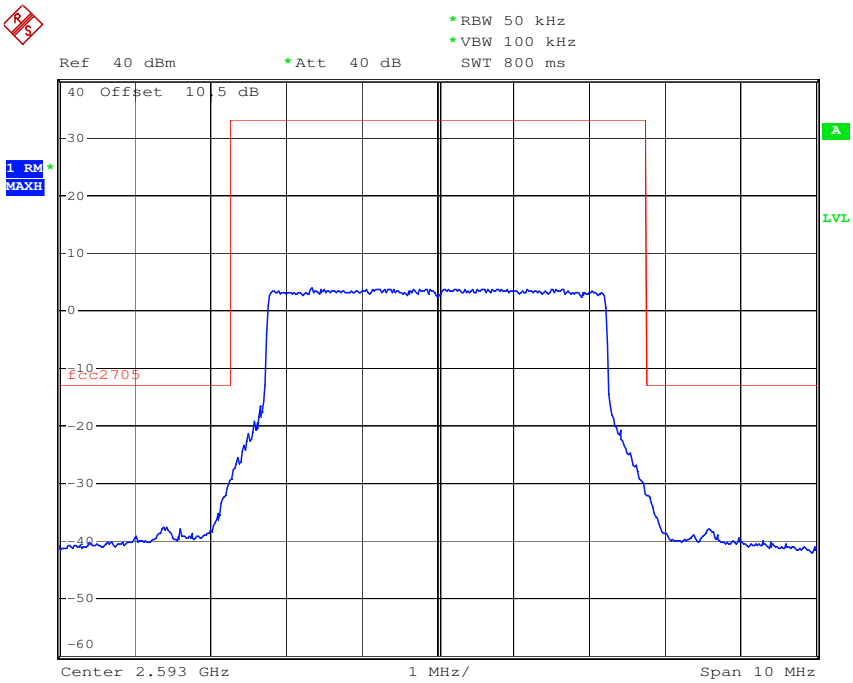
Date: 21.APR.2008 14:30:33

Plot 85:



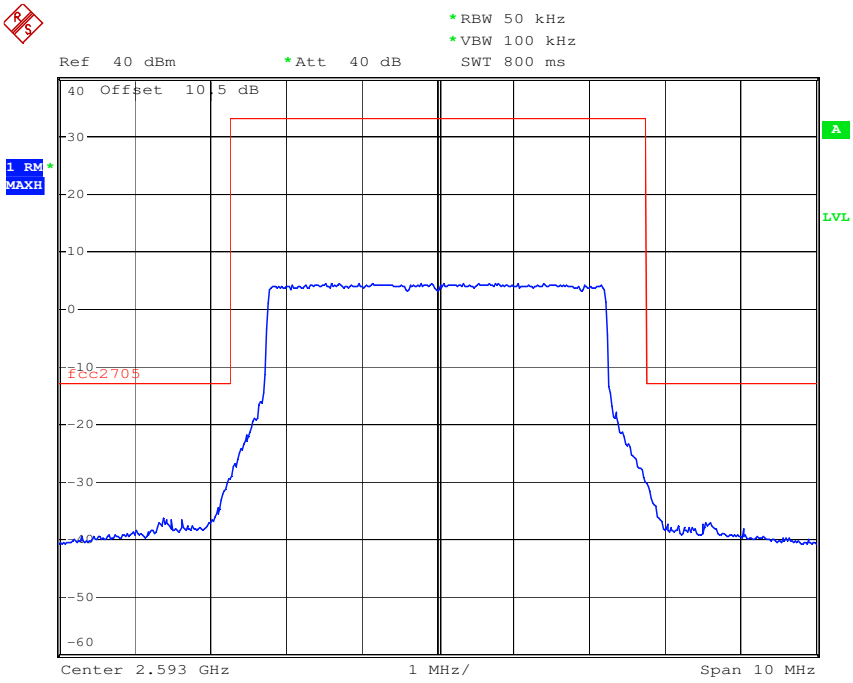
Date: 21.APR.2008 14:28:45

Plot 86:



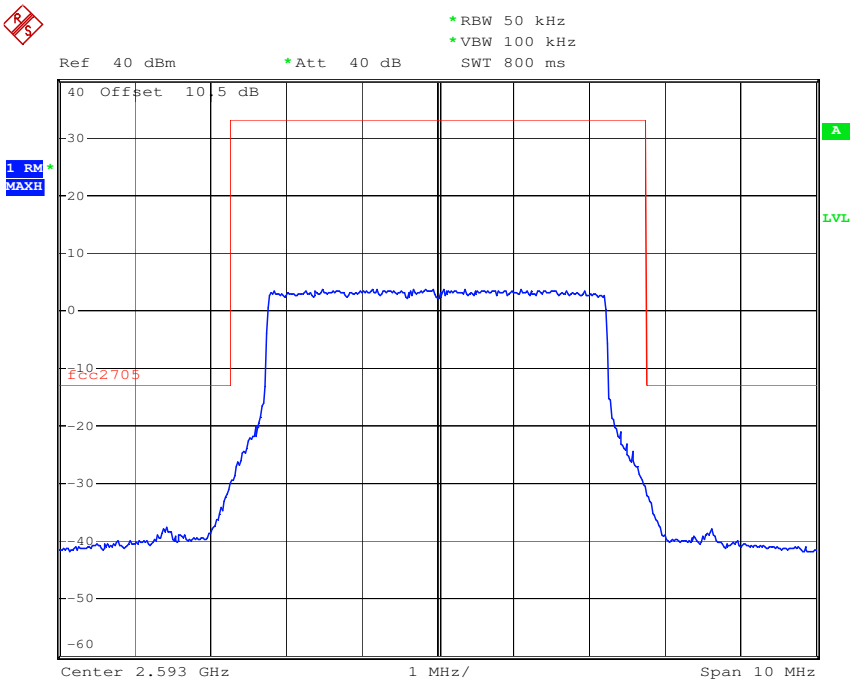
Date: 21.APR.2008 14:29:33

Plot 87:



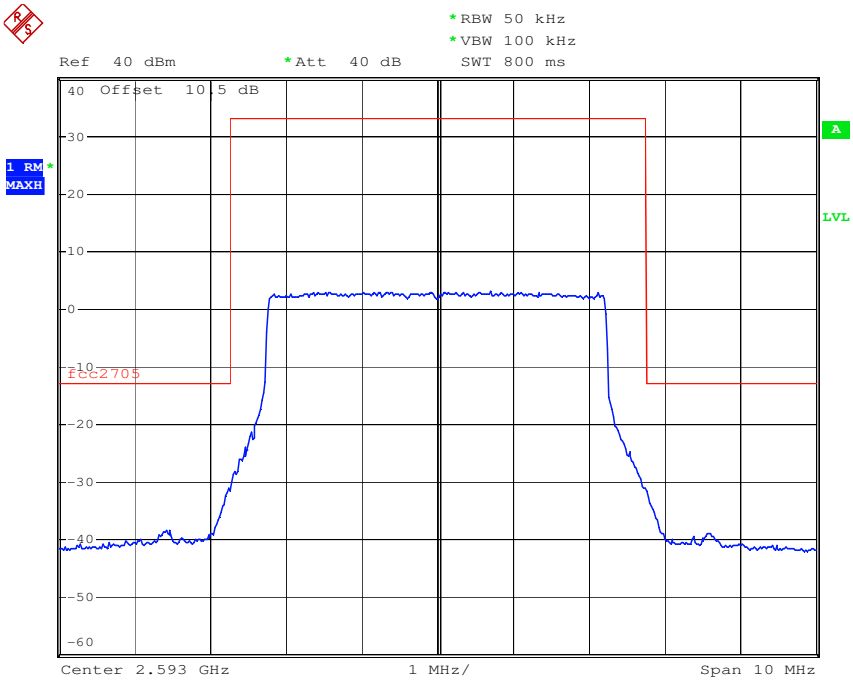
Date: 21.APR.2008 15:17:05

Plot 88:



Date: 21.APR.2008 15:07:37

Plot 89:



Date: 21.APR.2008 15:00:30

CFR 47 Part 2.1055 Measurements required: **Frequency stability**
CFR 47 Part 27.54 Frequency stability

Transmitter characteristics: 10 MHz channel spacing

Measurement conditions:

Frequency	f_{nom}	= 2.596000 GHz
Channel spacing	CS	= 10.0 MHz
Modulation	D	= 64QAM
Temperature	t	= see table
Power supply	U_{DC}	= see table
Measurement at	C'	

Test set-up: see page 9 / no. 4

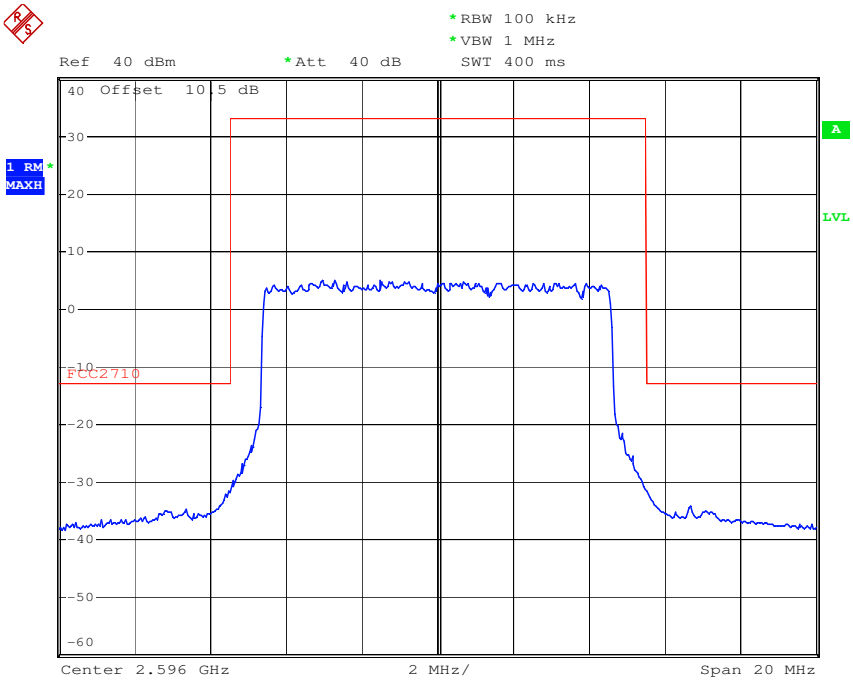
Limit: see plot

Test measurement:

U_{DC}	T	Channel spacing	Modulation	Frequency	Frequency Error	Plot
[V]	[°C]	[MHz]		[GHz]		
115.0	-30.0	10	64QAM	2.596000	see plot	90
115.0	-20.0	10	64QAM	2.596000	see plot	91
115.0	-10.0	10	64QAM	2.596000	see plot	92
115.0	0.0	10	64QAM	2.596000	see plot	93
115.0	10.0	10	64QAM	2.596000	see plot	94
103.5	20.0	10	64QAM	2.596000	see plot	95
115.0	20.0	10	64QAM	2.596000	see plot	96
126.5	20.0	10	64QAM	2.596000	see plot	97
115.0	30.0	10	64QAM	2.596000	see plot	98
115.0	40.0	10	64QAM	2.596000	see plot	99
115.0	50.0	10	64QAM	2.596000	see plot	100

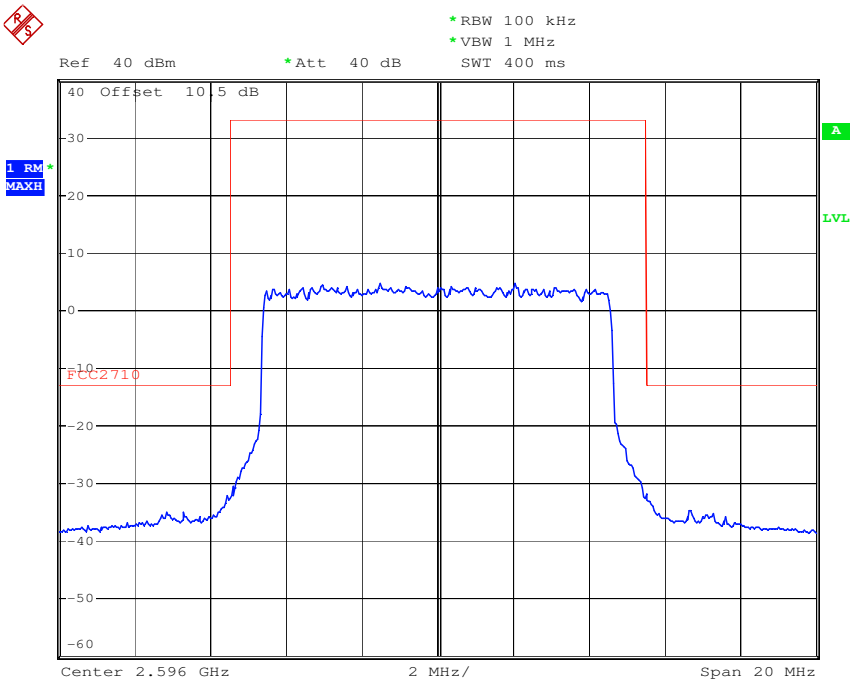
Test result: Passed: [X] Failed: [ ]

Plot 90:



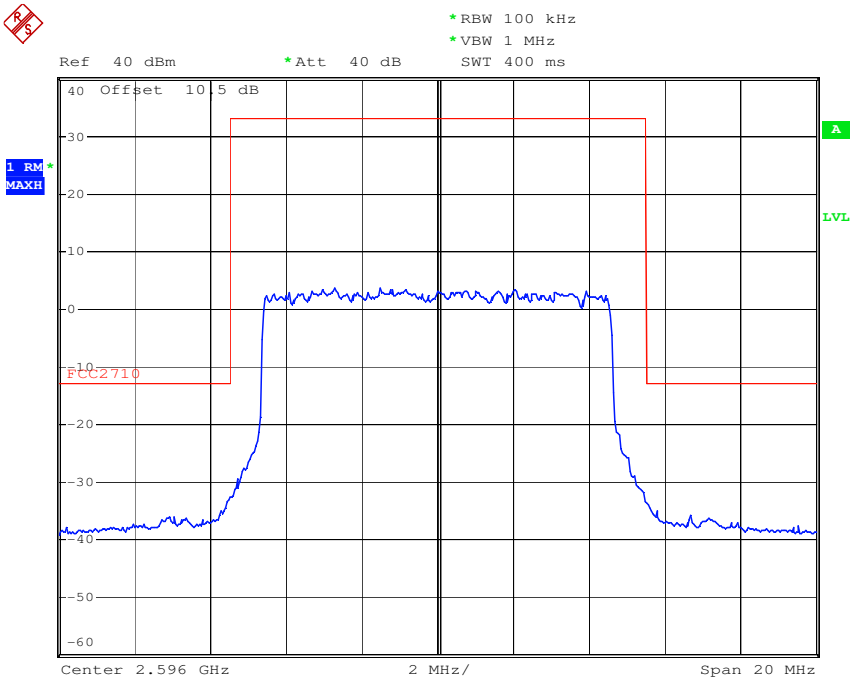
Date: 21.APR.2008 15:58:45

Plot 91:



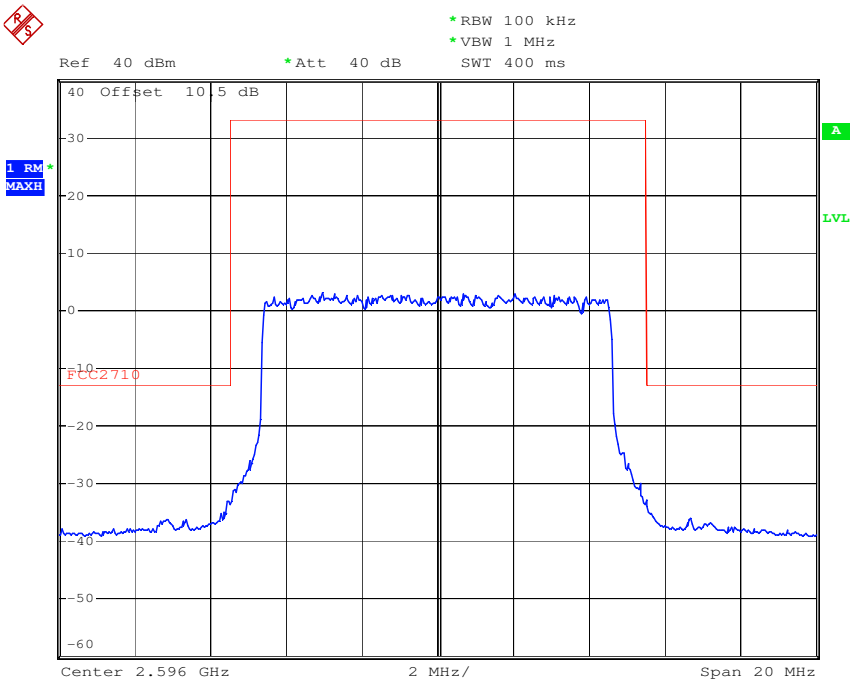
Date: 21.APR.2008 16:01:58

Plot 92:



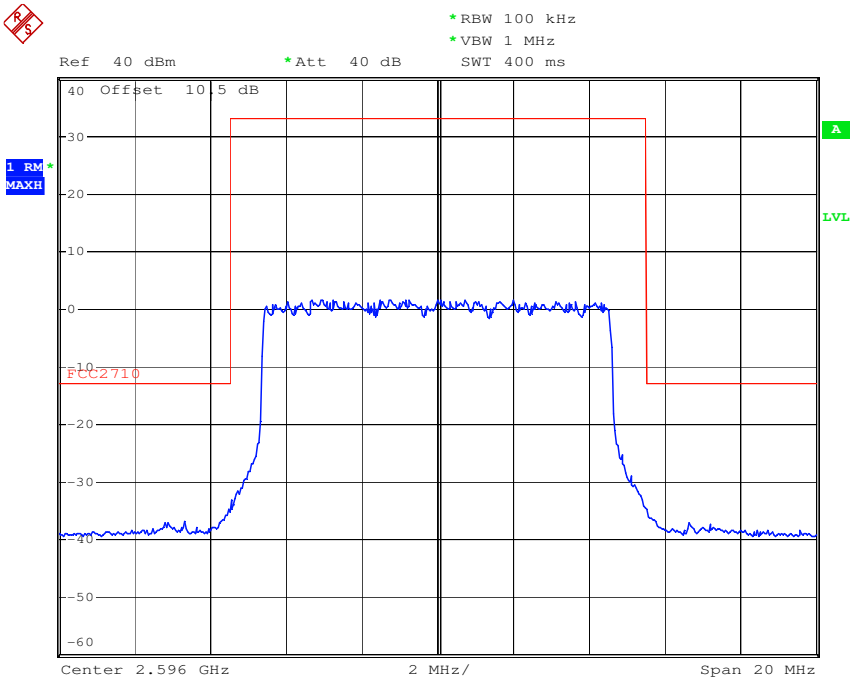
Date: 21.APR.2008 16:06:33

Plot 93:



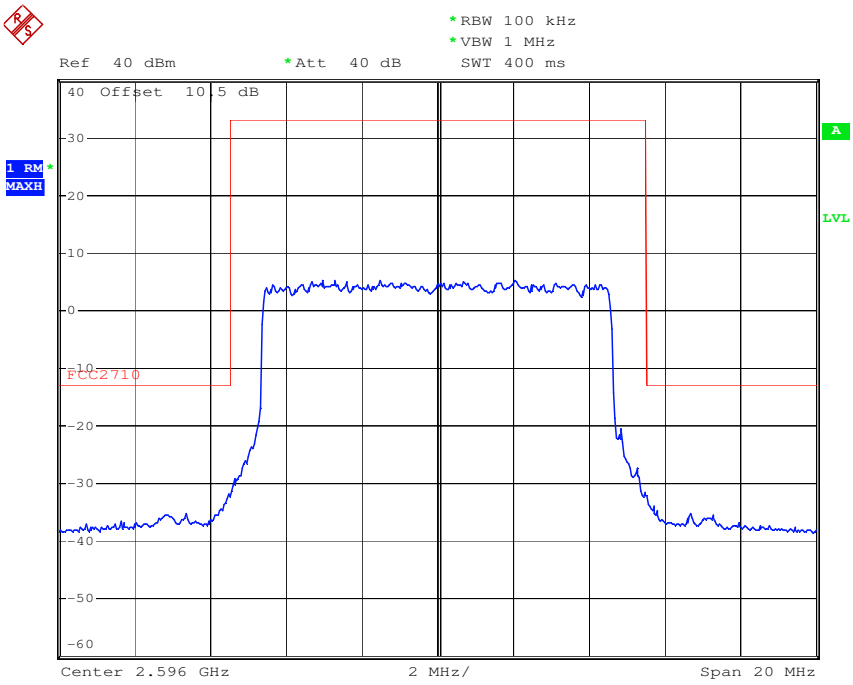
Date: 21.APR.2008 16:09:46

Plot 94:



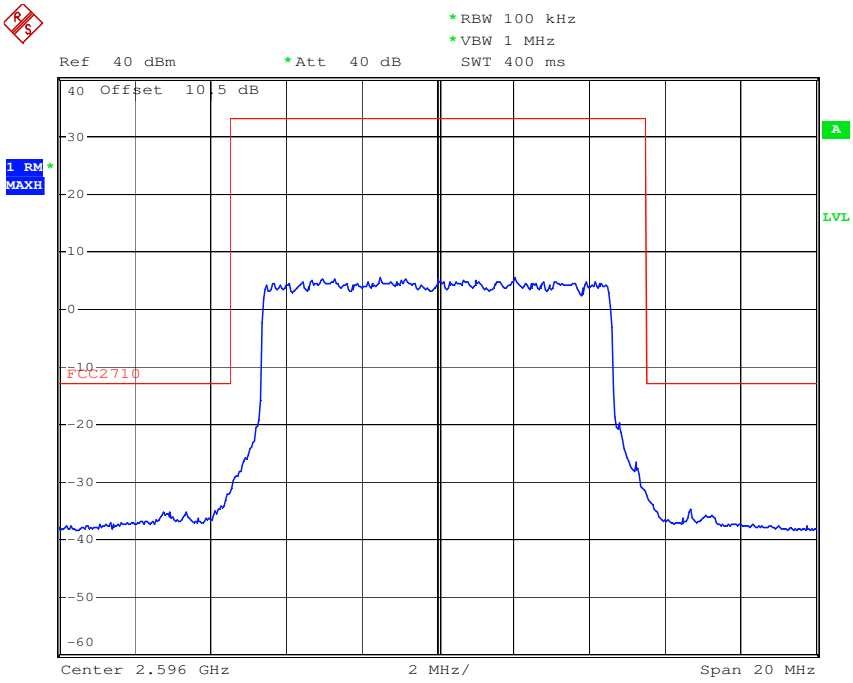
Date: 21.APR.2008 16:17:21

Plot 95:



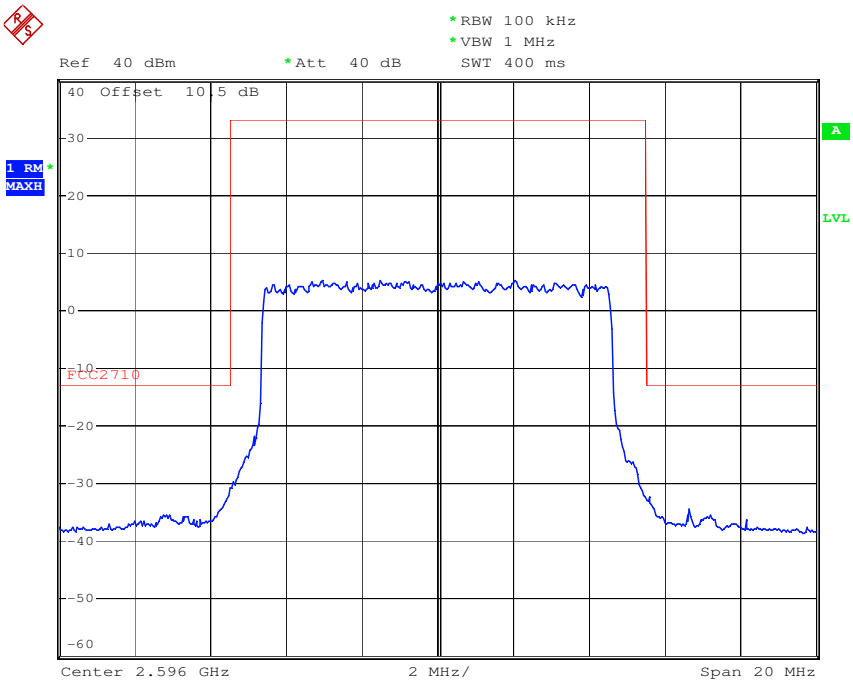
Date: 22.APR.2008 10:04:10

Plot 96:



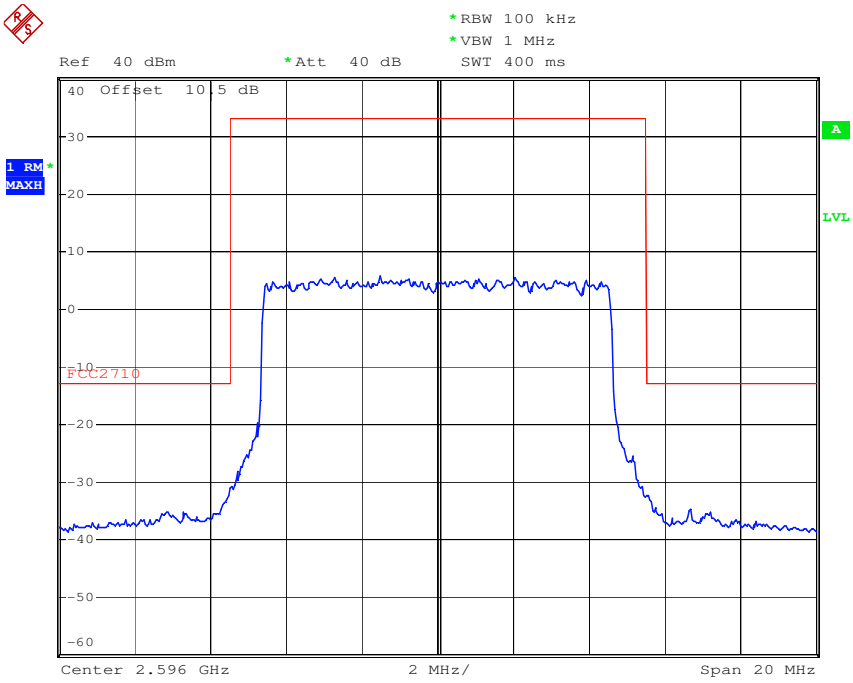
Date: 22.APR.2008 10:03:05

Plot 97:



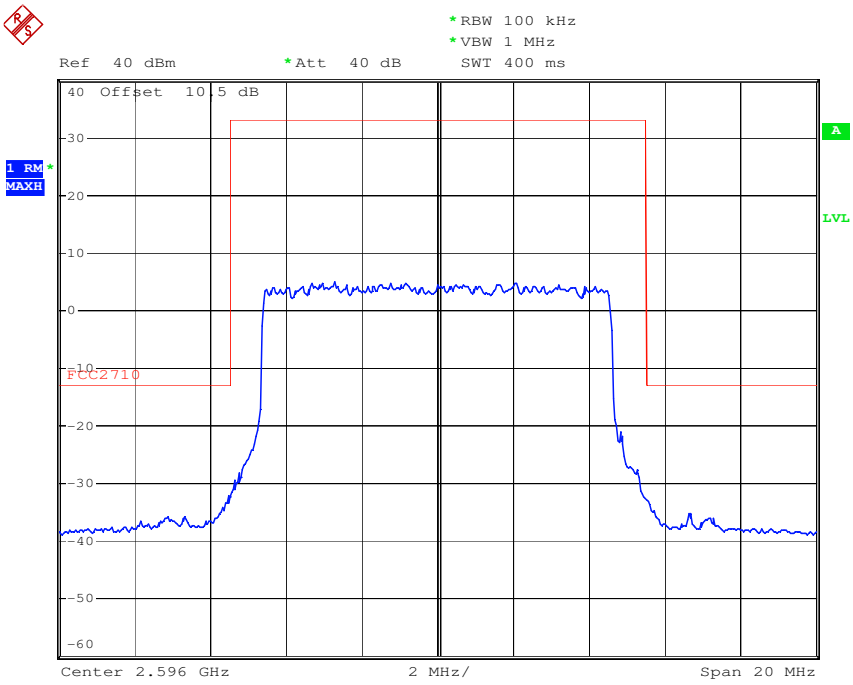
Date: 22.APR.2008 10:04:54

Plot 98:



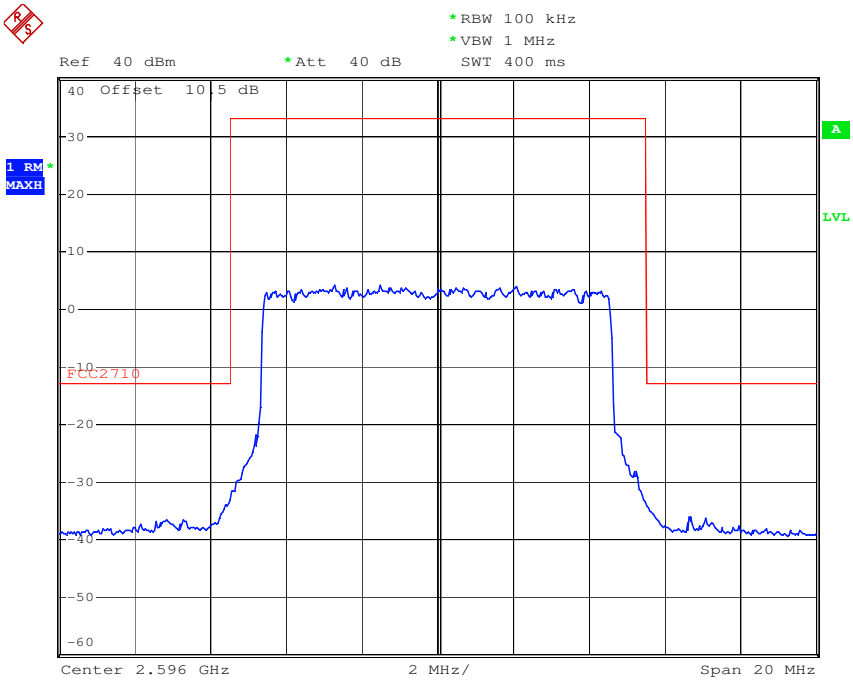
Date: 22.APR.2008 10:10:35

Plot 99:



Date: 22.APR.2008 10:15:08

Plot 100:



Date: 22.APR.2008 10:21:05

RF Exposure / Safety

Calculation of Maximum Permissable Exposure (MPE)
based on Section 1.1307(b) Requirements

a) FCC limit is: 1mW/cm^2

b) The Wimax CPE can be configured in one of three different setups:
Setup 1: CPE with 9dBi internal antenna
Setup 2: CPE with 9dBi external desktop antenna
Setup 3: CPE with 18dBi external outdoor antenna

c) The power density produced by the EUT is:

$$S_{peak} = \frac{P_t \cdot G_t}{4\pi R^2}$$

$$S_{average} = \frac{P_t \cdot G_t \cdot dc}{4\pi R^2 \cdot 100}$$

P_t – Transitted power 251mW (rms peak) (24dBm)
G_t – Antenna gain dependant on setup
R – Distance from transmitter
Dc – duty cycle

d) The power density is:

	Setup 1	**Setup 2**	**Setup 3**
P_t - Power output (rms peak) 24dBm	24dBm 251mW	24dBm 251mW	24dBm 251mW
G_t – Antenna gain	9dBi 8	9dBi – 3dB cable loss 4	18dBi – 3dB cable loss 31,6
Maximum duty cycle	45%	45%	45%
R – Distance from antenna (cm)	20	20	120
S_{peak} – peak power density (mW/cm^2)	0,4	0,2	0,04
$S_{average}$ – average power density (mW/cm^2)	0,18	0,09	0,018

e) $S_{average}$ << 1mW/cm^2

2 Photos

Photo 1

Gigaset SX682 WIMAX

Photo 2

Photo 3

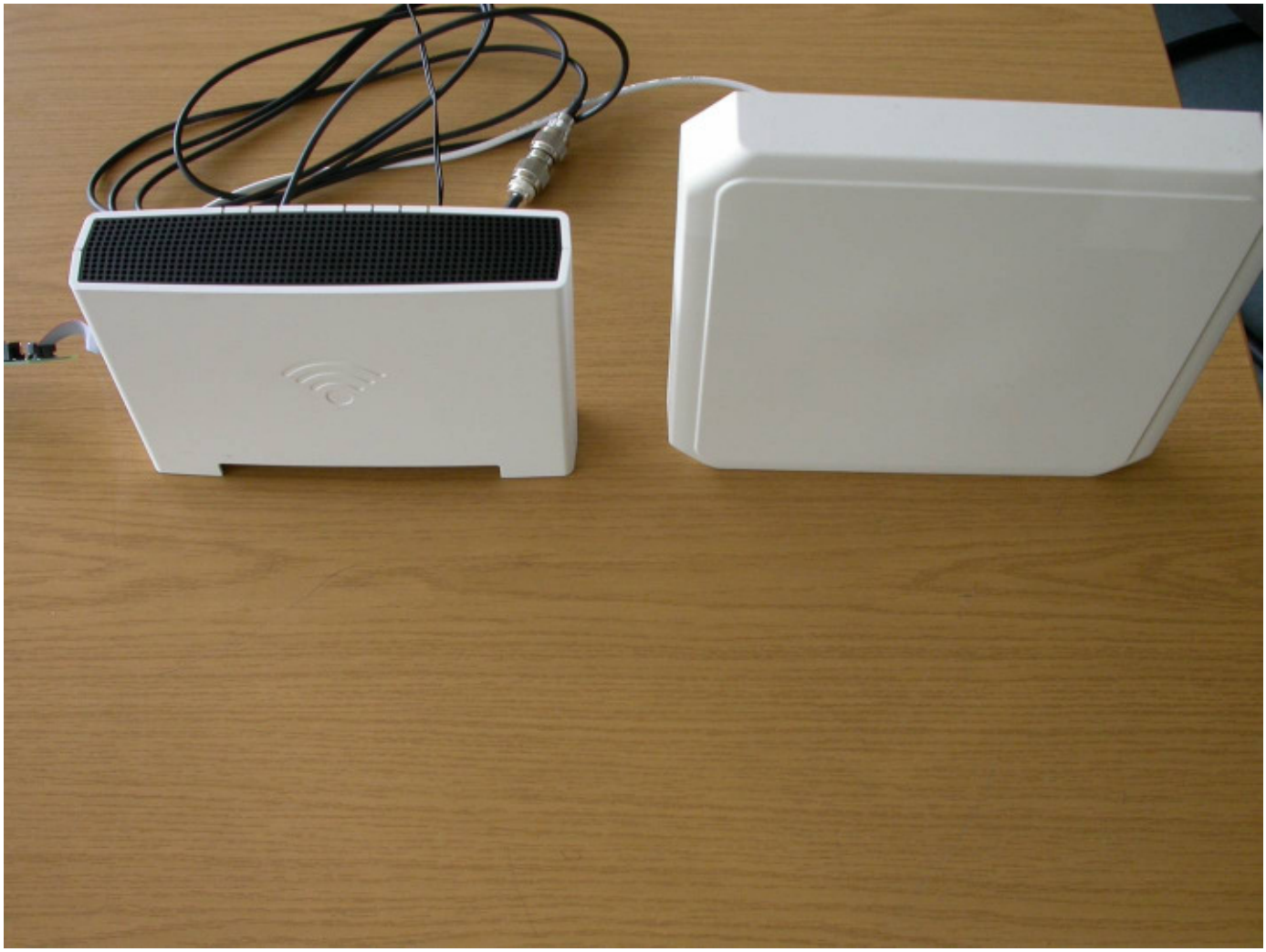


Photo 4

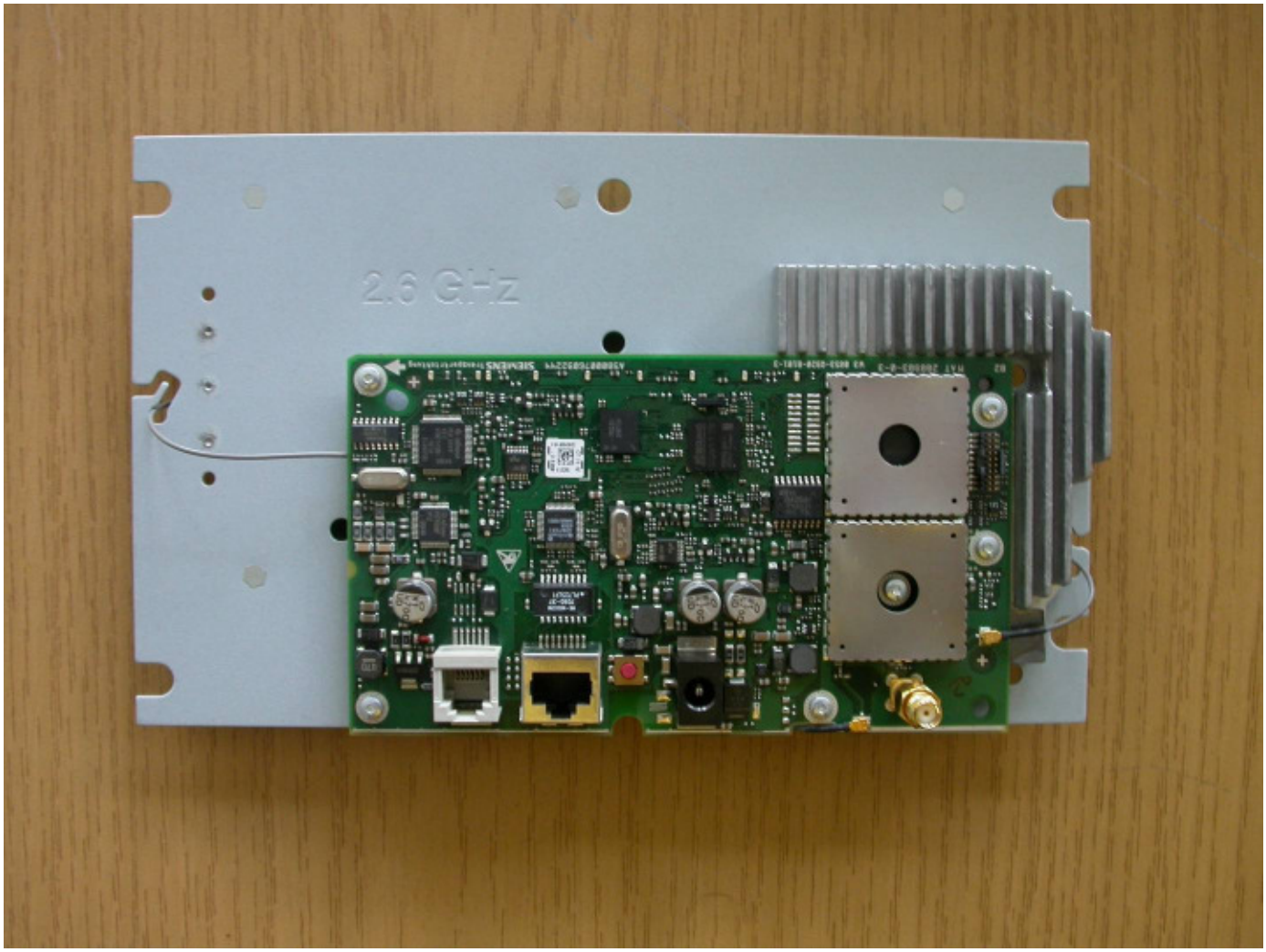


Photo 5

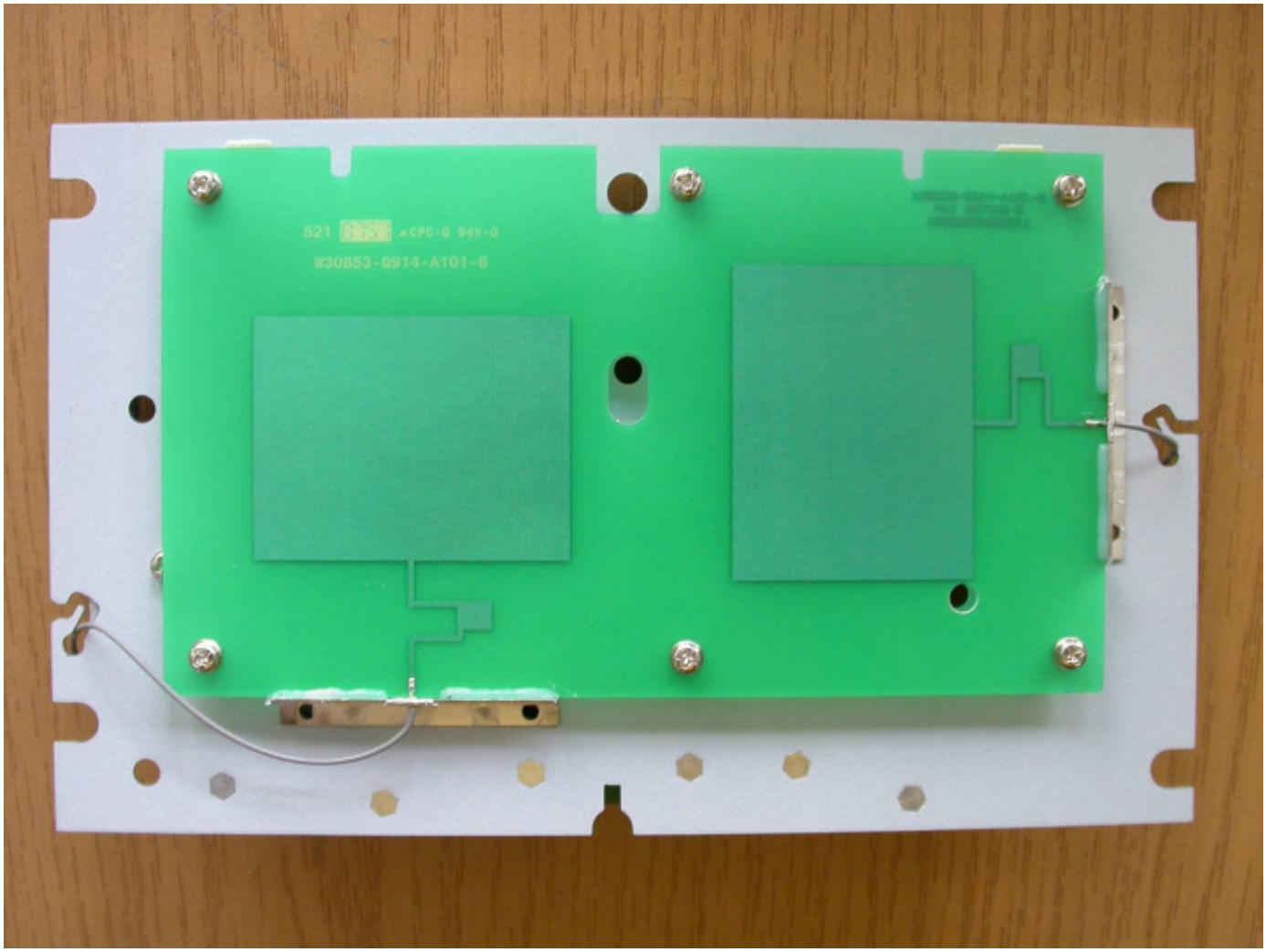


Photo 6

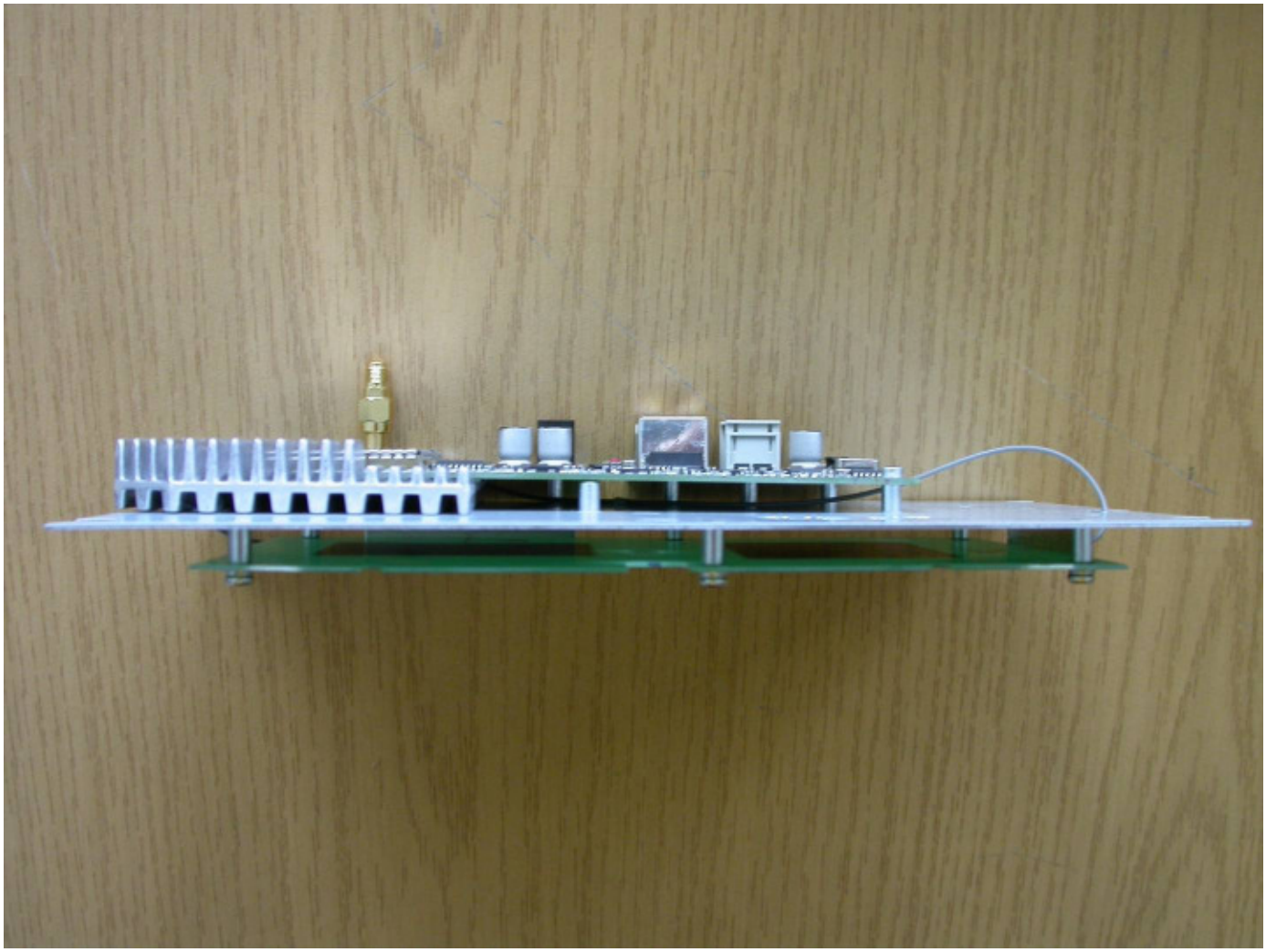


Photo 7


SIEMENS
Gigaset SX682 WiMAX
Phone
LAN
Reset
WiMAX
S30853-S920-R301-3 CT/W3
Made in Germany
MAC: 002104000279
C39280-Z4-C720 only!
FCC ID:TVU-SX682

Photo 8


S30853-S920-R301-3 CT/W3
Made in Germany
MAC: 002104000279
C39280-Z4-C720 only!

Photo 9

Photo 10

Photo 11

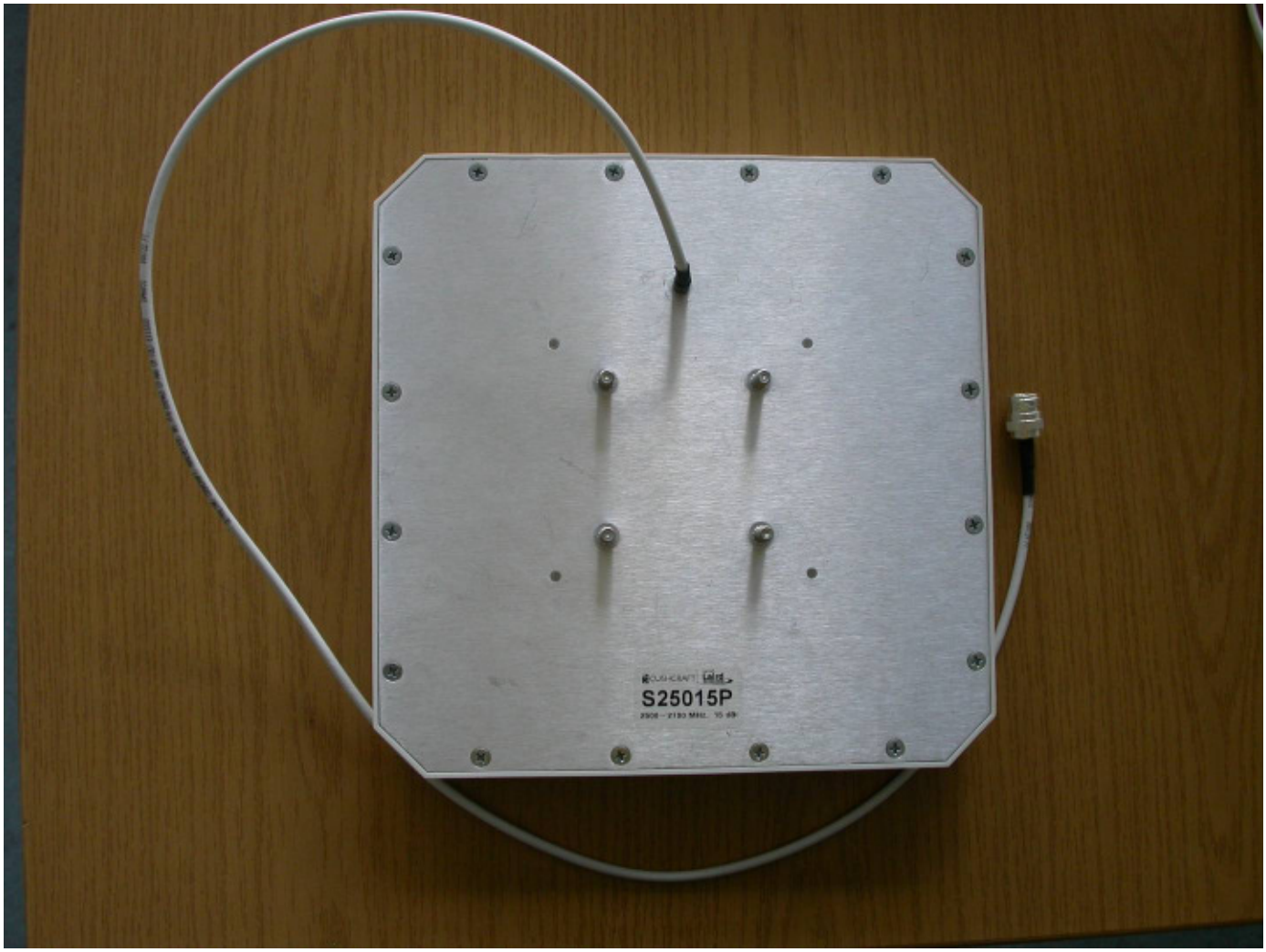


Photo 12


CUSHCRAFT
a unit of
Laird
TECHNOLOGIES
S25015P
2500 – 2700 MHz, 15 dBi

Photo 13

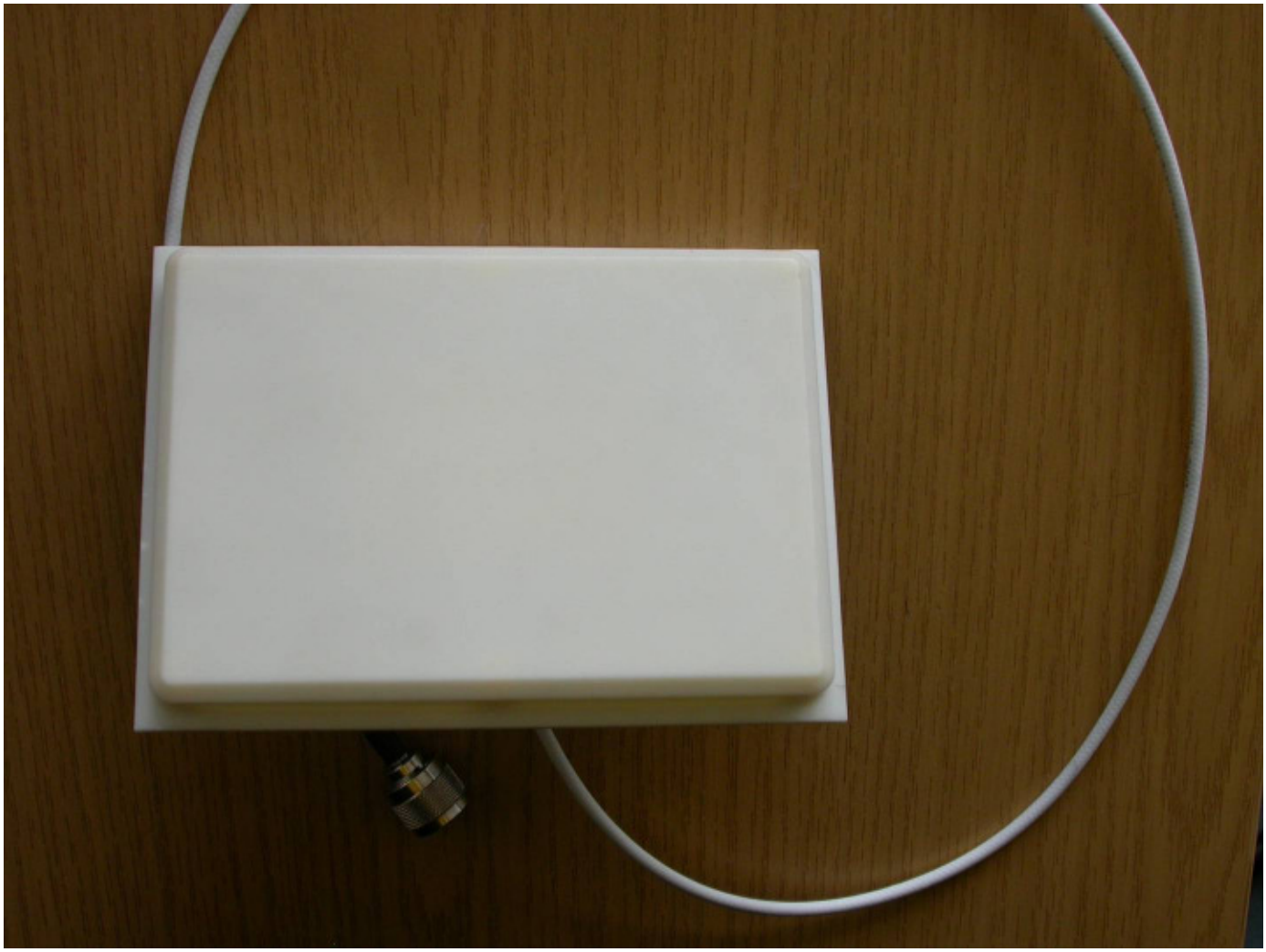


Photo 14

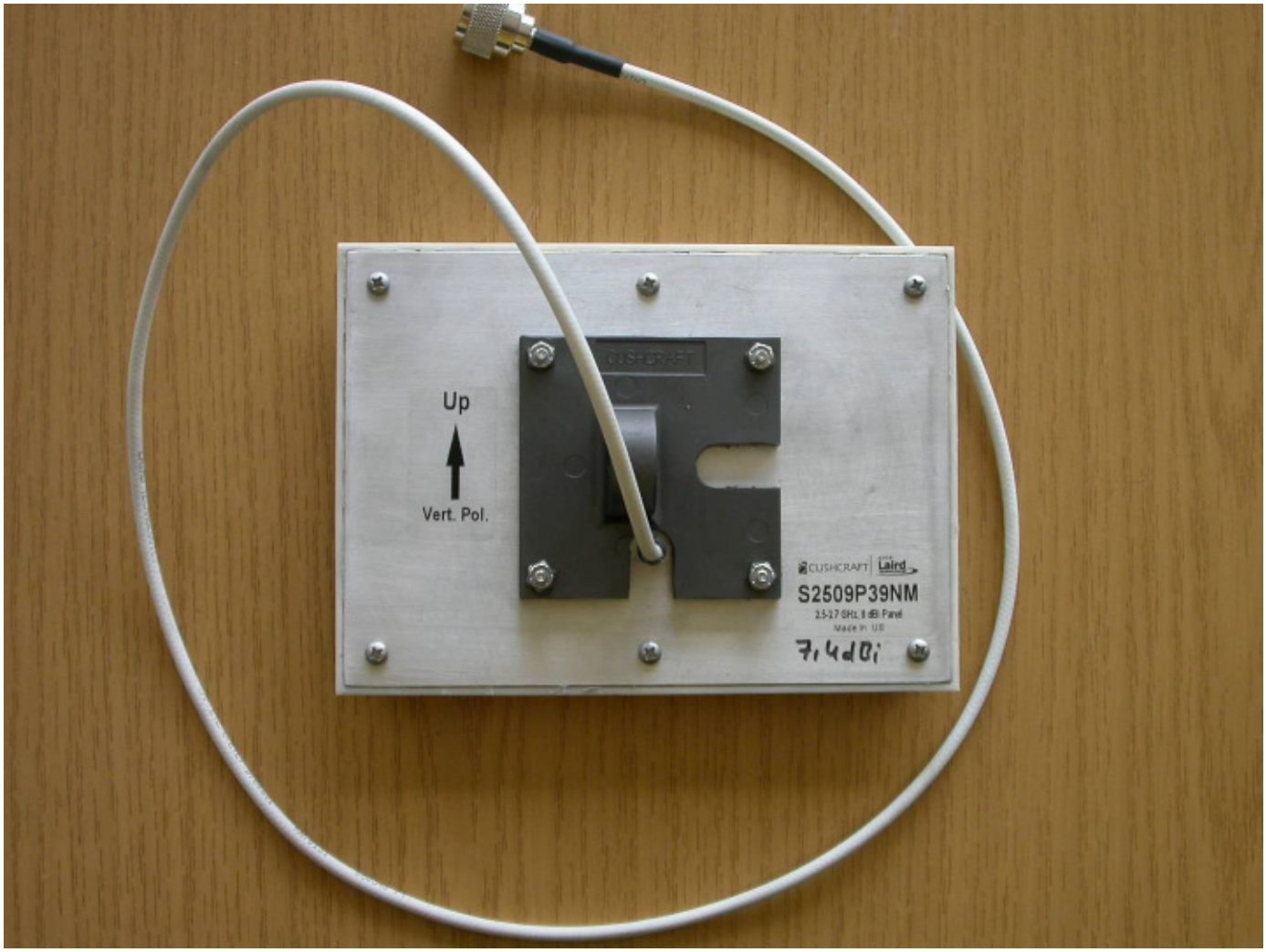


Photo 15


CUSHCRAFT
a unit of
Laird
S2509P39NM
2.5-2.7 GHz, 9 dBi Panel
Made in US
7,4dBi

Photo 16


DVE® Switching Power Adapter
C39280-Z4-C720 A5B00076087838
MODEL:DSA-15P-12 US 120120
INPUT:100-240V ~ 50/60Hz 0.5A
OUTPUT:+12V ⎓ 1A
LEVEL 3 EFFICIENCY LEVEL: IV 115V
I.T.E L.P.S
81GJ
E135856
Made In China
LISTED

Photo 17

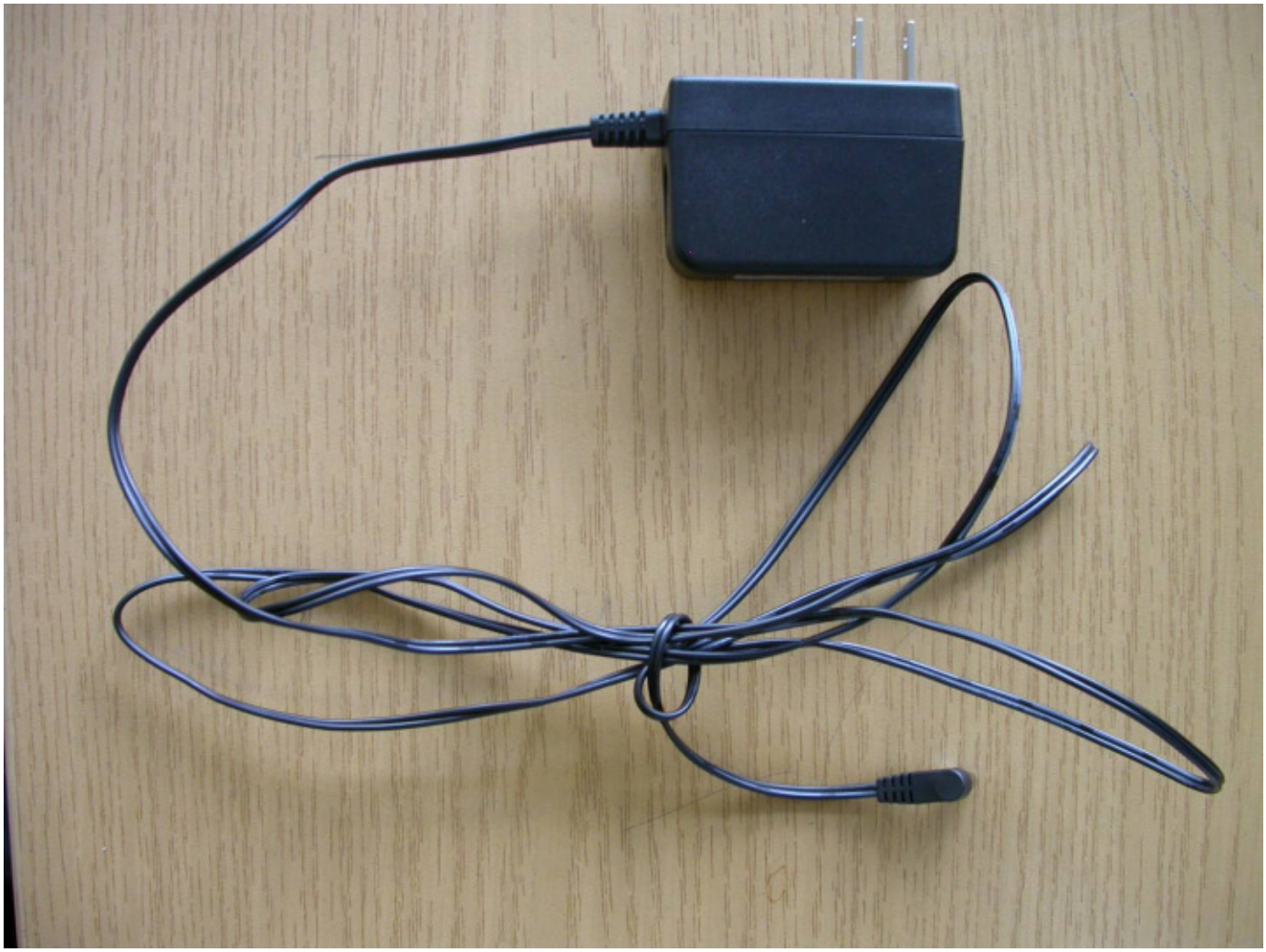
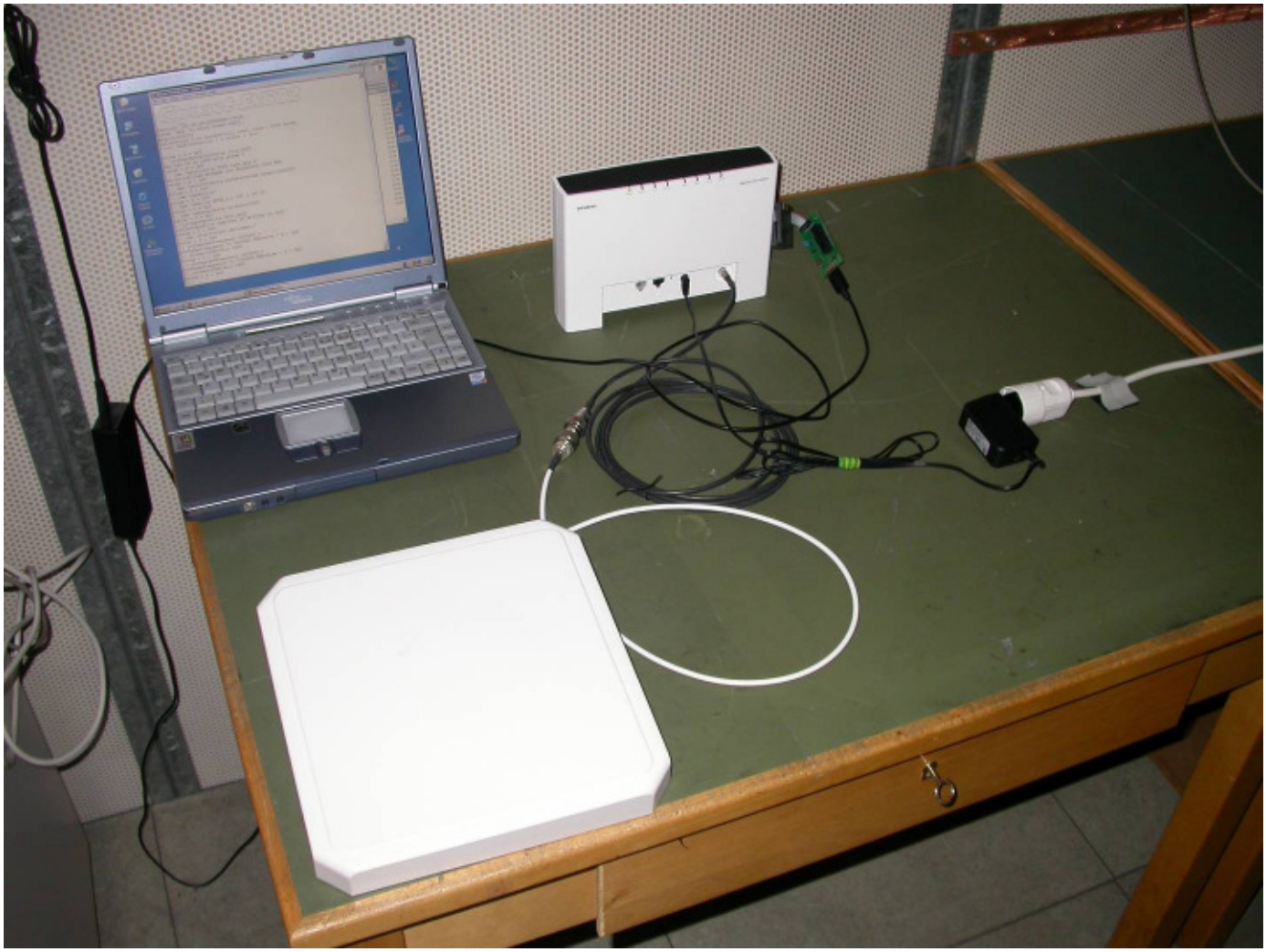


Photo 18



AC-conducted measurement

Photo 19

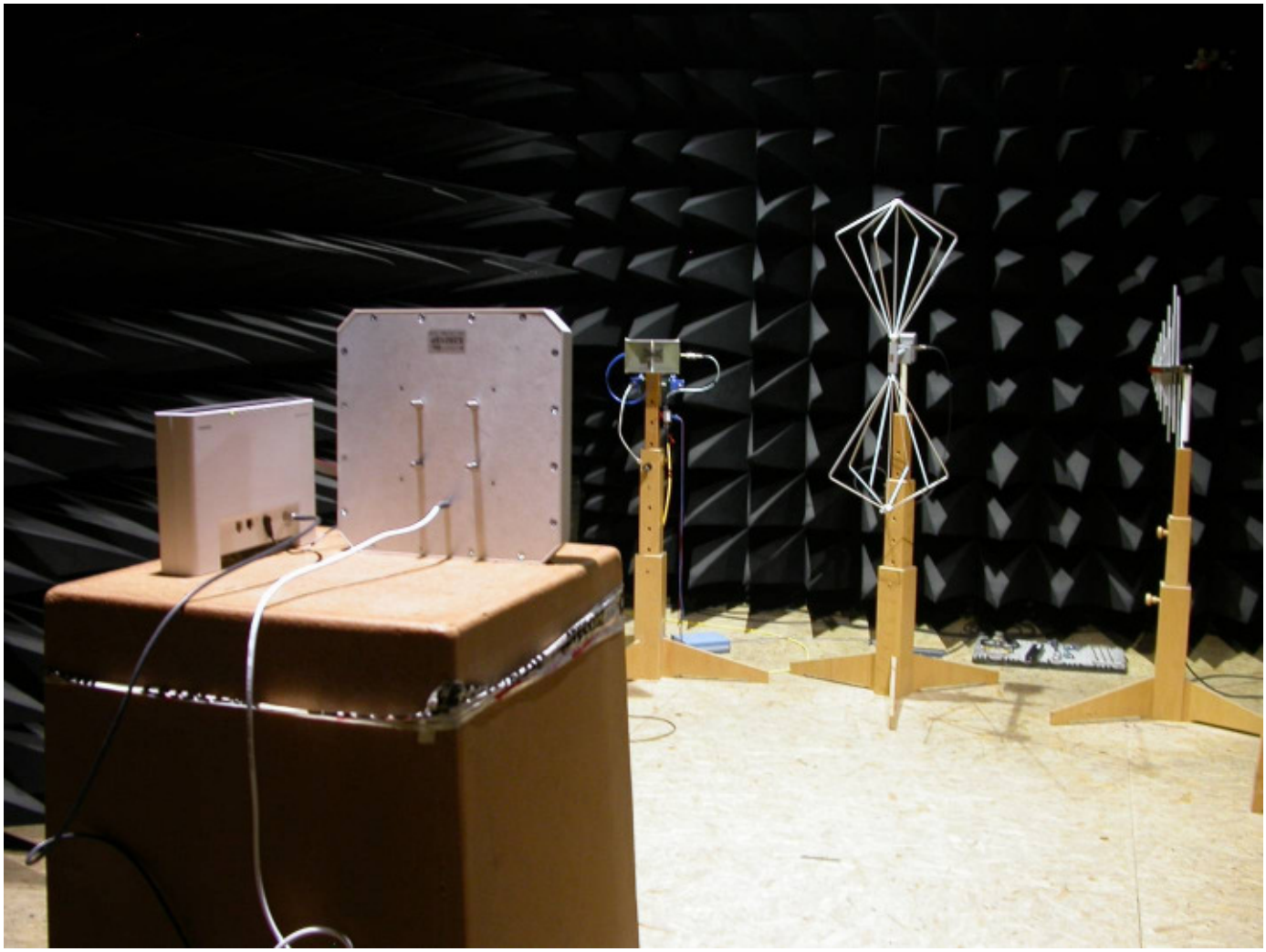
Anechoic chamber with 10m measurement distance

Photo 20

Photo 21

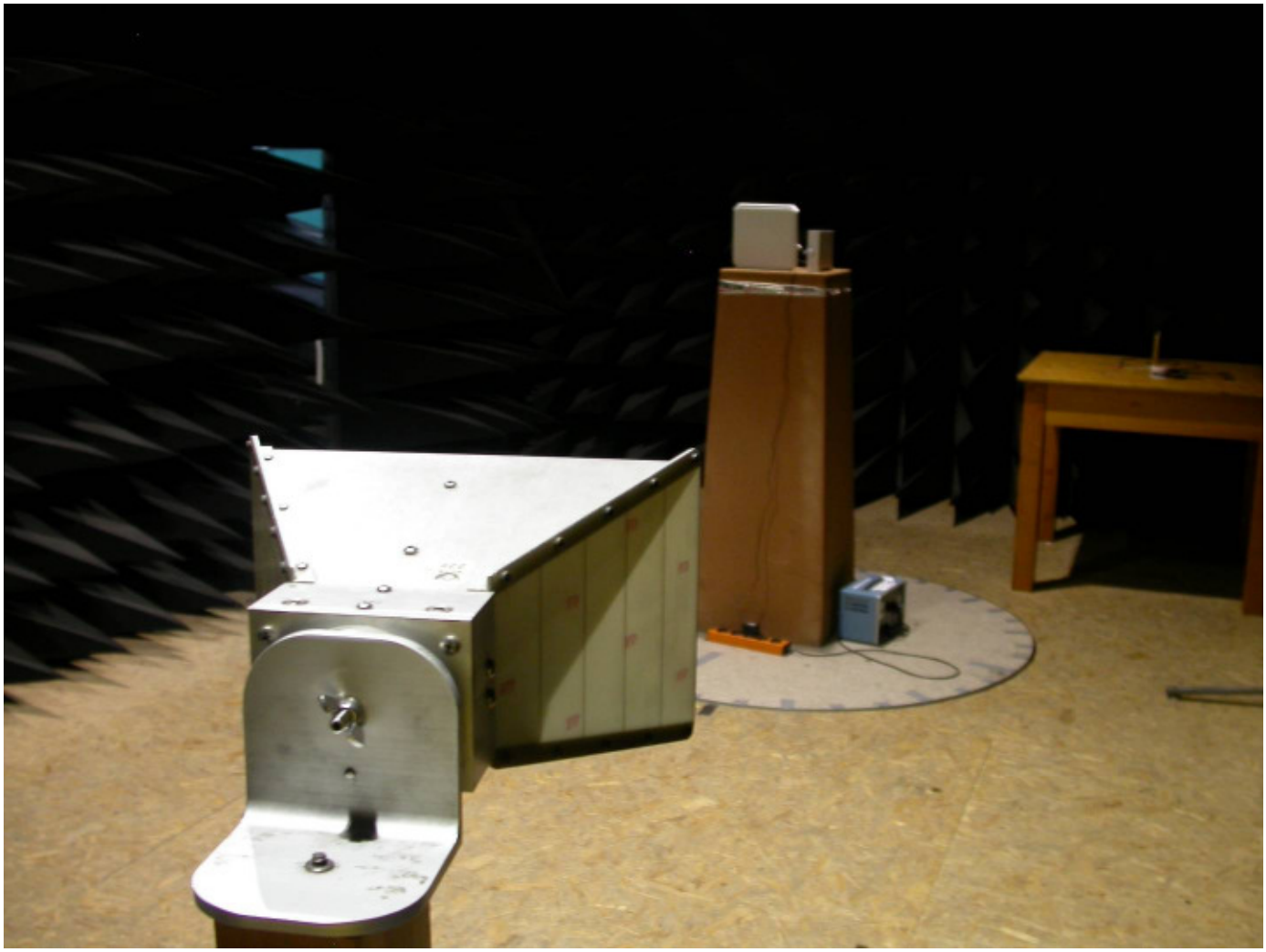
Spurious emissions from 9 kHz to 30 MHz

Photo 22



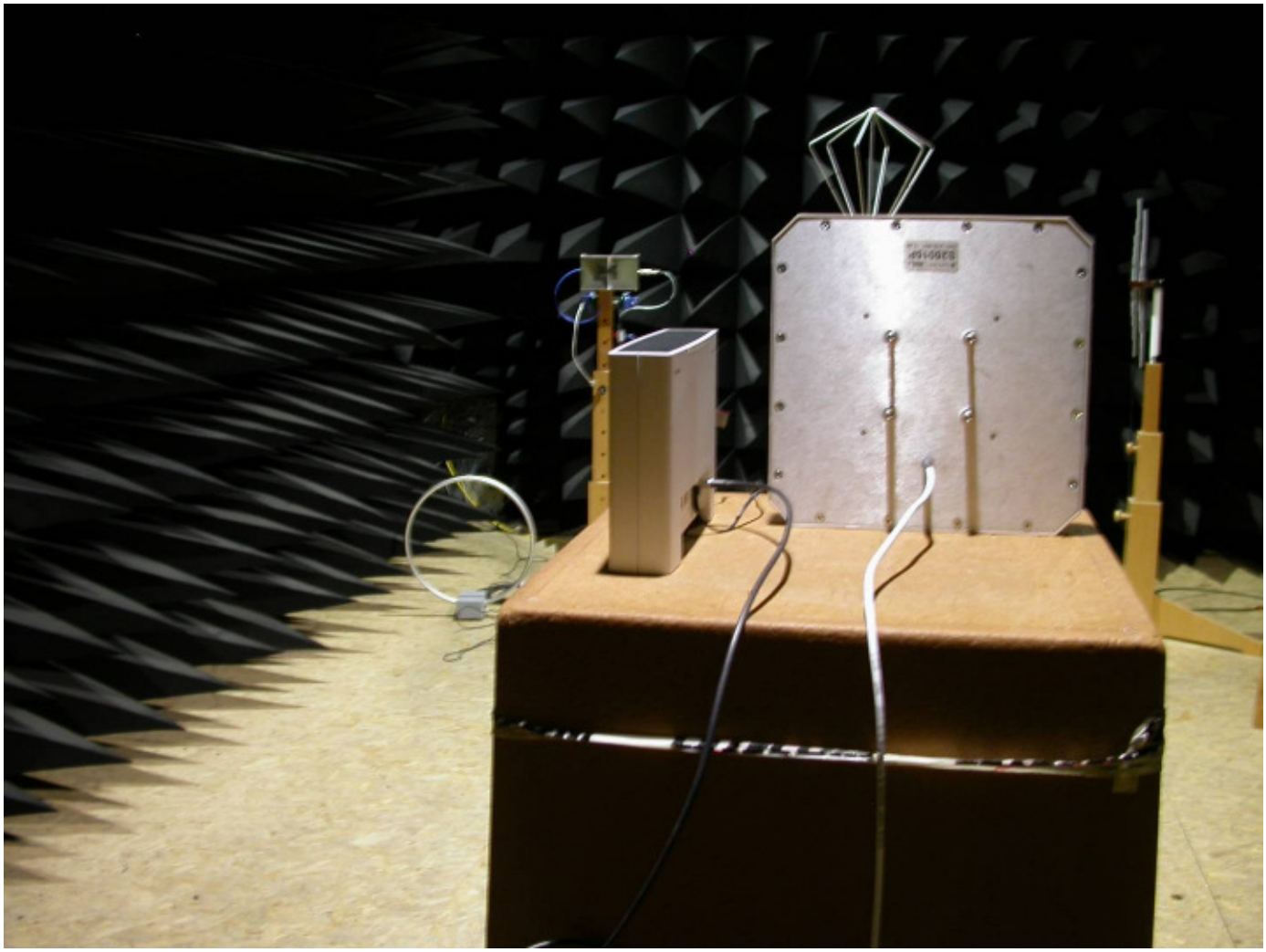
Spurious emissions from 30 MHz to 12 GHz

Photo 23



Spurious emissions from 30 MHz to 12 GHz

Photo 24



Spurious emissions from 30 MHz to 12 GHz

Photo 25

Equipment for spurious emission measurement from 12 GHz to 27 GHz

Photo 26

Gigaset SE681 WIMAX

Photo 27


S30853-S920-R301-3 CT/W3
Made in Germany
MAC: 0021040002FF
C39280-Z4-C720 only!

Photo 28