Industry Canada listed test facility No. IC 3481

RADIO TEST REPORT

No. 704684R1

EQUIPMENT UNDER TEST

Equipment:	Repeater
Type / model:	AR4640/053
Manufacturer:	Powerwave Technologies Sweden AB
Tested by request of:	Powerwave Technologies Sweden AB

SUMMARY

The equipment complies with the requirements of the following standards:

47CFR part 2 (2006)	Frequency allocations and radio treaty matters; general rules and regulations
47CFR part 90 (2005)	Private land mobile radio services
47CFR part 15B Class B	
RSS-Gen Issue 1 (2005)	General requirement and Information for the Certification of Radiocommunication Equipment
RSS-131 Issue 2 (2003)	Zone Enhancers for the Land Mobile Service

Date of issue: 2007-04-05

Tested by: Niklas Boström Approved by: Björn Utermöhl

Intertek Semko AB
Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden
Telephone +46 8 750 00 00, Fax +46 8 750 60 30, www.sweden.intertek-etlsemko.com
Registered in Sweden: No SE556024059901, Registered office: As address

CONTENTS

Page

1. CLIENT INFORMATION

The EUT has been tested by request of

Company:	Powerwave Technologies Sweden AB Antennvägen 7 SE-187 80 Täby Sweden
Name of contact:	Sven-Erik Söderberg

2. EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT according to the manufacturer/client declaration

Equipment:	Repeater
Type/Model:	AR4640/053
Brand name:	Powerwave Technologies Sweden AB
Serial number:	6A.10234
Manufacturer:	Powerwave Technologies
Rating/Supplying voltage:	115 / 230 VAC, 50 / 60Hz
Rating RF output power:	+38 dBm PEP Downlink +36 dBm PEP Uplink
Rating Mean Power	+33 dBm Downlink +30 dBm Uplink
Maximal gain:	85 dB Uplink 95 dB Downlink
Filter bandwidth:	0.5 – 20 MHz (remotely adjustable)
External antenna connector:	Yes
Operating temperature range:	-25 to +55 °C
Frequency range:	806 – 824 MHz Uplink 851 – 869 MHz Downlink
Modulation characteristics:	iDEN (TDMA,16QAM)

2.2 Additional hardware information about the EUT

The EUT consists of the following units:

Unit	Type and version
CU Board	500-13817-001 rec C
BSA Board	550-13568-151rev B1
BSA Board	550-13568-151rev B1
PA Board	550-13039-350 rev A
PA Board	550-13039-210 rev A
BA Board	550-14368-110 rev A
Duplex Filter	800-14781-201 rev A
LNA Unit UL	800-12053-401 rev A
LNa Unit DL	800-12053-451 rev A
Power Supply Unit	UA101 14/1-LR rev A1

2.3 Additional software information about the EUT

During the tests the EUT supported the following software:

Software	Version
OM Online	Powerwave Technologies Sweden AB / SA102 60/1

2.4 Peripheral equipment

Peripheral equipment is defined as equipment needed for correct operation of the EUT during the tests, but not included as a part of the testing and evaluation of the EUT.

Equipment	Manufacturer / Type	Semko No.
Laptop PC	IBM Thinkpad 600x	S30774

2.5 Modifications during the test

No modifications have been made during the tests

2.6 Abbreviations

Throughout the document the following abbreviations are used:

EUT	Equipment Under Test
CW	Continuous wave
DL	Downlink
UL	Uplink

3. TEST SPECIFICATIONS

3.1 Standards

FCC

47CFR part 2 (2006)	Frequency allocations and radio treaty matters; general rules and regulations
47CFR part 90 (2005)	Private land mobile radio services
47CFR part 15B Class B	

Industry Canada

RSS-Gen Issue 1 (2005)	General requirement and Information for the Certification of Radiocommunication Equipment
RSS-131 Issue 2 (2003)	Zone Enhancers for the Land Mobile Service

Measurements methods according to ANSI C63.4-2003 and RSS-131

3.2 Additions, deviations and exclusions from standards

No additions, deviations or exclusions have been made from standards.

3.3 Test set-up

Measurement set-ups for radiated measurements and conducted emissions from AC power port are described in Sections 10 and 11 respectively. For conducted RF measurements the EUT was connected to the spectrum analyser by cable with a suitable power attenuator. During the tests the input signal was either CW or iDEN signal/signals. Measurement results were corrected for attenuation in the set-up configuration. The EUT was supplied with 120 V, (50-60 Hz) during the tests.

3.4 Operating environment

If not additionally specified, the tests were performed under the following environmental conditions:

Air temperature:	20-25	°C
Relative humidity:	15-30	%

4. TEST SUMMARY

The results in this report apply only to the sample tested.

FCC reference	Industry Canada reference	Test	Result	Note
2.1046 90.635		RF output power	PASS	
2.1049		Occupied bandwidth	PASS	
2.1051 90.691	6.3	Out of band spurious emissions, conducted	PASS	1
2.1053 90.691	6.4	Out of band spurious emissions, radiated	PASS	1
2.1055	6.5	Frequency stability	NA	3
	6.1	Amplifier Gain and Bandwidth	PASS	1
	6.2	Output power	PASS	1
15B	6 (a)(Table1)	Out of band spurious emissions, radiated	PASS	2
15B	7.2.2 (Table 2)	Conducted emission at AC port	PASS	2

NA = Not Applicable

Notes:

1. Industry Canada reference: RSS-131, Issue 2 (September 2003)

2. Industry Canada reference: RSS-Gen, Issue 1 (September 2005)

3. The EUT is not a band translator

5. RF OUTPUT POWER

Date of test: 2007-04-03

5.1 Test specification

47 CFR 2.1046 and 90.635
Output power should not exceed 500W (57 dBm) in downlink and 100W (50 dBm) in uplink

5.1 Test results

Link	Input signal	Peak Output Power (dBm)	Limit value (dBm)	Plots
UL	iDEN	38.2	57	Plot 5.1
DL	iDEN	38.7	50	Plot 5.2

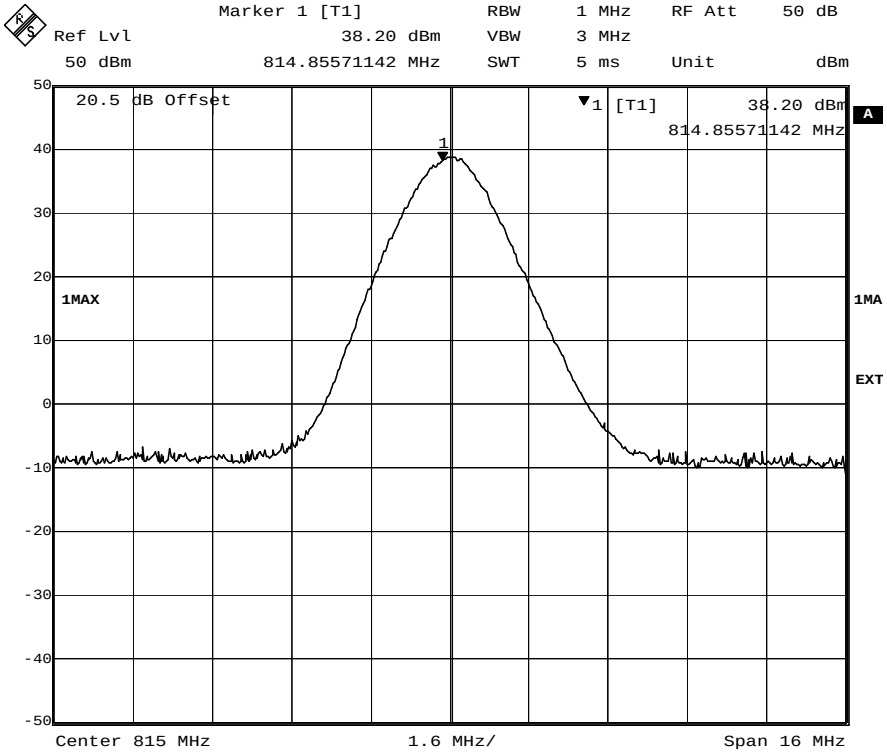
Measurement results are corrected for attenuation in the set-up configuration and antenna gain declared by the manufacturer.

Example calculation:

Peak output power [dBm] = Analyser reading [dBm] + cable loss [dB] + attenuator loss [dB]

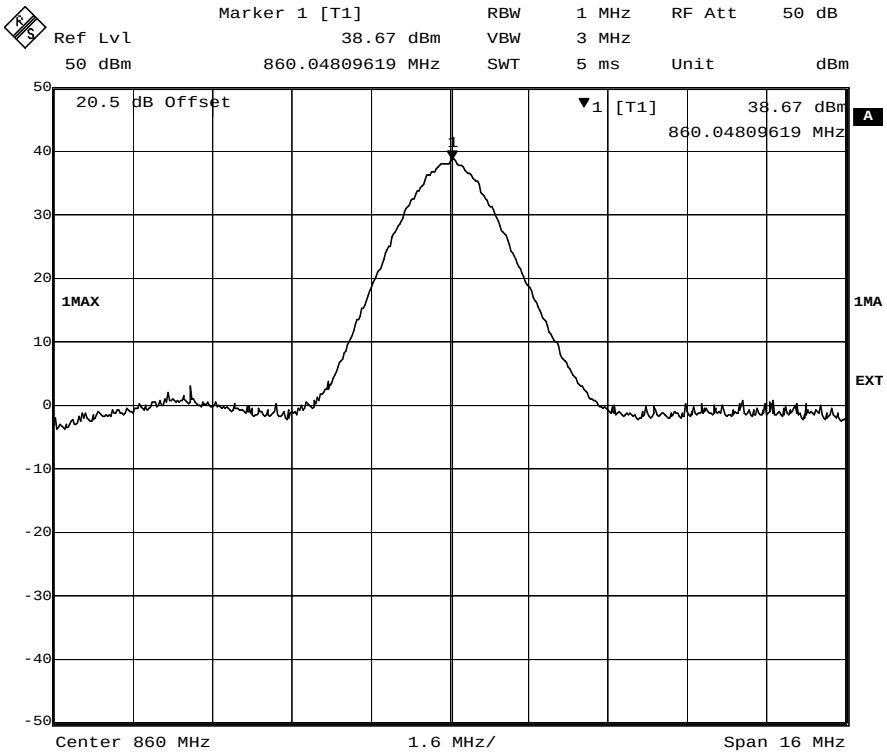
Fulfil requirements: YES

Plot 5.1



Date: 3.APR.2007 09:02:31

Plot 5.2



Date: 3.APR.2007 09:00:26

6. OCCUPIED BANDWIDTH

Date of test: 2007-04-03

6.1 Test specification

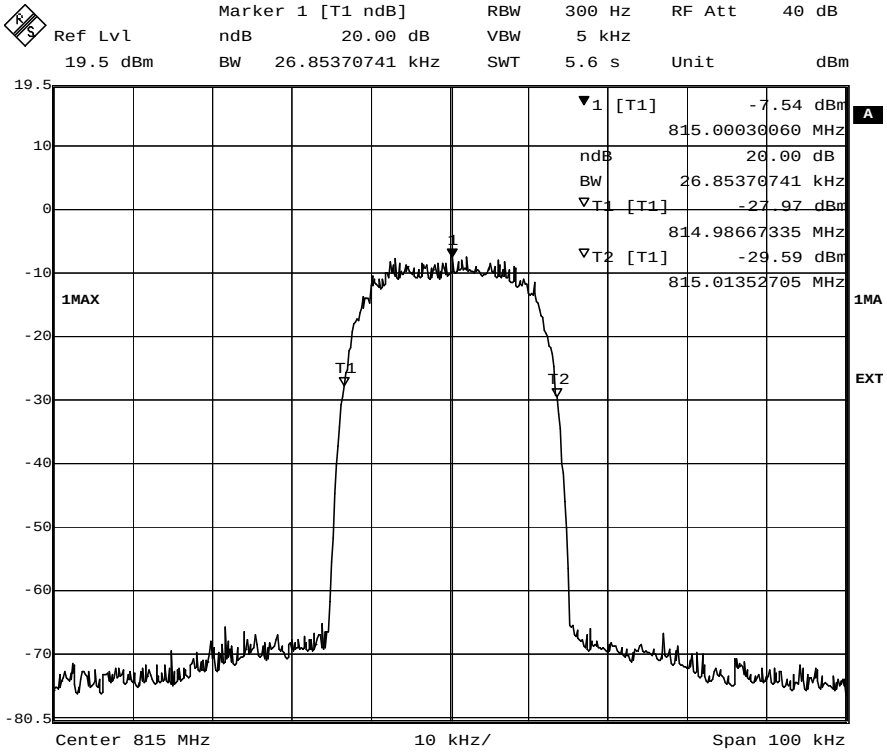
47 CFR 2.1049
The spectral shape of the output should look similar to input for all modulations using 300 Hz RBW (or 1% of occupied bandwidth) according to recommendations from FCC.

6.2 Test results

Link	Input signal	20 dB bandwidth		Plots
		Input (kHz)	Output (kHz)	
UL	iDEN	26.854		Plot 6.1
UL	iDEN		26.854	Plot 6.2
DL	iDEN	27.054		Plot 6.3
DL	iDEN		27.054	Plot 6.4

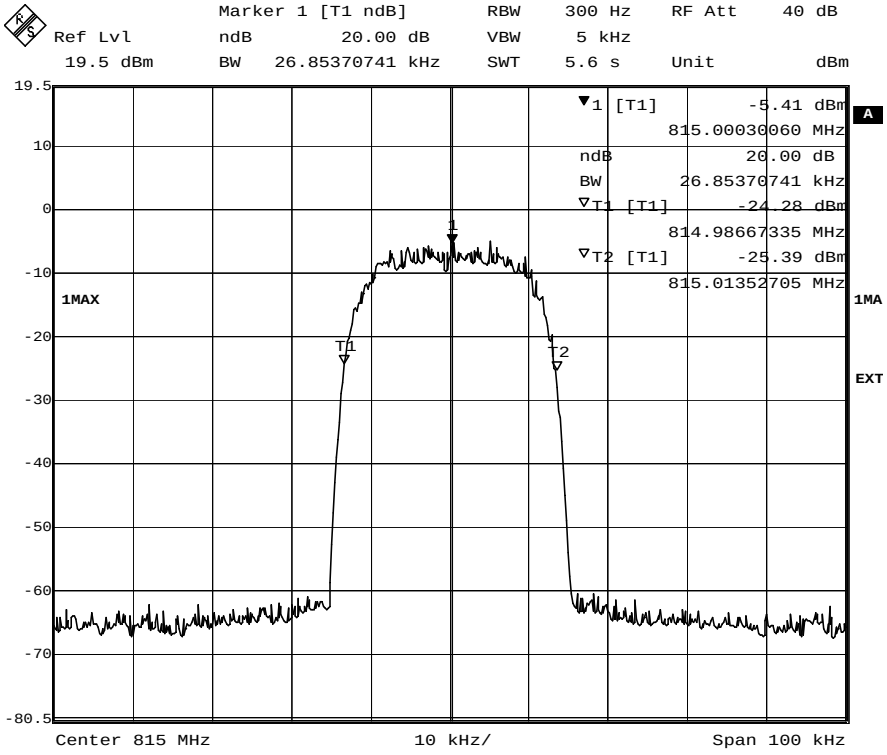
Fulfil requirements: YES

Plot 6.1



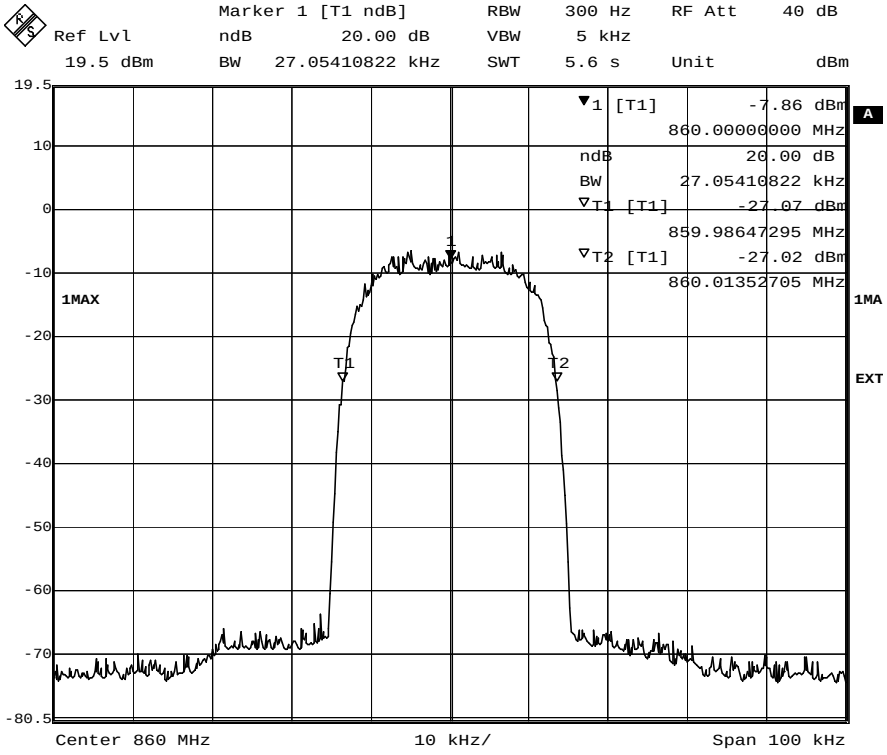
Date: 3.APR.2007 08:36:29

Plot 6.2



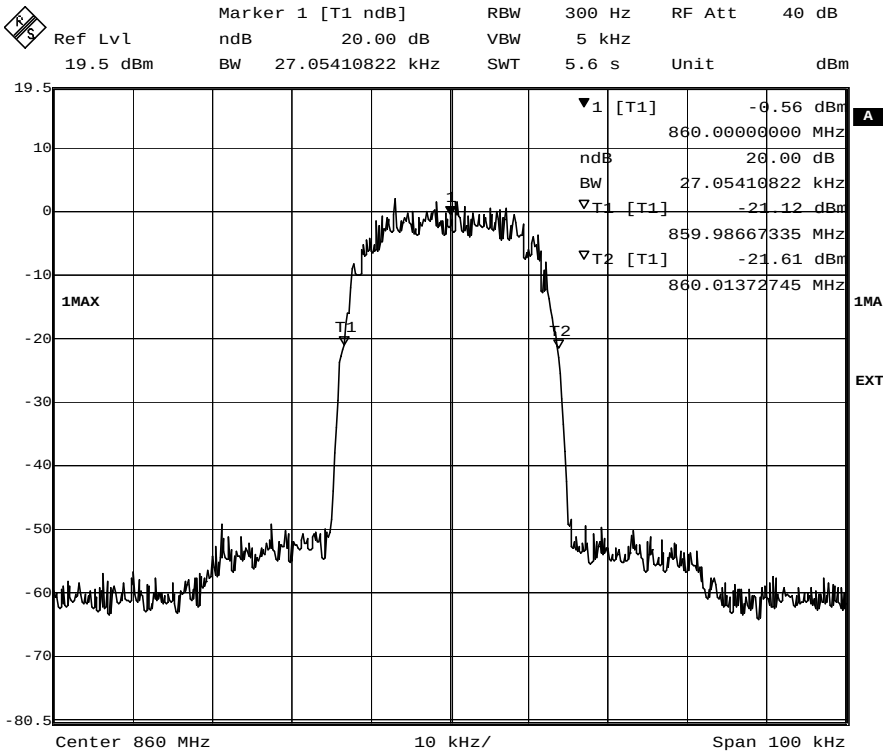
Date: 3.APR.2007 08:39:22

Plot 6.3



Date: 3.APR.2007 08:34:00

Plot 6.4



Date: 3.APR.2007 08:47:41

7. CONDUCTED SPURIOUS EMISSIONS AT ANTENNA PORT

Date of test: 2007-04-02

7.1 Test specification

47 CFR 2.1051, 90.691 and RSS-131 §6.3
Spurious emissions should be attenuated below the transmitter power (P) in watts by at least 43 + 10 log (P)

This gives a limit at -13 dBm at the antenna port.

The frequency range to be inspected is from 9 kHz up to the tenth harmonics of the highest fundamental frequency according to 47 CFR 2.1057.

7.2 Test results

Uplink

Test signal: 3 CW tones located at lower band edge + 2 MHz, +3 MHz and +15 MHz.

Strength of conducted spurious emissions					
Frequency [MHz]	RBW [kHz]	Measured peak level (dBm)	Limit (dBm)	Plots	Comment
9kHz – 3 000	100	- 18.8	- 13	Plot 7.1	
3 000 – 10 000	100	- 32.5	- 13	Plot 7.2	Noise floor

Test signal: iDEN carrier at a low channel

Strength of conducted spurious emissions					
Frequency [MHz]	RBW [kHz]	Measured peak level (dBm)	Limit (dBm)	Plots	Comment
9kHz – 3 000	100	- 33.4	- 13	Plot 7.3	
3 000 – 10 000	100	- 31.3	- 13	Plot 7.4	Noise floor

Test signal: iDEN carrier at a mid channel

Strength of conducted spurious emissions					
Frequency [MHz]	RBW [kHz]	Measured peak level (dBm)	Limit (dBm)	Plots	Comment
9kHz – 3 000	100	- 31.6	- 13	Plot 7.5	
3 000 – 10 000	100	- 31.3	- 13	Plot 7.6	Noise floor

Test signal: iDEN carrier at a high channel

Strength of conducted spurious emissions					
Frequency [MHz]	RBW [kHz]	Measured peak level (dBm)	Limit (dBm)	Plots	Comment
9kHz – 3 000	100	- 32.2	- 13	Plot 7.7	
3 000 – 10 000	100	- 31.5	- 13	Plot 7.8	Noise floor

Downlink

Test signal: 3 CW tones in the pass band located at lower band edge + 2 MHz, +3 MHz and +15 MHz.

Strength of conducted spurious emissions					
Frequency [MHz]	RBW [kHz]	Measured peak level (dBm)	Limit (dBm)	Plots	Comment
9kHz – 3 000	100	- 31-7	- 13	Plot 7.9	
3 000 – 10 000	100	- 31-2	- 13	Plot 7.10	Noise floor

Test signal: iDEN carrier at a low channel

Strength of conducted spurious emissions					
Frequency [MHz]	RBW [kHz]	Measured peak level (dBm)	Limit (dBm)	Plots	Comment
9kHz – 3 000	100	- 33.3	- 13	Plot 7.11	
3 000 – 10 000	100	- 31.9	- 13	Plot 7.12	Noise floor

Test signal: iDEN carrier at a mid channel

Strength of conducted spurious emissions					
Frequency [MHz]	RBW [kHz]	Measured peak level (dBm)	Limit (dBm)	Plots	Comment
9kHz – 3 000	100	- 30.6	- 13	Plot 7.13	
3 000 – 10 000	100	- 30.6	- 13	Plot 7.14	Noise floor

Test signal: iDEN carrier at a high channel

Strength of conducted spurious emissions					
Frequency [MHz]	RBW [kHz]	Measured peak level (dBm)	Limit (dBm)	Plots	Comment
9kHz – 3 000	100	- 27.6	- 13	Plot 7.15	
3 000 – 10 000	100	- 31.5	- 13	Plot 7.16	Noise floor

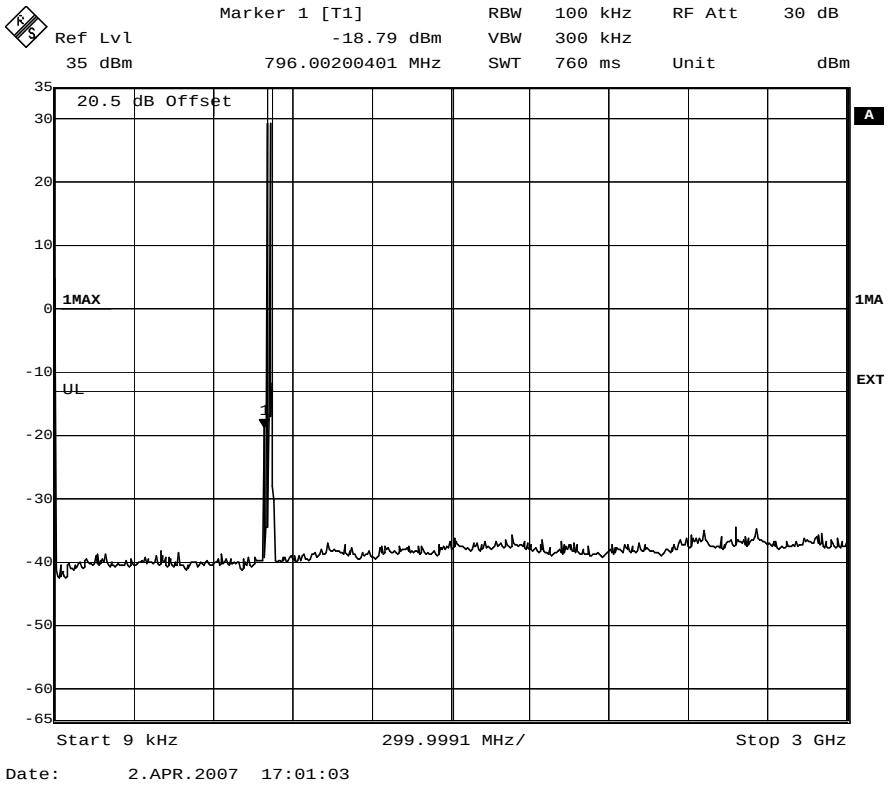
Measurement results are corrected for attenuation in the set-up configuration.

Example calculation:

Measured level [dBm] = Analyser reading [dBm] + cable loss [dB] + attenuator loss [dB]

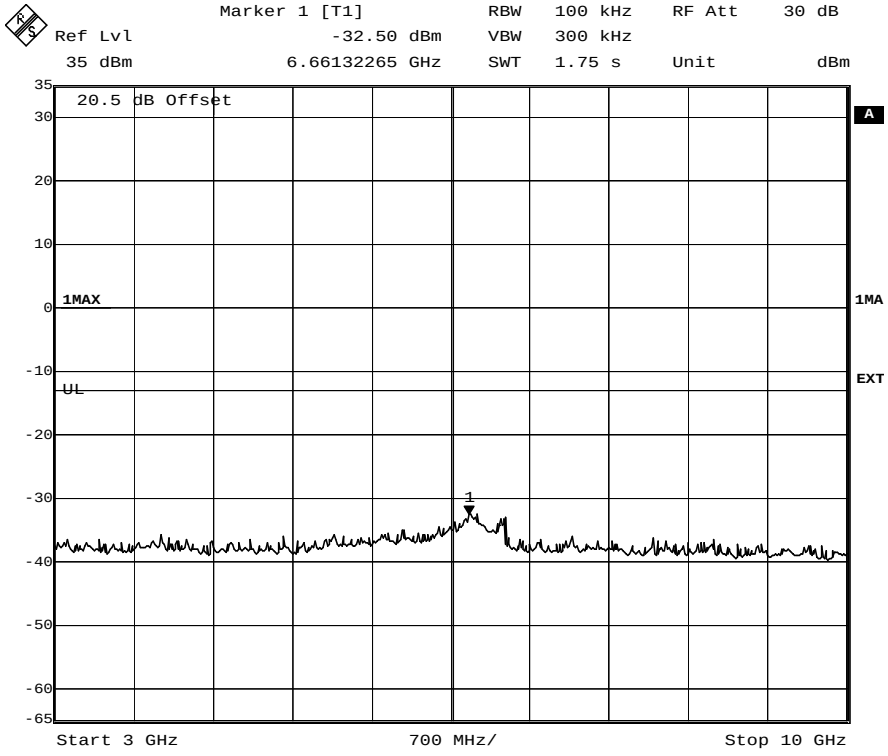
Fulfil requirements: YES

Plot 7.1



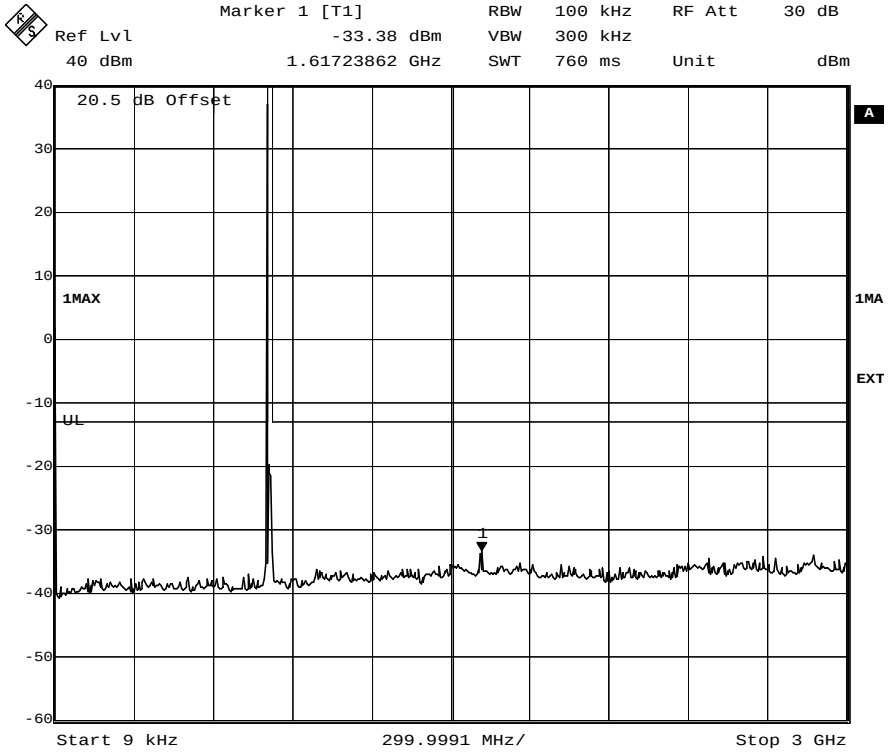
Date: 2.APR.2007 17:01:03

Plot 7.2



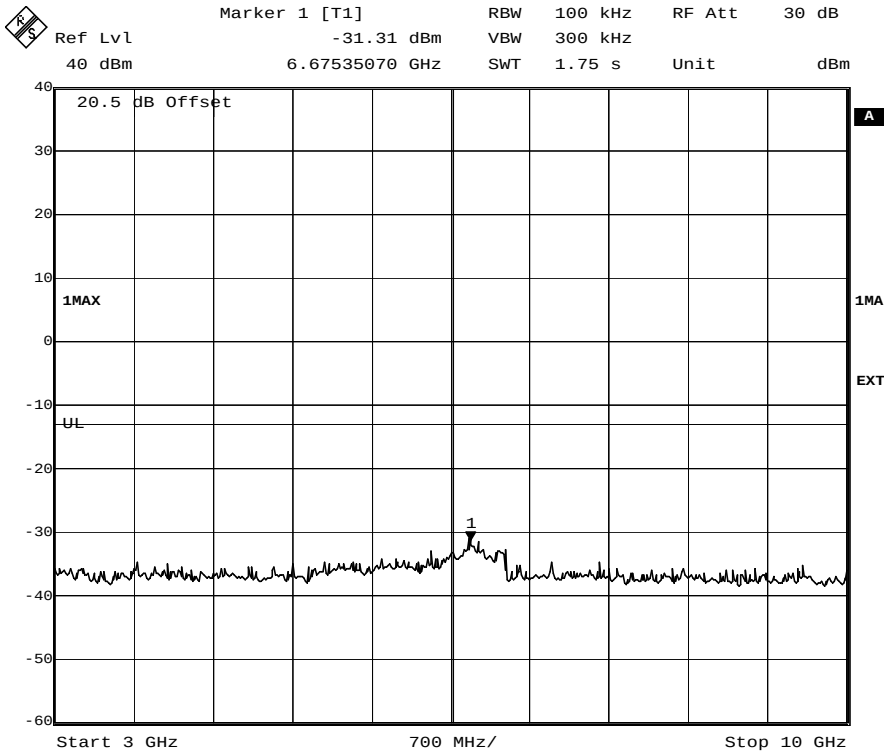
Date: 2.APR.2007 17:01:43

Plot 7.3



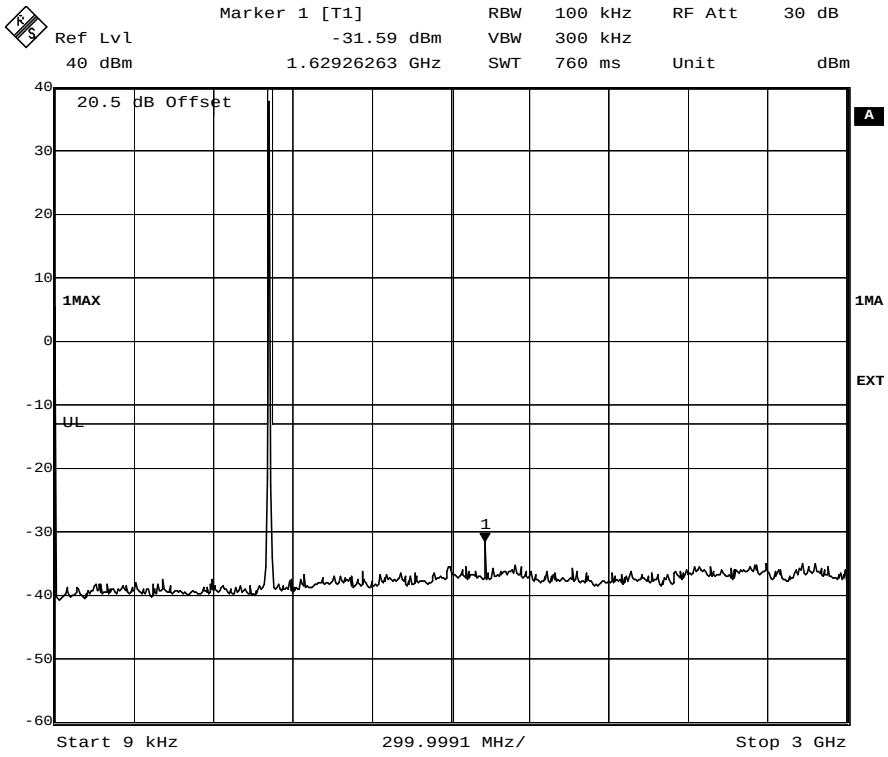
Date: 2.APR.2007 17:10:21

Plot 7.4



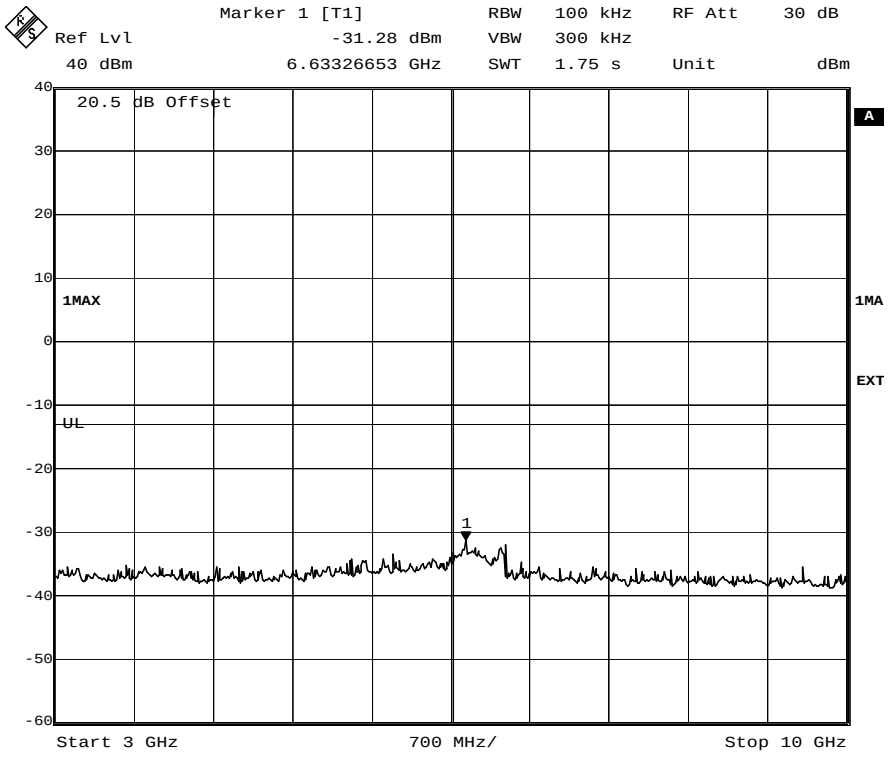
Date: 2.APR.2007 17:16:52

Plot 7.5



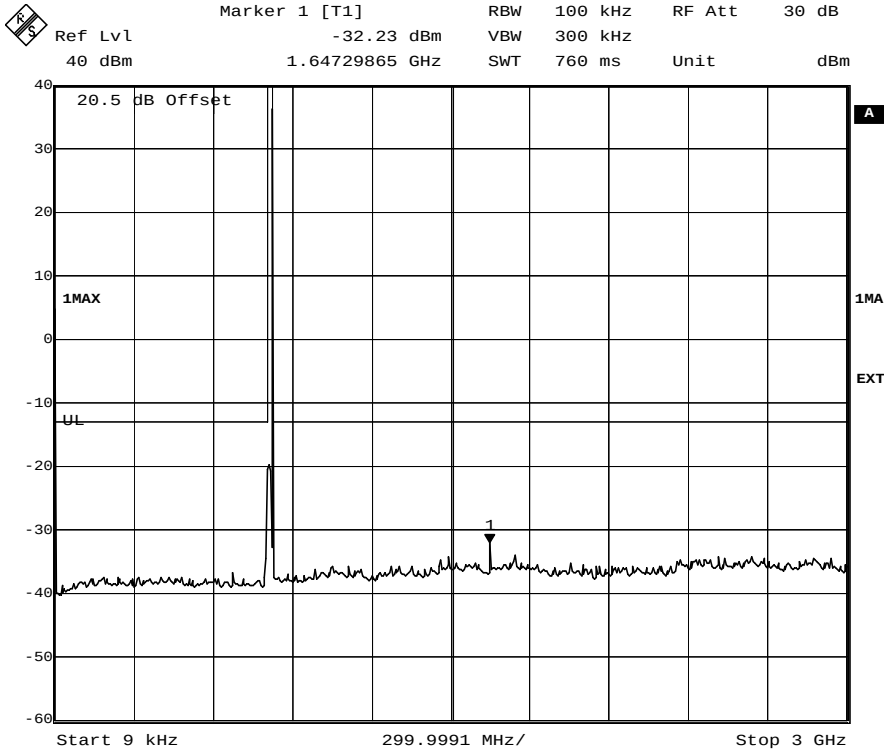
Date: 2.APR.2007 17:10:43

Plot 7.6



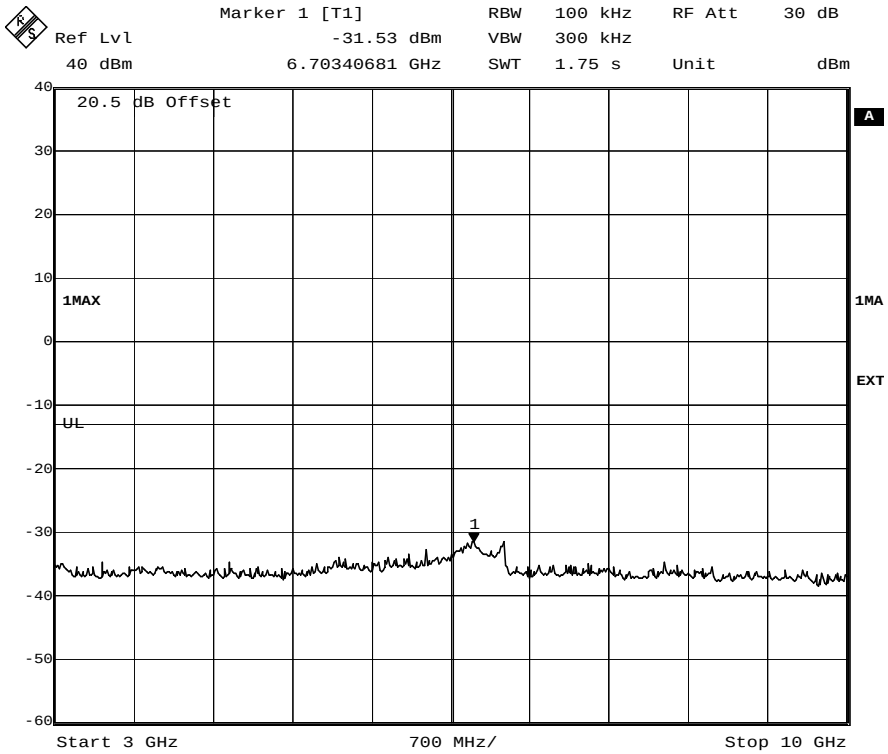
Date: 2.APR.2007 17:16:24

Plot 7.7



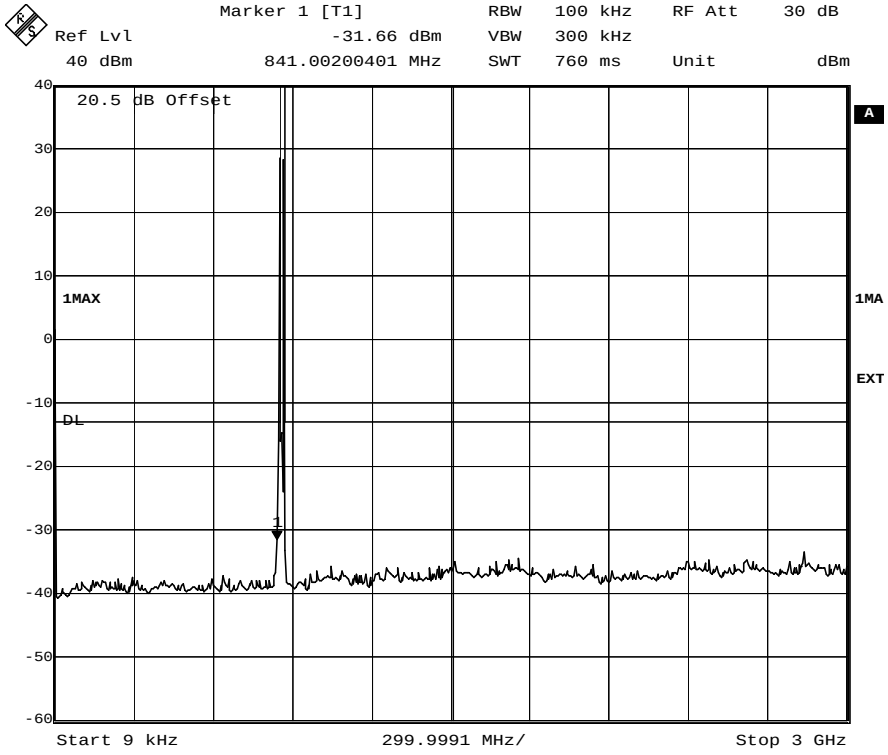
Date: 2.APR.2007 17:12:10

Plot 7.8



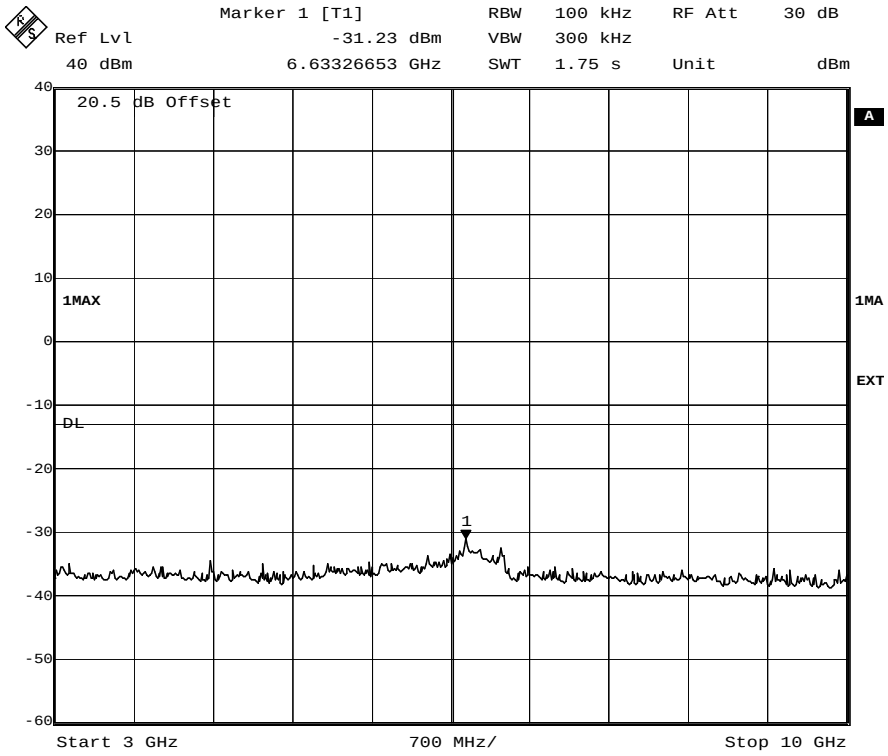
Date: 2.APR.2007 17:15:45

Plot 7.9



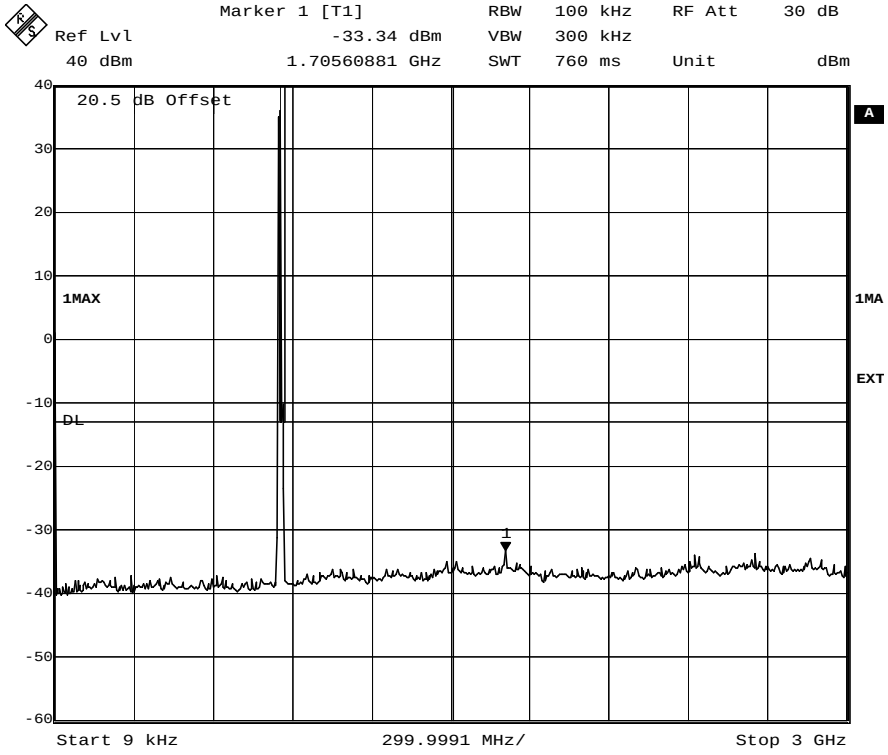
Date: 2.APR.2007 17:23:40

Plot 7.10



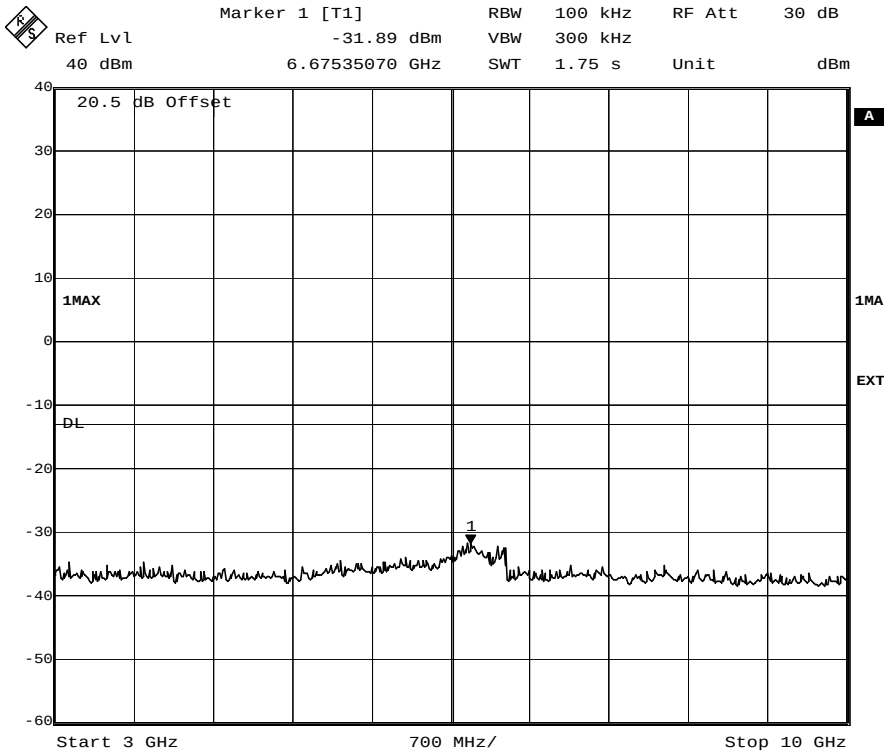
Date: 2.APR.2007 17:24:15

Plot 7.11



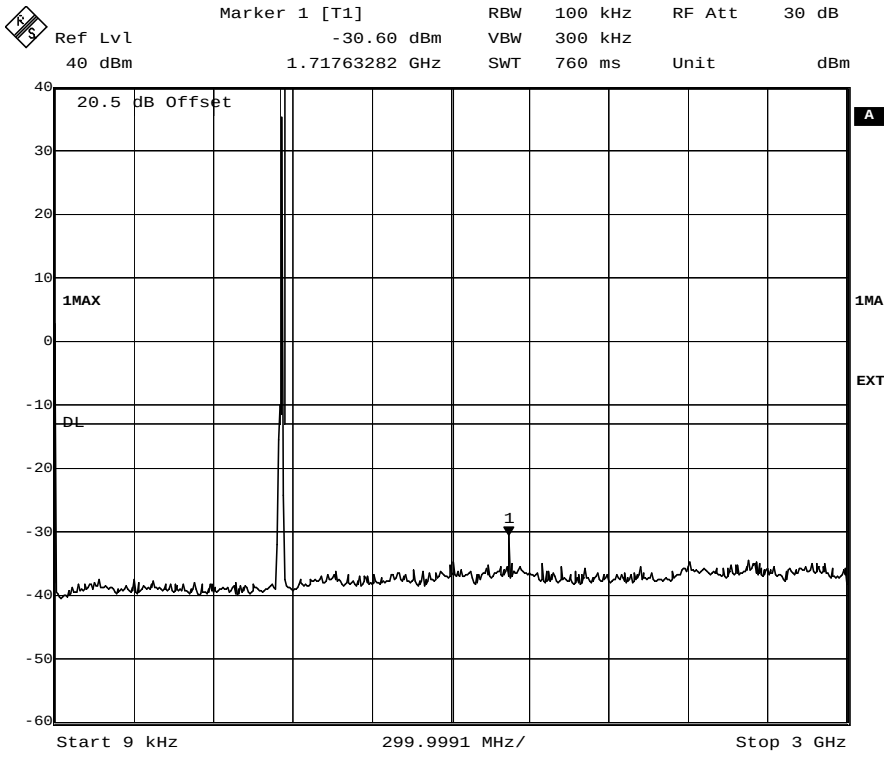
Date: 2.APR.2007 17:26:16

Plot 7.12



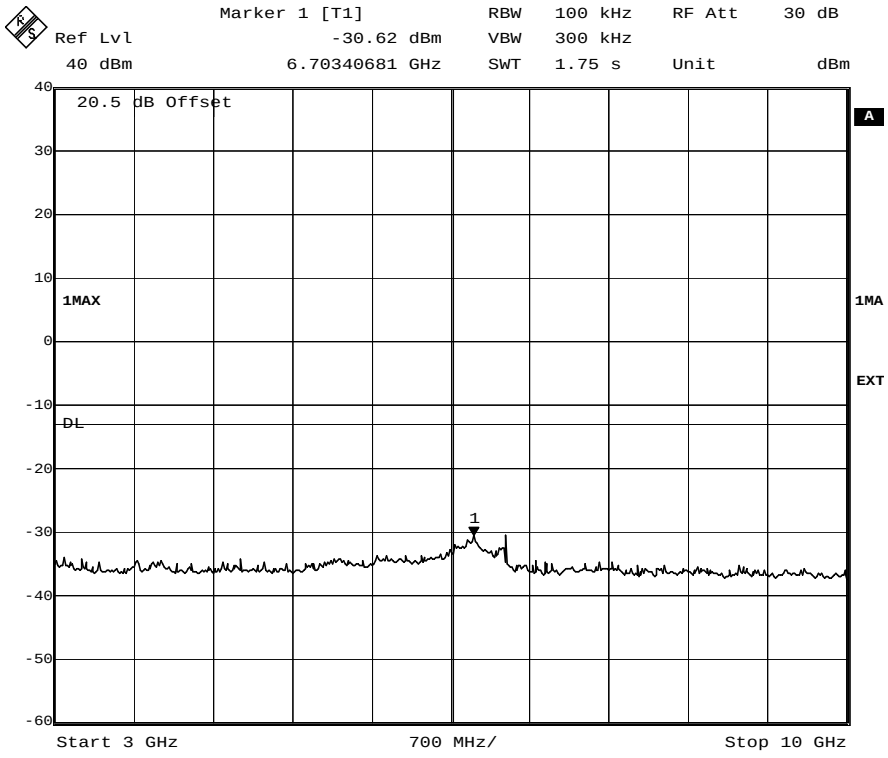
Date: 2.APR.2007 17:26:45

Plot 7.13



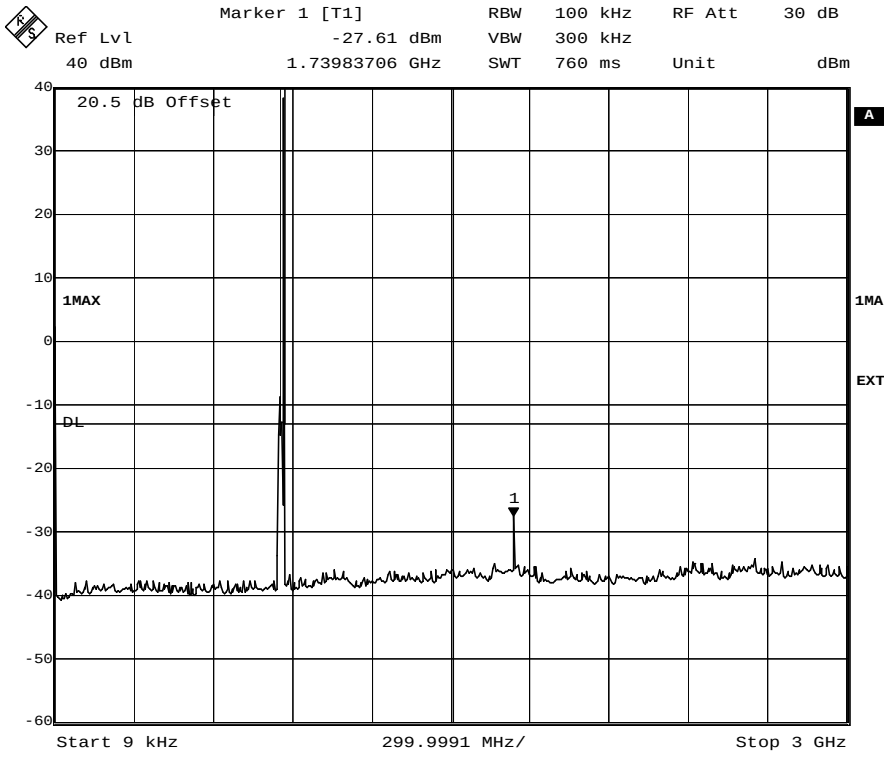
Date: 2.APR.2007 17:28:06

Plot 7.14



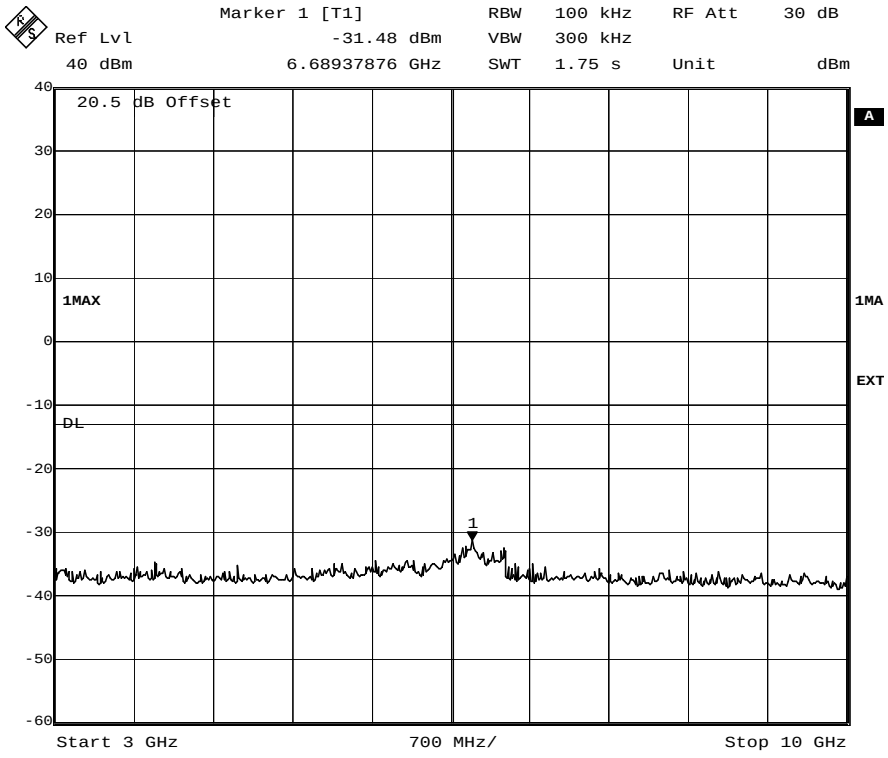
Date: 2.APR.2007 17:30:33

Plot 7.15



Date: 2.APR.2007 17:32:00

Plot 7.16



Date: 2.APR.2007 17:32:25

8. AMPLIFIER GAIN AND BANDWIDTH

Date of test: 2007-04-03

8.1 Test specification

RSS-131 §6.1
The pass band gain shall not exceed the nominal gain by more than 1.0 dB.
The 20 dB bandwidth shall not exceed the nominal bandwidth that is stated by the manufacturer.
Outside of the 20 dB bandwidth, the gain shall not exceed the gain at the 20 dB point.

8.2 Test results

The tracking generator in the spectrum analyzer was used to measure the gain and frequency response of the amplifier.

Amplifier gain

Link	Gain (dB)	Nominal gain (dB)	Plots	Result
Uplink	85.8	85	Plot 8.1	PASS
Downlink	96.0	95	Plot 8.2	PASS

20 dB bandwidth

Link	20 dB Bandwidth (MHz)	Gain outside 20 dB Bandwidth (dB)	Plots	Result
Uplink	19.038	Below the 20 dB point gain	Plot 8.3	PASS
Downlink	19.038	Below the 20 dB point gain	Plot 8.4	PASS

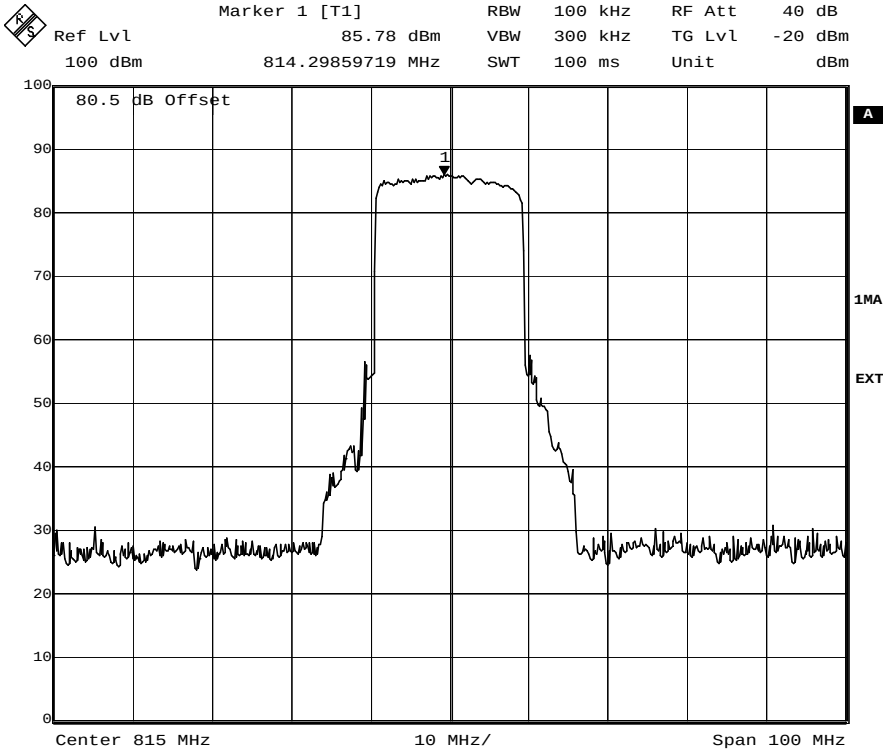
Measurement results are corrected for attenuation in the set-up configuration.

Example calculation:

Measured level [dB] = Analyser reading [dBm] - Tracking Generator signal level [dBm] + cable loss [dB] + attenuator loss [dB]

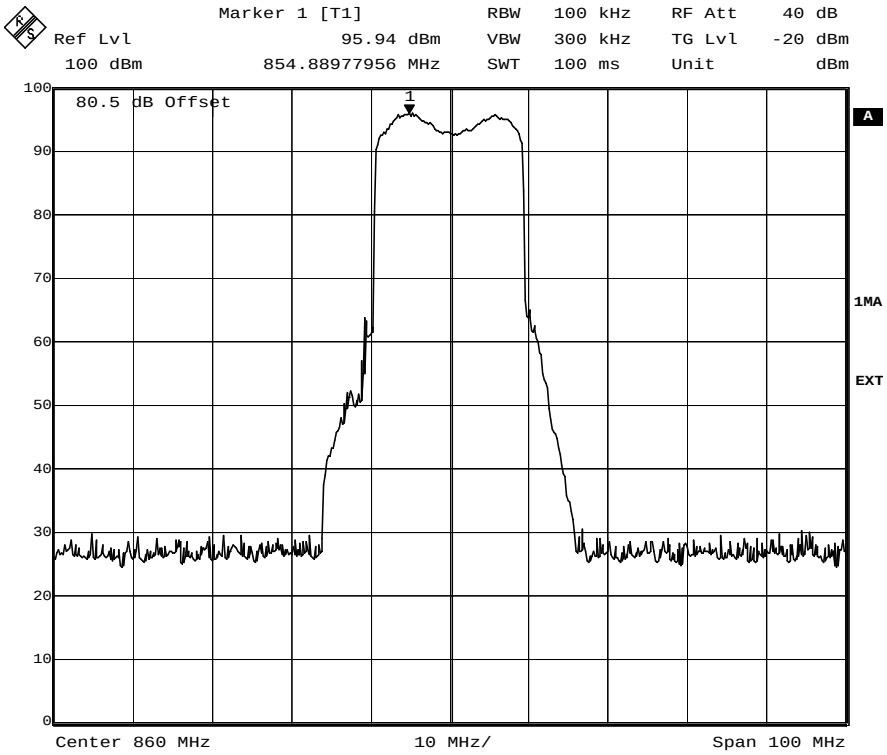
Fulfil requirements: YES

Plot 8.1



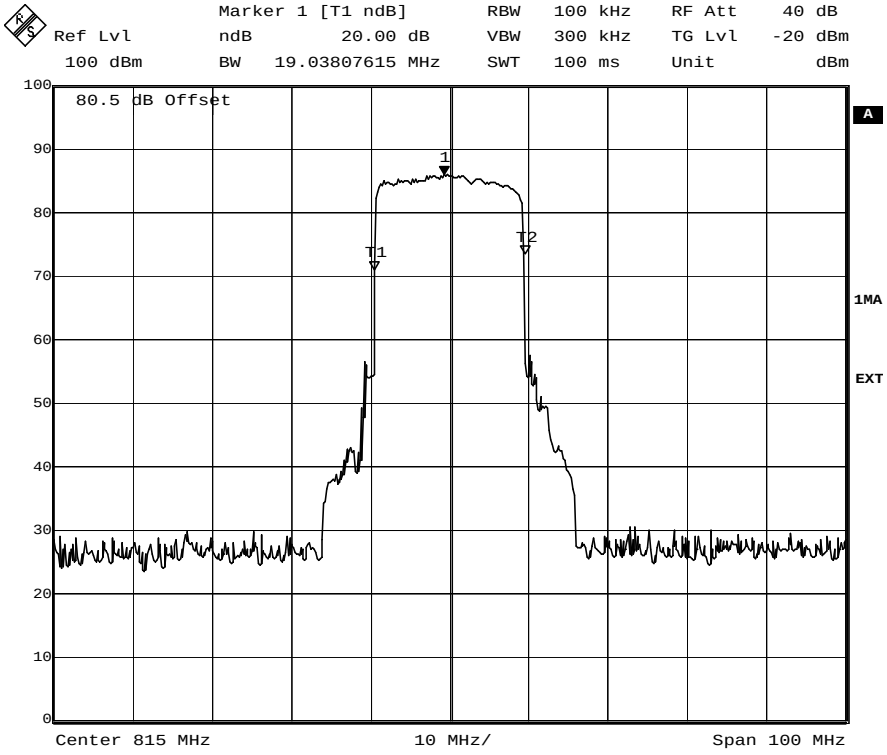
Date: 3.APR.2007 08:06:59

Plot 8.2



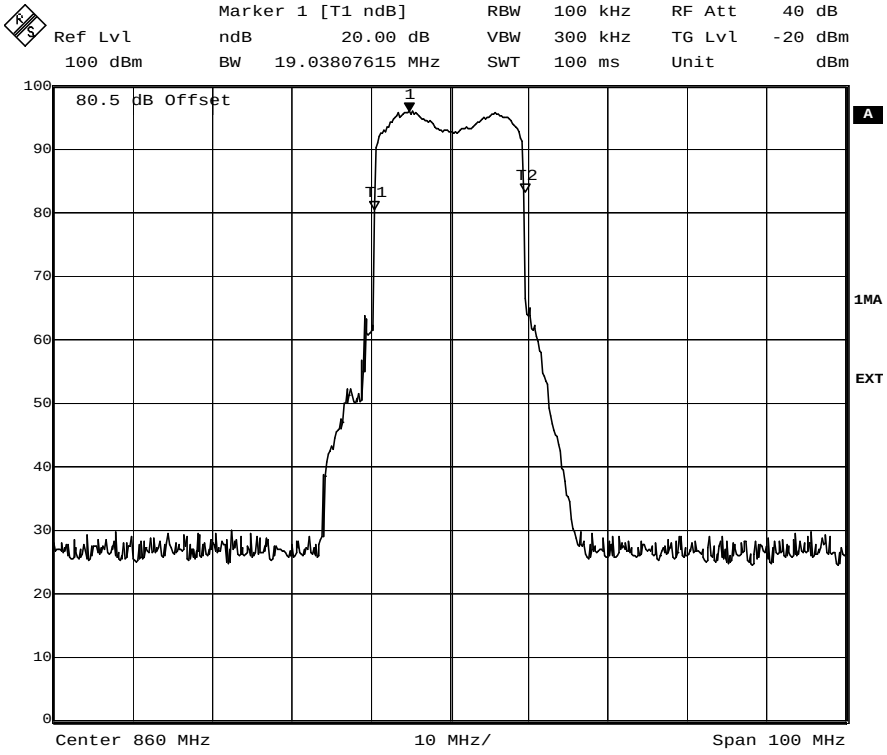
Date: 3.APR.2007 08:04:19

Plot 8.3



Date: 3.APR.2007 08:07:37

Plot 8.4



Date: 3.APR.2007 08:05:01

9. MEAN OUTPUT POWER (RSS-131)

Date of test: 2007-04-03

9.1 Test specification

RSS-131 §6.2
The manufacturer's output power rating P_{rated} MUST NOT be greater than P_{mean} for all types of enhancers.

9.2 Test results

This product is a Multi-channel enhancer and the Mean power is measured according to RSS-131 §4.3.1.

link	Highest CW output power (dBm)	P_{mean} (dBm)	P_{rated} (dBm)	Plots	Result
UL	32.1	35.1	30	Plot 9.1	PASS
DL	30.1	33.1	33	Plot 9.2	PASS

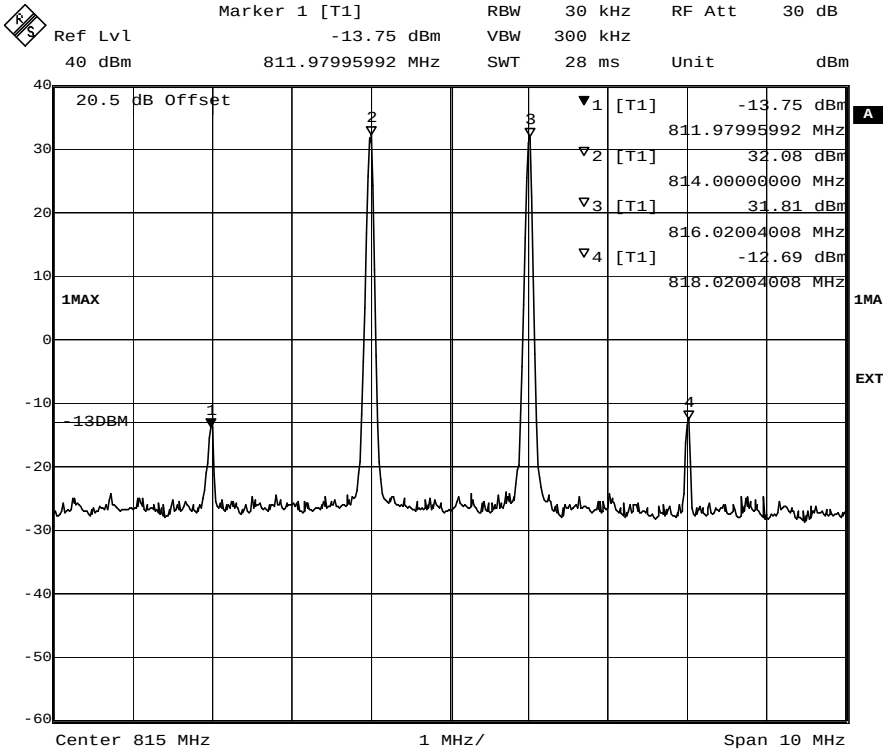
Measurement results are corrected for attenuation in the set-up configuration.

Example calculation:

Measured level [dBm] = Analyser reading [dBm] + cable loss [dB] + attenuator loss [dB]

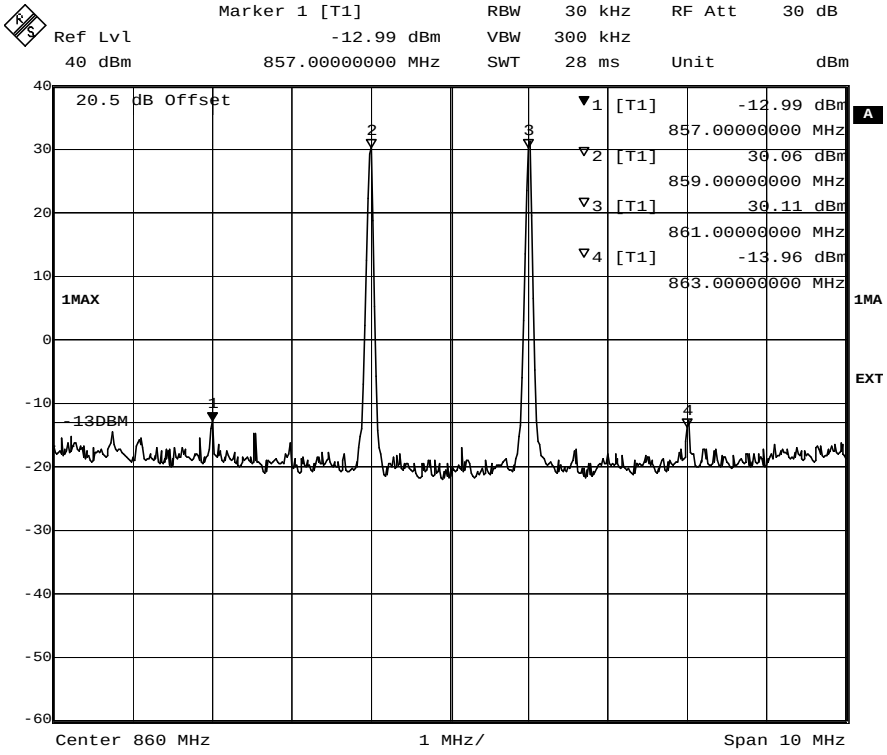
Fulfil requirements: YES

Plot 9.1



Date: 2.APR.2007 18:04:08

Plot 9.2



Date: 2.APR.2007 17:57:17

10. RADIATED SPURIOUS EMISSIONS

10.1 Test specification

47 CFR 2.1053, 90.691 and RSS-131 §6.4
Spurious emissions should be attenuated below the transmitter power (P) in watts by at least 43 + 10 log (P). This gives a limit at -13 dBm.

The field strength limit is calculated using the plane wave relation:

$GP/4\pi R^2 = E^2 / 120\pi$

G: antenna gain
P: power (W)
R: measurement distance (m)

This gives a field strength limit of 84.4 dBμV/m ERP or 82.2 dBμV/m EIRP at a 3m measurement distance.

For standby mode the limits are according to 47 CFR Part 15B Class B and RSS-Gen §6 (a) (Table 1)

10.2 Test equipment

Equipment	Manufacturer	Type	SEMKO No.
Test site: "Björkhallen"			
Semi-anechoic shielded chamber, 6 x 9 x 6 m (W x L x H)			30900, 30901
Software:	Rohde & Schwarz	EMC 32	
Measurement receiver:	Rohde & Schwarz	ESCI	12798
Antenna, bilog:	Rohde & Schwarz	HL-562	30711
Test site: "Radiohallen"			
Anechoic shielded chamber, 3,7 x 7,0 x 2,4 m (W x L x H)			12285
Software:	Rohde & Schwarz	ES-K1, V1.70	
Signal analyser:	Rohde & Schwarz	FSIQ 40	40023
Preamplifier:	MITEQ	AFS6/AFS44	12335
Antennas:			
Double Ridge Guide Horn:	EMCO	3115	4936
Transformer	Tufvassons	AFM-1500	30317

10.3 Measurement set-up

Test site: “Björkhallen” Semi-anechoic shielded chamber (30 – 1000 MHz)

The radiated disturbance electric field intensity was measured in a semi-anechoic chamber at a distance of 3 m and the EUT was placed on a non-metallic table, 0,8 m above the reference ground plane. The specified test mode was enabled. Test set-up photos are given below.

An overview sweep with peak detection of the electric field intensity was performed with the measurement receiver in max-hold and with the antenna placed 1,5 m, 2,5 m and 3,5 m above the floor. The polarisation was horizontal and vertical. The measurements were repeated with the EUT rotated in 90-degree steps.

At the frequencies where high disturbance levels were found a search for max disturbance level was performed. With the EUT and antenna in the worst-case configuration new measurements with quasi-peak detector were carried out.

The EUT was supplied with 120 V AC (60 Hz) during the test.

Test set-up photo:

Test site: Radio anechoic shielded chamber (1 – 10 GHz)

In the Radio anechoic chamber the EUT was placed on a non-metallic table, 1,3 m above the floor. The radiated disturbance electric field intensity was measured at a distance of 3 m. The specified test mode was enabled.

An overview sweep with peak detection of the electric field intensity was performed with the spectrum analyser in max-hold and with the antenna height adjusted at the level of the EUT center (placed 1,55 m above the floor). The polarisation was horizontal and vertical. The measurements were repeated with the EUT rotated in 90-degree steps.

At the frequencies where high disturbance levels were found a search for max disturbance level was performed. With the EUT and antenna in the worst-case configuration new measurements with peak and average detectors were carried out.

The EUT was supplied by 120 V AC (50 Hz) during the test.

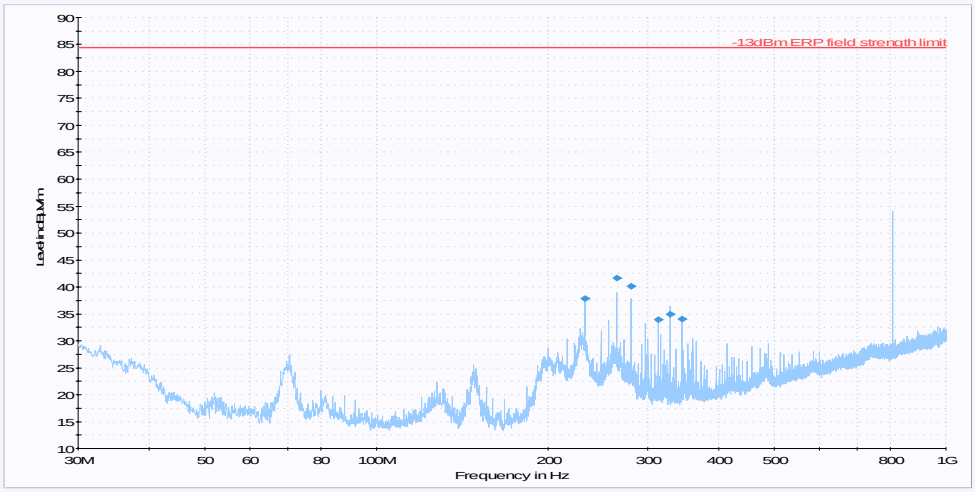
Test set-up photo:

10.5 Test results

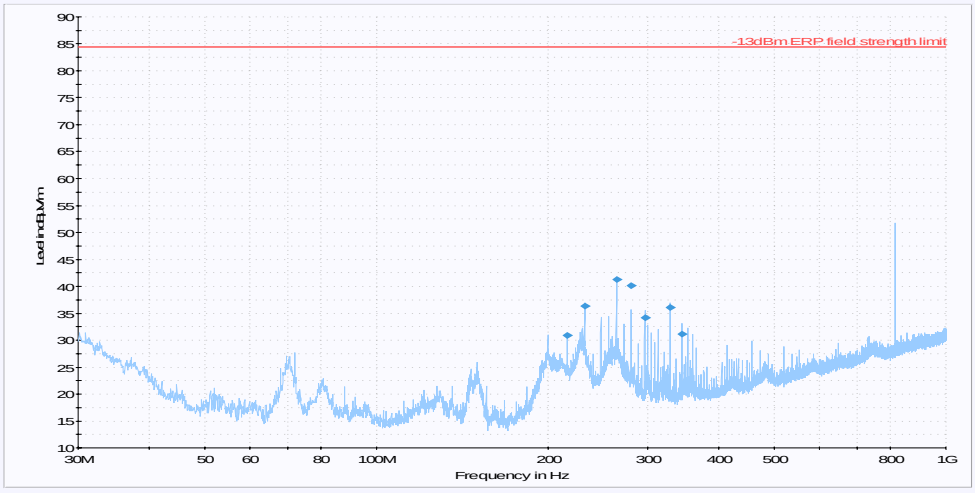
Semi-anechoic shielded chamber

Date of test: 2007-04-04

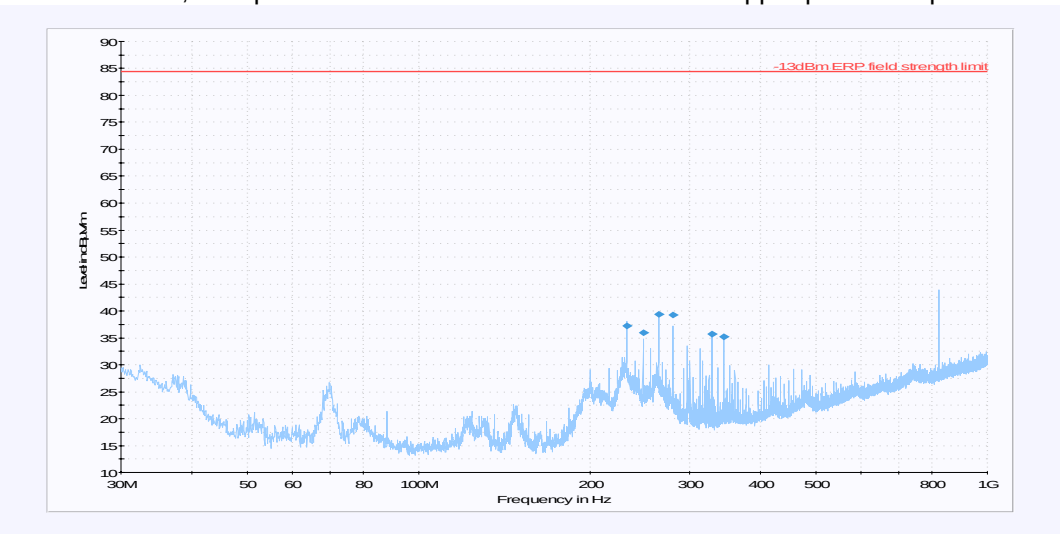
30 – 1000 MHz, max peak at a distance of 3 m. CW carrier in lower part of UL pass band



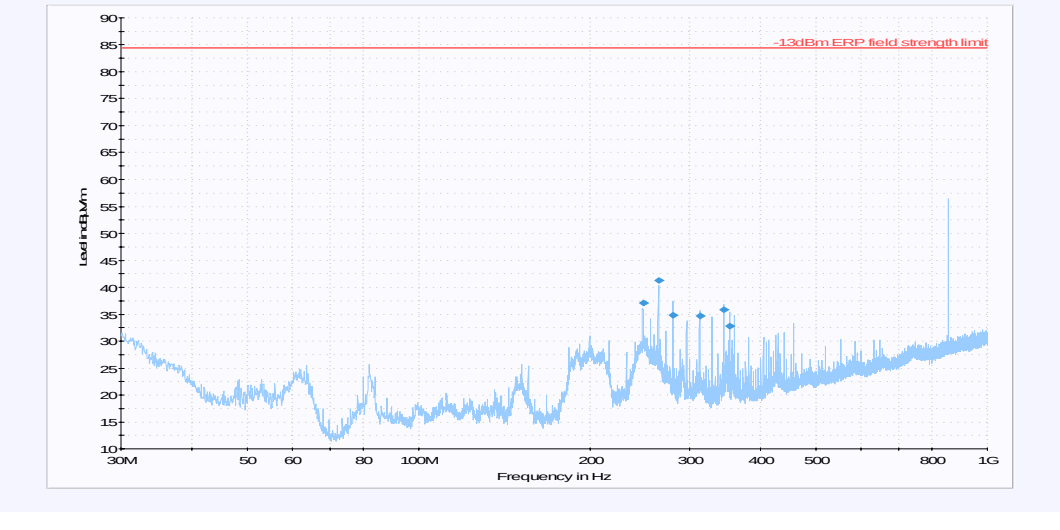
30 – 1000 MHz, max peak at a distance of 3 m. CW carrier in middle part of UL pass band



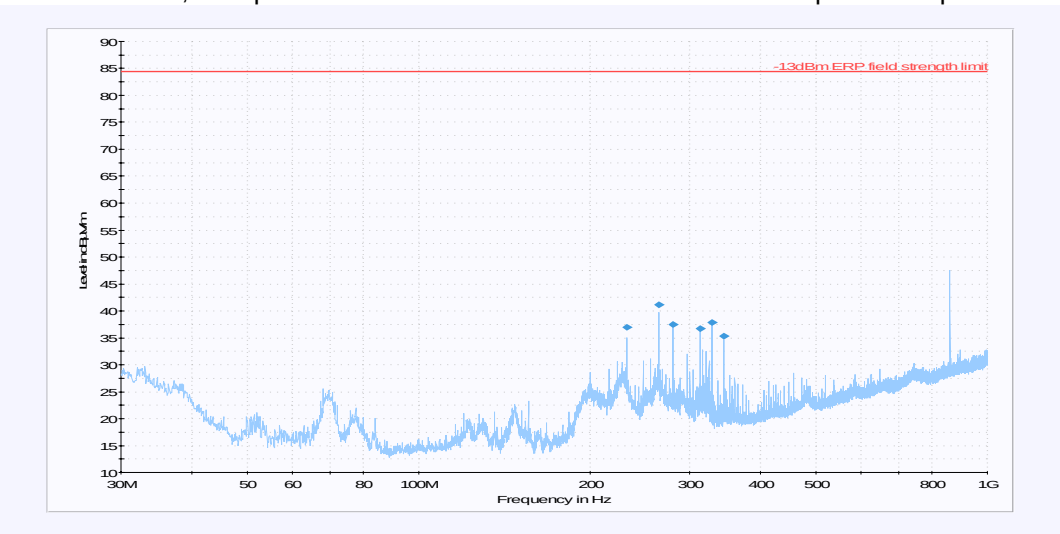
30 – 1000 MHz, max peak at a distance of 3 m. CW carrier in upper part of UL pass band



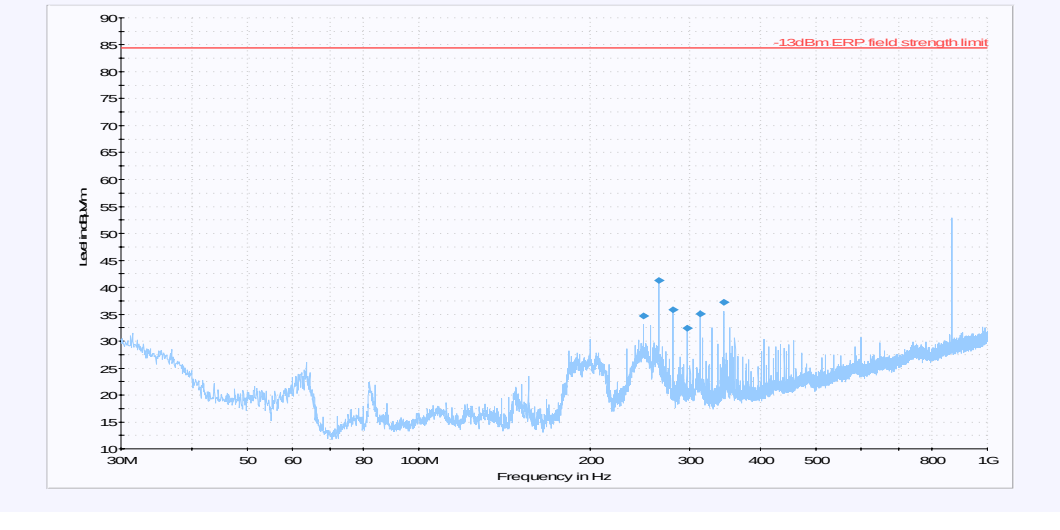
30 – 1000 MHz, max peak at a distance of 3 m. CW carrier in lower part of DL pass band



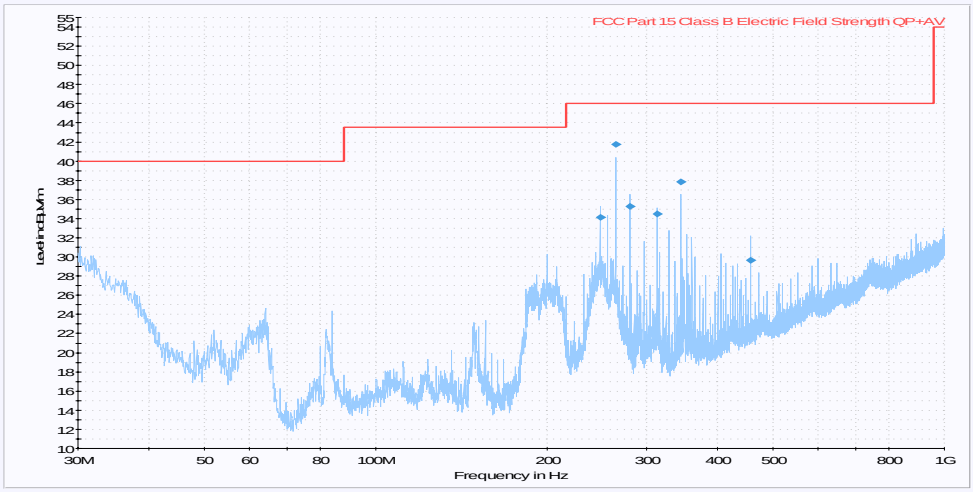
30 – 1000 MHz, max peak at a distance of 3 m. CW carrier in middle part of DL pass band



30 – 1000 MHz, max peak at a distance of 3 m. CW carrier in upper part of DL pass band



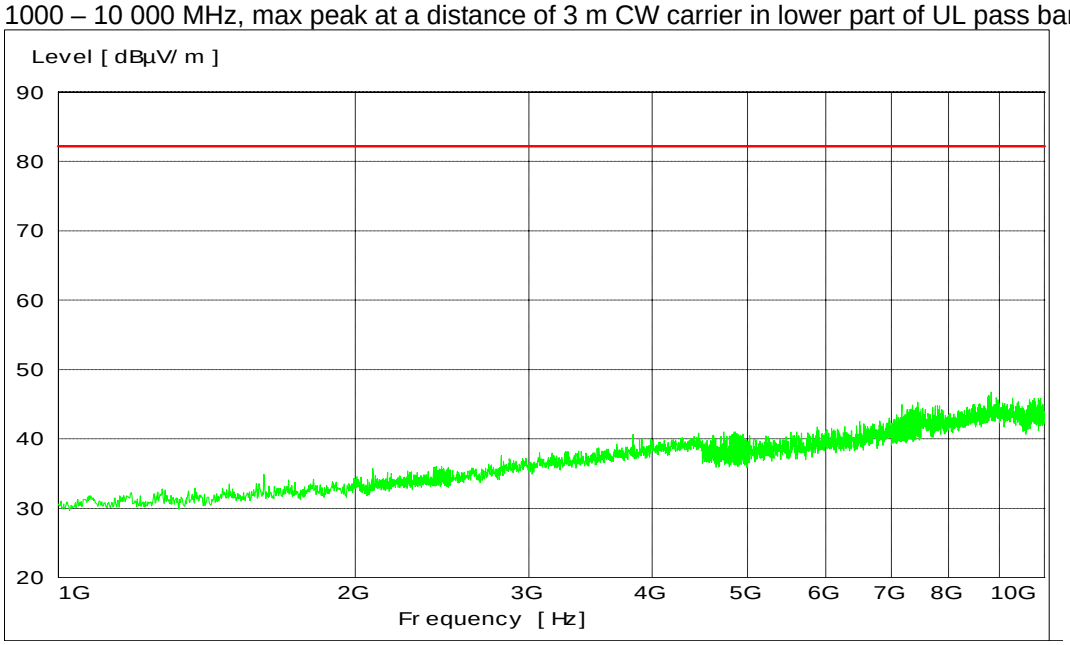
30 – 1000 MHz, max peak at a distance of 3m in standby mode



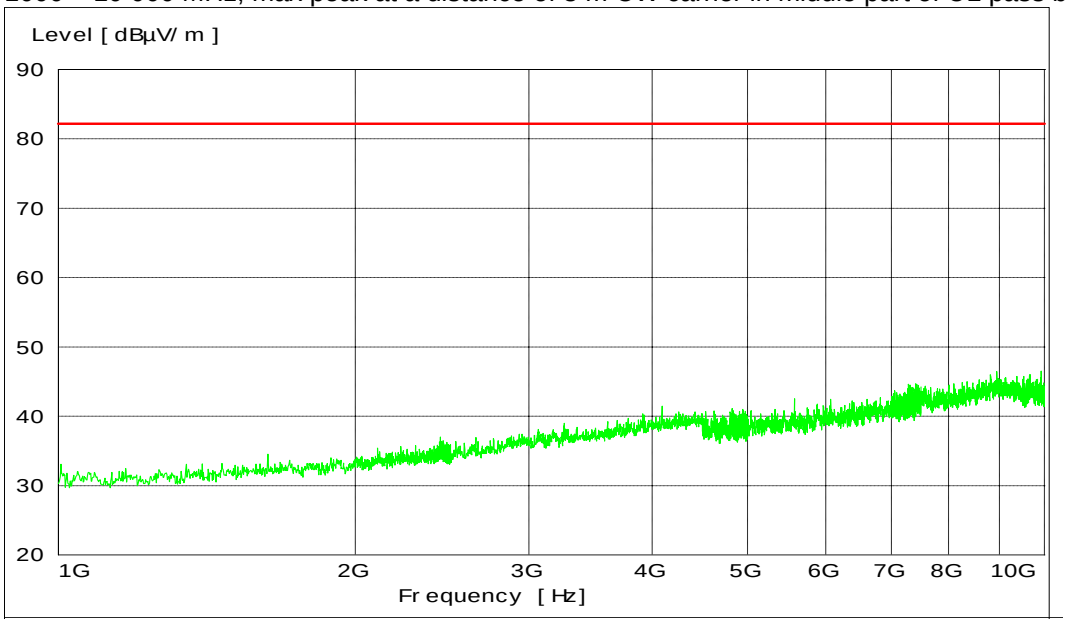
Radio anechoic shielded chamber

Date of test: 2007-04-03

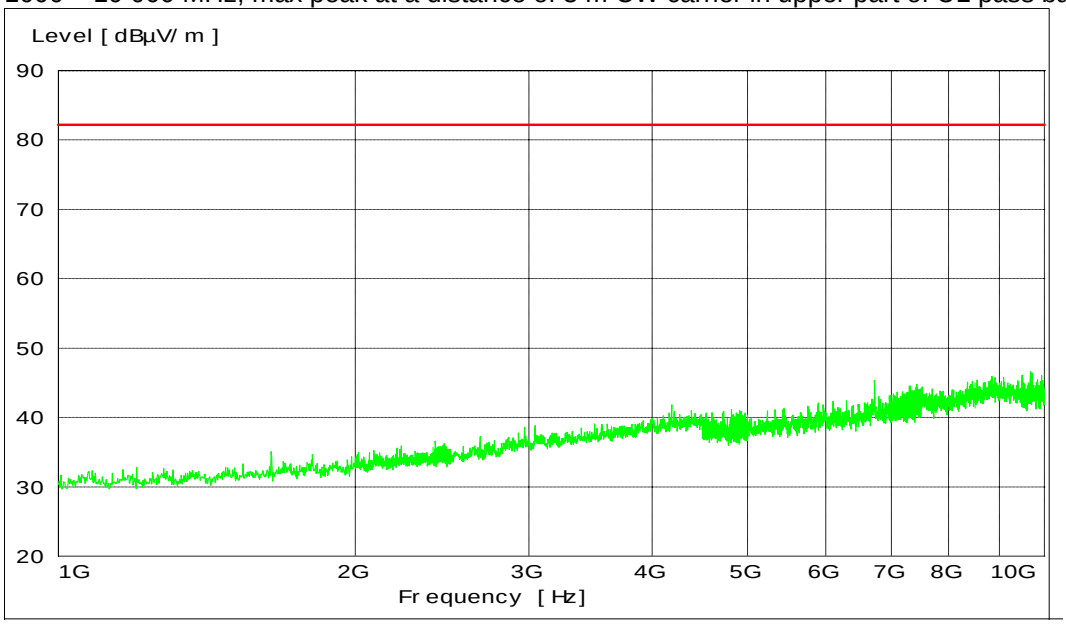
1000 – 10 000 MHz, max peak at a distance of 3 m CW carrier in lower part of UL pass band



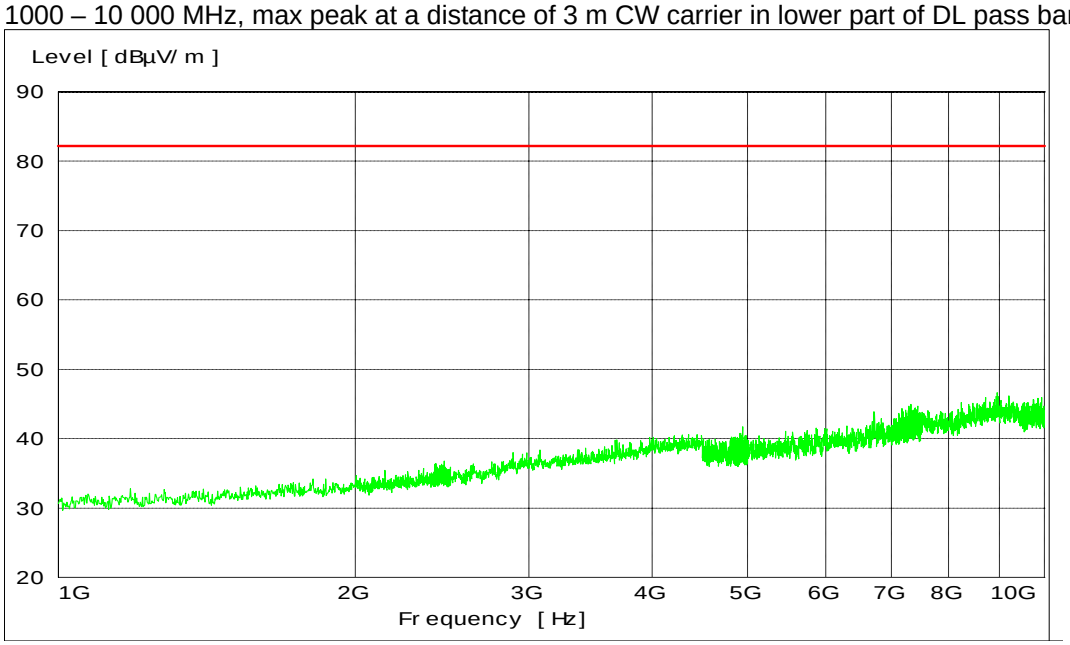
1000 – 10 000 MHz, max peak at a distance of 3 m CW carrier in middle part of UL pass band



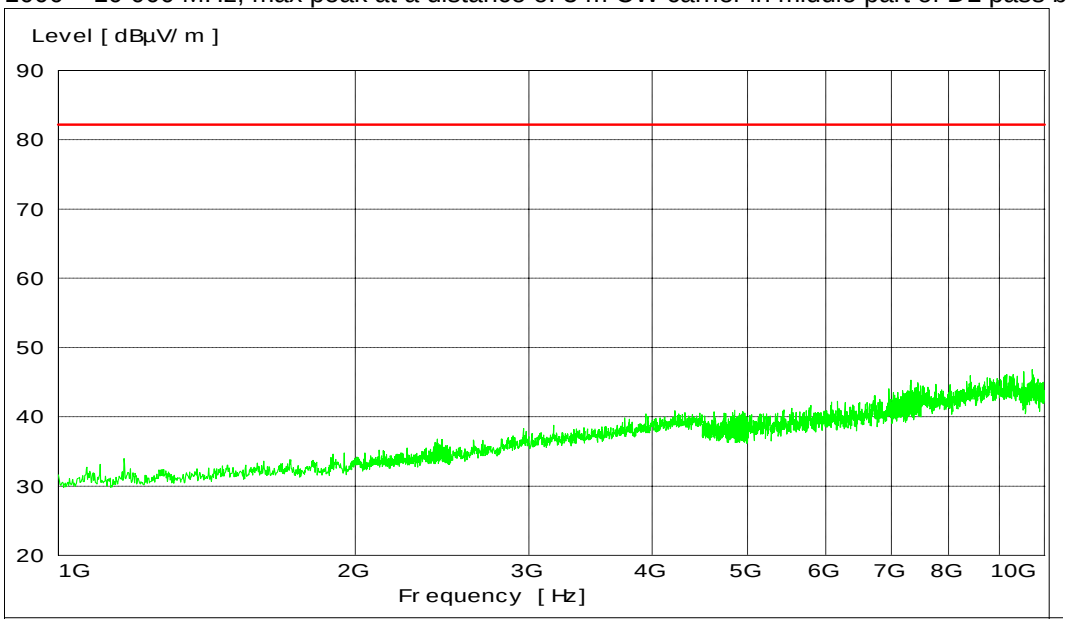
1000 – 10 000 MHz, max peak at a distance of 3 m CW carrier in upper part of UL pass band



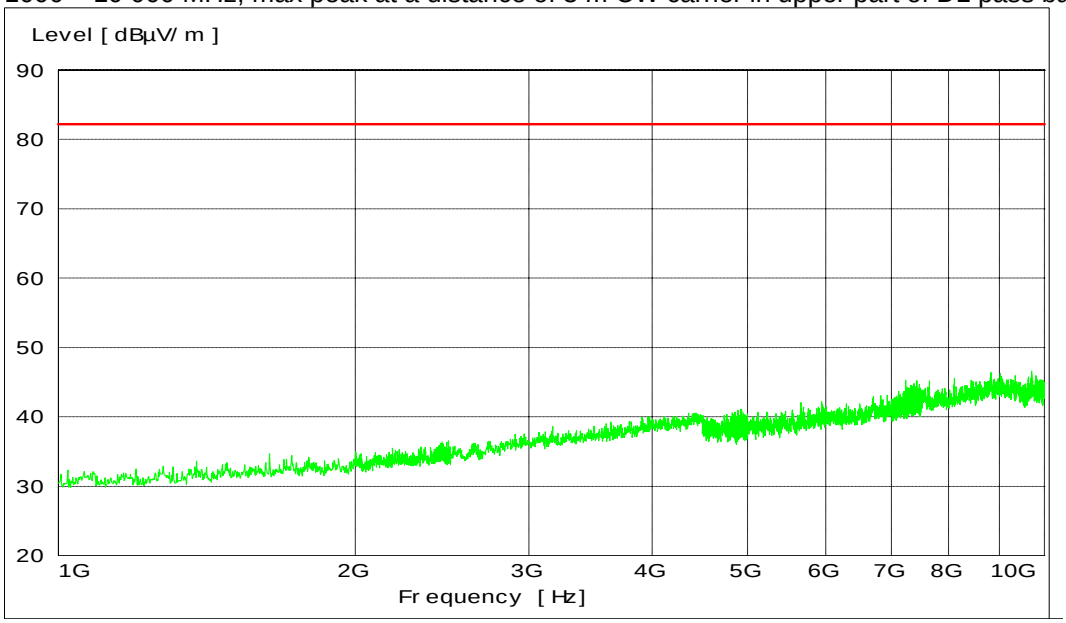
1000 – 10 000 MHz, max peak at a distance of 3 m CW carrier in lower part of DL pass band



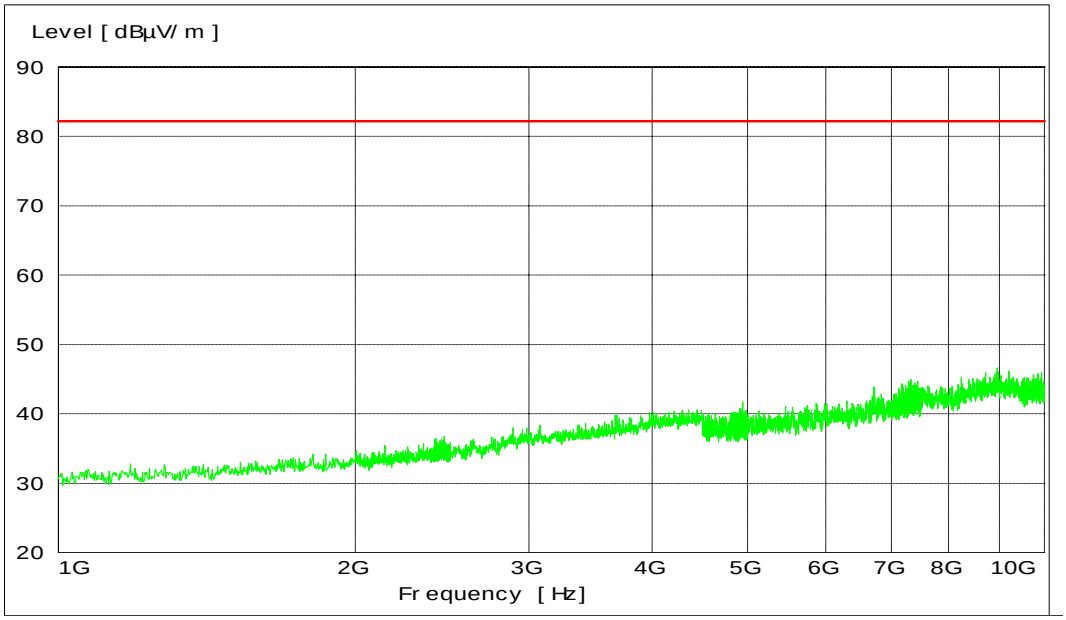
1000 – 10 000 MHz, max peak at a distance of 3 m CW carrier in middle part of DL pass band



1000 – 10 000 MHz, max peak at a distance of 3 m CW carrier in upper part of DL pass band



1000 – 10000 MHz, max peak at a distance of 3 m without input signal (standby)



Data summary

Test signal: CW carrier in lower part of UL pass band

Field strength of spurious emissions							
Frequency (MHz)	Corrected amplitude QP (dBµV/m)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable Position (deg)	Correction (dB)	Limit (dBµV/m)
232.077250	37.8	120	140.0	H	331.0	12.3	84.40
264.094250	41.6	120	175.0	V	281.0	12.8	84.40
280.082750	40.1	120	122.0	H	68.0	13.5	84.40
312.100500	34.0	120	120.0	V	325.0	15.0	84.40
328.089000	34.9	120	136.0	V	311.0	15.2	84.40
344.117500	34.1	120	151.0	V	317.0	16.1	84.40

Test signal: CW carrier in middle part of UL pass band

Field strength of spurious emissions							
Frequency (MHz)	Corrected amplitude QP (dBµV/m)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable Position (deg)	Correction (dB)	Limit (dBµV/m)
216.008000	30.8	120	131.0	V	257.0	11.0	84.40
232.036500	36.3	120	133.0	H	341.0	12.3	84.40
264.053500	41.3	120	183.0	V	283.0	12.8	84.40
280.042000	40.1	120	116.0	H	74.0	13.5	84.40
296.030500	34.2	120	113.0	V	33.0	14.8	84.40
328.048250	36.0	120	138.0	V	314.0	15.2	84.40
344.037500	31.1	120	100.0	V	310.0	16.1	84.40

Test signal: CW carrier in upper part of UL pass band

Field strength of spurious emissions							
Frequency (MHz)	Corrected amplitude QP (dBµV/m)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable Position (deg)	Correction (dB)	Limit (dBµV/m)
232.077250	37.2	120	135.0	H	350.0	12.3	84.40
248.105750	35.9	120	111.0	V	86.0	12.5	84.40
264.094250	39.3	120	162.0	H	201.0	12.8	84.40
280.122750	39.3	120	111.0	H	71.0	13.5	84.40
328.129000	35.7	120	148.0	V	327.0	15.2	84.40
344.118250	35.2	120	155.0	V	320.0	16.1	84.40

Test signal: CW carrier in lower part of DL pass band

Field strength of spurious emissions							
Frequency (MHz)	Corrected amplitude QP (dBµV/m)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable Position (deg)	Correction (dB)	Limit (dBµV/m)
248.024250	37.1	120	100.0	V	315.0	12.5	84.40
264.013500	41.3	120	195.0	V	224.0	12.8	84.40
280.002000	34.8	120	113.0	V	8.0	13.5	84.40
312.019000	34.7	120	136.0	H	45.0	15.0	84.40
343.996750	35.9	120	148.0	V	282.0	16.1	84.40
351.991000	32.8	120	131.0	V	279.0	16.4	84.40

Test signal: CW carrier in middle part of DL pass band

Field strength of spurious emissions							
Frequency (MHz)	Corrected amplitude QP (dBµV/m)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable Position (deg)	Correction (dB)	Limit (dBµV/m)
232.077250	37.0	120	148.0	H	341.0	12.3	84.40
264.095000	41.1	120	138.0	H	69.0	12.8	84.40
280.123500	37.5	120	100.0	V	314.0	13.5	84.40
312.140500	36.7	120	112.0	V	305.0	15.0	84.40
328.129000	37.8	120	119.0	V	294.0	15.2	84.40
344.157500	35.4	120	100.0	V	312.0	16.1	84.40

Test signal: CW carrier in upper part of DL pass band

Field strength of spurious emissions							
Frequency (MHz)	Corrected amplitude QP (dBµV/m)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable Position (deg)	Correction (dB)	Limit (dBµV/m)
248.105750	34.7	120	100.0	H	66.0	12.5	84.40
264.094250	41.3	120	187.0	V	234.0	12.8	84.40
280.123500	35.9	120	150.0	V	341.0	13.5	84.40
296.112000	32.4	120	159.0	V	240.0	14.8	84.40
312.140500	35.1	120	121.0	H	54.0	15.0	84.40
344.157500	37.2	120	150.0	V	282.0	16.1	84.40

Test signal: No input signal (standby)

Field strength of spurious emissions							
Frequency (MHz)	Corrected amplitude QP (dBμV/m)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable Position (deg)	Correction (dB)	Limit (dBμV/m)
248.065750	34.1	120	112.0	H	68.0	12.5	46.02
264.094250	41.7	120	180.0	V	232.0	12.8	46.02
280.082750	35.3	120	125.0	V	338.0	13.5	46.02
312.100500	34.5	120	113.0	H	226.0	15.0	46.02
344.118250	37.8	120	163.0	V	281.0	16.1	46.02
456.157750	29.6	120	138.0	V	36.0	18.6	46.02

No spurious emissions was found above 1GHz (noise floor below 47 dBμV/m)

Example calculation:

Measured level [dBμV/m] = Analyser reading [dBμV] + cable loss [dB] – preamplifier gain [dB] + antenna factor [1/m]

Fulfil requirements: YES

11CONDUCTED DISTURBANCE VOLTAGE IN THE FREQUENCY RANGE 0,15 - 30 MHZ

11.1 Measurement uncertainty

Conducted disturbance voltage, quasi-peak detection: ±2,0 dB

The measurement uncertainty describes the overall uncertainty of the given measured value during operation of the EUT.

Measurement uncertainty is calculated in accordance with EA-4/02-1997.
The measurement uncertainty is given with a confidence of 95%.

11.2 Test equipment

Test site:	FCC		
Equipment	Manufacturer	Type	SEMKO No.
Software:	Rohde & Schwarz	ES-K1 V1.60	
Measurement receiver:	Rohde & Schwarz	ESHS 30	4946
Artificial mains network:	Rohde & Schwarz	ESH3-Z5	2727
Transformer	Tufvassons	AFM-1500	30317

11.3 Measurement set-up

The mains terminal disturbance voltage was measured with the EUT located 0,8 m above the ground plane and 0,4 m from the vertical ground plane. The EUT was connected to an artificial mains network (AMN). The AMN was placed on the ground plane. Amplitude measurements were performed with a quasi-peak detector. The EUT was supplied by 120 VAC (60 Hz) during the test.

Test set-up photo:

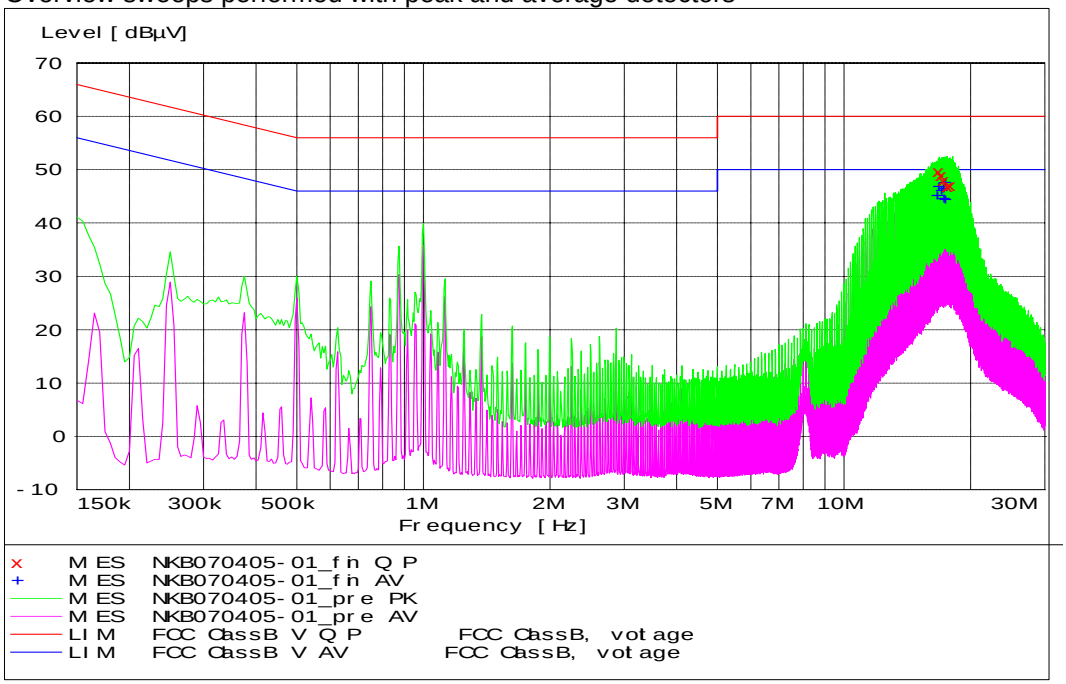
11.4 Test protocol

Date of test: 2007-04-05

Frequency /MHz	Quasi-Peak	
	Disturbance Level /dB(µV)	Permitted limit /dB(µV)
16.845	45.154	60
17.220	48.876	60
17.470	47.977	60
17.845	46.859	60
18.095	47.000	60
19.970	49.615	60

Fulfil requirements: YES

Overview sweeps performed with peak and average detectors



12 INSTRUMENTATION LIST

Equipment	Manufacturer	Type	SEMKO No.
Spectrum analyser	Rohde & Schwarz	FSIQ40	40023
Measurement receiver	Rohde & Schwarz	ESCI	12798
Measurement receiver	Rohde & Schwarz	ESHS 30	4946
Signal generator	Rohde & Schwarz	SMIQ03B	40017
Signal generator	Rohde & Schwarz	SMIQ03B	40018
Signal generator	Agilent	E4432B	Serial: US40052636
Rubidium reference	Philips	PM6685R/071	40031
Rubidium reference	DATUM	8040 Class 1	40032
Preamplifier	MITEQ	AFS6/AFS44	12335
Artificial mains network	Rohde & Schwarz	ESH3-Z5	2727
Antenna, bilog	Rohde & Schwarz	HL-562	30711
Antenna horn	EMCO	3115	4936
Attenuator	Aeroflex/Weinschel	46-10-34	9443
Attenuator	Aeroflex/Weinschel	46-10-34	9444
Attenuator	Hewlett Packard	8491A	7967
Attenuator	Hewlett Packard	8491A	30089
Attenuator	Hewlett Packard	8491A	30090

13 UNCERTAINTIES SUMMARY

All uncertainties are given with a level of confidence of approximately 95% (k=2).

Measurement uncertainty for radiated disturbance

Uncertainty for the frequency range 30 to 300 MHz using a biconical or a combination antenna at 10 m	± 4,6 dB
Uncertainty for the frequency range 200 to 1000 MHz using a logperiodic or a combination antenna at 10 m	± 4,6 dB
Uncertainty for the frequency range 1000 to 18000 MHz using a horn antenna at 3 m	± 6,0 dB

Measurement uncertainty for conducted disturbances at the antenna port on radio equipment ± 3,6 dB

Measurement uncertainty for Output power (Radio)

Digital signal, conducted	± 0,6 dB
Digital signals, radiated	
1 - 18 GHz	± 3,3 dB

Measurement uncertainty for conducted disturbance voltage at AC port ± 2,0 dB

APPENDIX III – PHOTOS OF THE EUT

Front side

Bottom side with antenna connectors

Product door opened

Identification label inside

Identification label outside