

RADIO TEST REPORT

No. 603701R1

EQUIPMENT UNDER TEST

Equipment: Golf PDA
Type / model: EGO Pocket
Manufacturer: Teleca System Design AB
Tested by request of: Teleca System Design AB

SUMMARY

The equipment complies with the requirements of the following standards:

FCC, Part 15, Subpart B (2004) and Subpart C (2004);

Date of issue: September 10, 2006

Tested by:


Björn Utermöhl

Approved by:


Lars-Olov Johansson

This test report replaces our previous issued test report with same number, dated 6 April 2006

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1. CLIENT INFORMATION

The EUT has been tested by request of

Company: Teleca System Design AB
Telegrafgatan 8A
169 84 Stockholm
Sweden
Name of contact: Holger Tiberg

2. EQUIPMENT UNDER TEST (EUT)**2.1 Identification of the EUT according to the manufacturer/client declaration**

Equipment: PDA
Type/Model: EGO Pocket
Brand name: EGO
FCC ID: TTL EGO1
Serial number: --
Manufacturer: Wooyoung Telecom CO LTD,
Gyeonggi-Do, Korea
Rating/Supplying voltage: Nominal 3.7 V DC, Li-Polymer battery
Rating RF output power: 1 W e.i.r.p.
Antenna gain: 1 dBi
External antenna connector: No
Operating temperature range: 0 - 40 deg C
Frequency range: 902 - 928 MHz, Frequency hopping within a 2.5
MHz band that is possible to set within the
frequency range.
Number of channels: 50
Channel separation: 50 kHz
Modulation characteristics: FHSS
Stand by mode supported: Yes



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2.2 Additional software information about the EUT

During the tests the EUT supported the following software:

Software	Version	Comment
Microsoft Windows CE with additional application developed for this product	--	--

2.3 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	Serial number
AC/DC adapter	Nordic Power SA 125A 1220 0040G Input : 100–240 V~, 47–63 Hz Output: 12 V DC, 2A	-

2.4 Modifications during the test

No modifications have been made during the tests.



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3. TEST SPECIFICATIONS

3.1 Standards

FCC 47 CFR part 15 (2004) Subpart B – Unintentional radiators
FCC 47 CFR part 15 (2004) Subpart C – Intentional Radiators; §15.247 Operation within the bands 902-928 MHz, 2400 – 2483.5 MHz and 5725 – 5850 MHz.

Measurements methods according to ANSI C63.4-2003

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 the test of conducted disturbance voltage in the frequency range 0,15-30 MHz and out-of-band spurious emissions test are described in corresponding sections. During other tests the EUT was connected to the spectrum analyser by cable.

3.4 Operating environment

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

Air temperature: 22 – 23 °C
Relative humidity: 23 – 53 %



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4. TEST SUMMARY

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

FCC reference	Test	Result	Note
15.247(b)	Peak output power	Pass	
15.247(a)	20 dB Bandwidth	Pass	
15.247(a)	Carrier frequency separation	Pass	
15.247(a)	Number of hopping frequencies (channels)	Pass	
15.247(a)	Time of occupancy (dwell time)	Pass	
15.247	Band edge compliance	Pass	
15.247(d)	Out of band spurious emissions, radiated	Pass	
15.247(d)	Out of band spurious emissions, conducted	NA	
15B	Out of band spurious emissions, radiated	Pass	
15B	Conducted emission at AC port	Pass	

NA = Not Applicable



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5. PEAK OUTPUT POWER

5.1. Test protocol

Date of test: March 29, 2006

EUT mode of operation: TX, hopping on one channel.

Spectrum analyser settings:

Span: 10 MHz
 RBW: 3 MHz
 VBW: 3 MHz
 Sweep time: 5 ms
 Detector: Peak
 Trace: Max Hold

Output power level, mW	Measured value, dBm e.i.r.p.			Limit, dBm e.i.r.p.
	903 MHz	915 MHz	927 MHz	
1000	27,8	27,3	27,1	30

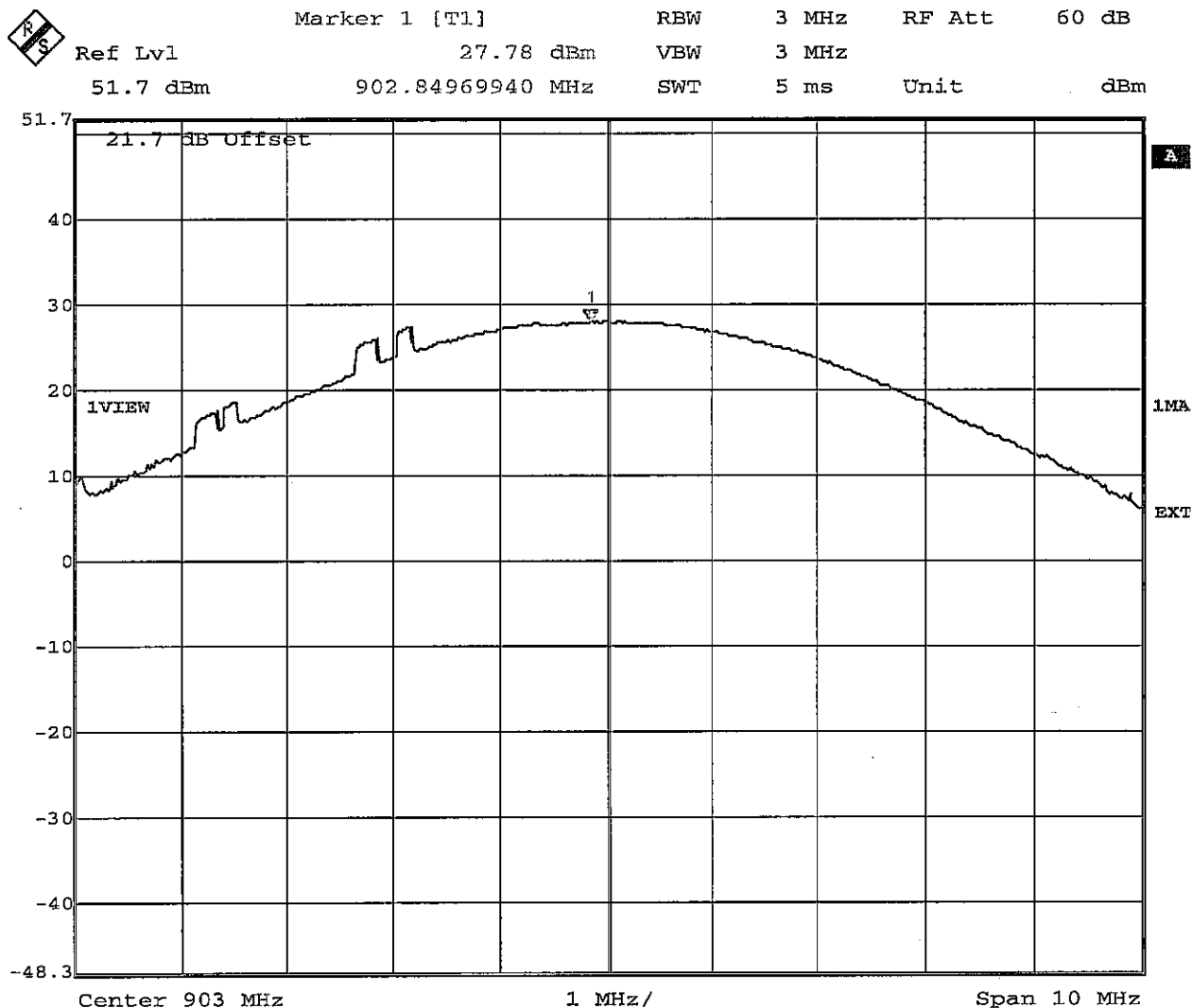


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Date: 31.MAR.2006 10:14:02
Low channel



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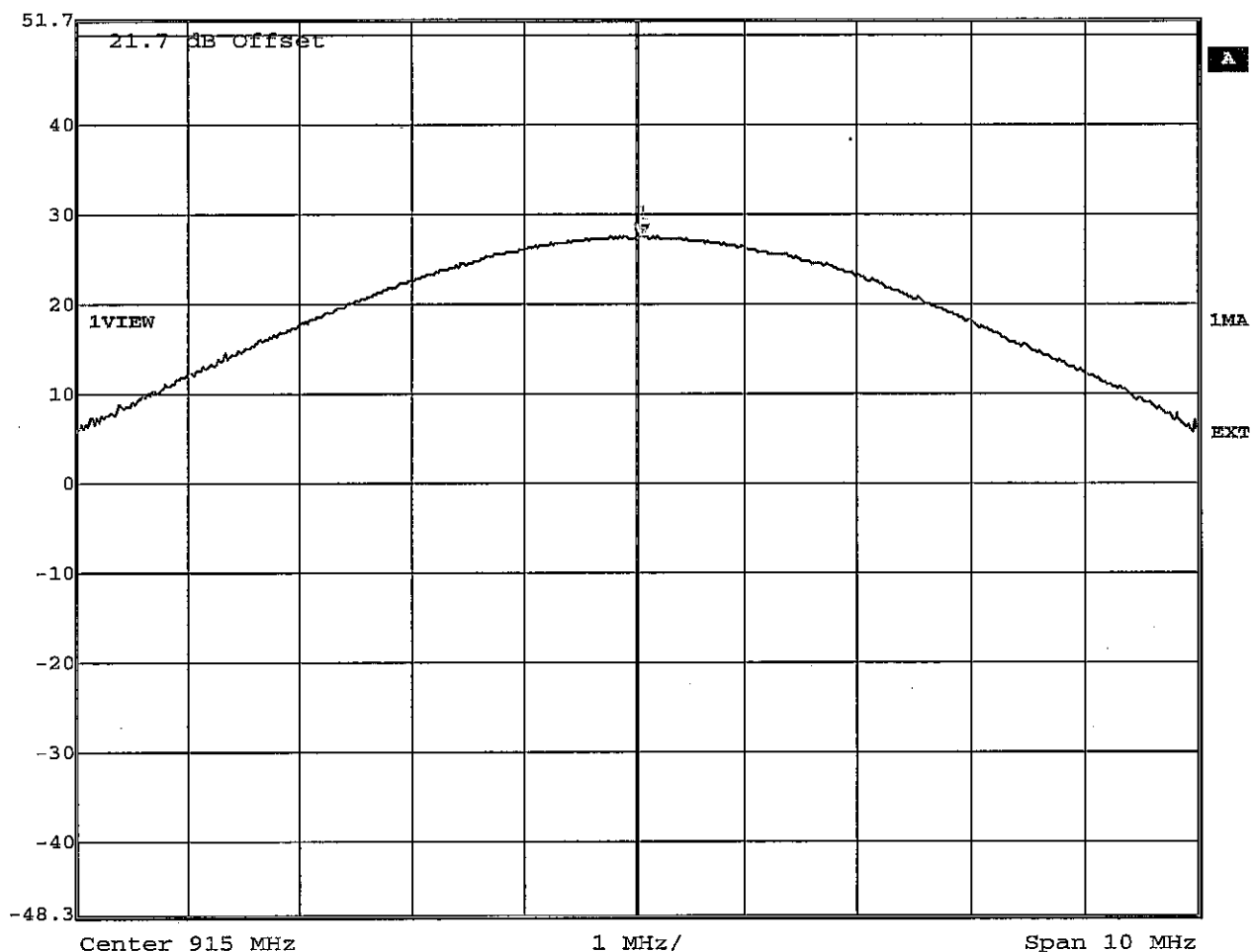
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Marker 1 [T1] RBW 3 MHz RF Att 60 dB
 Ref Lvl 27.28 dBm VBW 3 MHz
 51.7 dBm 915.07014028 MHz SWT 5 ms Unit dBm

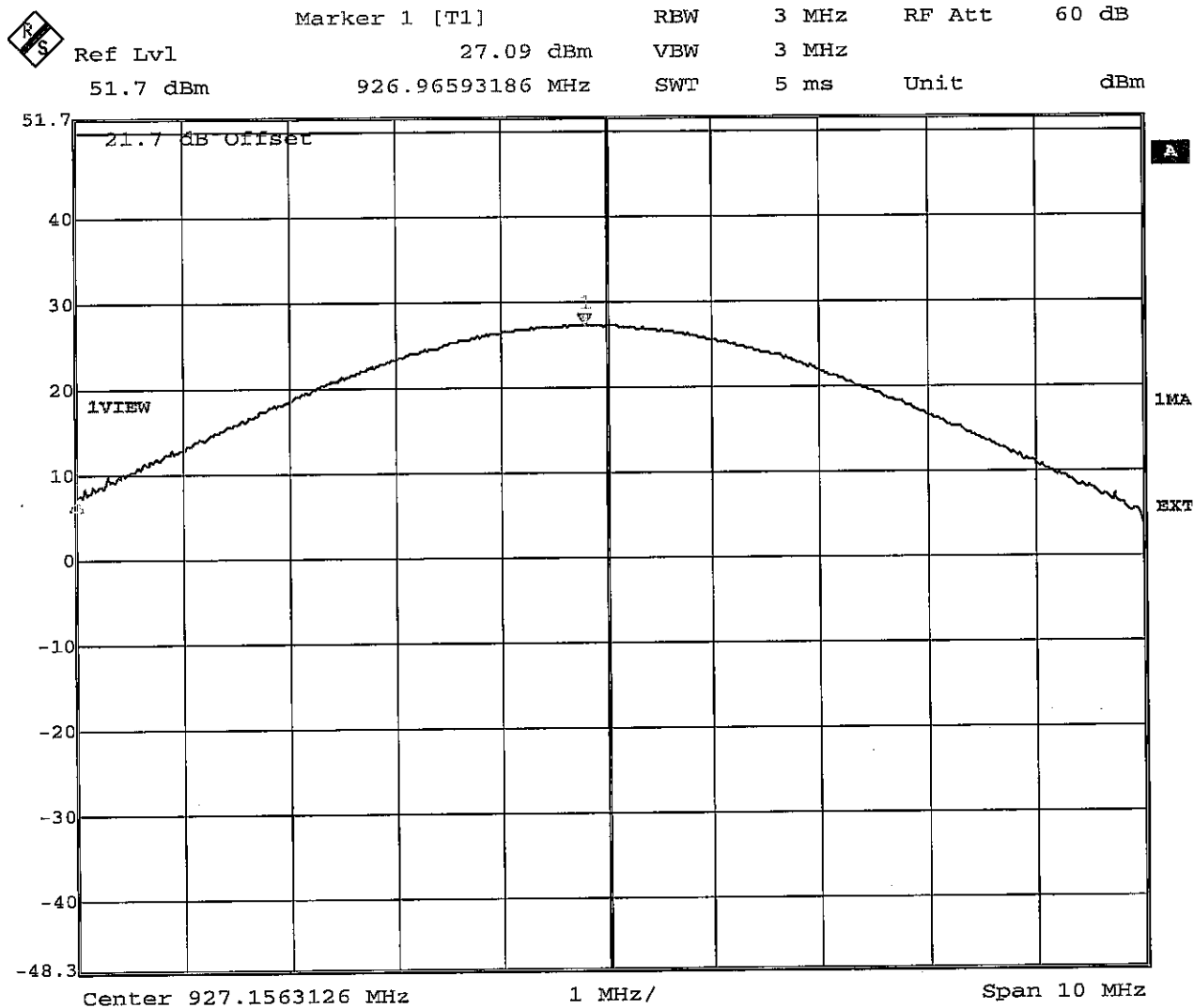


Date: 31.MAR.2006 10:23:33
 Mid channel



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Date: 31.MAR.2006 10:33:12
High channel

5.2. SAR calculation

:

The PDA has a maximum duty cycle of 4.5% and the maximum output power is 630 mW e.i.r.p, the time-averaged output power becomes 28 mW.

Limit: 130 mW



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6. 20 dB BANDWIDTH**6.1 Test protocol**

Date of test: March 29, 2006

EUT mode of operation: TX, hopping on one channel.

Spectrum analyser settings:

Span: 200 kHz

RBW: 10 kHz

VBW: 10 kHz

Sweep time: 5 ms

Detector: Peak

Trace: Max Hold

Channel (MHz)	20 dB Bandwidth (kHz)	Limit value (kHz)
903	44	< 250
915	43	
927	43	



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Marker 1 [T1]

RBW 10 kHz RF Att 60 dB

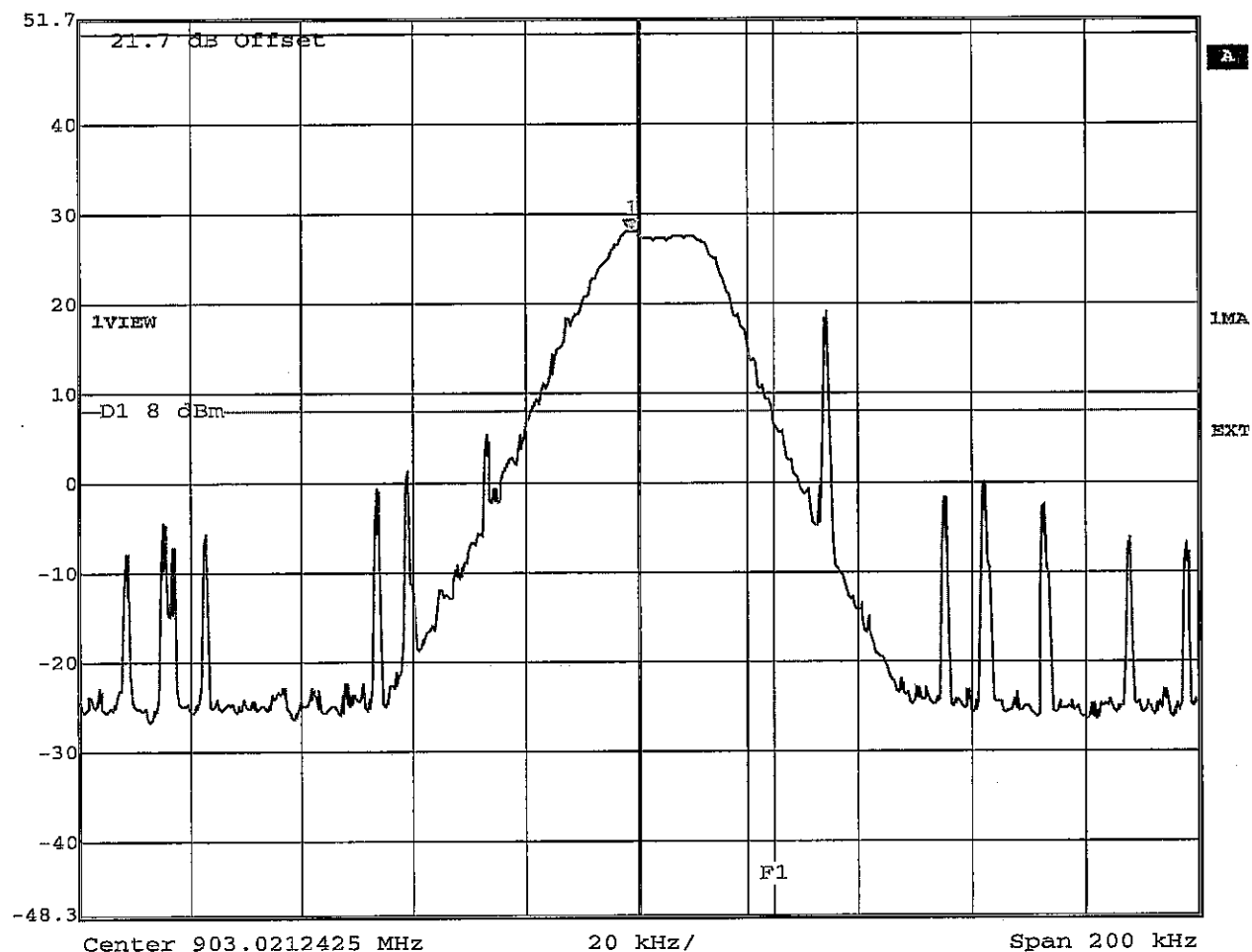
Ref Lvl 27.91 dBm

VBW 10 kHz

51.7 dBm 903.02024048 MHz

SWT 15 ms

Unit dBm



Date: 31.MAR.2006 10:20:45

Low channel

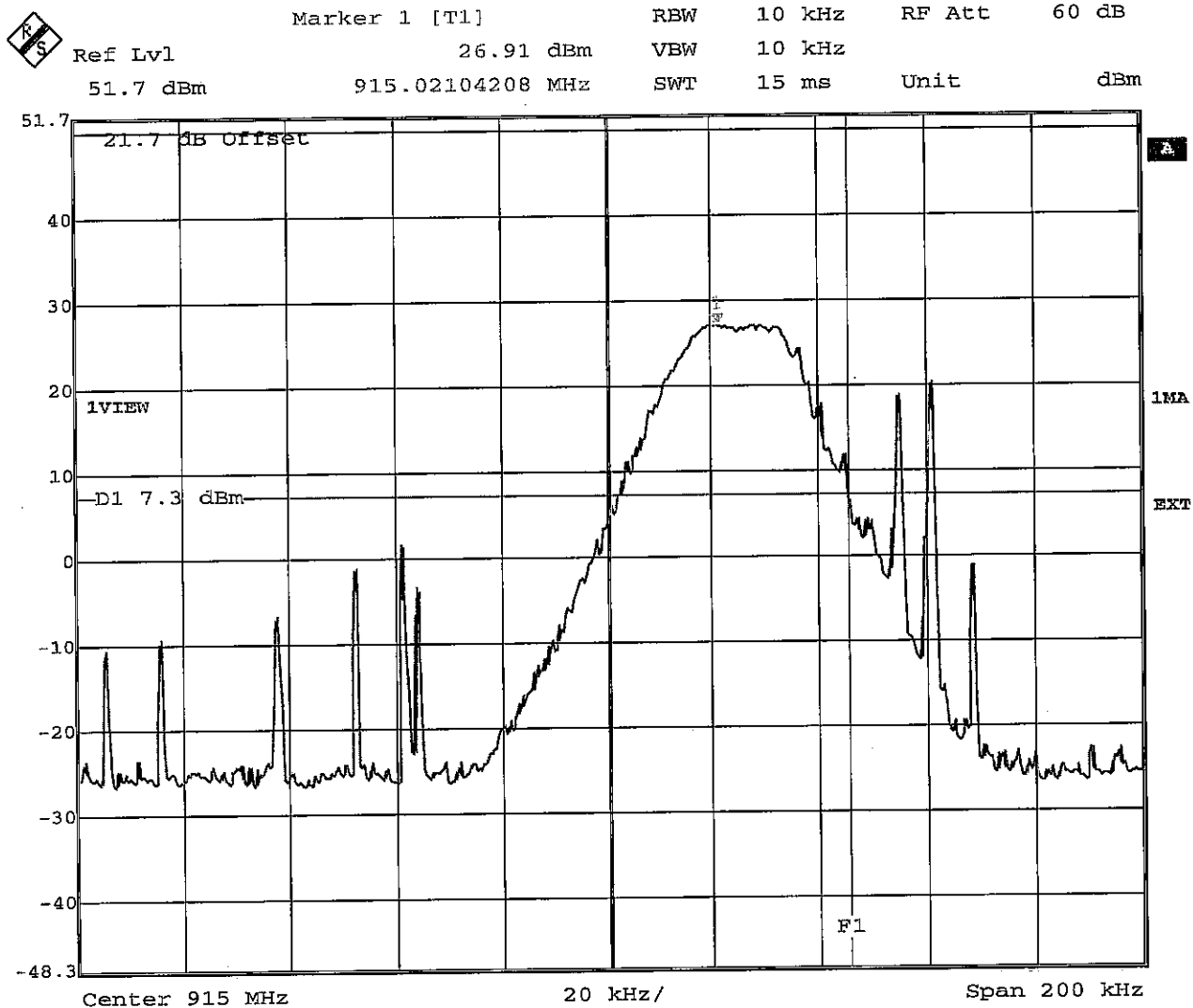


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Mid channel

High channel, No plot



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7. CARRIER FREQUENCY SEPARATION

7.1 Test protocol

Date of test: March 29, 2006

EUT mode of operation: TX and hopping on.

Spectrum analyser settings:

Span: 150 kHz
 RBW: 3 kHz
 VBW: 3 kHz
 Sweep time: Auto
 Detector: Peak
 Trace: Max Hold

Channel (MHz)	Carrier frequency separation from the next channel		Limit value (kHz)
	To the right (kHz)	To the left (kHz)	
903	55,5	-	> 44
915	50,2	50,2	> 43
927	-	51,2	> 43

Limit = Result from the 20 dB Bandwidth measurements



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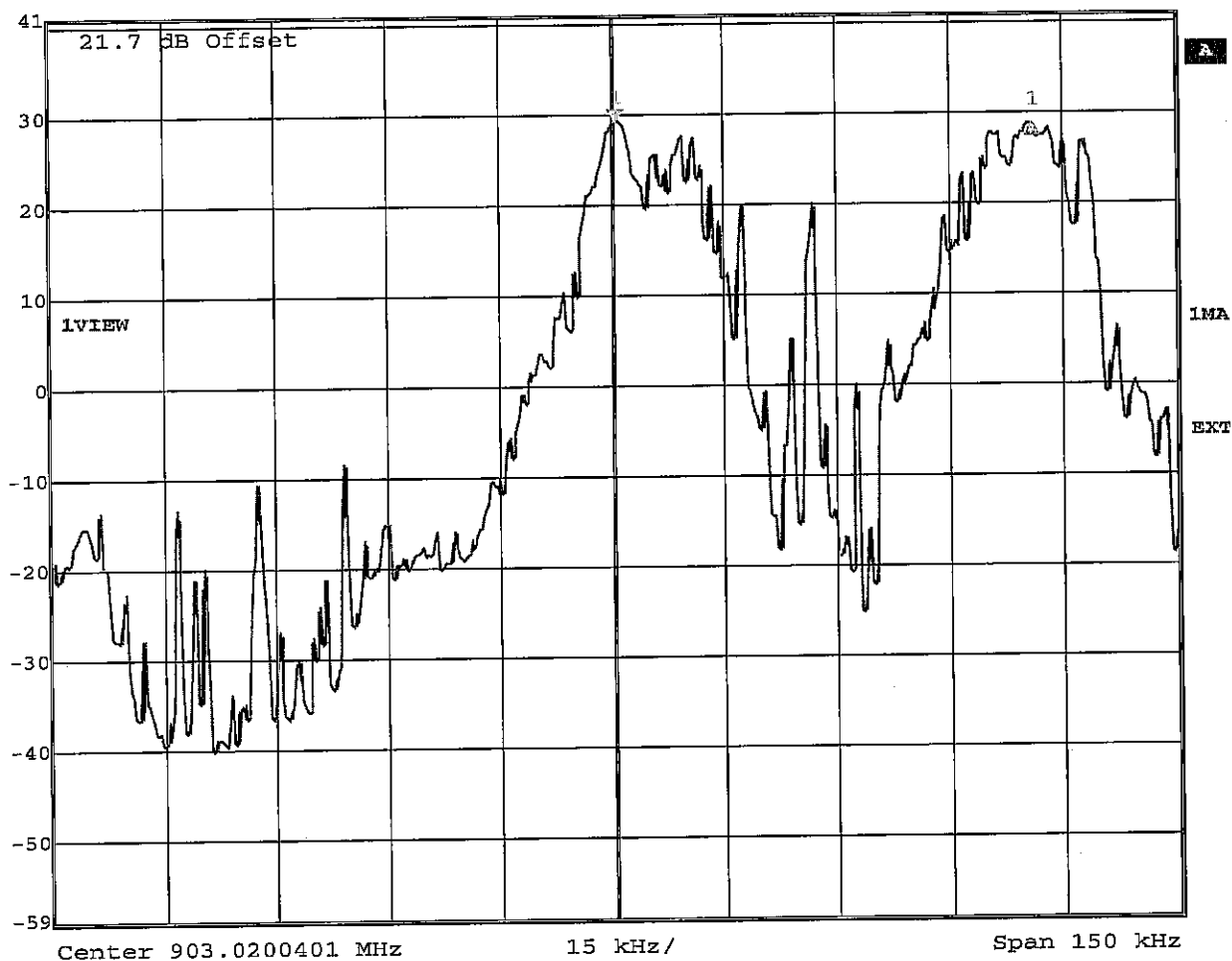
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Delta 1 [T1]	RBW	3 kHz	RF Att	40 dB
Ref Lvl	-0.44 dB	VBW	3 kHz	
41 dBm	55.46092184 kHz	SWT	50 ms	Unit dBm



Date: 29.MAR.2006 12:39:53
Low channel

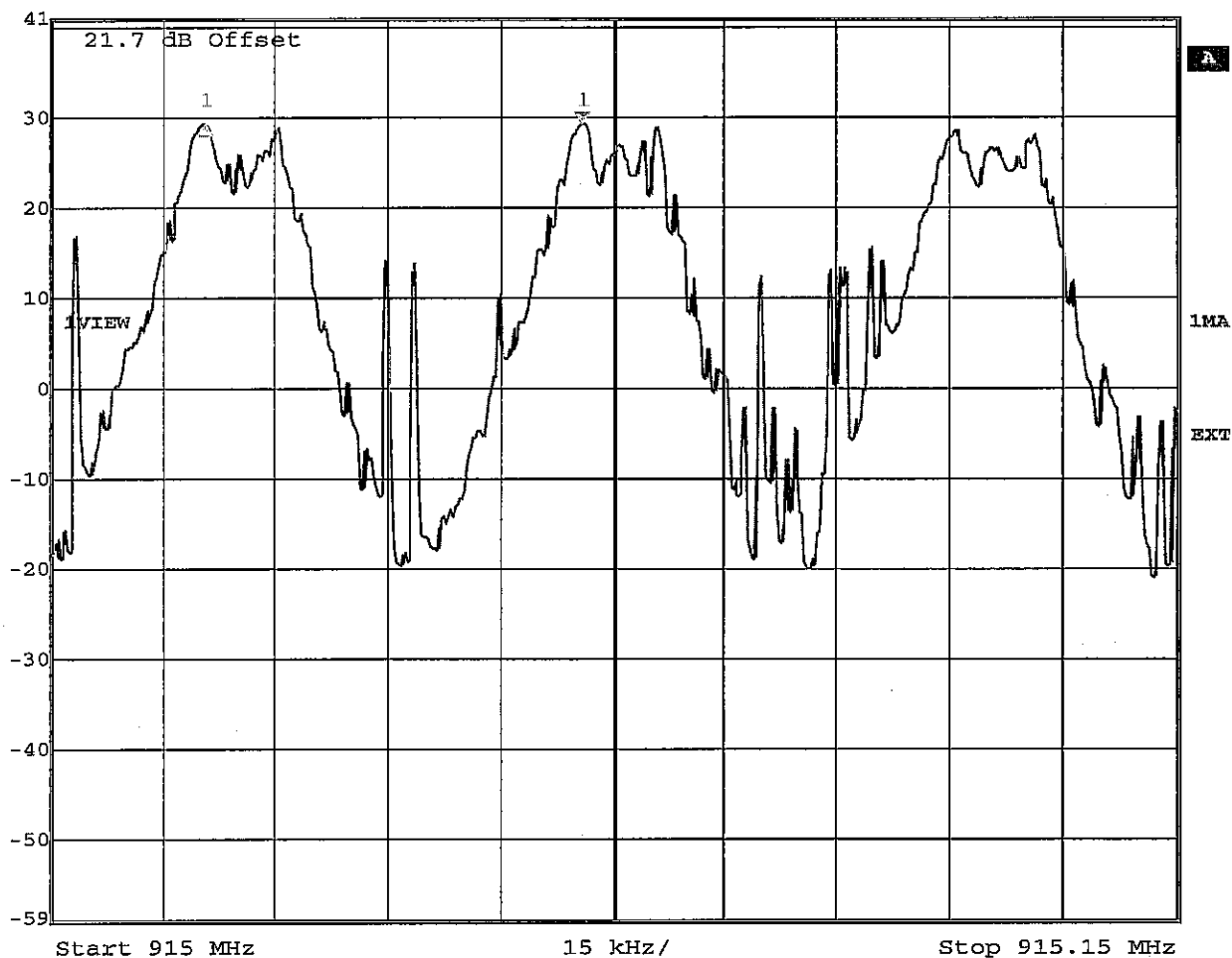


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Delta 1 [T1] RBW 3 kHz RF Att 40 dB
 Ref Lvl -0.00 dB VBW 3 kHz
 41 dBm -50.20040080 kHz SWT 50 ms Unit dBm



Date: 29.MAR.2006 12:47:36
 Mid channel

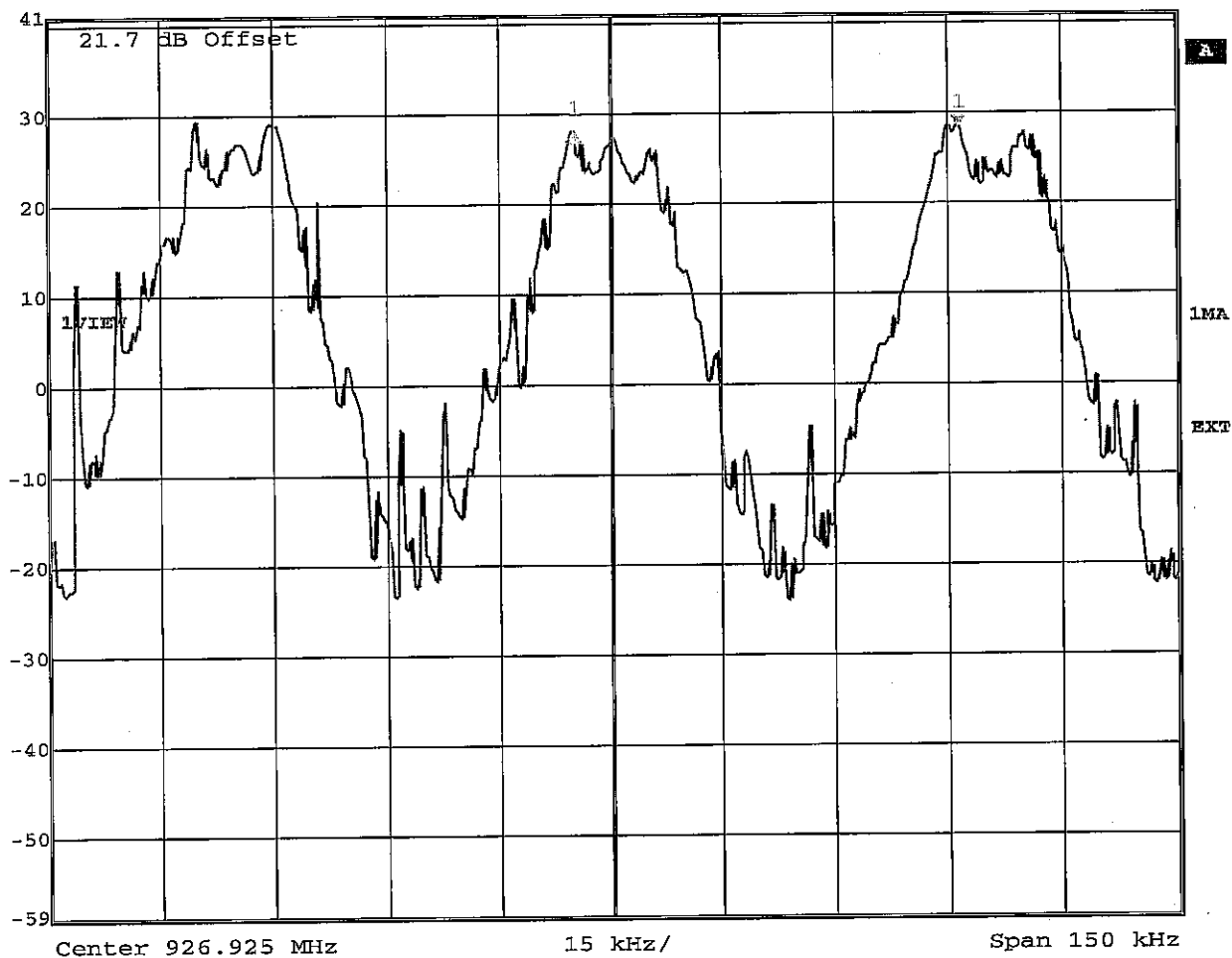


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Ref Lvl	Delta 1 [T1]	RBW	3 kHz	RF Att	40 dB
41 dBm	-0.39 dB	VBW	3 kHz		
	-51.20240481 kHz	SWT	50 ms	Unit	dBm



Date: 29.MAR.2006 12:55:31
High channel



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8. NUMBER OF HOPPING CHANNELS

8.1 Test protocol

Date of test: March 29, 2006

EUT mode of operation: TX and hopping on.

Spectrum analyser settings:

Start frequency: 902 MHz

Stop frequency: 906 MHz

RBW: 20 kHz

VBW: 20 kHz

Sweep time: Auto

Detector: Peak

Trace: Max Hold

Frequency band	Number of hopping channels	Limit value
903 MHz	50	≥ 50
915 MHz	50	≥ 50
927 MHz	50	≥ 50



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Marker 1 [T1]

RBW

20 kHz

RF Att

40 dB

Ref Lvl

23.94 dBm

VBW

20 kHz

41 dBm

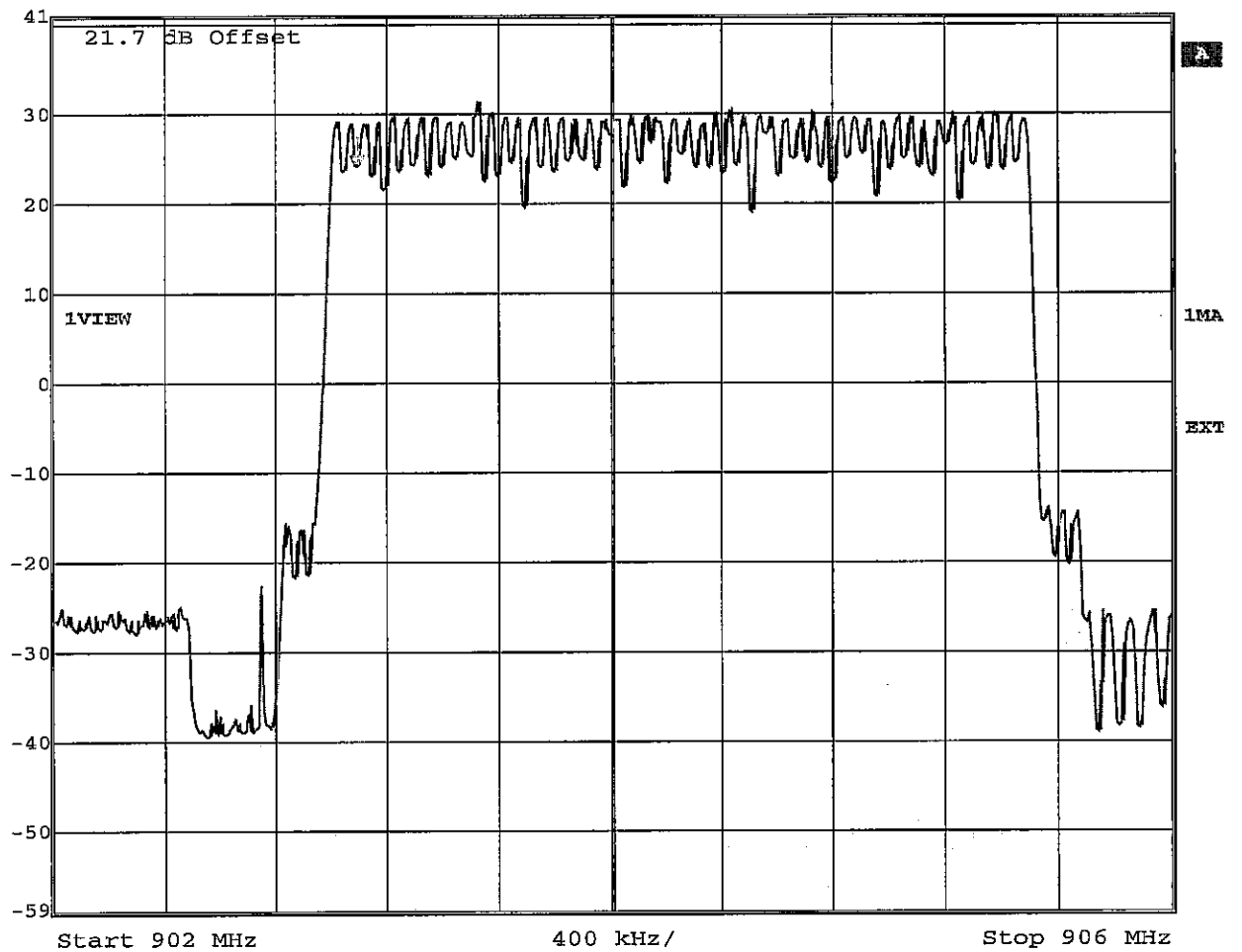
903.09468938 MHz

SWT

25 ms

Unit

dBm



Date: 29.MAR.2006 10:07:01
Low channel



Intertek Semko AB

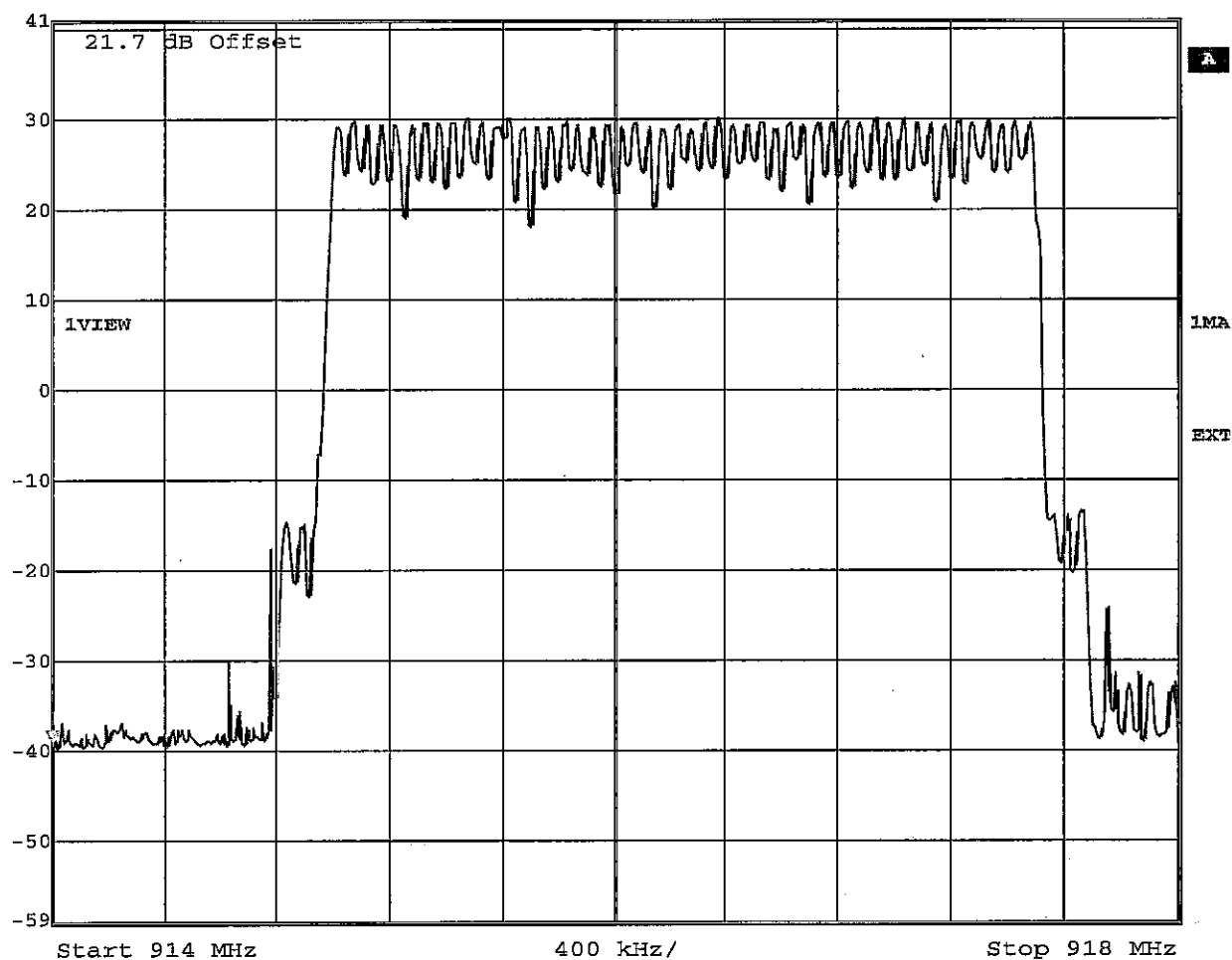
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Marker 1 [T1] RBW 20 kHz RF Att 40 dB
 Ref Lvl -39.01 dBm VBW 20 kHz
 41 dBm 914.00000000 MHz SWT 25 ms Unit dBm



Date: 29.MAR.2006 10:15:28
 Mid channel

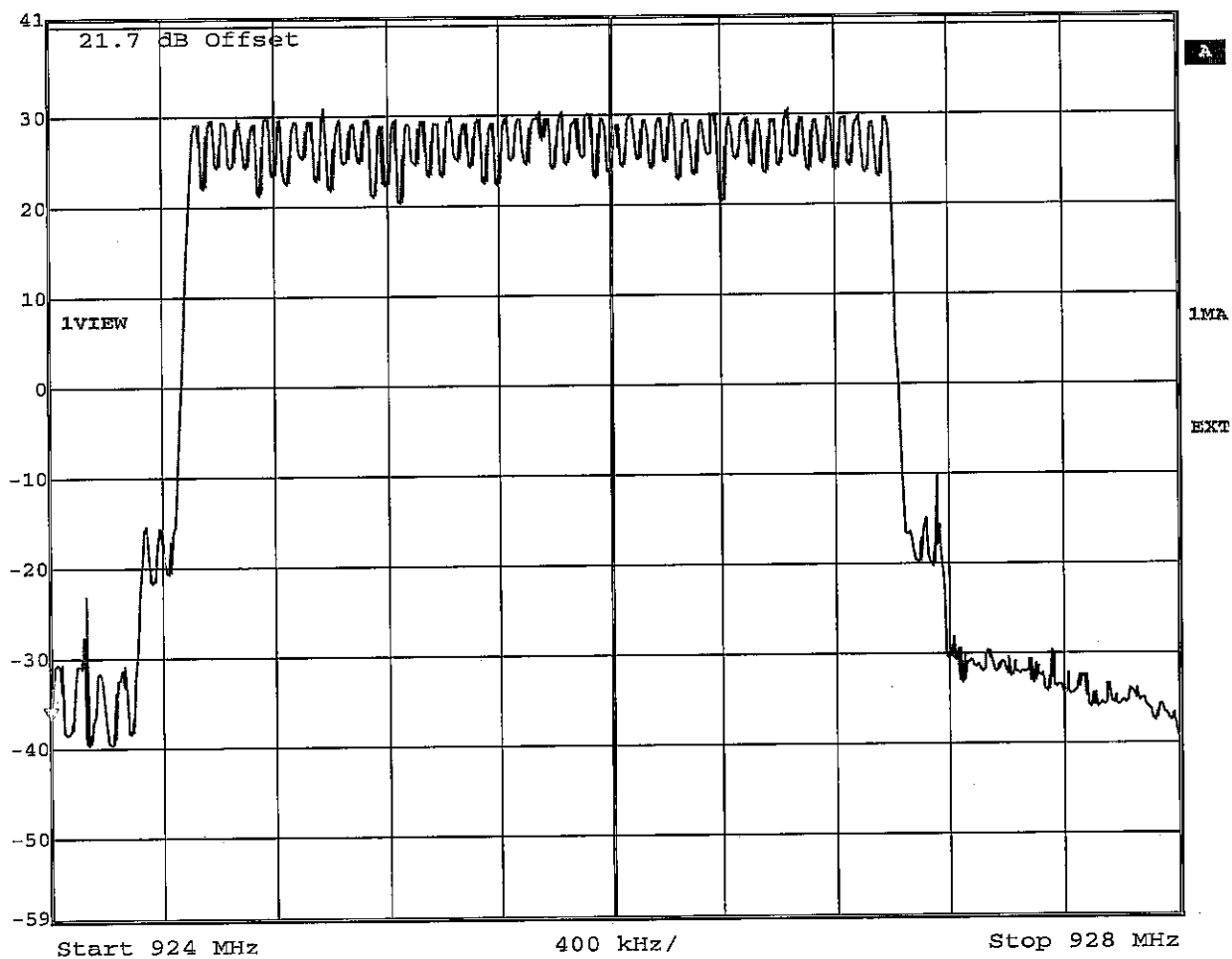


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Marker 1 [T1] RBW 20 kHz RF Att 40 dB
Ref Lvl -36.99 dBm VBW 20 kHz
41 dBm 924.00000000 MHz SWT 25 ms Unit dBm



Date: 29.MAR.2006 10:19:12
High channel



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9. TIME OF OCCUPANCY (DWELL TIME)

9.1 Test protocol

Date of test: March 29, 2006

EUT mode of operation: TX and hopping on.

Spectrum analyzer settings:

Determination of transmitting time T

Span: 0 Hz
 RBW: 1 MHz
 VBW: 1 MHz
 Sweep time: 50 ms
 Continuous sweep
 Detector: Peak
 Trace: Clear/Write
 Trigger: Video

Determination of the number of times n the channel is active during the sweep time of 20 s

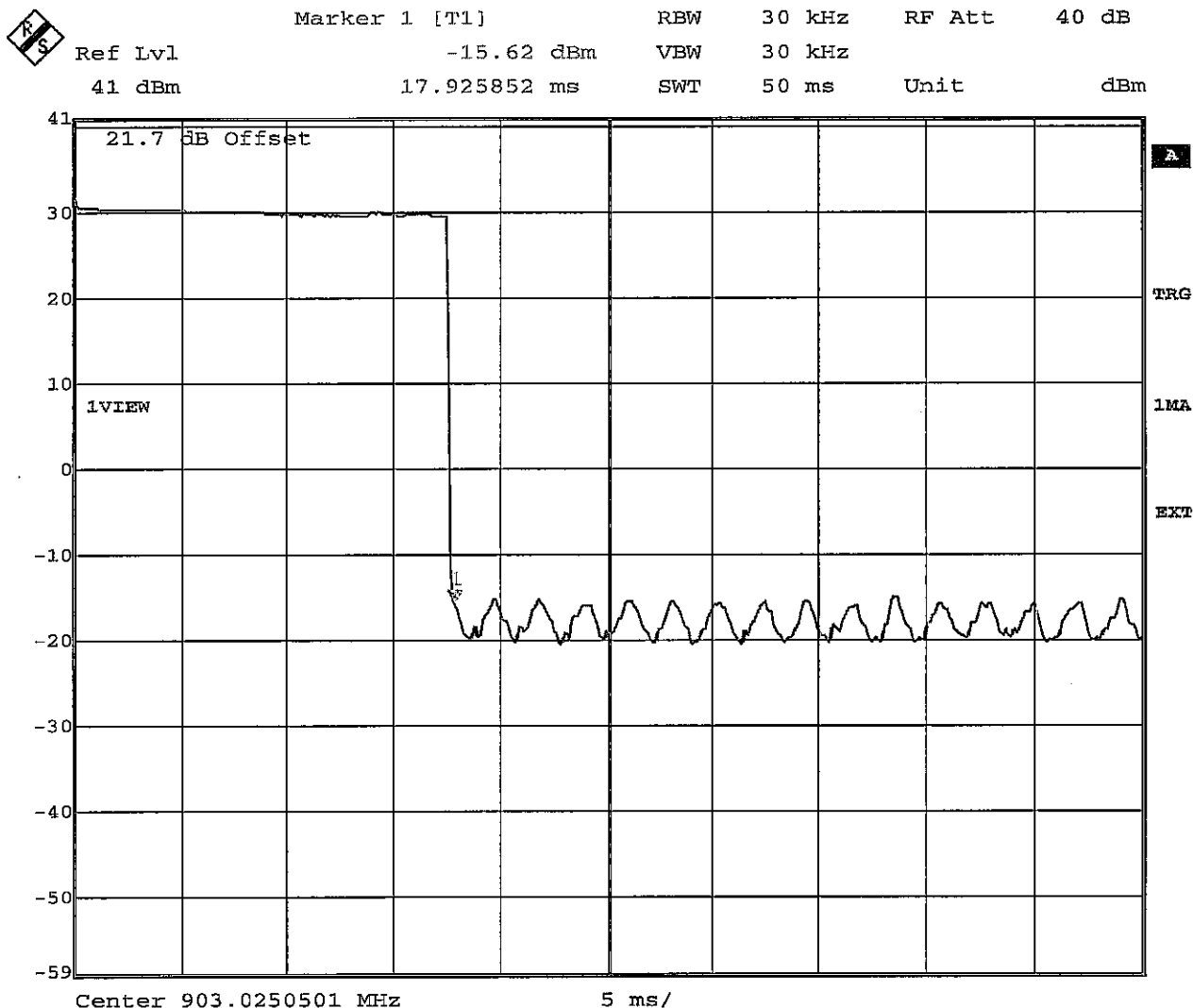
RBW: 30 kHz
 VBW: 30 kHz
 Sweep time: 20 s
 Single sweep

Test parameters	Channel (MHz)			Limit value (s)
	903	915	927	
T (ms)	17,9	17,8	18,0	-
n	1	1	1	-
Dwell time (s) = T · n	0.018	0.018	0.018	< 0,4



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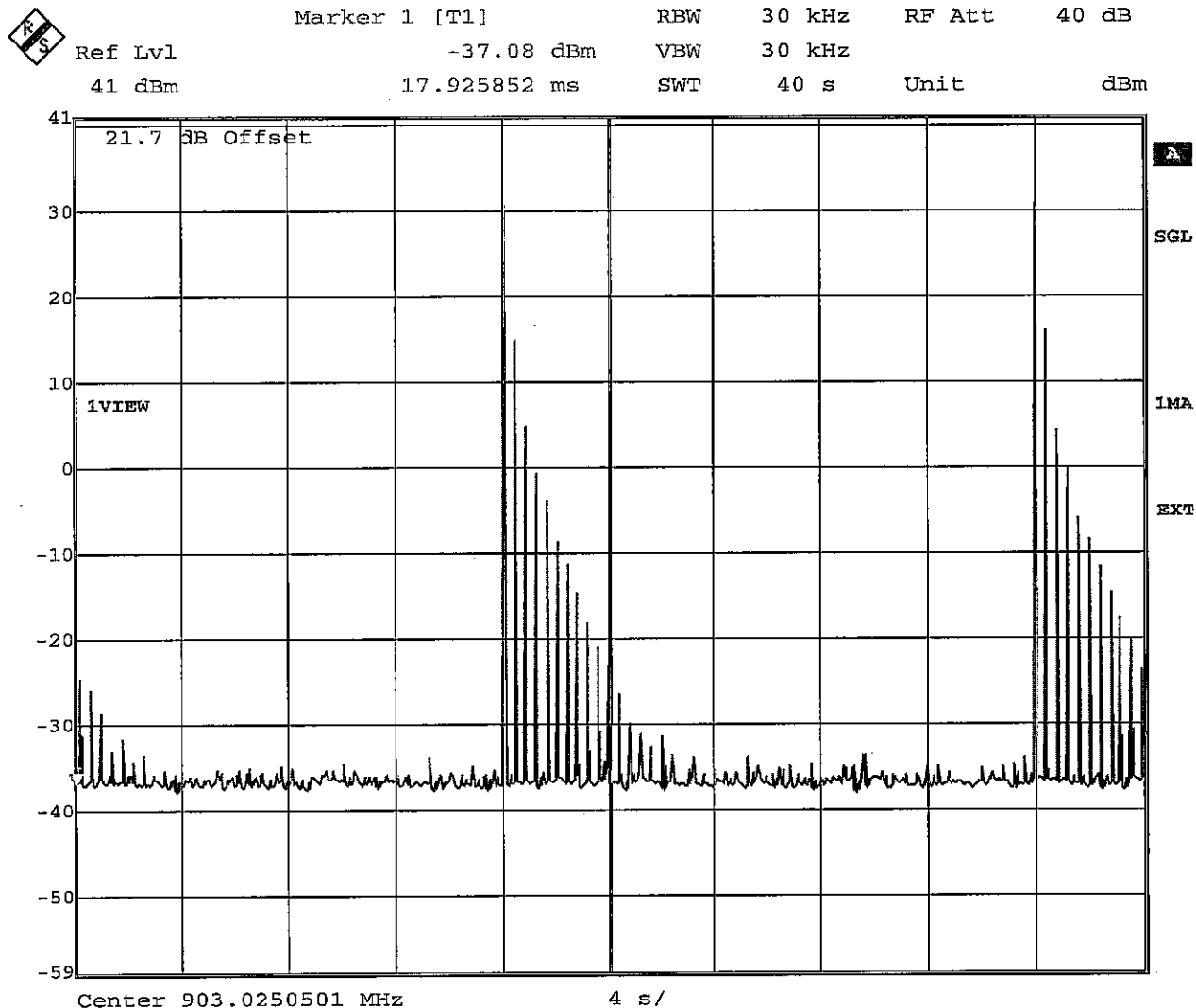


Date: 29.MAR.2006 13:29:28



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Low channel



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Marker 1 [T1]

RBW 30 kHz RF Att 40 dB

Ref Lvl -41.72 dBm

VBW 30 kHz

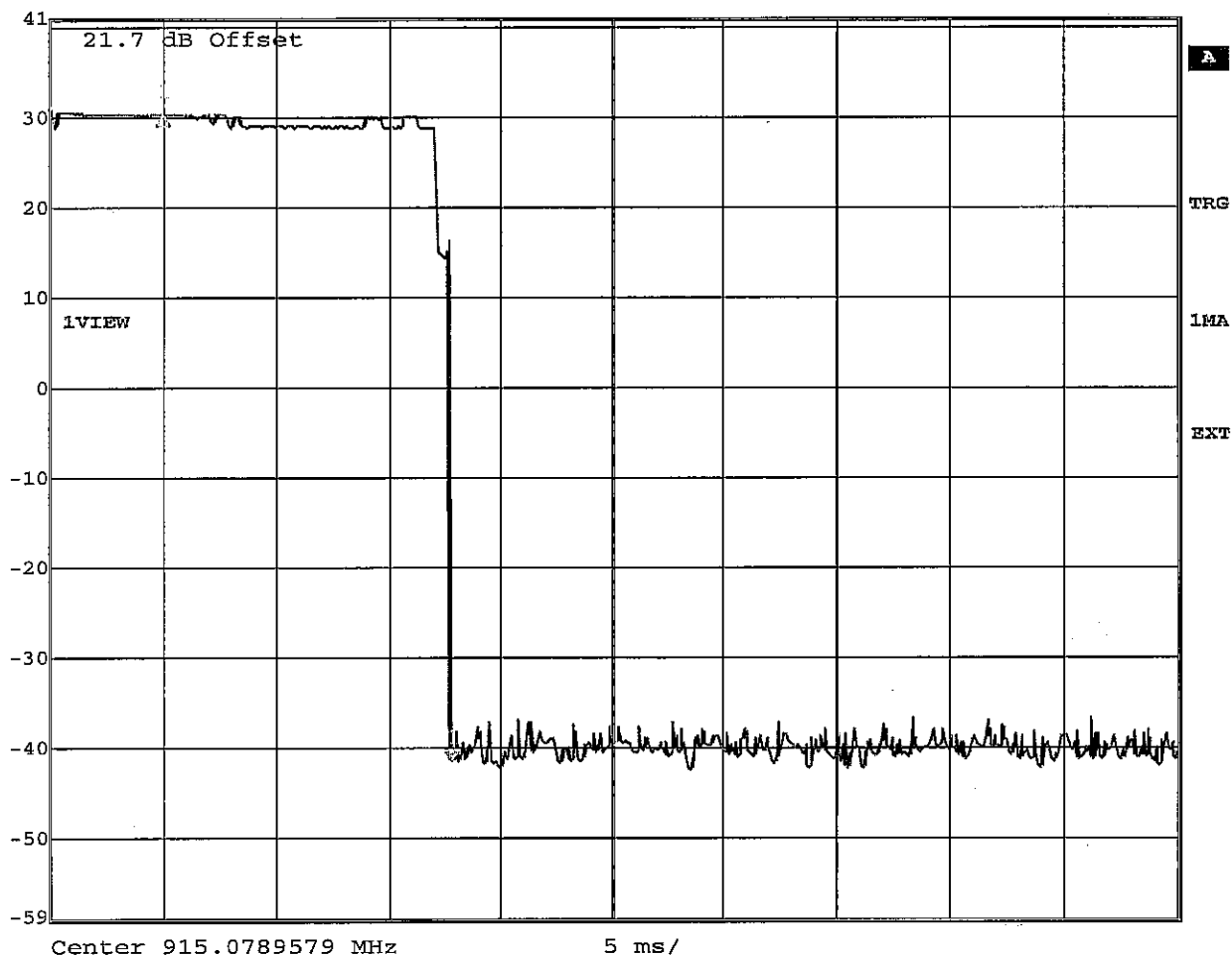
41 dBm

17.825651 ms

SWT 50 ms

Unit

dBm



Date: 29.MAR.2006 13:23:33

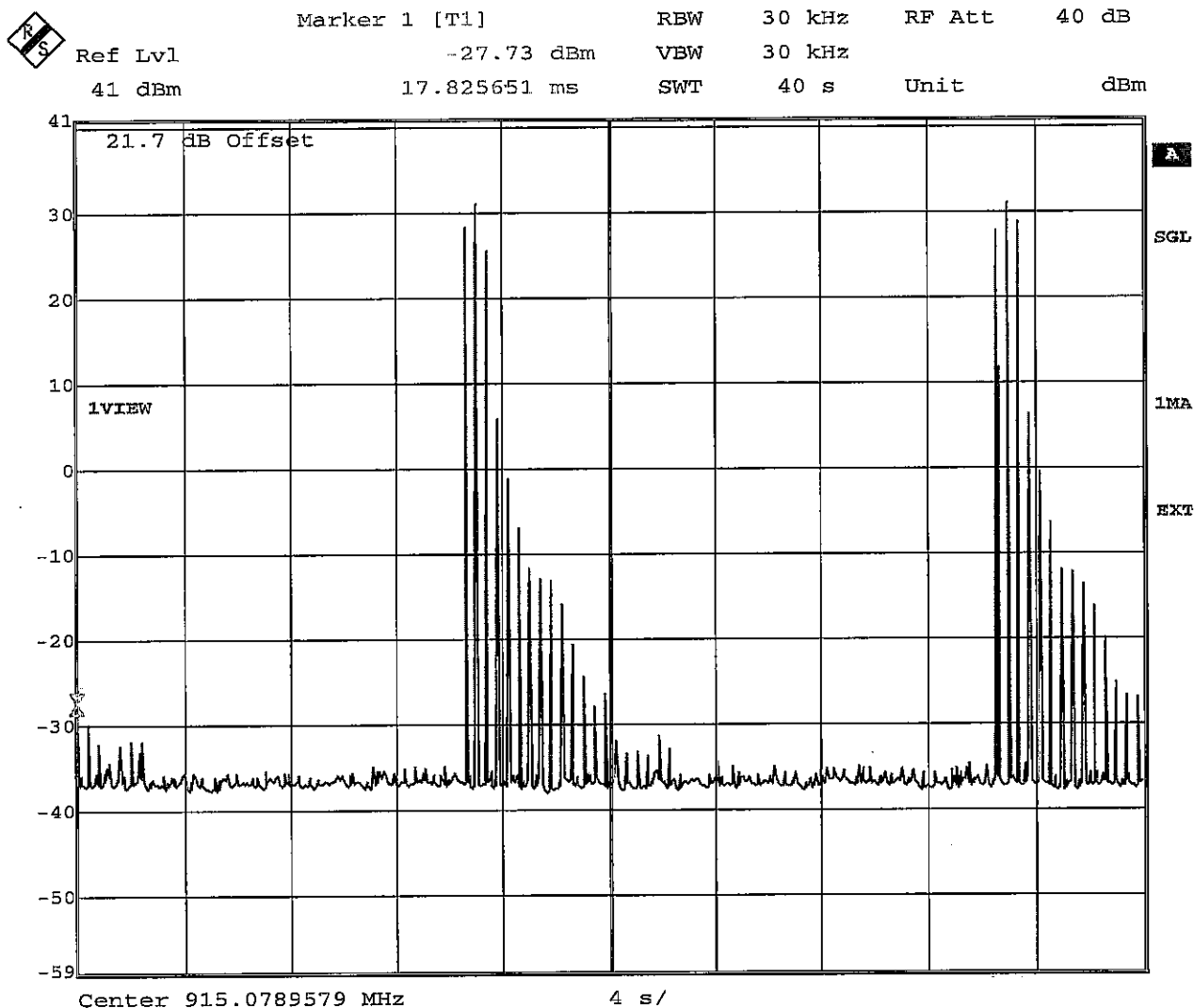


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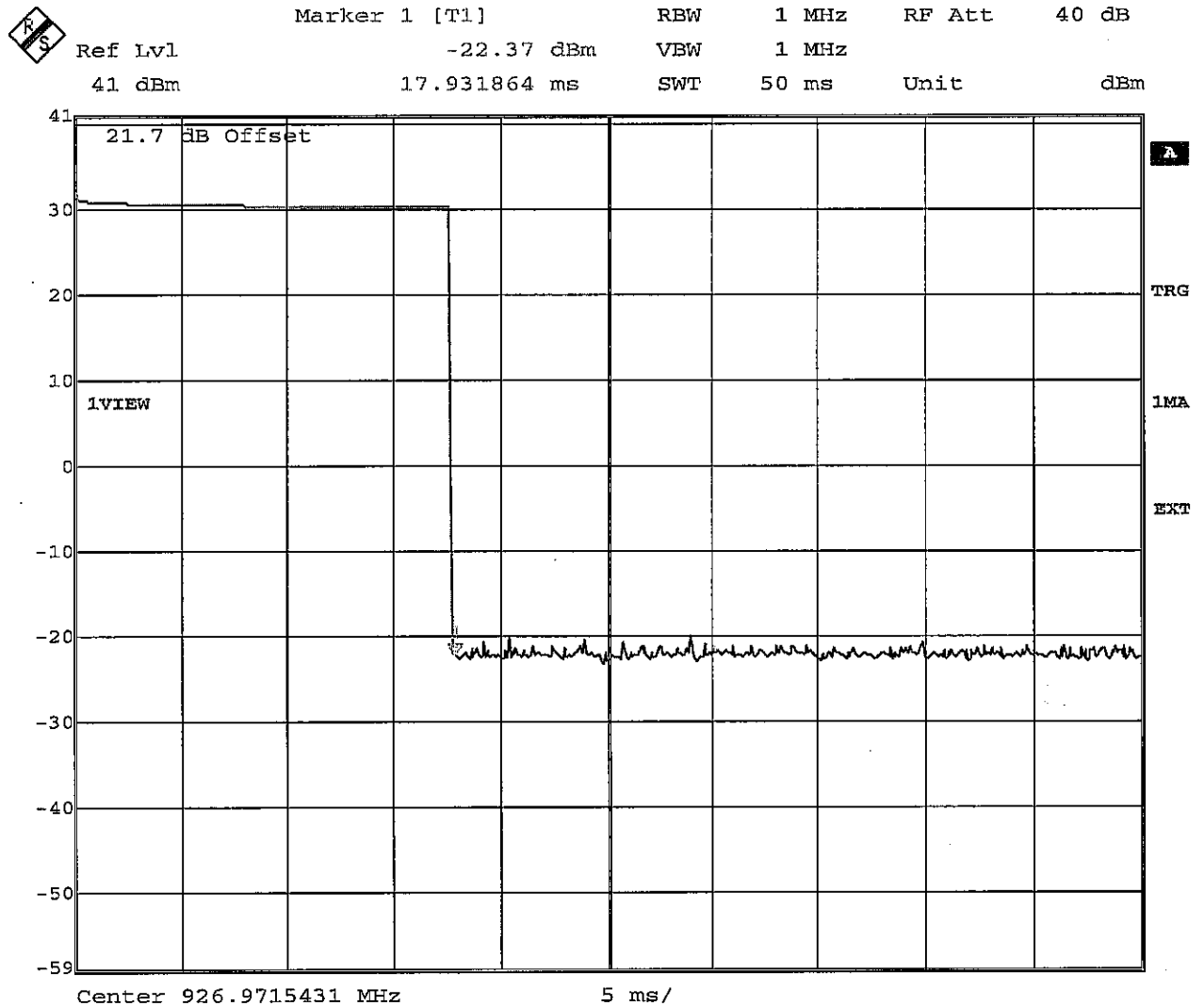


Date: 29.MAR.2006 13:25:39
Mid channel



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Date: 29.MAR.2006 13:09:33

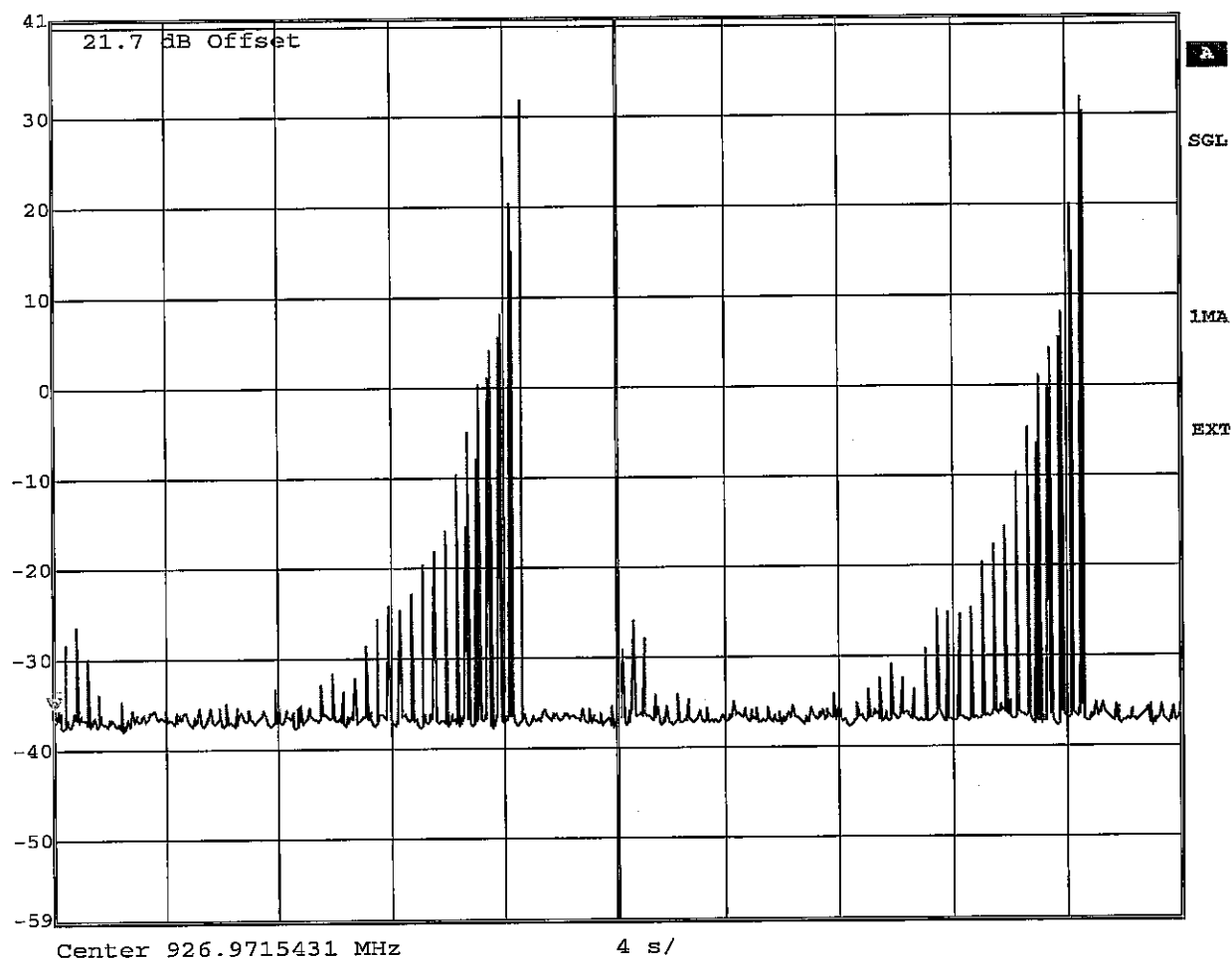


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Marker 1 [T1] RBW 30 kHz RF Att 40 dB
 Ref Lvl -35.72 dBm VBW 30 kHz
 41 dBm 17.931864 ms SWT 40 s Unit dBm



Date: 29.MAR.2006 13:17:02
 High channel



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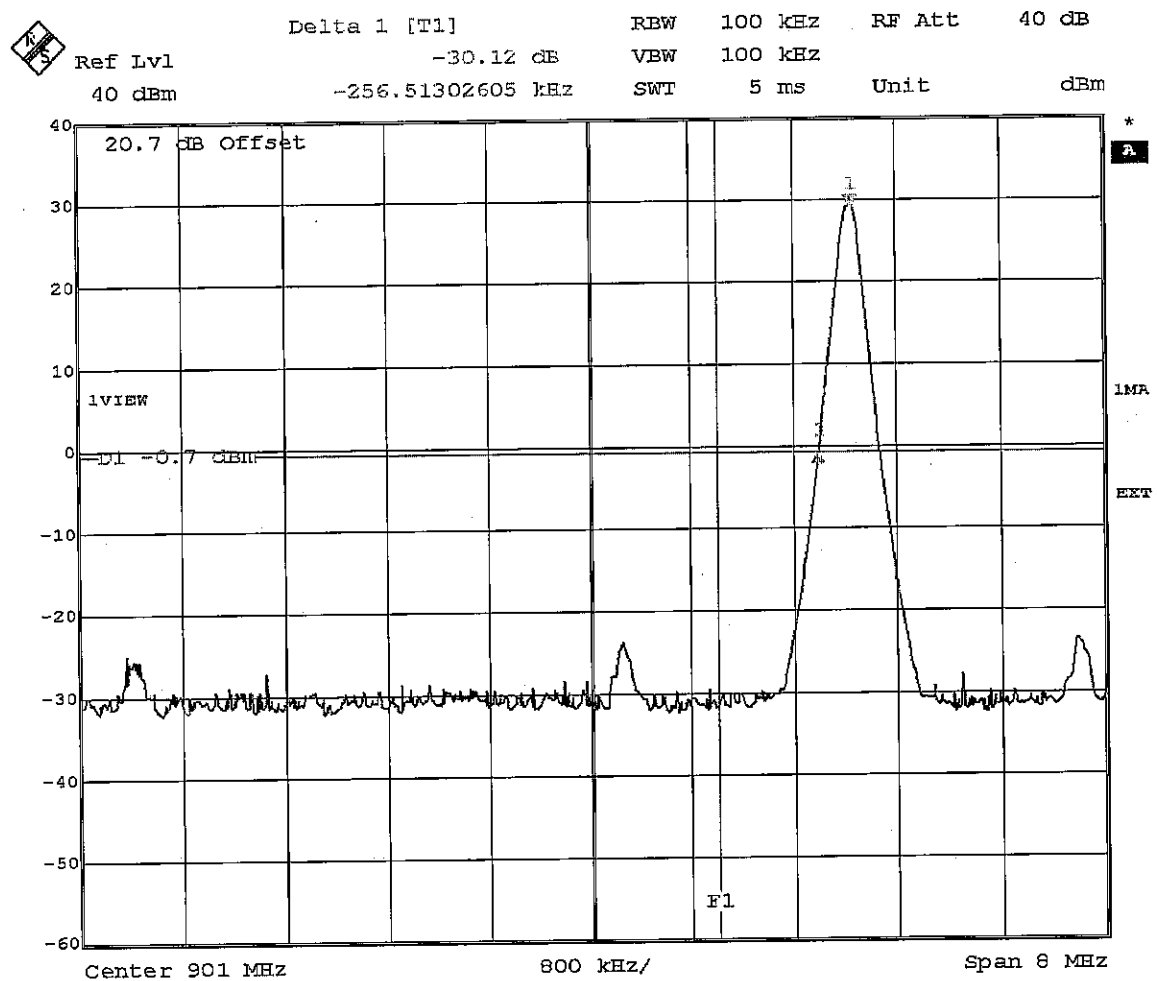
10. BAND EDGE COMPLIANCE

10.1 Test protocol

Date of test: March 29, 2006

Band edge compliance at 903 MHz

Sweep with peak detector, Frequency hopping disabled



Date: 29.MAR.2006 14:03:13

Limit = Red line D1 corresponds to 30 dBc.



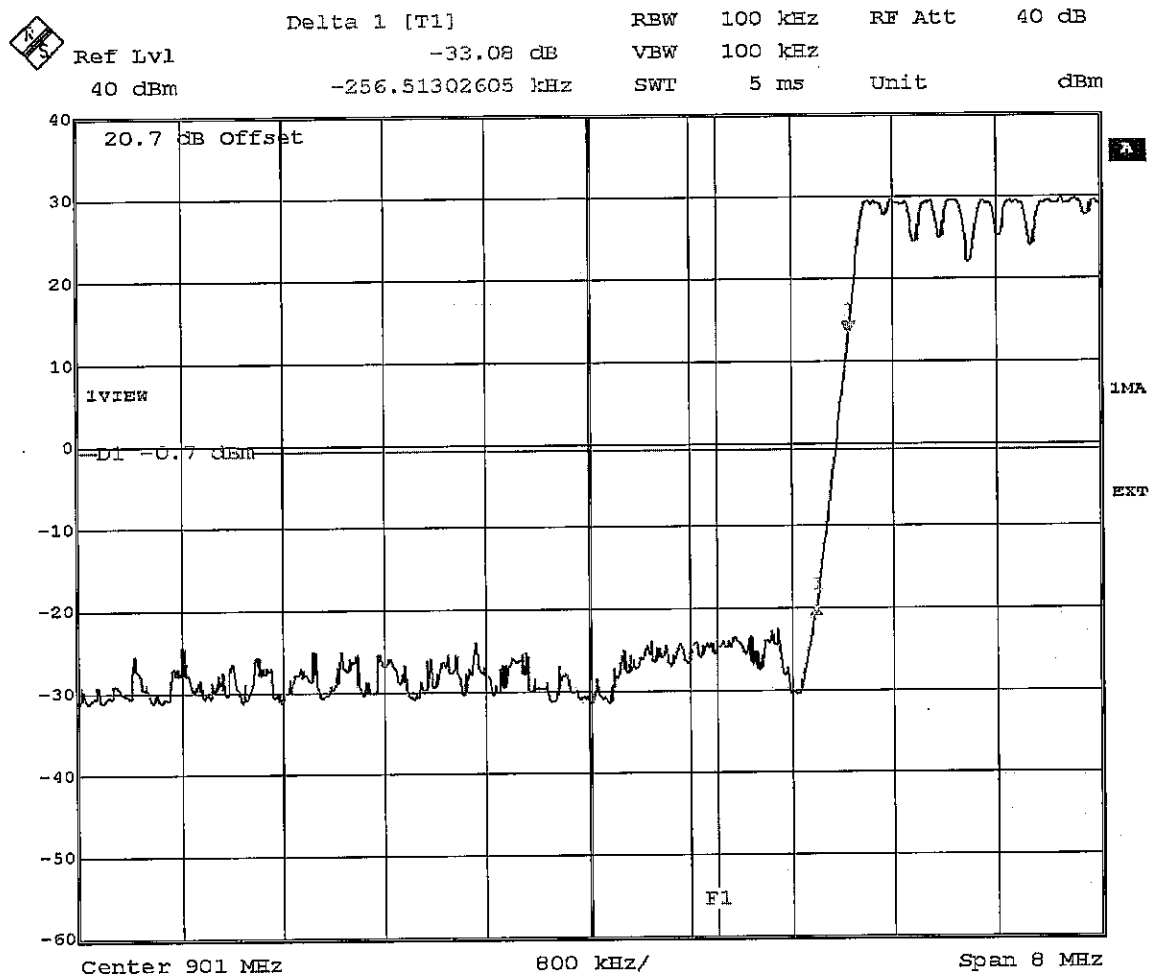
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Sweep with peak detector, Frequency hopping enabled



Date: 29.MAR.2006 14:06:31

Limit = Line D1 corresponds to 30 dBc.



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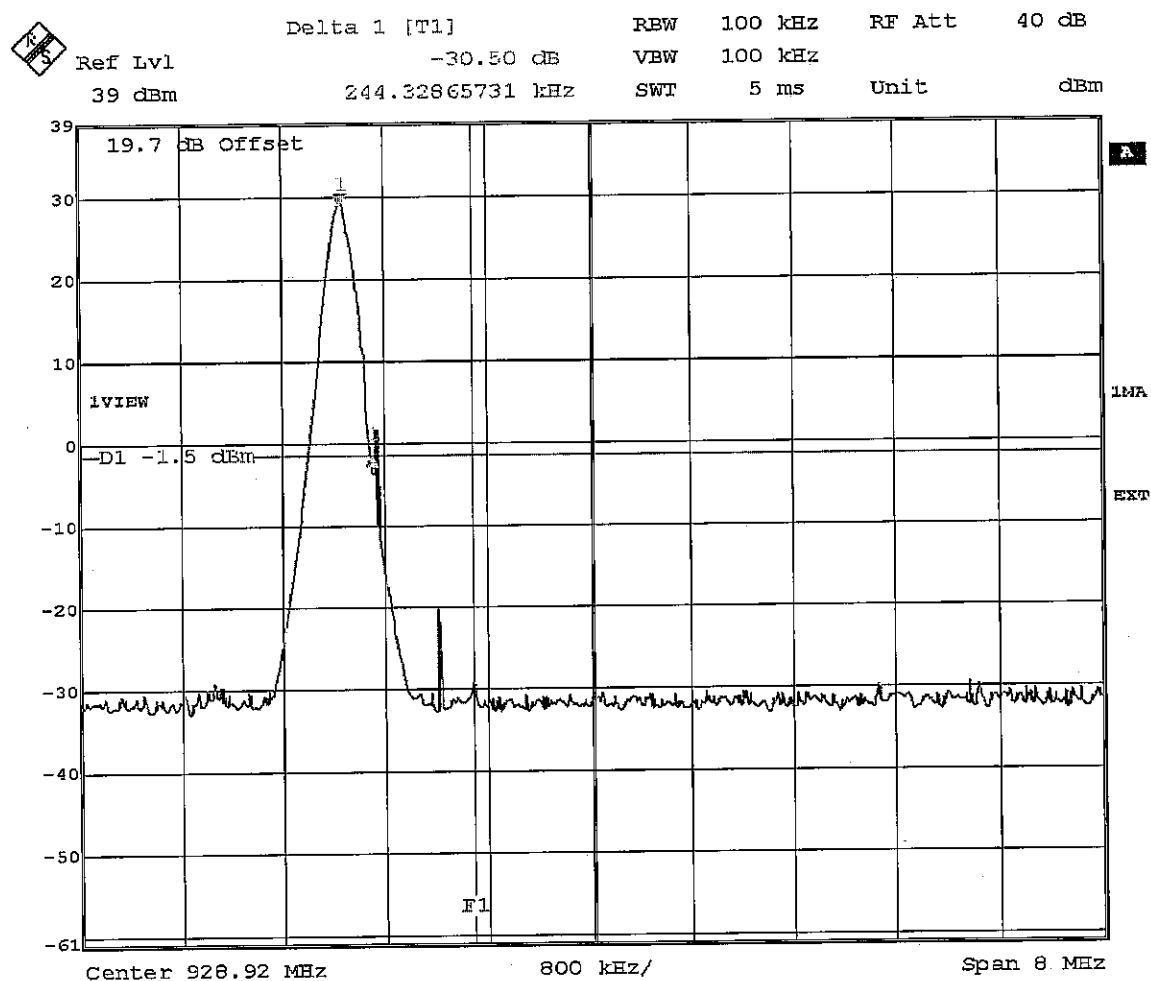
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Band edge compliance at 927 MHz

Sweep with peak detector, Frequency hopping disabled



Date: 29.MAR.2006 14:11:23

Limit = Line D1 corresponds to 30 dBc.



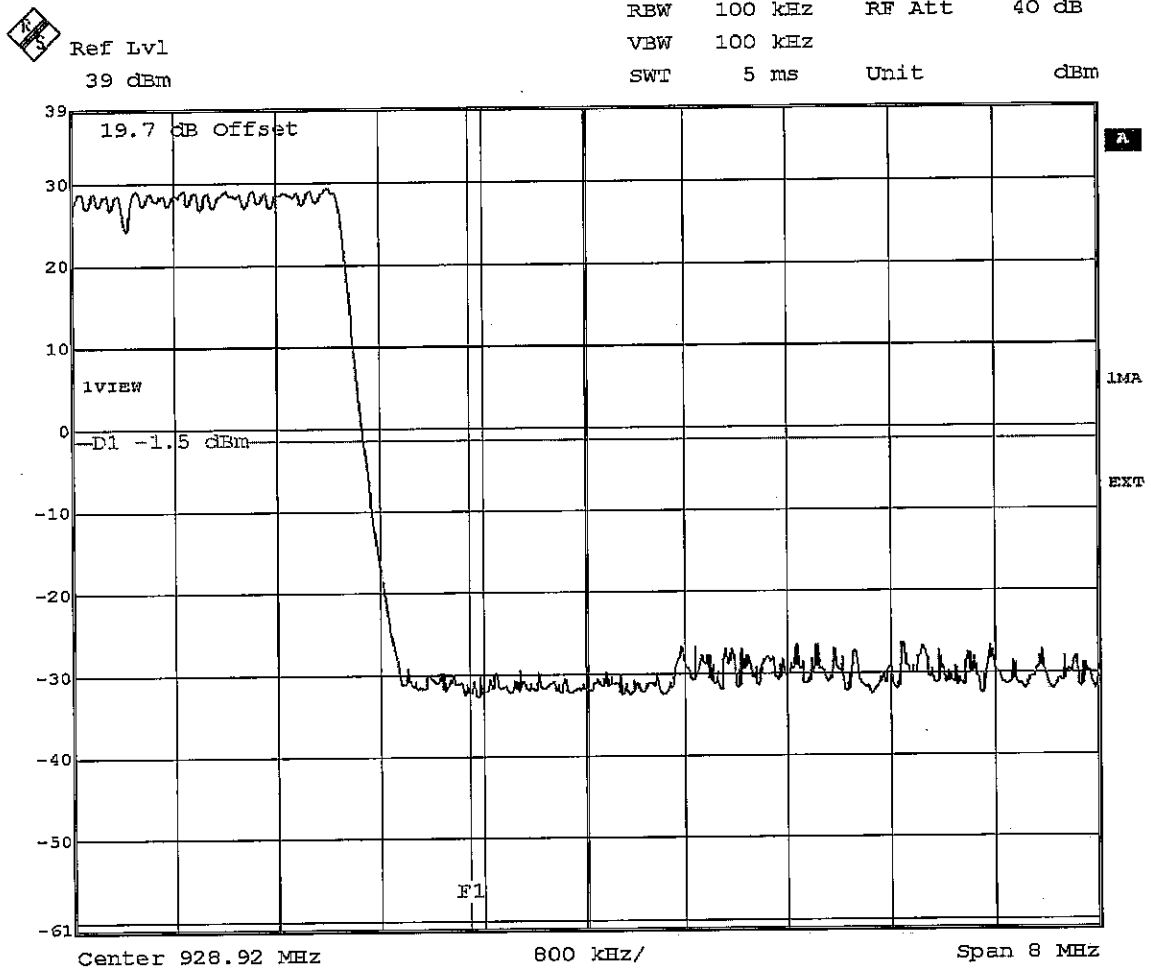
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Sweep with peak detector, Frequency hopping enabled



Date: 29.MAR.2006 14:16:12

Limit = Line D1 corresponds to 30 dBc.



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11. RADIATED SPURIOUS EMISSIONS

11.1 Measurement uncertainty

Radiated disturbance electric field intensity, 30 – 1000 MHz: $\pm 4,6$ dB
 Radiated disturbance electric field intensity, 1000 – 18000 MHz: $\pm 6,0$ 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

Equipment	Manufacturer	Type	SEMKO No.
<i>Test site: Semi-anechoic shielded chamber, 6 x 9 x 6 m (W x L x H)</i>			30900,
30901			
Software:	Rohde & Schwarz	EMC 32	
Measurement receiver:	Rohde & Schwarz	ESCI	12798
Antenna, bilog:	Rohde & Schwarz	HL-562	30711
<i>Test site: Bluetooth anechoic shielded chamber, 3,7 x 7,0 x 2,4 m (W x L x H)</i>			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
Horn antenna:	EMCO	3160-08	30099
Horn antenna:	EMCO	3160-09	30101
High pass filter	K & L	11SH10-1300-U4000-0/0	5133
Band rejection filter	K & L	3TNF-800/1000-0.2-N/N	12389
Transformer	Tufvassons	AFM-1500	30317



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11.3 Measurement set-up

Test site: 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 stand by test.

Test set-up photos:

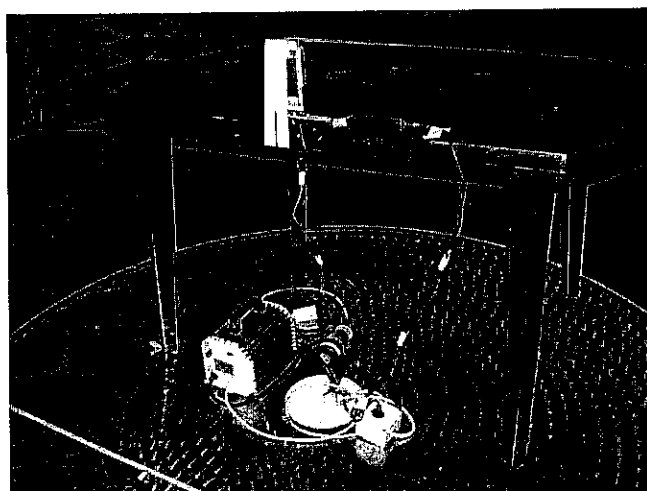


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Test site: Radio anechoic shielded chamber (1 – 10 GHz)

In the Radio anechoic chamber the EUT was placed on a non-metallic table, 1,4 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 placed 1,4 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 (60 Hz) during the stand by test.
Test set-up photo:

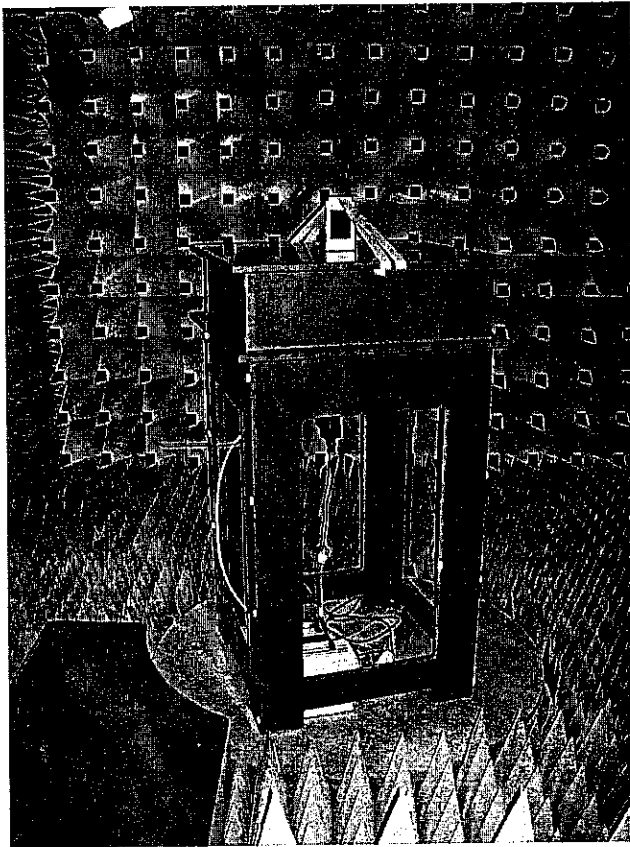


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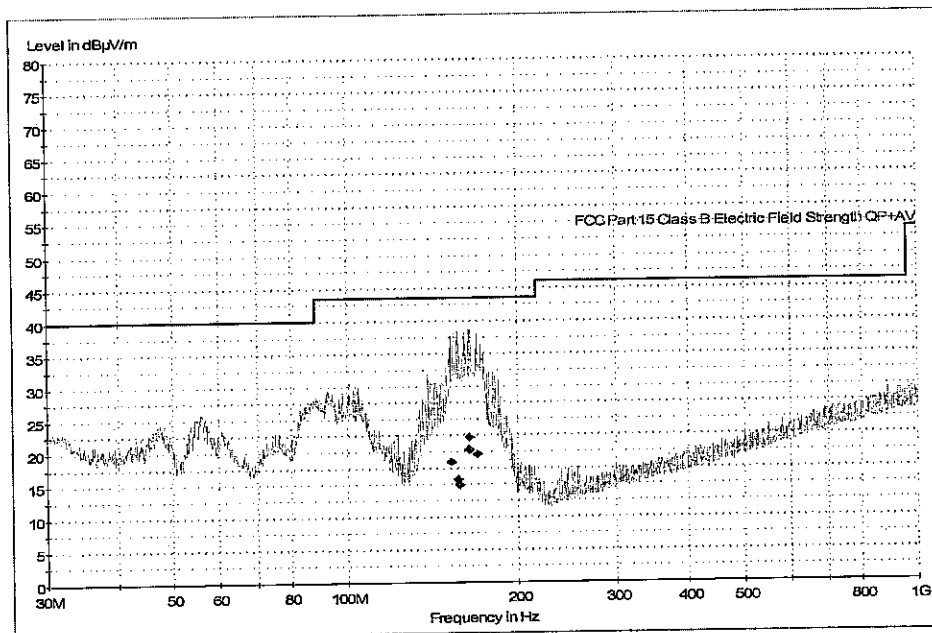
Registered in Sweden: No SE556024059901, Registered office: As address

11.4 Test protocol

Semi-anechoic shielded chamber

Date of test: April 1-2, 2006

30 – 1000 MHz, max peak at a distance of 3 m in stand by mode/charging mode



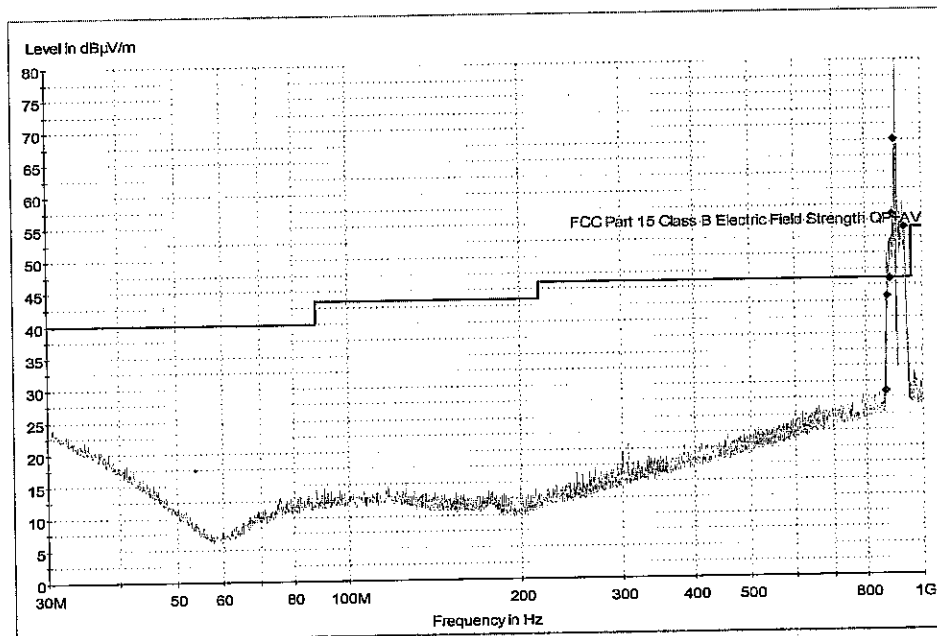
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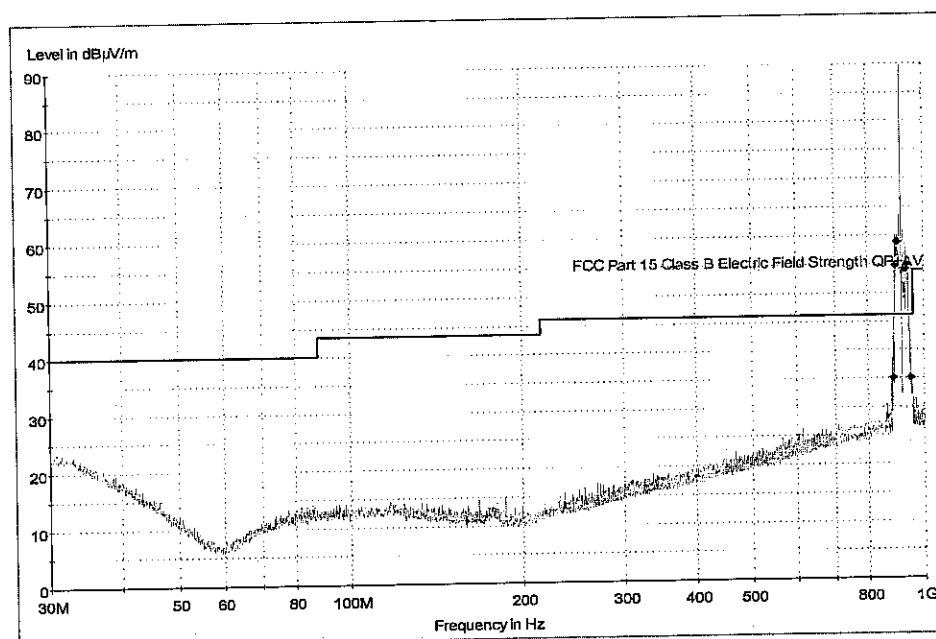
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30 – 1000 MHz, max peak at a distance of 3 m on the lower TX channel
Carrier is attenuated by band rejection filter K&L 3TNF-800/1000-0.2-N/N



30 – 1000 MHz, max peak at a distance of 3 m on the middle TX channel
Carrier is attenuated by band rejection filter K&L 3TNF-800/1000-0.2-N/N



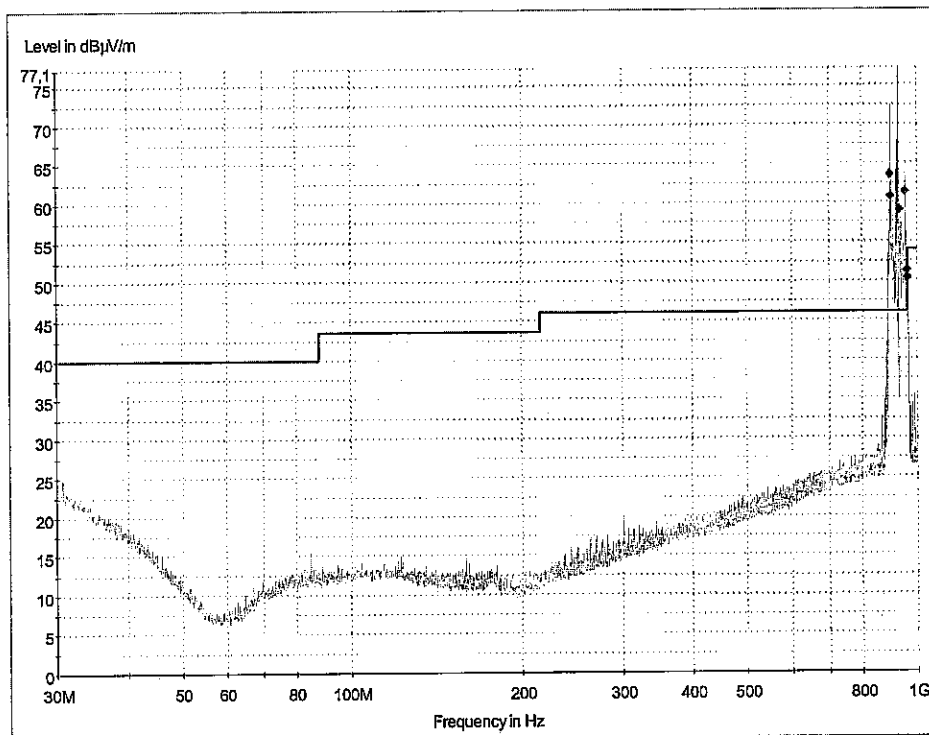
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30 – 1000 MHz, max peak at a distance of 3 m on the upper TX channel
Carrier is attenuated by band rejection filter K&L 3TNF-800/1000-0.2-N/N



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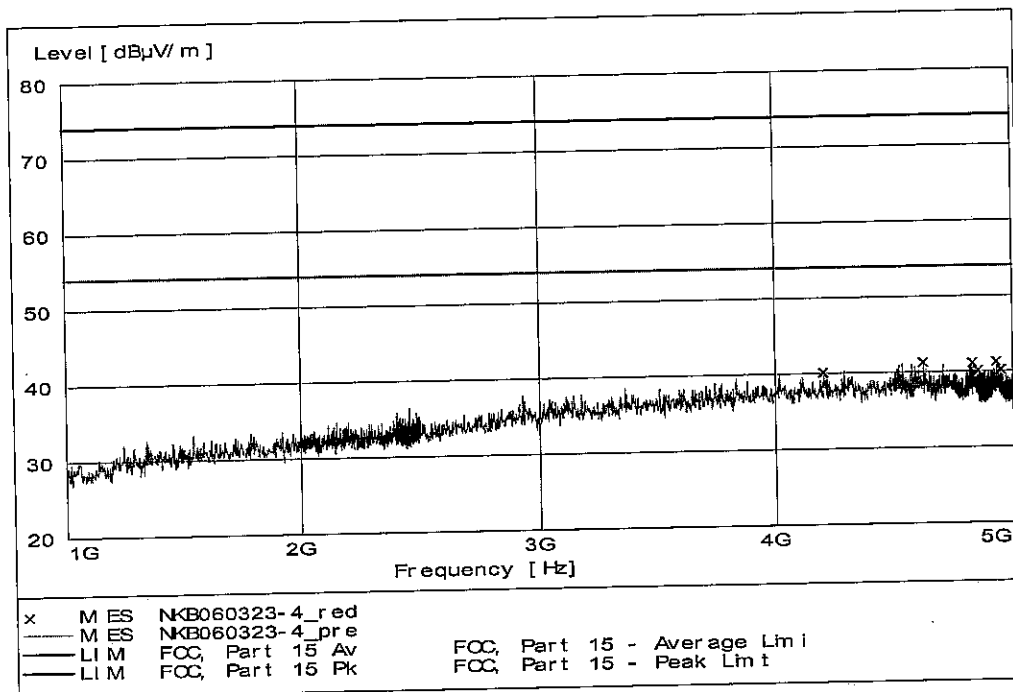
Telephone +46 8 750 00 00, Fax +46 8 750 60 30, www.sweden.intertek-etlsemko.com

Registered in Sweden: No SE556024059901, Registered office: As address

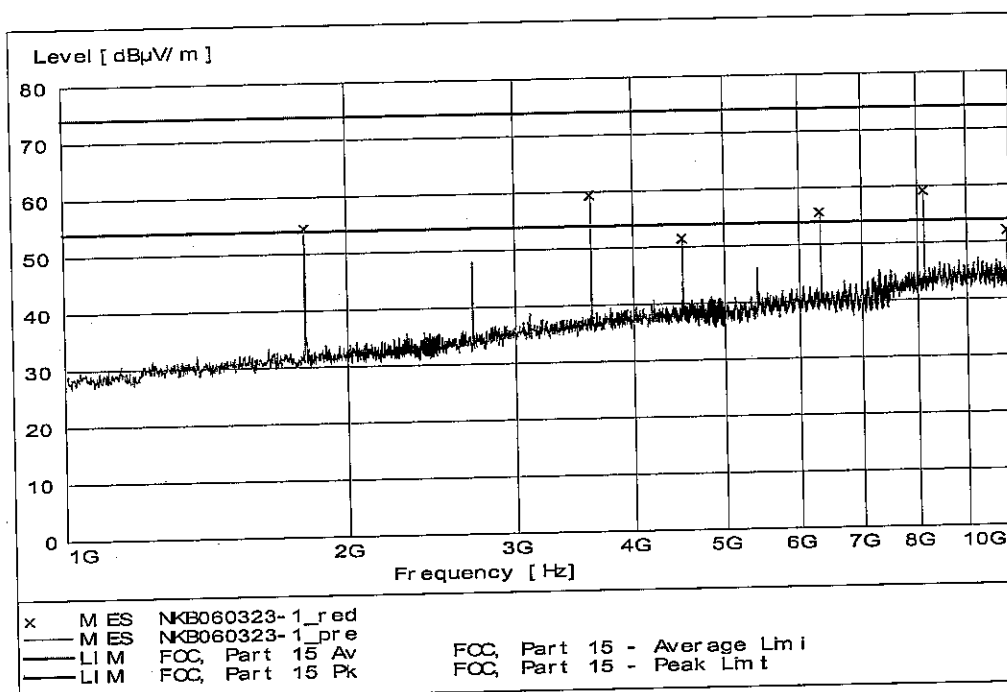
Radio anechoic shielded chamber

Date of test: March 23- 28, 2006

1000 – 5000 MHz, max peak at a distance of 3 m in stand by mode/charging mode



1000 – 10 000 MHz, max peak at a distance of 3 m on the low TX channel.
Carrier is attenuated by high pass filter K&L 11SH10-1300-U4000-0/0



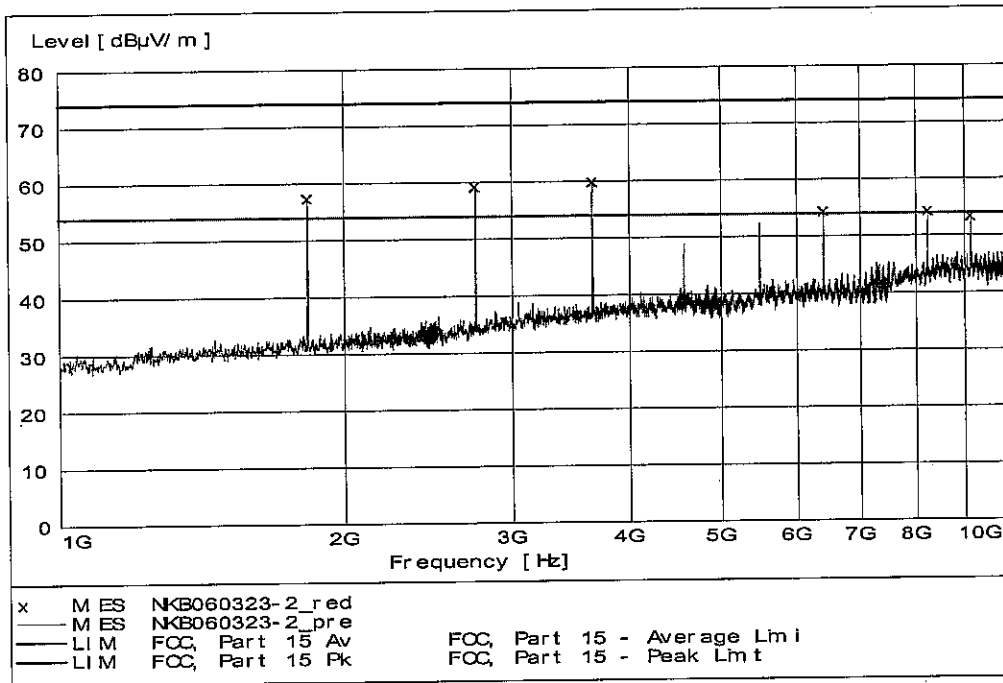
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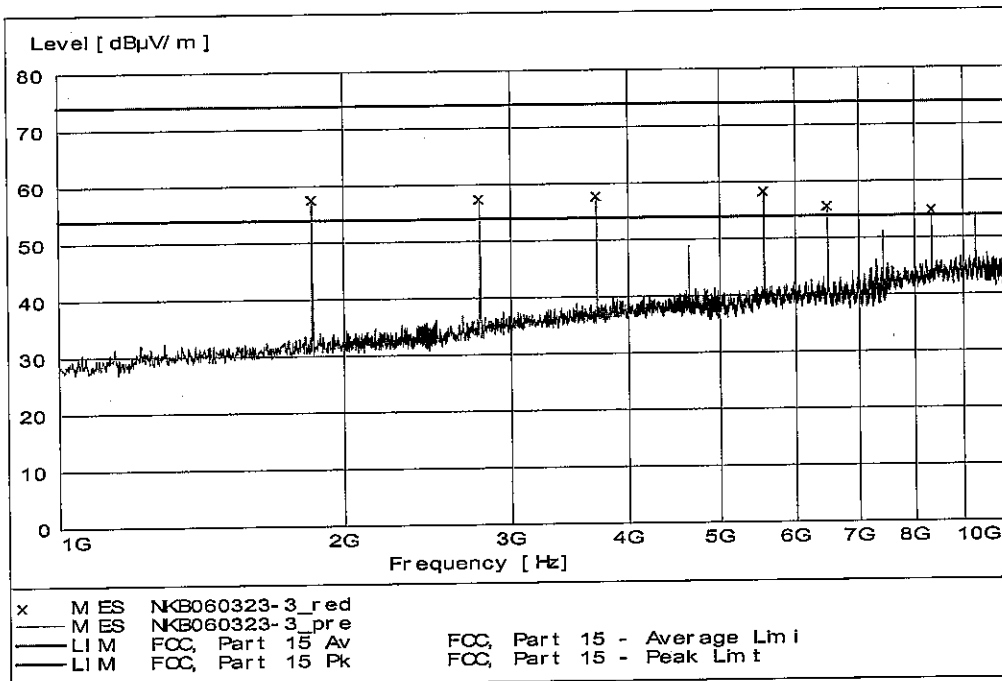
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Registered in Sweden: No SE556024059901, Registered office: As address

1000 – 10 000 MHz, max peak at a distance of 3 m on the middle TX channel.
Carrier is attenuated by high pass filter K&L 11SH10-1300-U4000-0/0



1000 – 10 000 MHz, max peak at a distance of 3 m on the upper TX channel.
Carrier is attenuated by high pass filter K&L 11SH10-1300-U4000-0/0



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Data summary

Stand by mode

Field strength of spurious emissions						
Frequency [MHz]	RBW [kHz]	Measured level		Limit		Note
		Peak [dB(μV/m)]	QP/AV [dB(μV/m)]	Peak [dB(μV/m)]	QP/AV [dB(μV/m)]	
30-88	120	--	< 20	--	40	
88-216	120	--	< 22	--	43,5	
219 -960	120	--	< 26	--	46	Noise floor
960-1000	120	--	< 26	--	54	Noise floor
1000-5000	1000	< 40	--	74	54	Noise floor

Low channel

Field strength of spurious emissions						
Frequency [MHz]	RBW [kHz]	Measured level		Limit		Note
		Peak [dB(μV/m)]	QP/AV [dB(μV/m)]	Peak [dB(μV/m)]	QP/AV [dB(μV/m)]	
864.4	120	--	28,5	--	116	*20 dBc
871.7	120	--	43,3	--	116	*20 dBc
880.1	120	--	46,0	--	116	*20 dBc
890.0	120	--	55,9	--	116	*20 dBc
897.4	120	--	67,6	--	116	*20 dBc
934.3	120	--	54,1	--	116	*20 dBc
1807.6	1000	54,7	--	116	--	*20 dBc
2709.0	1000	64,8	<45	74	54	Restricted band
3612.0	1000	63,5	<45	74	54	Restricted band
4515.0	1000	58,8	<45	74	54	Restricted band
5418.0	1000	52,8	<45	74	54	Restricted band
6320.6	1000	56,0	<45	116	--	*20 dBc
8127.0	1000	67,0	<45	74	54	Restricted band
9030.0	1000	59,0	<45	74	54	Restricted band
9933.9	1000	52,4	<45	116	--	*20 dBc

* Output power is 28,0 dBm = 136 dBuV/m @ 3 m



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Mid channel

Field strength of spurious emissions						
Frequency [MHz]	RBW [kHz]	Measured level		Limit		Note
		Peak [dB(μV/m)]	QP/AV [dB(μV/m)]	Peak [dB(μV/m)]	QP/AV [dB(μV/m)]	
884.8	120	--	35,9	--	102,5	*20 dBc
894.5	120	--	55,7	--	102,5	*20 dBc
899.9	120	--	59,9	--	102,5	*20 dBc
929.2	120	--	55,1	--	102,5	*20 dBc
937.4	120	--	55,8	--	102,5	*20 dBc
948.3	120	--	35,9	--	102,5	*20 dBc
2745.0	1000	69,5	<45	74	54	Restricted band
3660.0	1000	64,0	<45	74	54	Restricted band
4575.0	1000	56,8	<45	74	54	Restricted band
7320.0	1000	55,9	<45	74	54	Restricted band
8235.0	1000	61,4	<45	74	54	Restricted band
9150.5	1000	57,9	<45	74	54	Restricted band

* Output power is 27.3 dBm = 122.5 dBuV/m @ 3 m

High channel

Field strength of spurious emissions						
Frequency [MHz]	RBW [kHz]	Measured level		Limit		Note
		Peak [dB(μV/m)]	QP/AV [dB(μV/m)]	Peak [dB(μV/m)]	QP/AV [dB(μV/m)]	
895.7	120	--	64,4	--	102,3	*20 dBc
901.1	120	--	61,7	--	102,3	*20 dBc
933.4	120	--	60,0	--	102,3	*20 dBc
953.1	120	--	62,4	--	102,3	*20 dBc
960.9	120	--	52,2	--	54	Restricted band
961.8	120	--	51,4	--	54	Restricted band
1854.0	1000	59,6	<45	74	54	Restricted band
2781.0	1000	59,7	<45	74	54	Restricted band
3708.0	1000	60,9	<45	74	54	Restricted band
4635.0	1000	55,4	<45	74	54	Restricted band
7416.0	1000	58,5	<45	74	54	Restricted band
8343.0	1000	61,0	<45	74	54	Restricted band

* Output power is 27.1 dBm = 122.3 dBuV/m @ 3 m



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12. CONDUCTED DISTURBANCE VOLTAGE IN THE FREQUENCY RANGE 0,15 - 30 MHZ**12.1 Measurement uncertainty**

Conducted disturbance voltage, quasi-peak detection: $\pm 2,0$ 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%.

12.2 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

12.3 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 standby test.



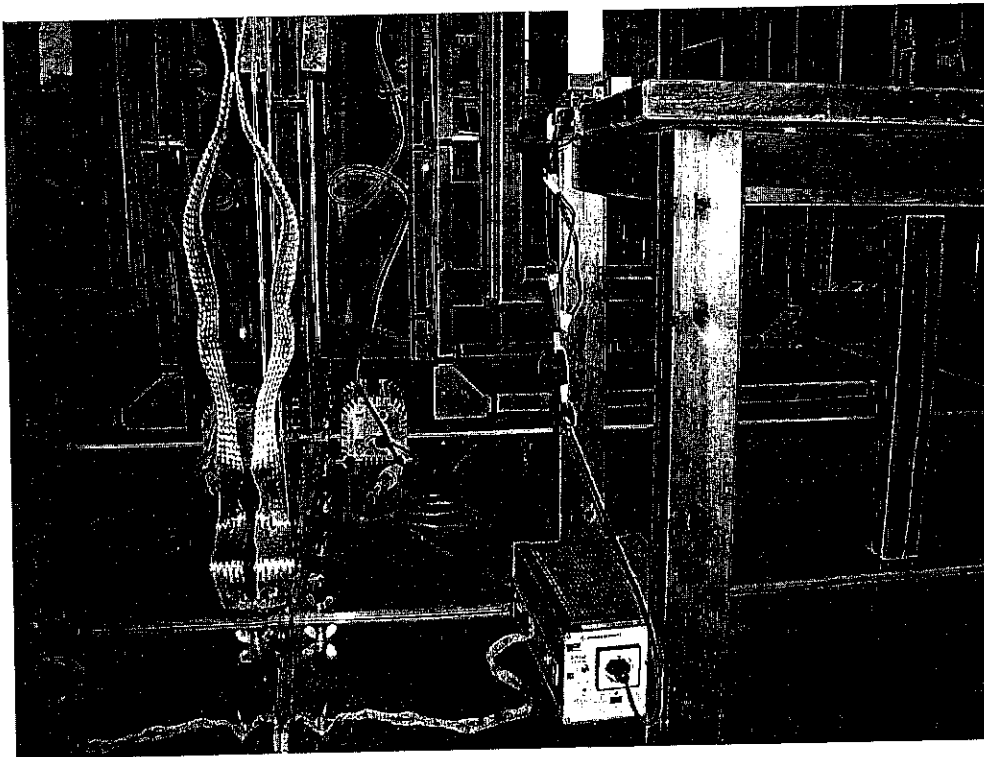
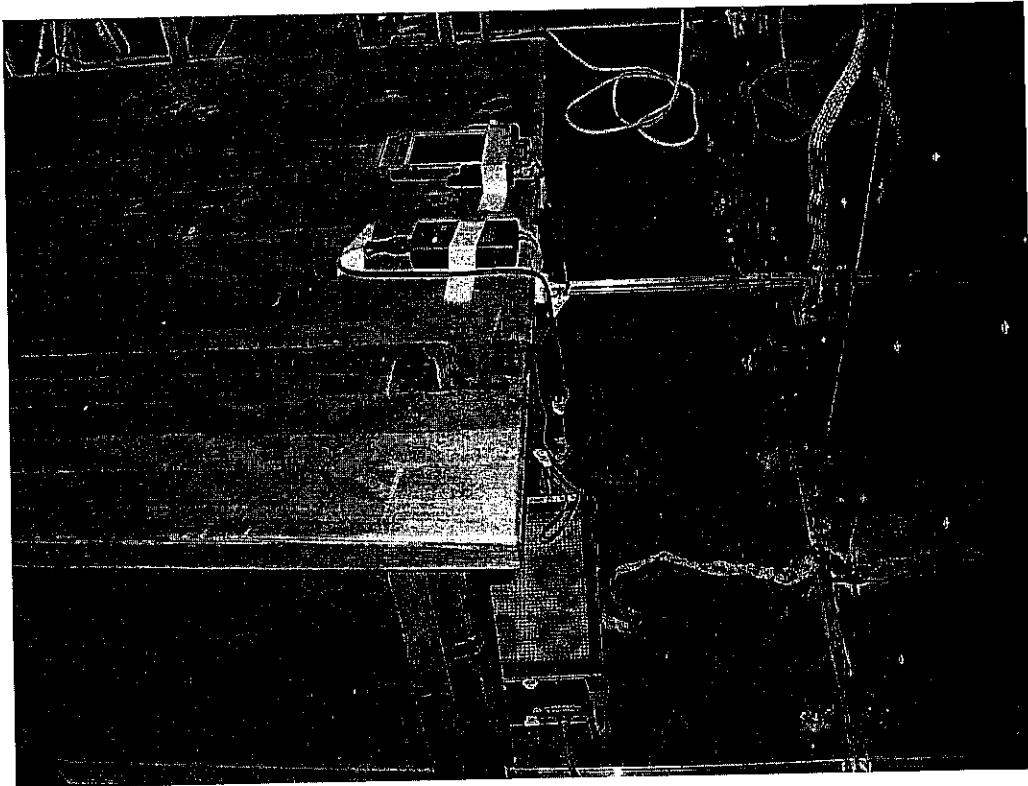
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Test set-up photo:



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12.4 Test protocol

Date of test: March 27, 2006

Frequency /MHz	Quasi-Peak	
	Disturbance Level /dB(μV)	Permitted limit /dB(μV)
0,150	42,2	66
0,255	37,8	62
0,368	31,2	59
0,375	29,8	58
1,110	29,4	56

Frequency /MHz	Average	
	Disturbance Level /dB(μV)	Permitted limit /dB(μV)
0,240	34,0	52
1,110	20,1	46



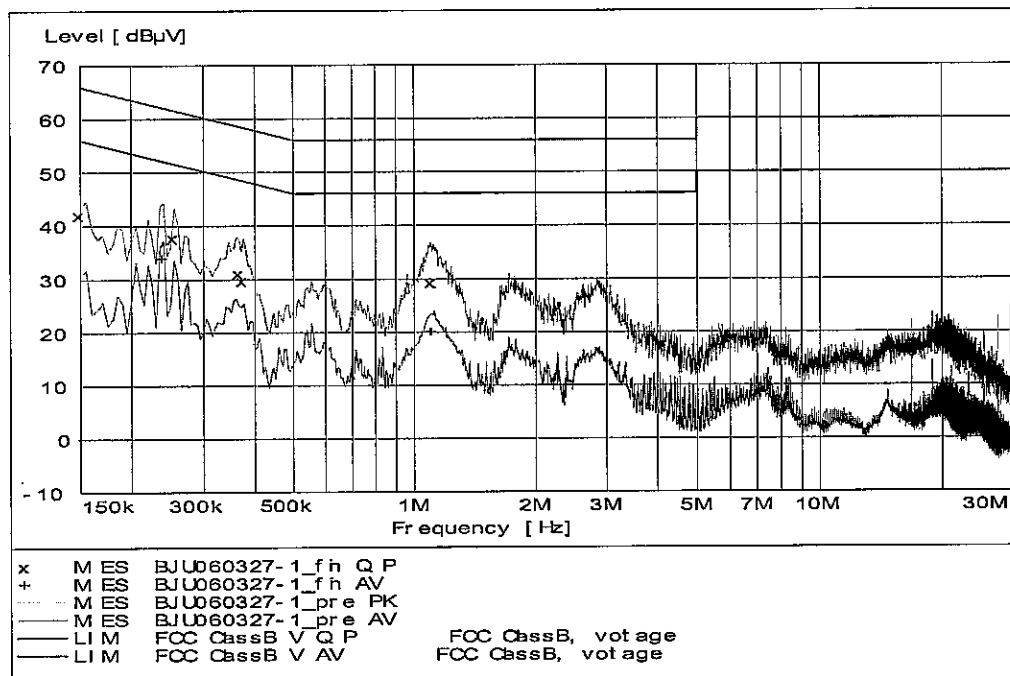
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Overview sweeps performed with peak and average detectors



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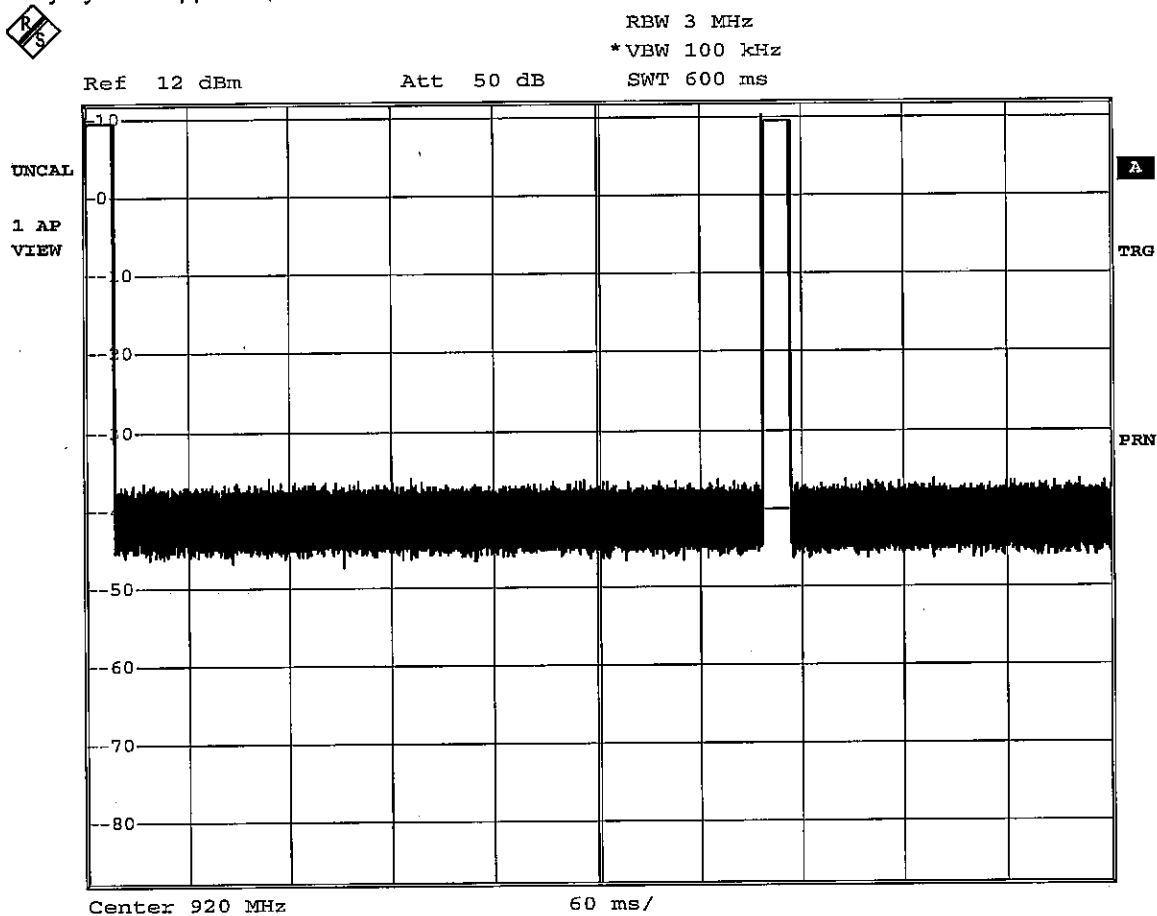
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13. DUTY CYCLE

Date of test: September 8, 2006

EUT mode of operation: Transmitting mode
Duty cycle is approx 4,5%

Date: 8.SEP.2006 15:04:19



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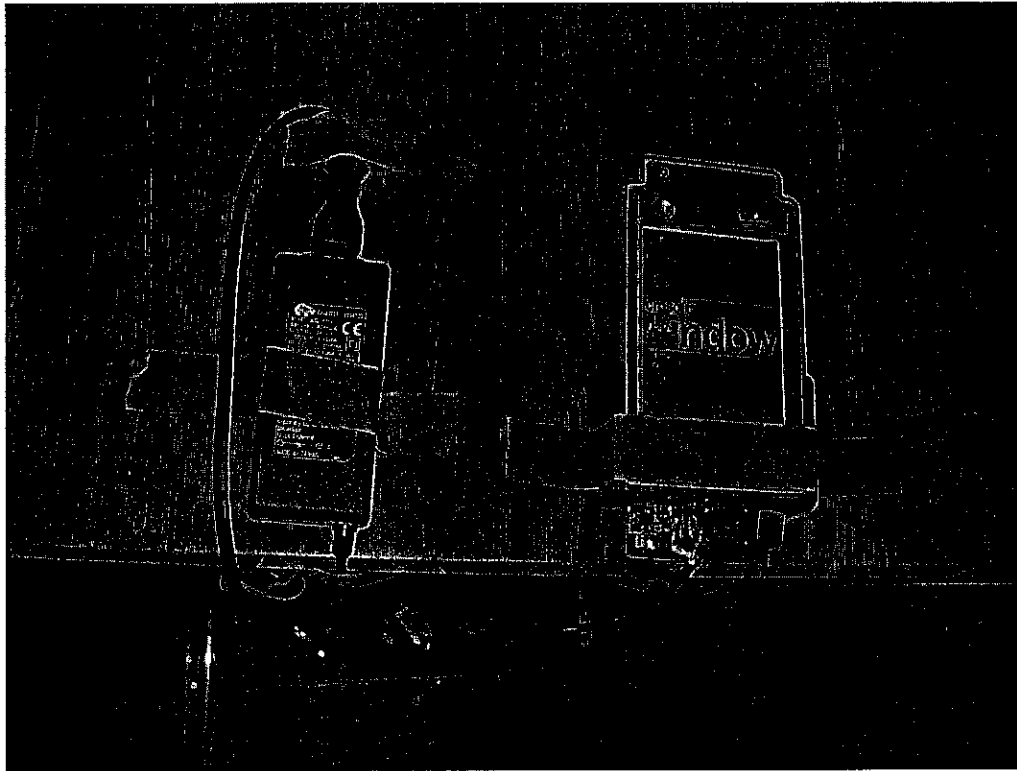
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APPENDIX I – PHOTOS OF THE EUT

General view



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