1701 E. Plano Parkway, Suite 150
Plano, Texas 75074
Phone: (972) 509-2566
Fax: (972) 509-0073

Certification Test Report

CFR 47 FCC Part 2 and Part 24, Subparts C and E

Model: Node C1943, Node M1943

FCC ID NO.: BCR-RPT-NCM1943

Project Code: W6397

Revision: 0

Prepared for:	Andrew Corporation 108 Rand Park Drive Garner, North Carolina 27529
Author:	Tom Tidwell, Manager of Wireless Services
Issued:	28 November, 2006

Report Summary

NTS Plano

Accreditation Numbers: FCC: 101741
IC: 46405-4319 File # IC-4319A-1

Applicant: Andrew Corporation
108 Rand Park Drive
Garner, North Carolina 27529

Customer Representative: Michael Williamson

EUT Description:

EUT Description	Manufacturer	Model	Revision	Serial Number
The EUT is an in-building repeater system designed to repeat both IS-95 CDMA and W-CDMA signals in the North American PCS 1900 band.	Andrew Wireless Systems Gmbh	Node C 1943 IS-95 Node M 1943 W-CDMA	0	12

Variations in models: The Node C1943 and Node M1943 are electrically identical devices. The software mode options for channel filter settings are reduced to two 5 MHz channels on the Node M1943 model to accommodate up to two W-CDMA carriers, while the Node C1943 allows additional channel filter settings for single 1.23 MHz channels for IS-95 CDMA.

Test Summary

Appendix	Test/Requirement Description	Deviations from:			Pass / Fail	Applicable Rule Parts
		Base Standard	Test Basis	NTS Procedure		
A	RF Power Output	No	No	No	PASS	CFR 47, Part 2, Para. 2.1046 CFR 47, Part 24, Para.24.232
B	Modulation Characteristics	No	No	No	PASS	CFR 47, Part 2, Para. 2.1047
C	Occupied Bandwidth	No	No	No	PASS	CFR 47, Part 2, Para. 2.1049 CFR 47, Part 24, Para. 24.238
D	Spurious Emissions at Antenna Terminals	No	No	No	PASS	CFR 47, Part 2, Para. 2.1051 CFR 47, Part 24, Para. 24.238
E	Field Strength of Spurious Radiation	No	No	No	PASS	CFR 47, Part 2, Para. 2.1053 CFR 47, Part 24, Para. 24.238
F	Frequency Stability	No	No	No	PASS	CFR 47, Part 2, Para. 2.1055 CFR 47, Part 24, Para. 24.235

Test Result: The product presented for testing complied with test requirements as shown above.

This is to certify that the preceding report is true and correct to the best of my knowledge.

Robert Stevens,
Quality Assurance Manager

Tom Tidwell,
Wireless Test Engineer

Table of Contents

Register of revisions

Revision	Reason for Revision	Release Date
0	Original	11/28/06

INTRODUCTION

1.1 PURPOSE

The purpose of this document is to describe the tests applied by NTS Plano to demonstrate compliance of the Node C1943 and Node M1943 to FCC Part 24 Subparts C and E in accordance with the certification requirements of CFR 47, Part 2.

2.0 EUT DESCRIPTION

2.1 CONFIGURATION

Description of EUT

	Name	Model	Revision	Serial Number
EUT	Node C / Node M	C1943 / M1943	2	11
RF Exposure Classification	Fixed. The antenna is mounted using a wall or pole mounting kit provided by the manufacturer. See page 8 of this report for a description of the 3 applications for this device. In applications A and B, a separately approved indoor distributed antenna system is used on the coverage side of the system.			
Channels/Frequency Range	1850 - 1910 MHz, 1930 – 1990 MHz			
Power	**Downlink:** +43 dBm (20 watts) at antenna port **Uplink:** +23 dBm (0.2 watts at antenna port.			
Emission Designator:	**F9W** F9W is the emission designator for both IS-95 CDMA and W-CDMA. The necessary bandwidth for IS-95 CDMA is 1.23 MHz while the necessary bandwidth for W-CDMA is 4.10 MHz (4.096 MHz).			
TX antenna details	Maximum antenna directional gain 17 dBi per Install Manual			
Functional Description	The Node C / Node M is used to enhance coverage of a cellular network within a building. Node C is designed to repeat IS-95 CDMA (CDMA800) signals while M1943 is designed to repeat W-CDMA (UMTS800) signals.			

2.1.1 EUT POWER

Voltage	120 Vac, 60 Hz
Number of Feeds	Single phase (L1 and Neutral)

2.2 EUT CABLES

Quantity	Model/Type	Routing		Shielded / Unshielded	Description	Cable Length (m)
		From	To			
1		EUT	AC power main	Unshielded	Power cord	1.25
1	Gore	IQ Signal Generator	EUT	Shielded (coaxial)	Coaxial cable	1.5
1	Gore	EUT	50 ohm load	Shielded (coaxial)	Coaxial cable	2

2.3 MODE OF OPERATION DURING TESTS

The device was tested in two basic operating modes:

- Downlink, maximum rf output power (+43 dBm, 20 watts)
- Uplink, maximum rf output power (+23 dBm, 0.2 watts)

While operating in these modes, the device was tested with variations in the following parameters:

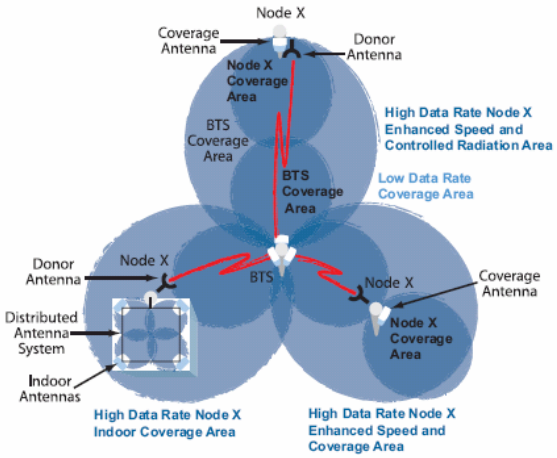
- RF filter configurations
  - Normal and High Attenuation settings
  - Single channel and multiple channel filter settings
- Gain configurations
  - Lowest gain setting
  - Highest gain setting

The rf power output of the device can be set in two different ways:

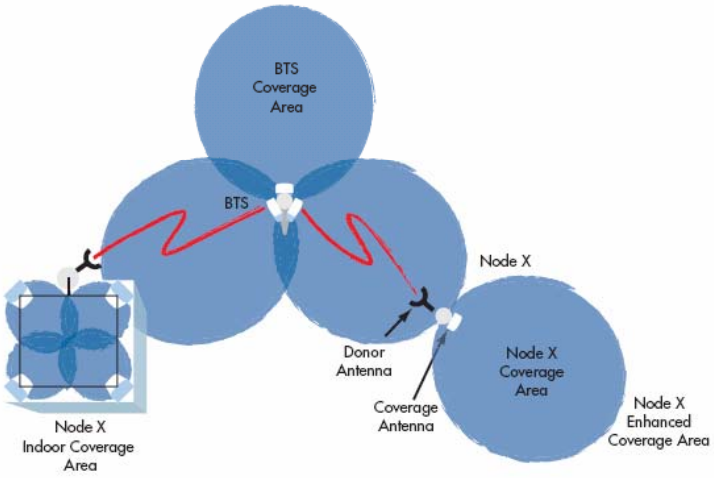
- RF power
  - In this mode a fixed rf output power target is set. The device uses the detected power of the rf pilot channel within the received waveform and adjusts the amplifier gain automatically to maintain the selected rf output power.
- Fixed gain
  - In this mode, a fixed rf gain is chosen. The rf gain is adjusted by the device only if the rf input level continues to increase after the maximum rated rf output power has been reached (AGC). In this way, the device prevents non-linear operation of the rf amplifiers.

The device was operated in the fixed gain mode for the purposes of this testing since it allows for various input level/gain variations to be tested. It was determined that the worst-case spurious levels occurred with the gain set to maximum and rf input level adjusted to obtain maximum rf output power.

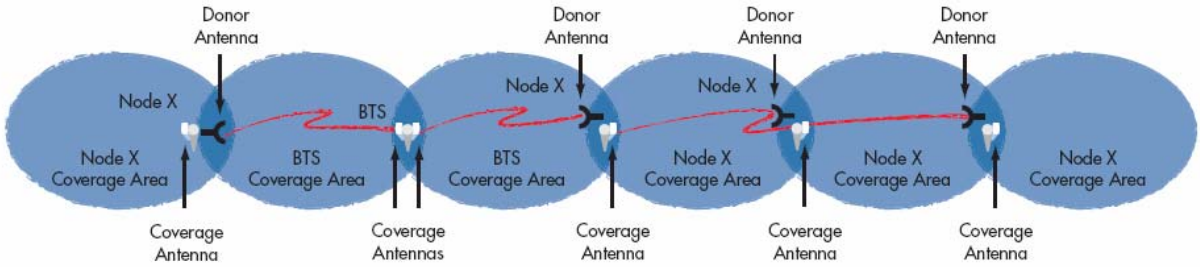
A) Urban hole filling and speed enhancement



B) Extending coverage for buildings and towns



C) Rural highway coverage (UMTS/CDMA)



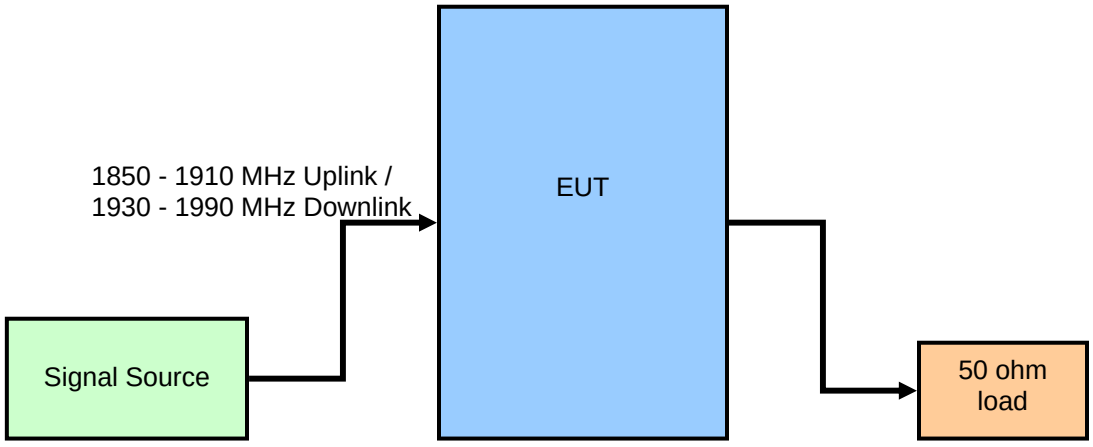
3.0 SUPPORT EQUIPMENT

3.1 CONFIGURATION

The radio was activated using customer-supplied test software. The software allowed the test engineer to change modulation modes and data rates as well as transmit channel.

3.2 TEST BED/PERIPHERAL CABLES

.



APPENDICES

APPENDIX A: 2.1046 RF POWER OUTPUT

A.1. Base Standard & Test Basis

Base Standard	FCC PART 2.1046
Test Basis	TIA 603-C, 2004
Test Method	TIA 603-C, 2004

A.2. Specifications

24.232 Power and antenna height limits.

(a) Base stations are limited to 1640 watts peak equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT, except as described in paragraph 24.232(b).

(b) Base stations that are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census, are limited to 3280 watts peak equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT.

(c) Mobile/portable stations are limited to 2 watts EIRP peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

Applicable RF Power Limit from Above: 1640 watts EIRP

A.3. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
None						

A.4. Test Procedure

TIA 603-C, 2004 and 24.232(d)

A.5. Test Results

The EUT is in compliance with the limits as specified above. The maximum rf output power at the antenna terminals is 20 watts (downlink) and 0.201 watts (uplink).

A.6. Operating Mode During Test

The transmitter was tested while in a continuous transmit mode. The EUT was tuned to a low, middle, and high channel in both the downlink (base to mobile) and uplink (mobile to base) directions. In the course of this testing, it was found that operating the device with a fixed rf gain and adjusting rf input signal to obtain maximum rf output power produced the worst-case results.

A.7. Sample Calculation

Rf power(watts) = $10^{(\text{rf power(dBm)}/10)}$ x 1000

A.8. Test Data

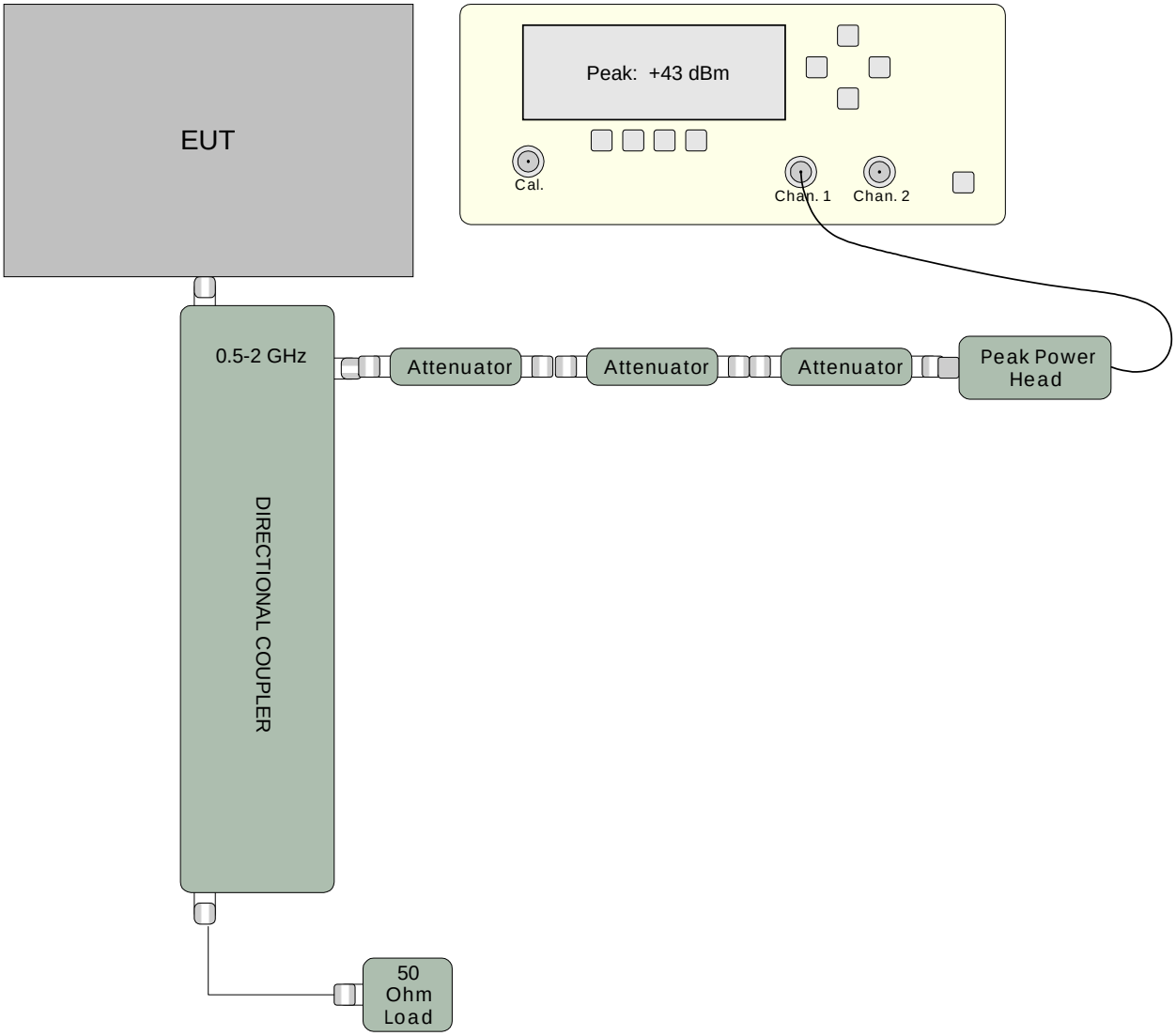
Channel	Signal Path	Modulation Mode	RF Power Output at Antenna Terminals (dBm)
25 (1931.25 MHz)	DL	F9W (IS-95 CDMA)	42.96
600 (1960.00 MHz)	DL	F9W (IS-95 CDMA)	42.69
1175 (1988.75 MHz)	DL	F9W (IS-95 CDMA)	43.07
62 (1933.10 MHz)	DL	F9W (W-CDMA)	42.91
600 (1960.00 MHz)	DL	F9W (W-CDMA)	42.77
1138 (1986.90 MHz)	DL	F9W (W-CDMA)	43.00
25 (1851.25 MHz)	UL	F9W (IS-95 CDMA)	22.90
600 (1880.00 MHz)	UL	F9W (IS-95 CDMA)	22.74
1175 (1908.75 MHz)	UL	F9W (IS-95 CDMA)	22.88
62 (1853.10 MHz)	UL	F9W (W-CDMA)	22.79
600 (1880.00 MHz)	UL	F9W (W-CDMA)	22.81
1138 (1906.90 MHz)	UL	F9W (W-CDMA)	22.92

Note: RF power output was measured using a peak rf power meter designed to quantify the true peak power using a high number of samples (10 Ms).

*DL = Downlink (BTS to Mobile) path, UL = Uplink (Mobile to BTS) path

Test Date: November 20, 2006

A.9. Test Diagram



A.10. Tested By

Name: Tom Tidwell,
Function: Manager of Wireless Services

APPENDIX B: 2.1047 MODULATION CHARACTERISTICS

B.1. Base Standard & Test Basis

Base Standard	FCC 2.1047
Test Basis	FCC 2.1047 Modulation Characteristics
Test Method	TIA 603-C, 2004

B.2. Specifications

2.1047 – Modulation Characteristics

(a) *Voice modulated communication equipment.* A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.
(b) *Equipment which employs modulation limiting.* A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.
(c) *Single sideband and independent sideband radiotelephone transmitters which employ a device or circuit to limit peak envelope power.* A curve showing the peak envelope power output versus the modulation input voltage shall be supplied. The modulating signals shall be the same in frequency as specified in paragraph (c) of §2.1049 for the occupied bandwidth tests.
(d) *Other types of equipment.* A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

B.3. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

B.4. Test Method

This device does not generate any modulation signals but only repeats a modulated rf waveform.

B.5. Test Results

Not applicable – The device does not produce a baseband signal but simply repeats a modulated rf waveform.

Test Data Summary

Emission Designators

IS-95 CDMA: F9W
W-CDMA: F9W

B.6. Test Diagram

N/A

B.7. Tested By

Name: Tom Tidwell
Function: Manager of Wireless Services

APPENDIX C: 2.10.49 OCCUPIED BANDWIDTH

C.1. Base Standard & Test Basis

Base Standard	FCC 2.1049
Test Basis	FCC 2.1049 Occupied Bandwidth
Test Method	TIA 603-C, 2004

C.2. Specifications

24.238 Emission limitations for Broadband PCS equipment

(a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

(b) *Measurement procedure.* Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

C.3. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

C.4. Test Method

TIA 603-C, 2004 and 24.238(b)

The modulated rf carrier fed to the device during testing is described below:

IS-95 CDMA carrier:

Downlink

Data source: PRBS (Pseudo-Random Bit Sequence)
Modulation: QPSK 2 b/sym
Symbol Rate: 1.2288 Msym/sec
Filter: IS-95 + Equalizer
Coding: None

Channel Mapping

Chan. No.	Walsh Code	Power (dB)	Data	Chan. No.	Walsh Code	Power (dB)	Data	Chan. No.	Walsh Code	Power (dB)	Data
0	0	-7	0000	**22**	22	-19	PRBS	**44**	44	-19	PRBS
1	1	-19	PRBS	**23**	23	-19	PRBS	**45**	45	-19	PRBS
2	2	-19	PRBS	**24**	24	-19	PRBS	**46**	46	-19	PRBS
3	3	-19	PRBS	**25**	25	-19	PRBS	**47**	47	-19	PRBS
4	4	-19	PRBS	**26**	26	-19	PRBS	**48**	48	-19	PRBS
5	5	-19	PRBS	**27**	27	-19	PRBS	**49**	49	-19	PRBS
6	6	-19	PRBS	**28**	28	-19	PRBS	**50**	50	-19	PRBS
7	7	-19	PRBS	**29**	29	-19	PRBS	**51**	51	-19	PRBS
8	8	-19	PRBS	**30**	30	-19	PRBS	**52**	52	-19	PRBS
9	9	-19	PRBS	**31**	31	-19	PRBS	**53**	53	-19	PRBS
10	10	-19	PRBS	**32**	32	-19	PRBS	**54**	54	-19	PRBS
11	11	-19	PRBS	**33**	33	-19	PRBS	**55**	55	-19	PRBS
12	12	-19	PRBS	**34**	34	-19	PRBS	**56**	56	-19	PRBS
13	13	-19	PRBS	**35**	35	-19	PRBS	**57**	57	-19	PRBS
14	14	-19	PRBS	**36**	36	-19	PRBS	**58**	58	-19	PRBS
15	15	-19	PRBS	**37**	37	-19	PRBS	**59**	59	-19	PRBS
16	16	-19	PRBS	**38**	38	-19	PRBS	**60**	60	-19	PRBS
17	17	-19	PRBS	**39**	39	-19	PRBS	**61**	61	-19	PRBS
18	18	-19	PRBS	**40**	40	-19	PRBS	**62**	62	-19	PRBS
19	19	-19	PRBS	**41**	41	-19	PRBS	**63**	63	-19	PRBS
20	20	-19	PRBS	**42**	42	-19	PRBS				
21	21	-19	PRBS	**43**	43	-19	PRBS				

Uplink

Data source: PRBS (Pseudo-Random Bit Sequence)
Modulation: OQPSK 2 b/sym
Symbol Rate: 1.2288 Msym/sec
Filter: IS-95
Coding: None
Channel Type: Traffic
Data Rate: 14, 400 b/sec
Convolution Encoder: On
Block Interleaver: On
Erasure Bit: 1

W-CDMA carrier: .

Data source: PRBS(Pseudo-Random Bit Sequence)
Modulation: OQPSK
Symbol Rate: 4.096 MHz
Sequence Length: 65536 sym
Filter: Root Cosine
Roll Off: 0.1
Window Function: Hanning

C.5. Test Results

Compliant. The rf input and output of the device was plotted to demonstrate that the modulated carrier is not degraded as a result of processing by the device under test.

C.6. Deviations from Normal Operating Mode During Test

None.

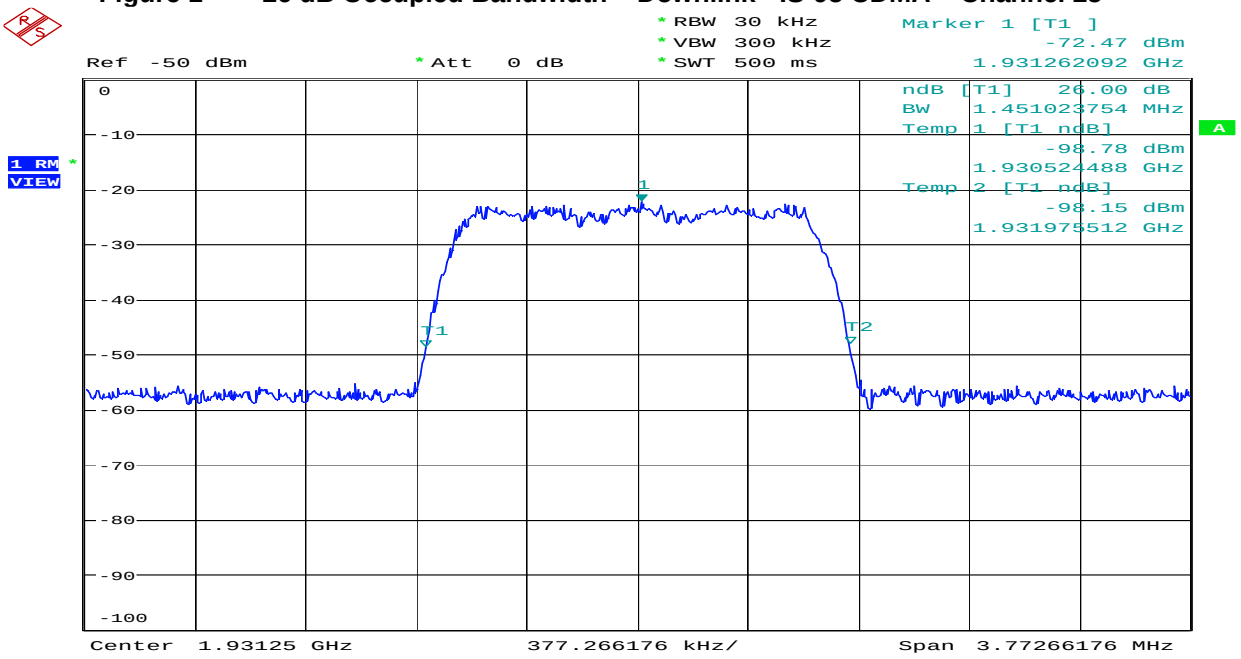
C.7. Sample Calculation

None.

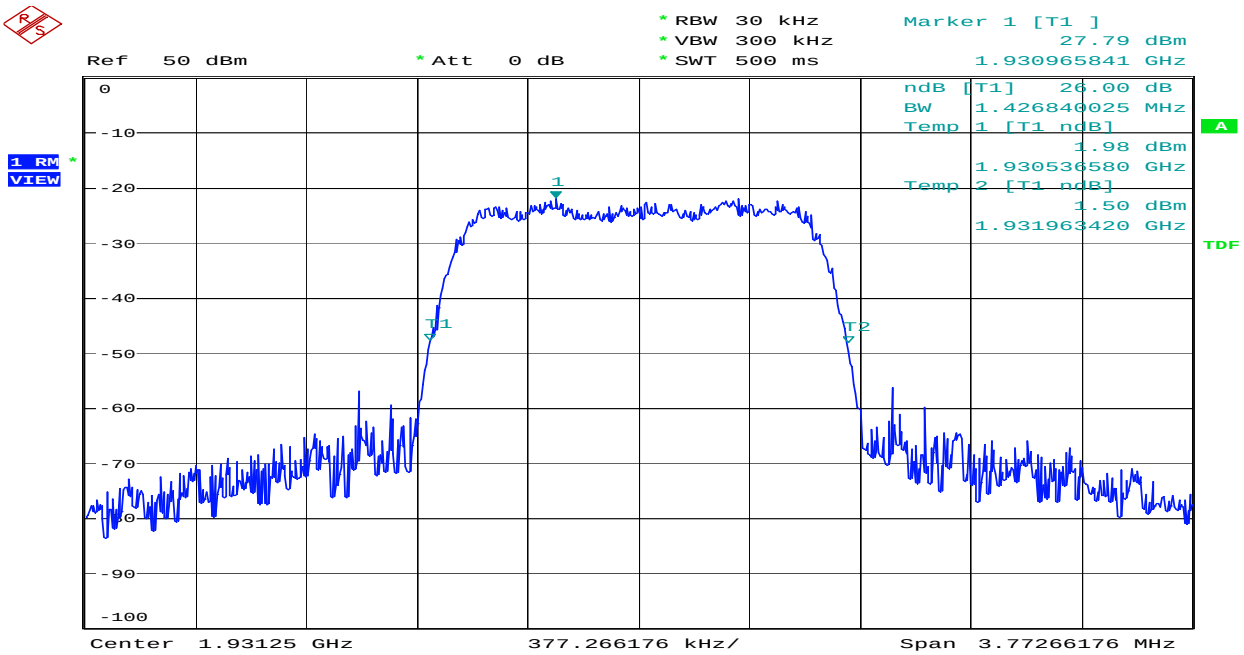
C.8. Test Data

See plots following.

Figure 1 26 dB Occupied Bandwidth – Downlink - IS-95 CDMA – Channel 25

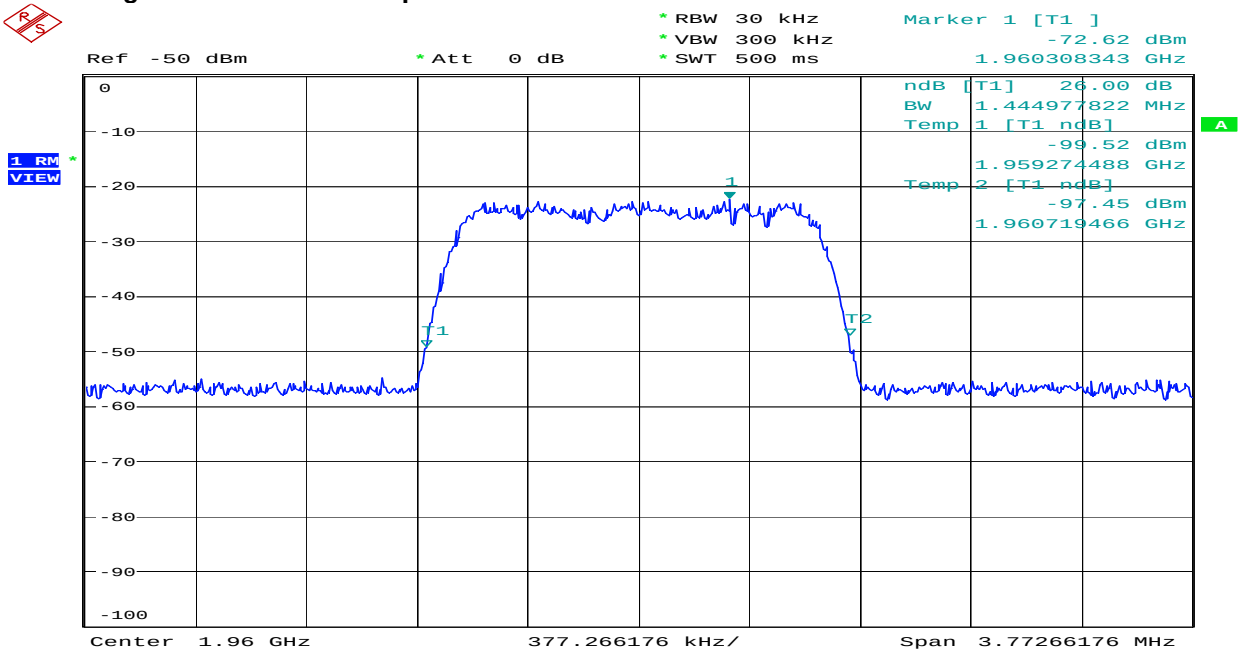


Date: 20.NOV.2006 18:52:05

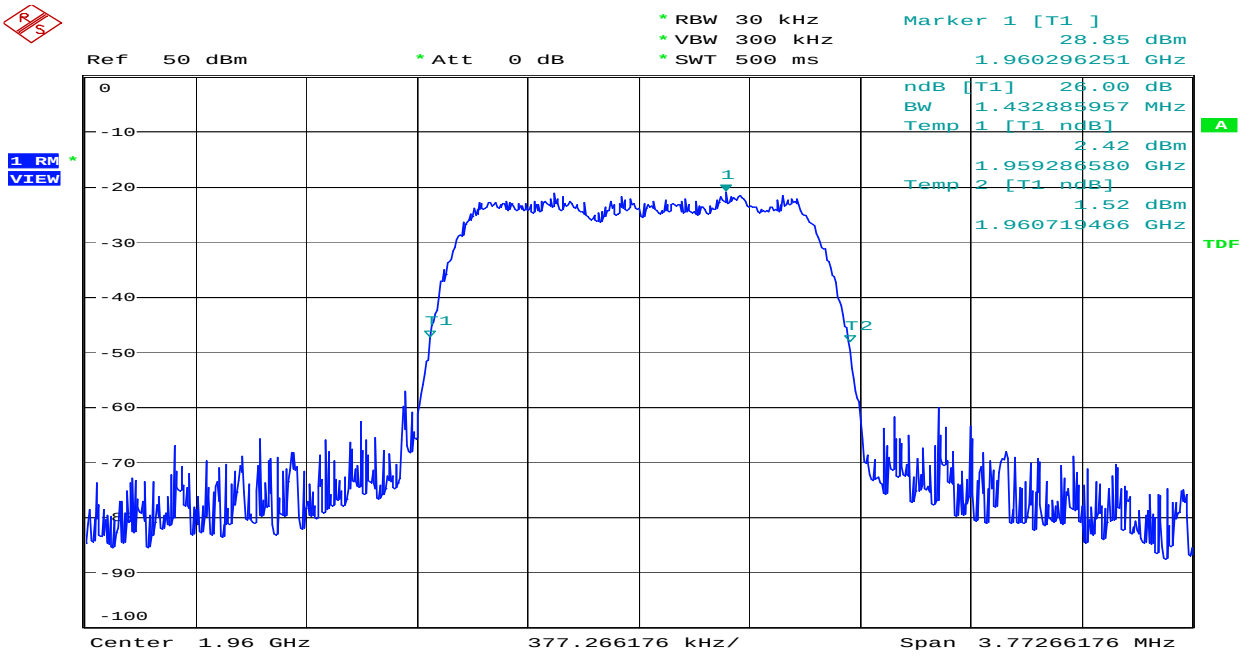


Date: 20.NOV.2006 19:08:08

Figure 2 26 dB Occupied Bandwidth – Downlink - IS-95 CDMA – Channel 600

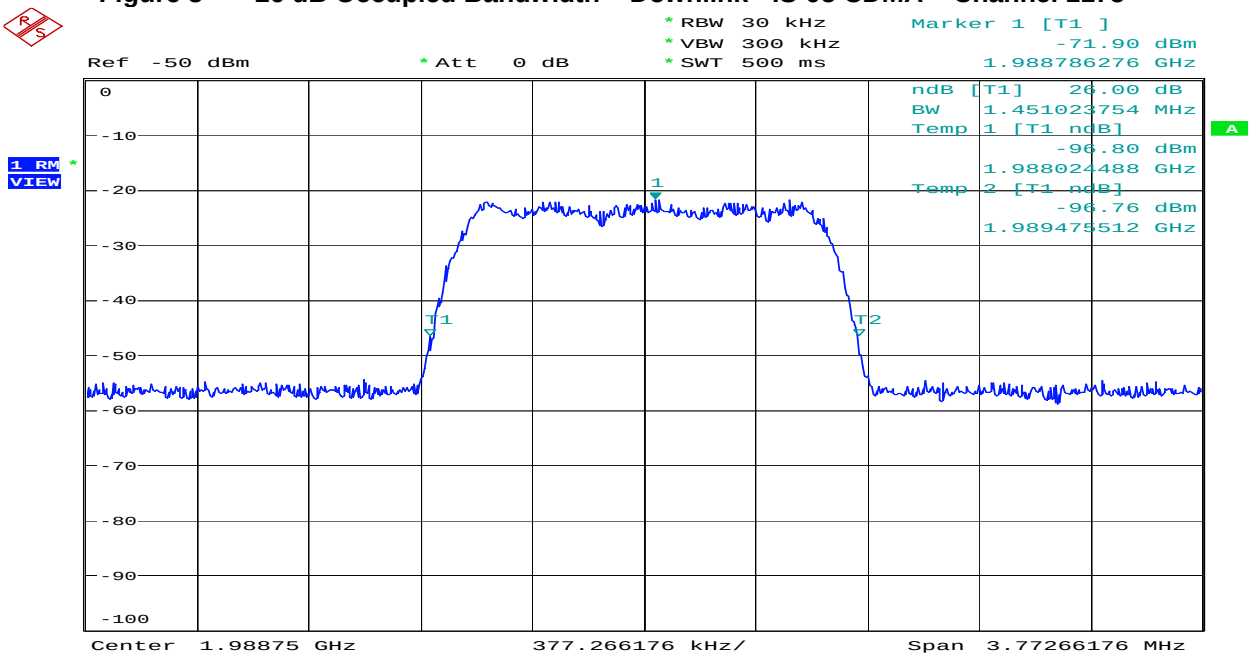


Date: 20.NOV.2006 18:55:10

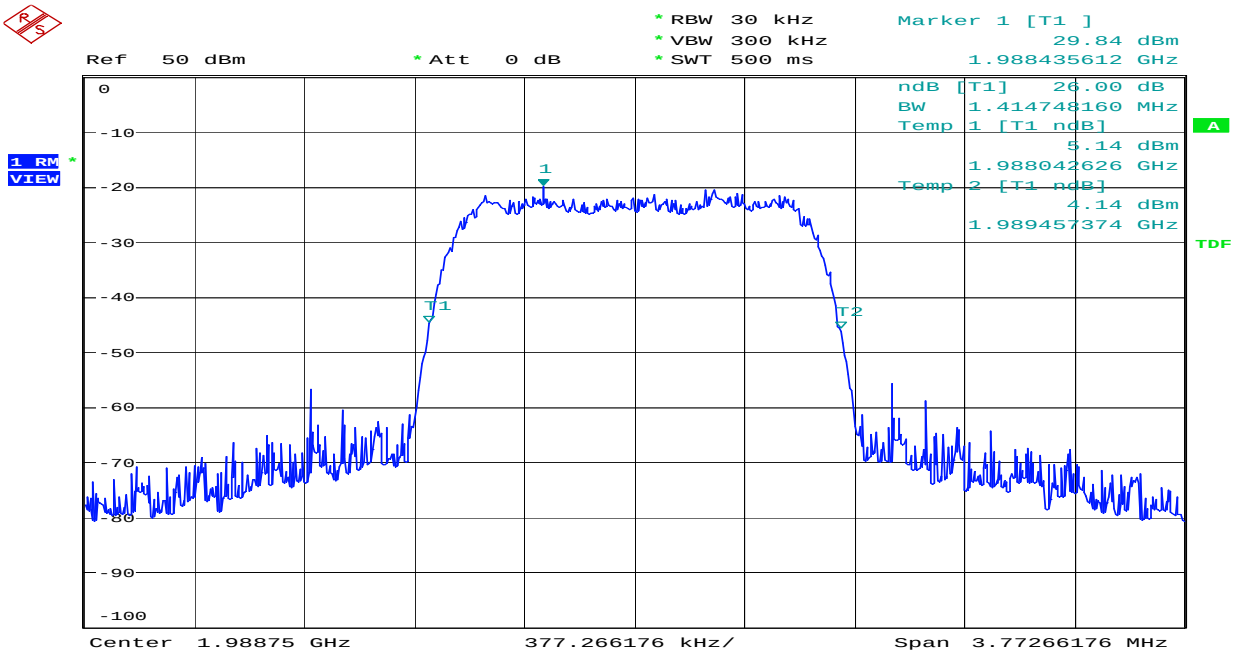


Date: 20.NOV.2006 19:00:42

Figure 3 26 dB Occupied Bandwidth – Downlink - IS-95 CDMA – Channel 1175

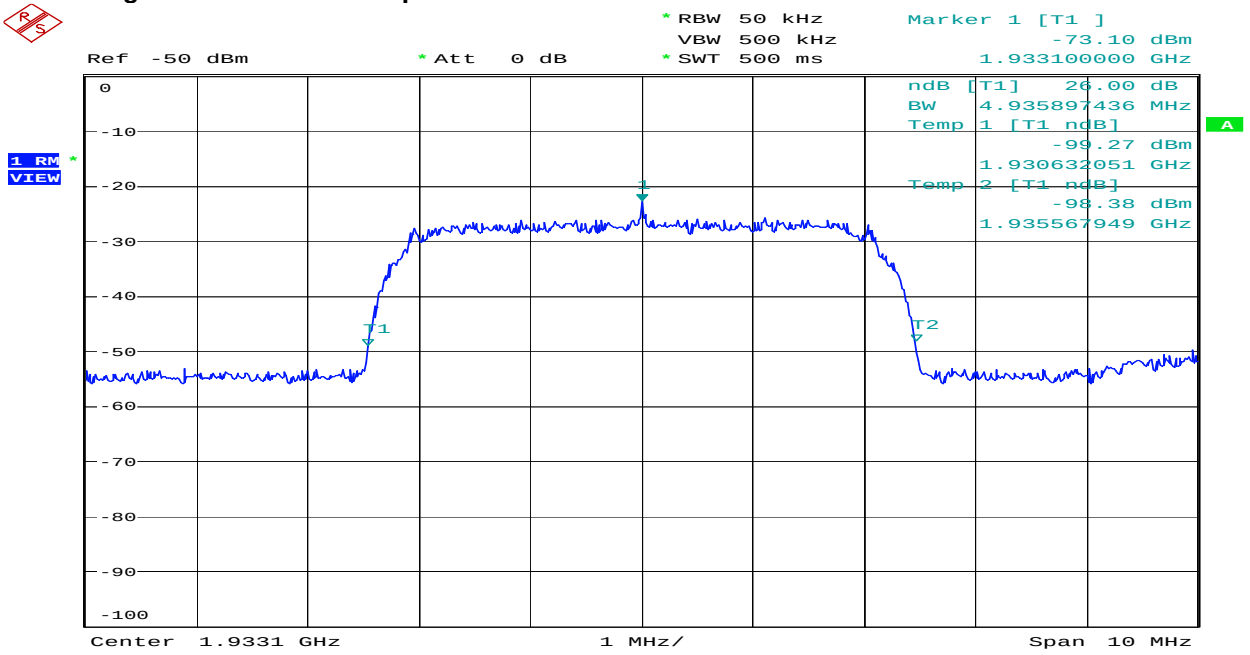


Date: 20.NOV.2006 18:57:28

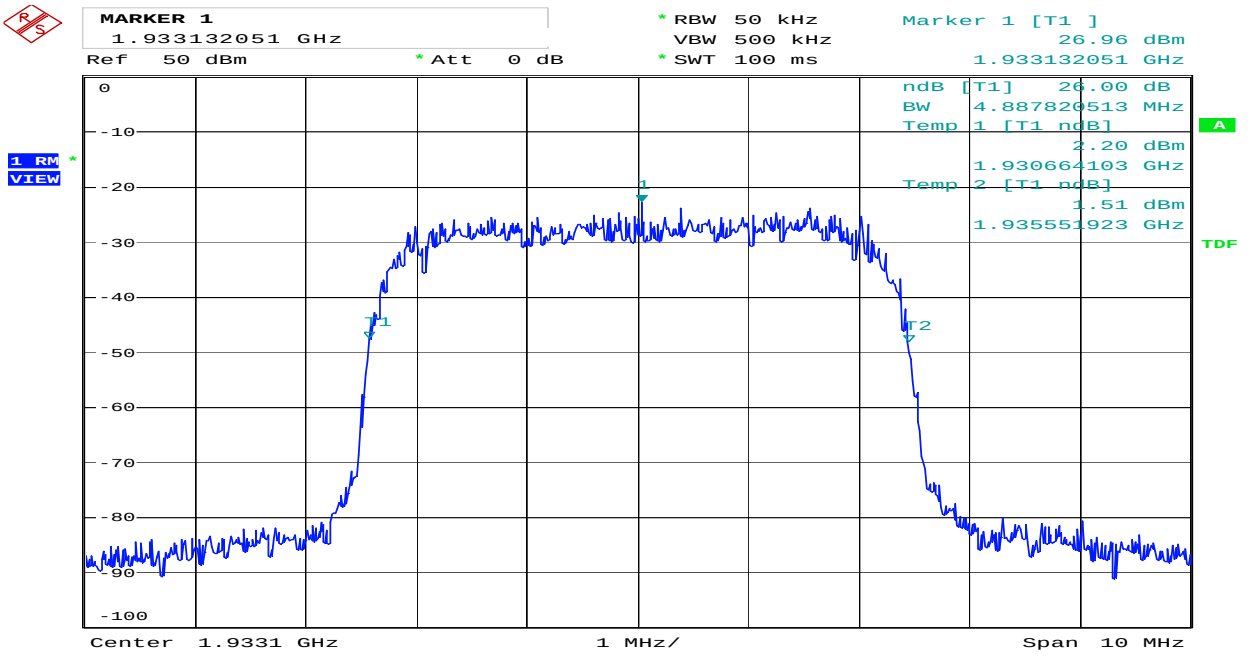


Date: 20.NOV.2006 19:05:36

Figure 4 26 dB Occupied Bandwidth – Downlink – W-CDMA – Channel 62

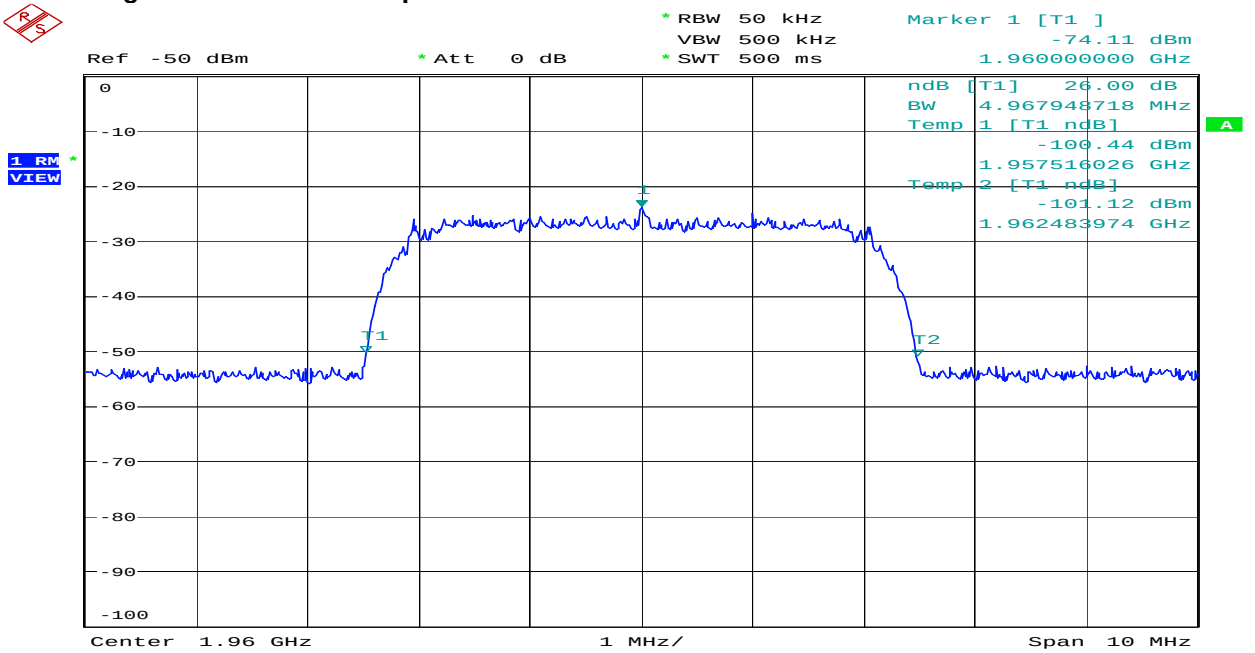


Date: 20.NOV.2006 19:45:42

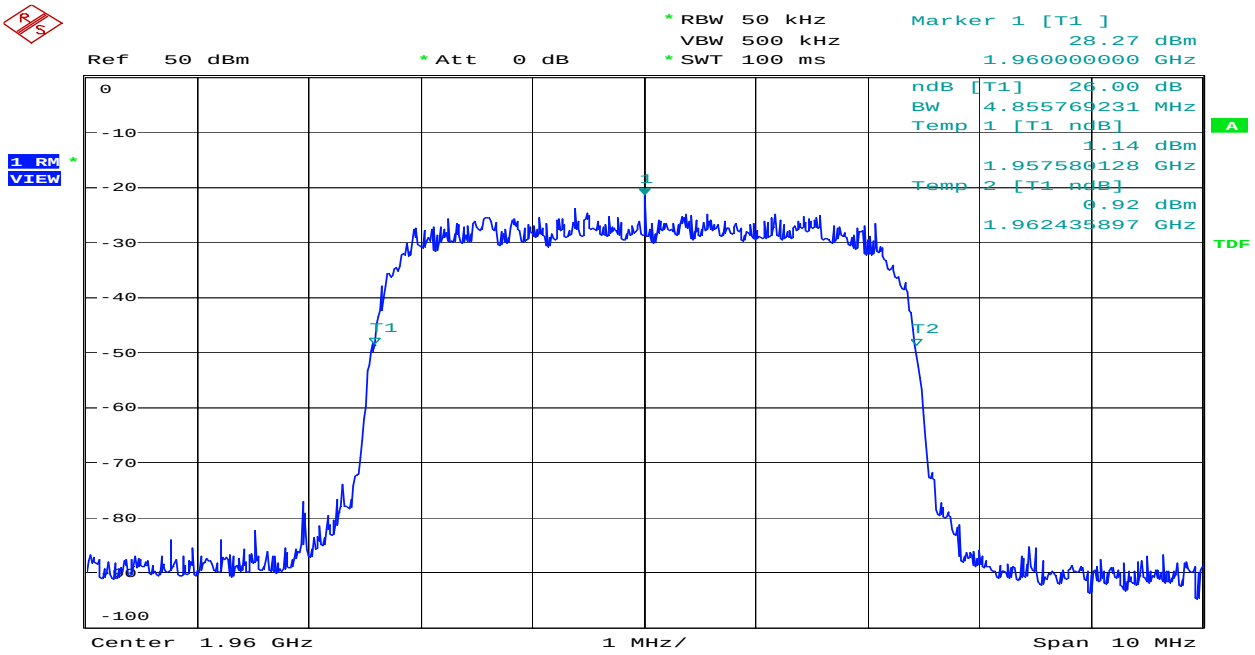


Date: 20.NOV.2006 19:23:51

Figure 5 26 dB Occupied Bandwidth – Downlink – W-CDMA – Channel 600

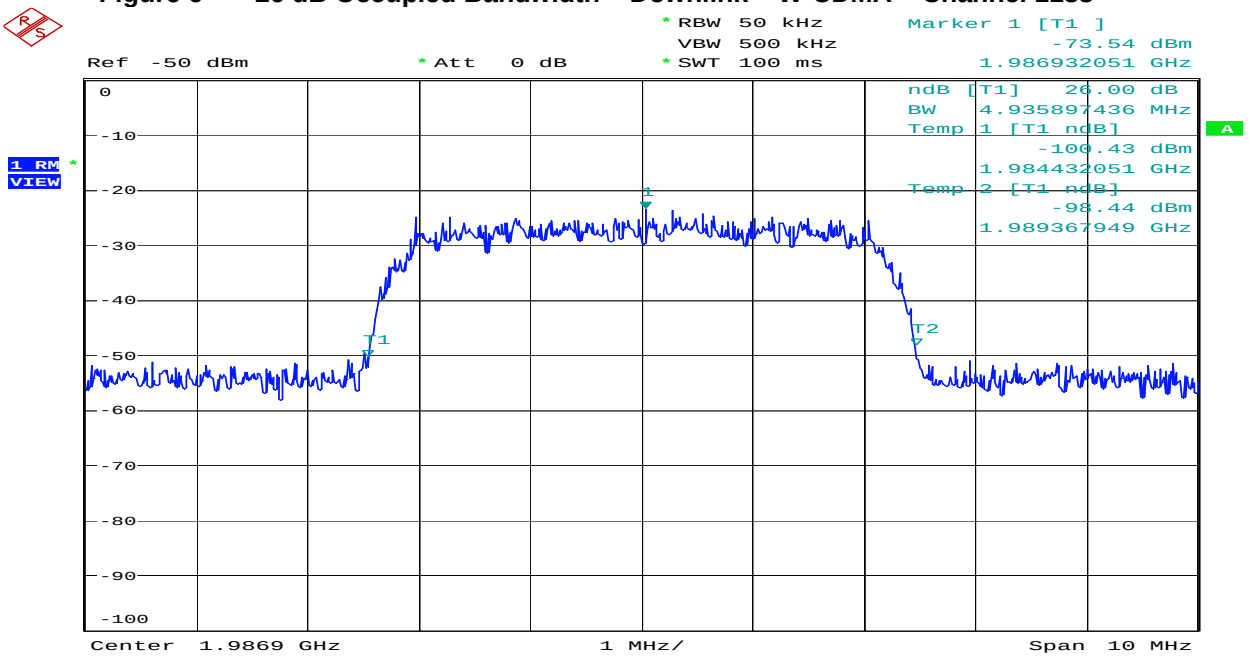


Date: 20.NOV.2006 19:44:24

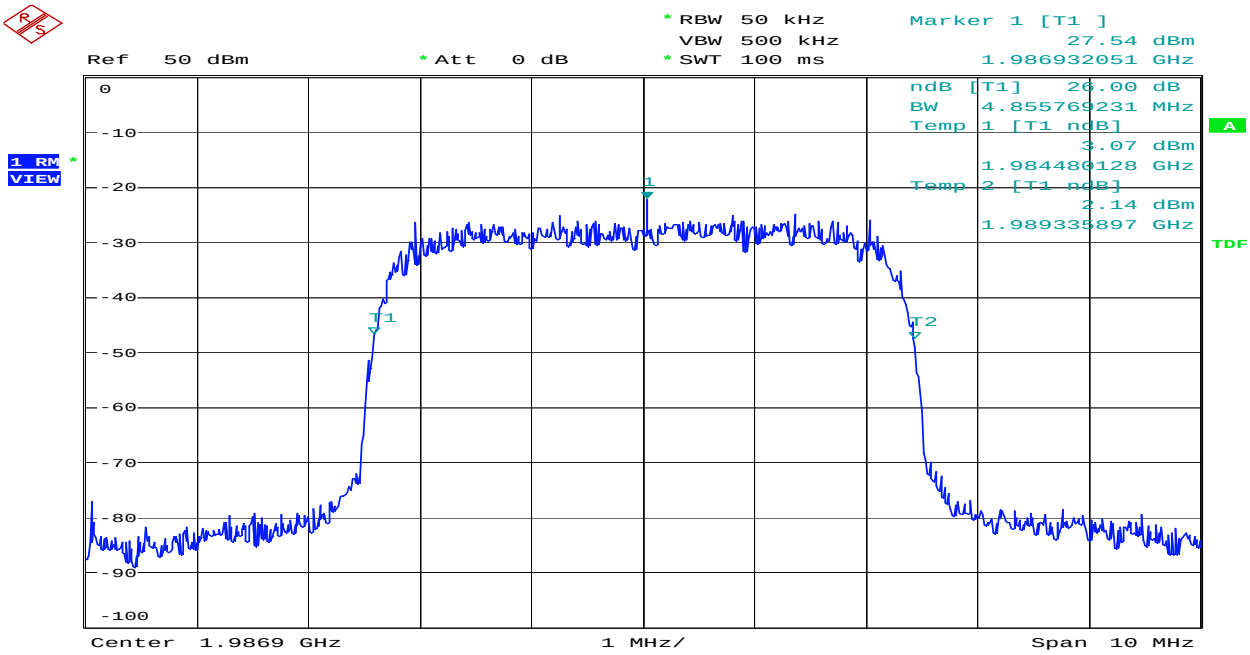


Date: 20.NOV.2006 19:35:52

Figure 6 26 dB Occupied Bandwidth – Downlink – W-CDMA – Channel 1138

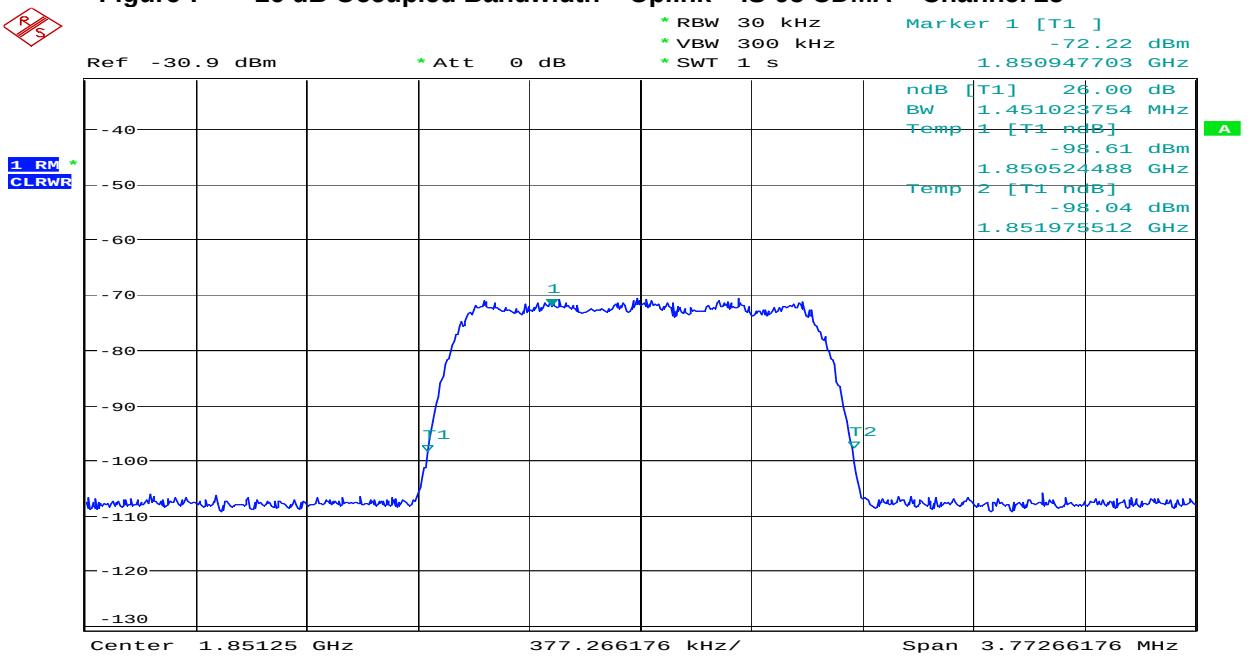


Date: 20.NOV.2006 19:43:03

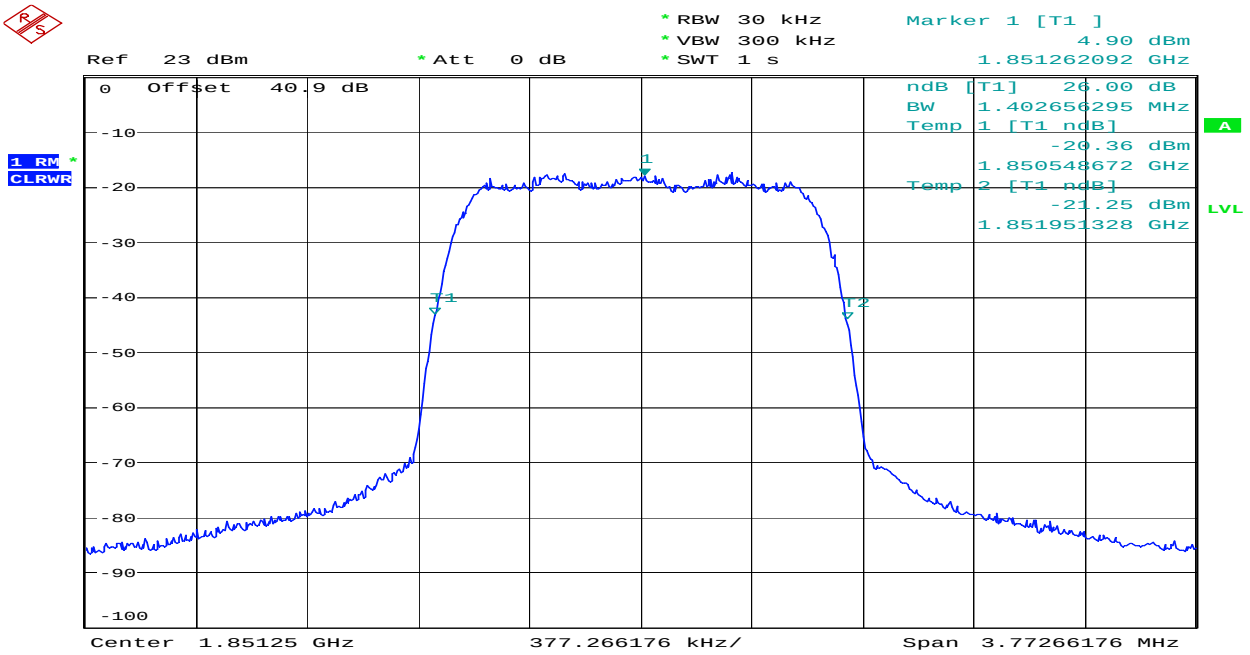


Date: 20.NOV.2006 19:38:48

Figure 7 26 dB Occupied Bandwidth – Uplink – IS-95 CDMA – Channel 25

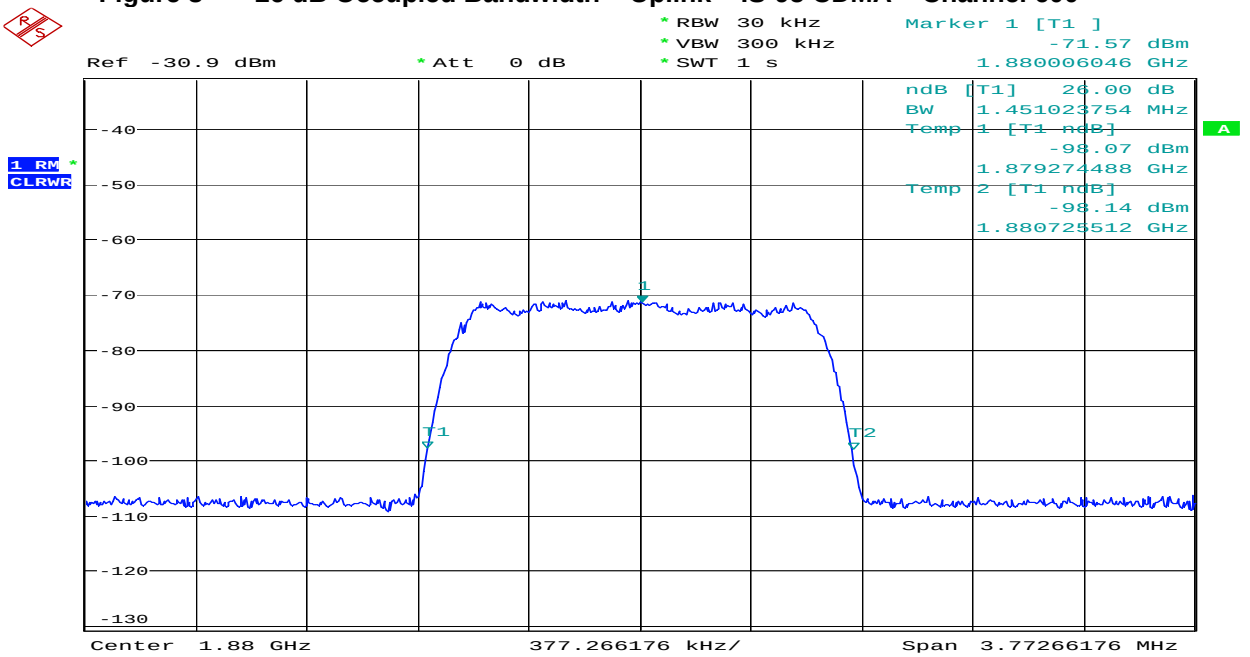


Date: 22.NOV.2006 21:23:36

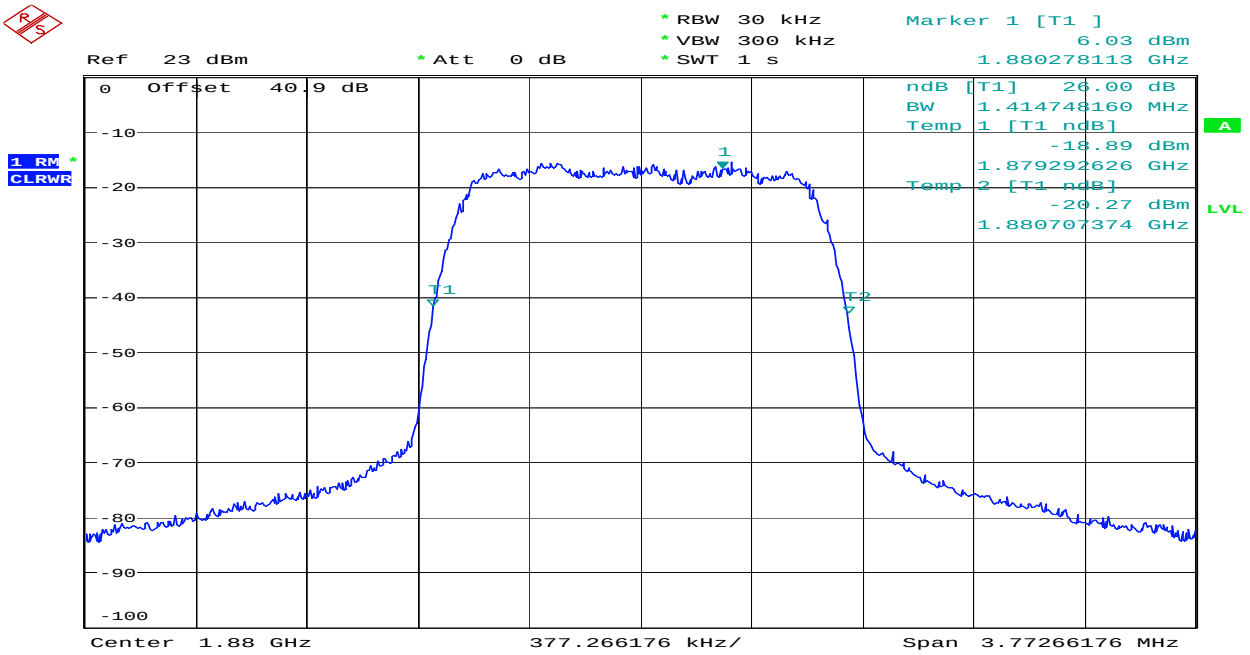


Date: 22.NOV.2006 21:13:00

Figure 8 26 dB Occupied Bandwidth – Uplink – IS-95 CDMA – Channel 600

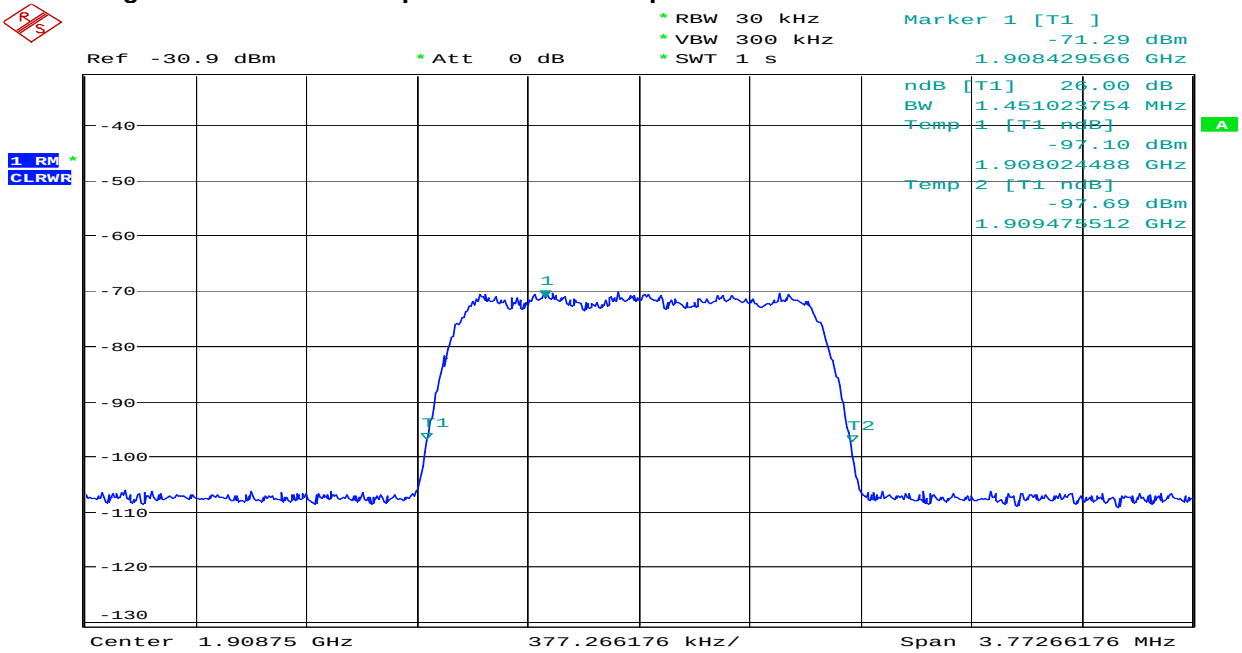


Date: 22.NOV.2006 21:22:22

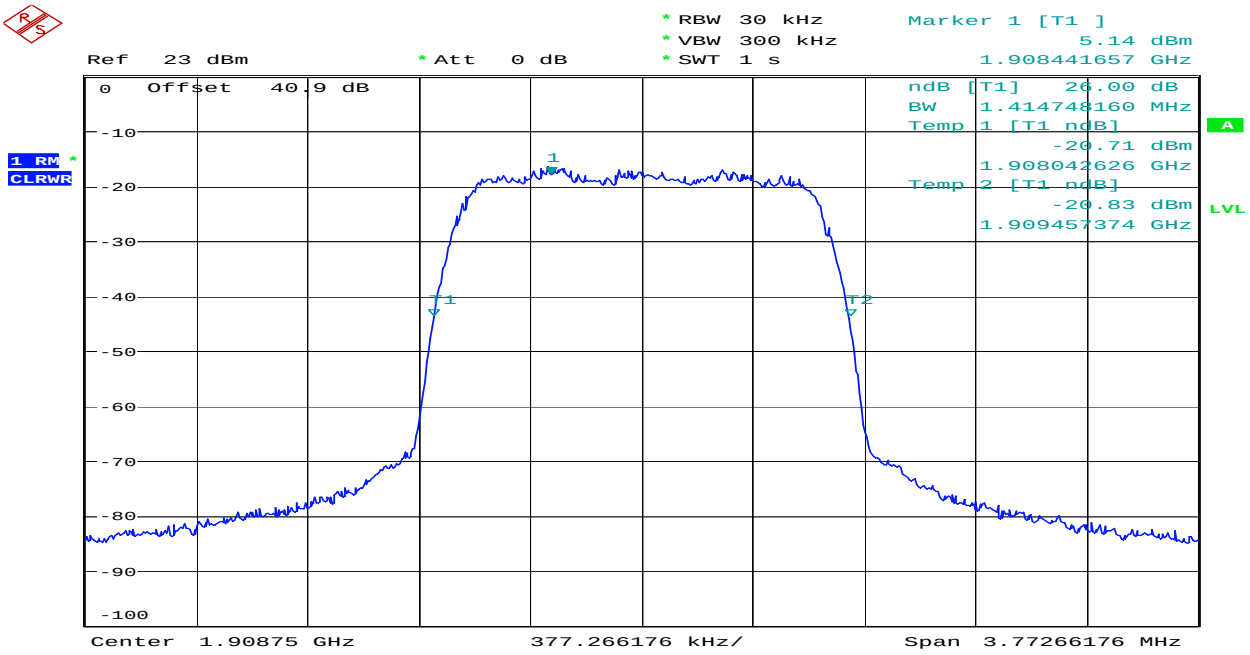


Date: 22.NOV.2006 21:08:11

Figure 9 26 dB Occupied Bandwidth – Uplink – IS-95 CDMA – Channel 1175

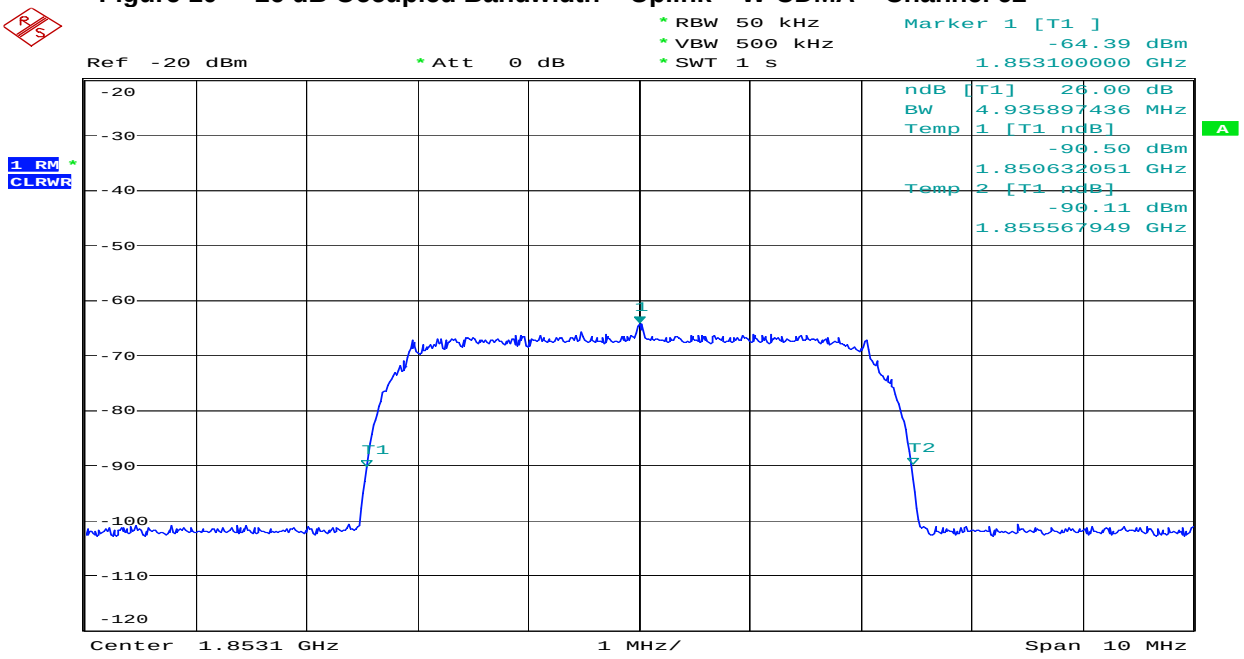


Date: 22.NOV.2006 21:21:00

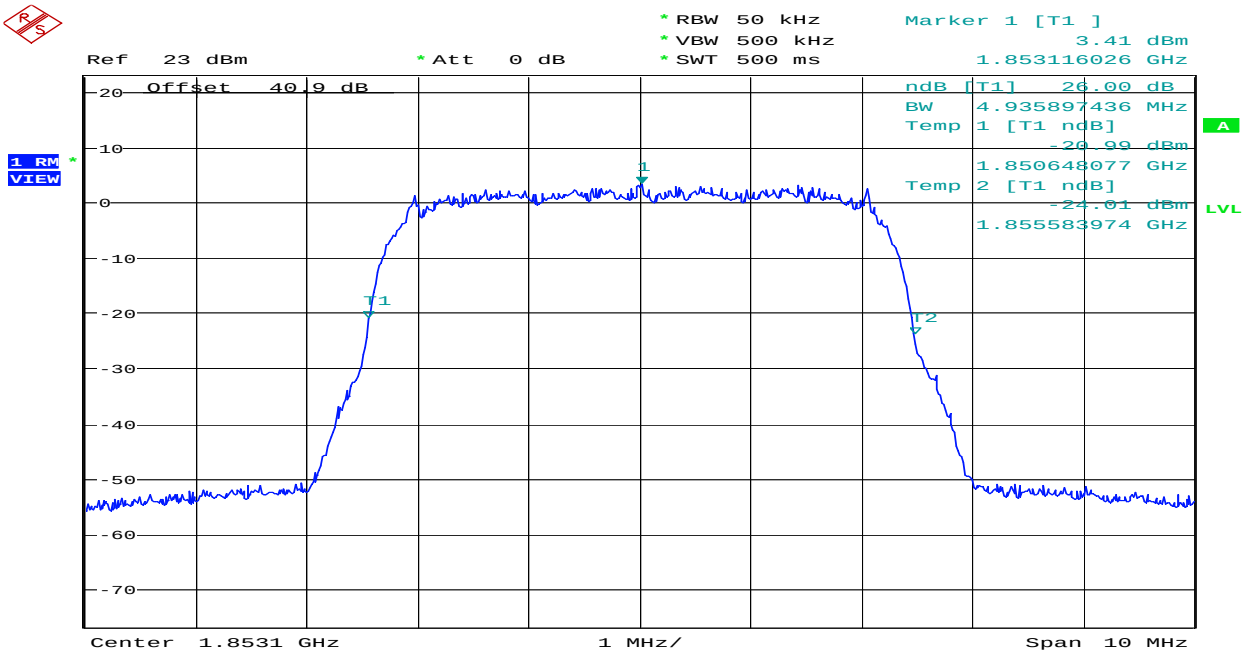


Date: 22.NOV.2006 21:15:20

Figure 10 26 dB Occupied Bandwidth – Uplink – W-CDMA – Channel 62

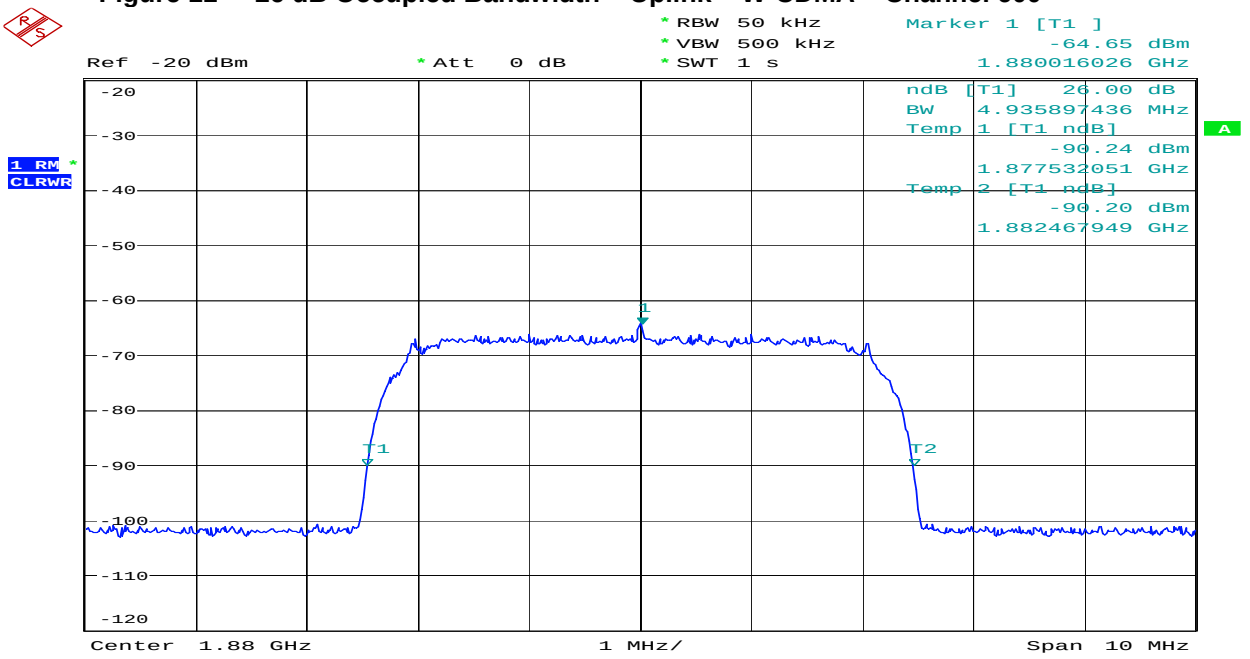


Date: 22.NOV.2006 21:52:29

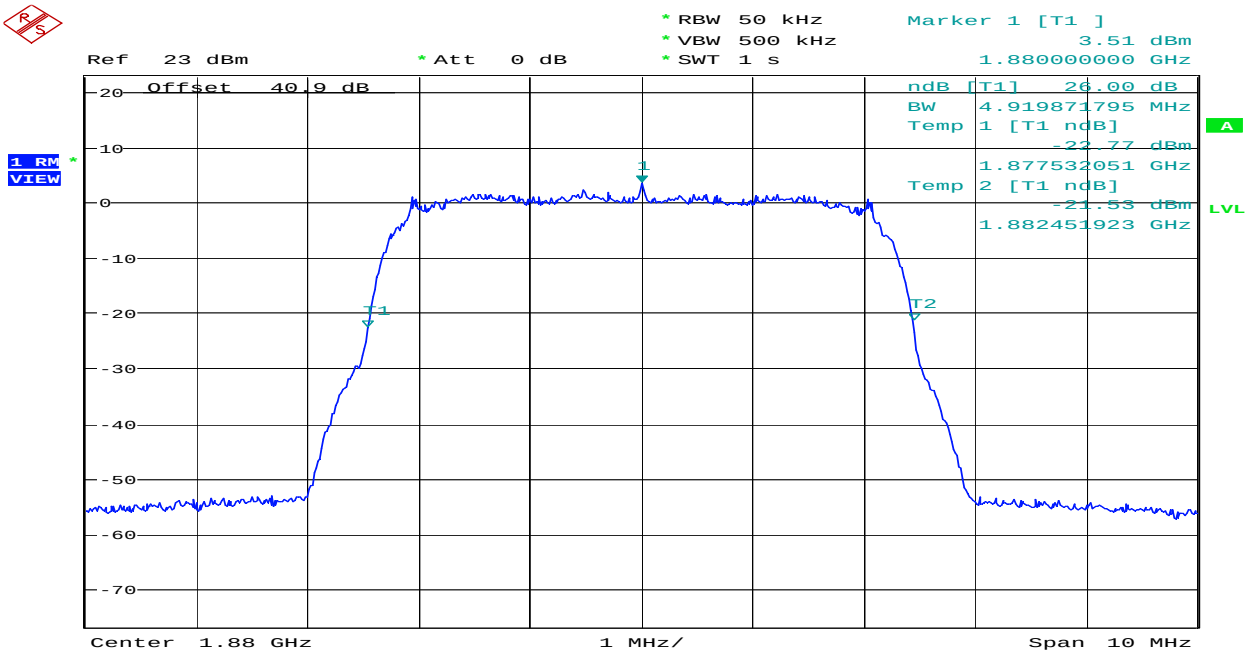


Date: 22.NOV.2006 22:00:09

Figure 11 26 dB Occupied Bandwidth – Uplink – W-CDMA – Channel 600

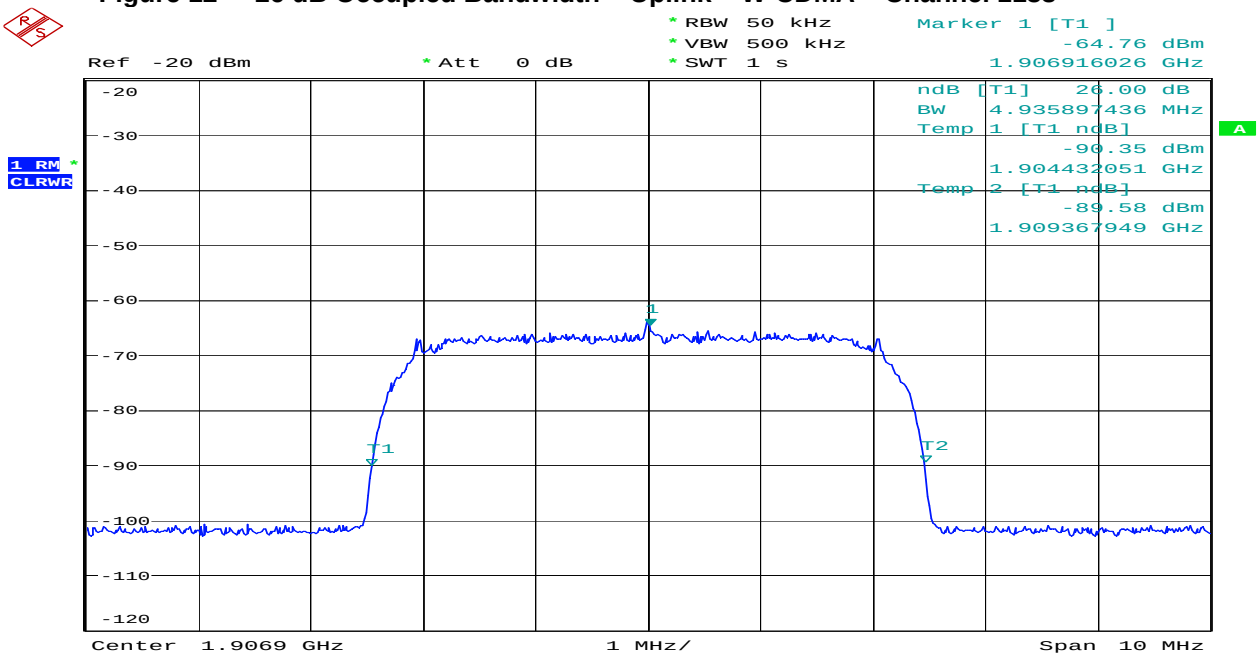


Date: 22.NOV.2006 21:51:45

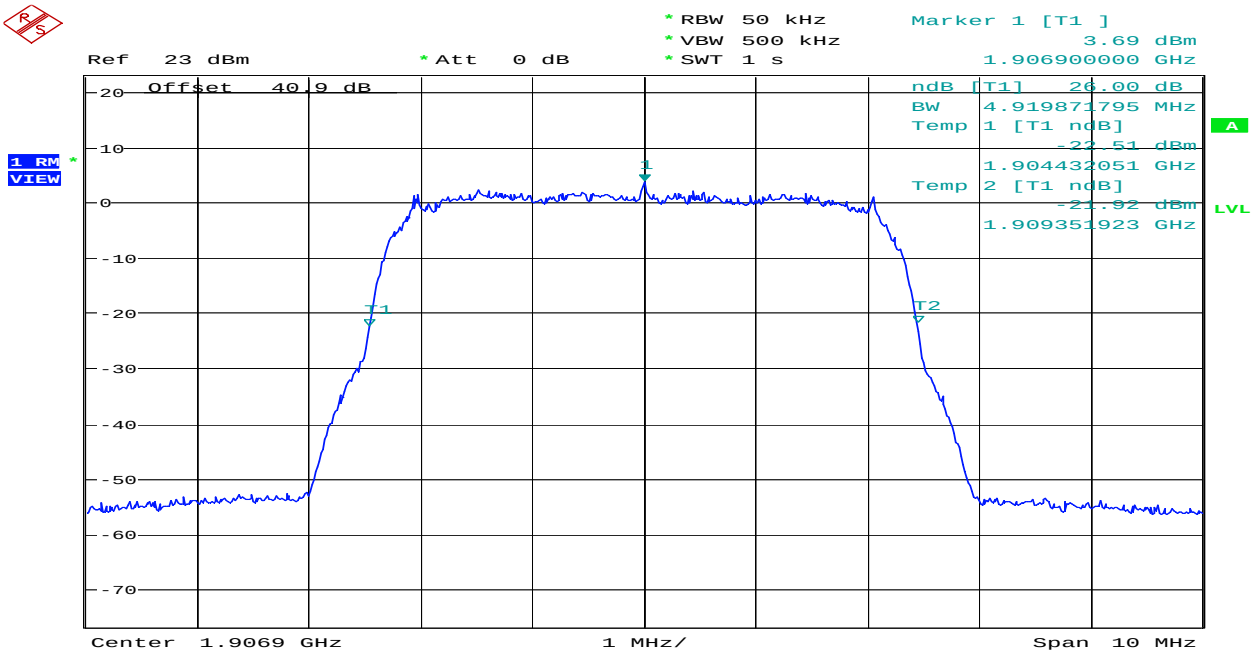


Date: 22.NOV.2006 21:58:23

Figure 12 26 dB Occupied Bandwidth – Uplink – W-CDMA – Channel 1138

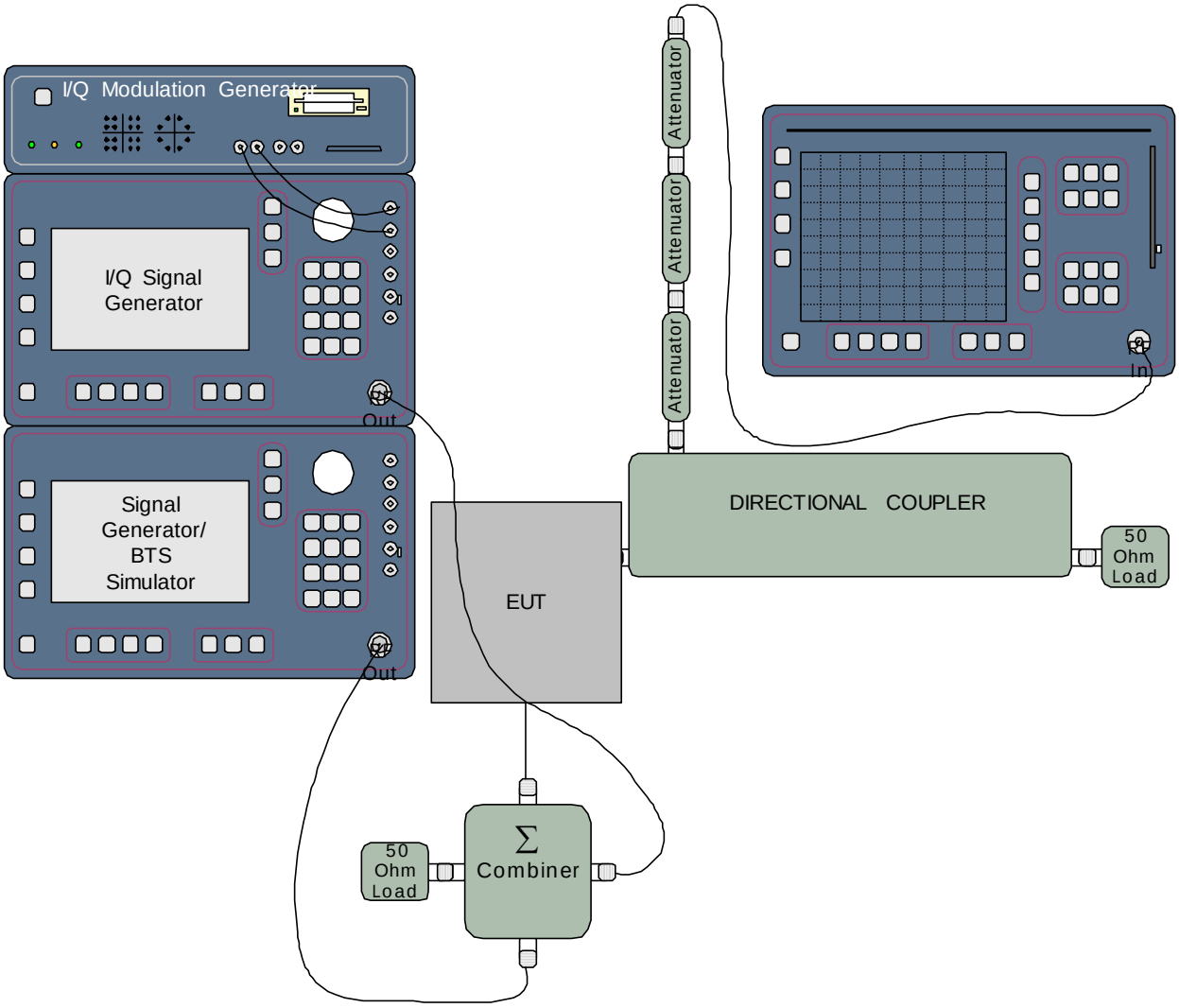


Date: 22.NOV.2006 21:50:51



Date: 22.NOV.2006 21:56:15

C.9. Test Diagram



C.10. Tested By

Name: Tom Tidwell,
Function: Manager of Wireless Services

APPENDIX D: 2.1051 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

D.1. Base Standard & Test Basis

Base Standard	FCC 2.1051
Test Basis	FCC 2.1051 Spurious Emissions at Antenna Terminals
Test Method	TIA 603-C, 2004

D.2. Specifications

24.238 Emission limitations for Broadband PCS equipment

(a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

D.3. Measurement Uncertainty

Expanded Uncertainty (K=2)
+1.11/-1.22

D.4. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

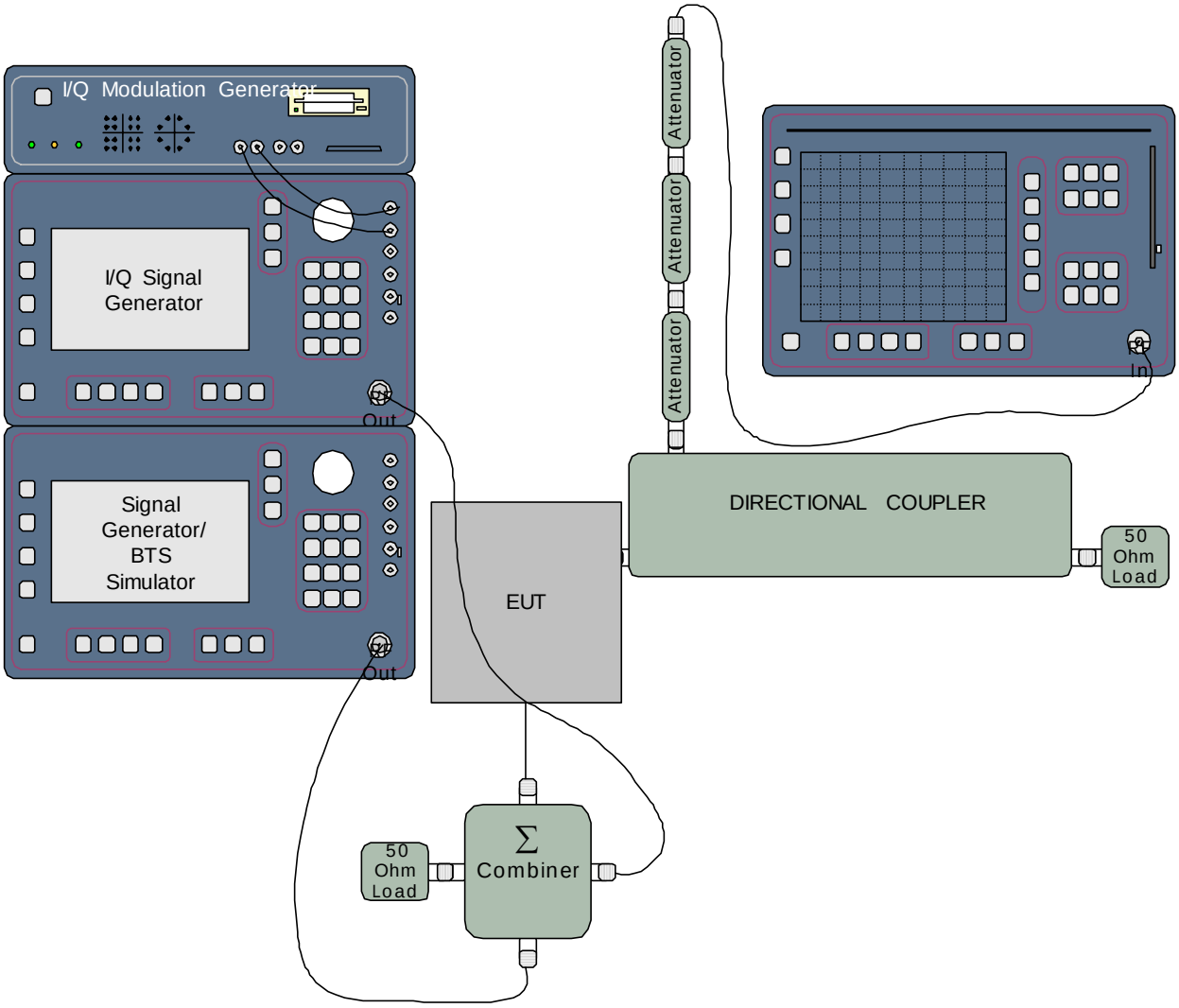
D.5. Test Results

Complies. All emissions meet the out of band limits.

Out-of-Band Emissions limit is 43 + 10 log(P) which relates to -13 dBm absolute power.

Attenuation limit = 43 + 10 log(20) = 56 dB

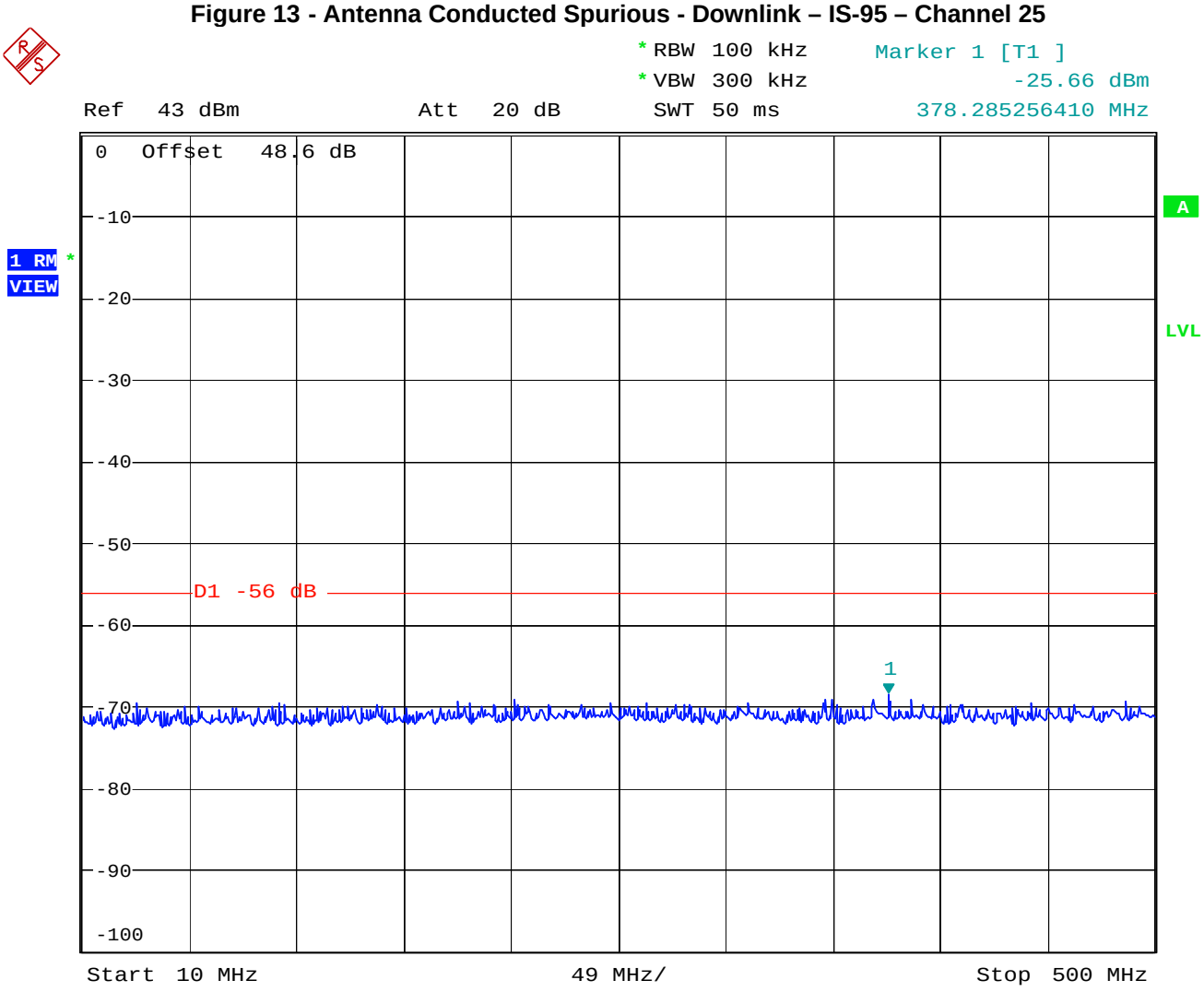
D.6. Test Diagram



D.7. Test Data

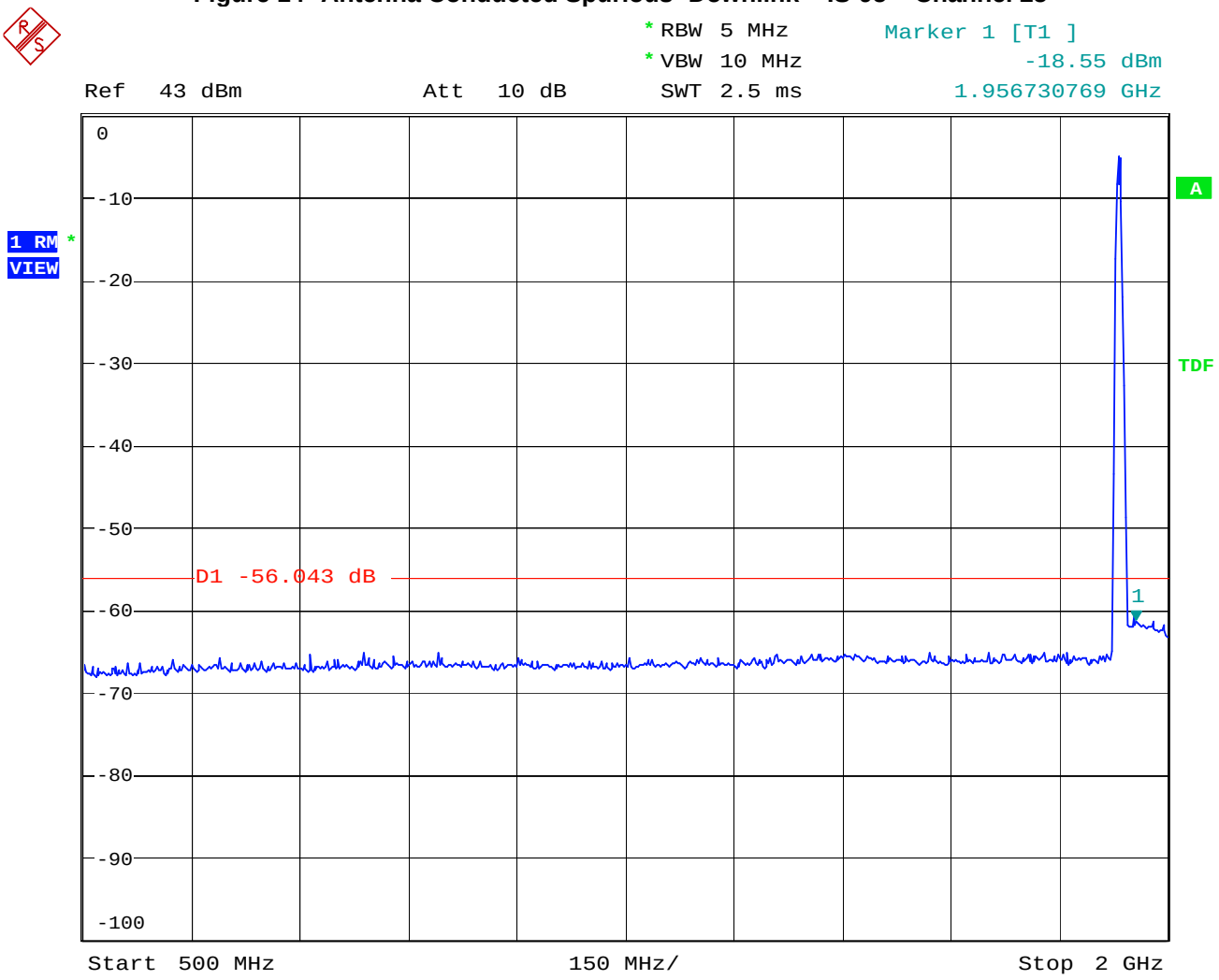
See following pages.

Figure 13 - Antenna Conducted Spurious - Downlink – IS-95 – Channel 25



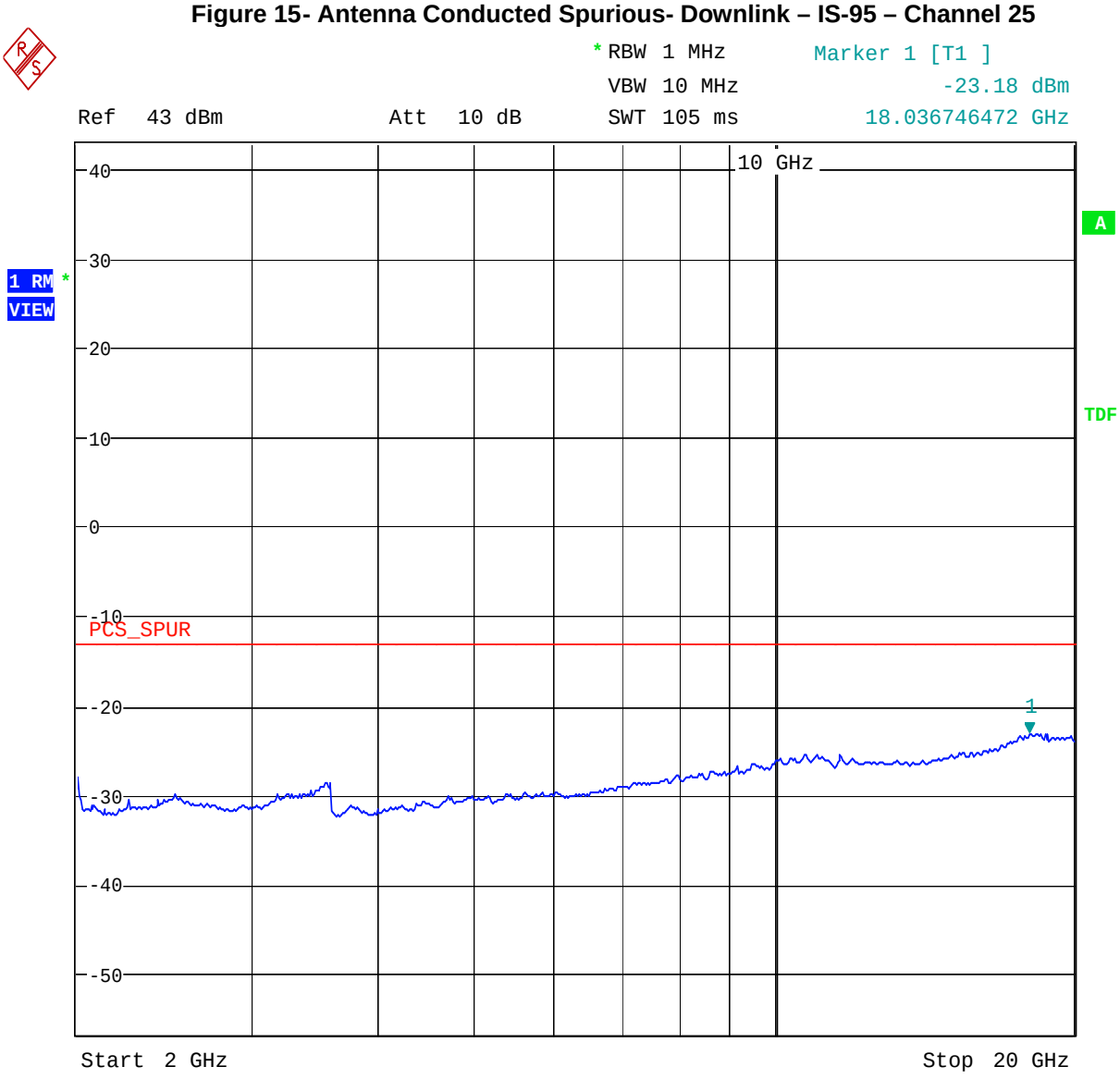
Date: 15.NOV.2006 22:50:30

Figure 14- Antenna Conducted Spurious- Downlink – IS-95 – Channel 25



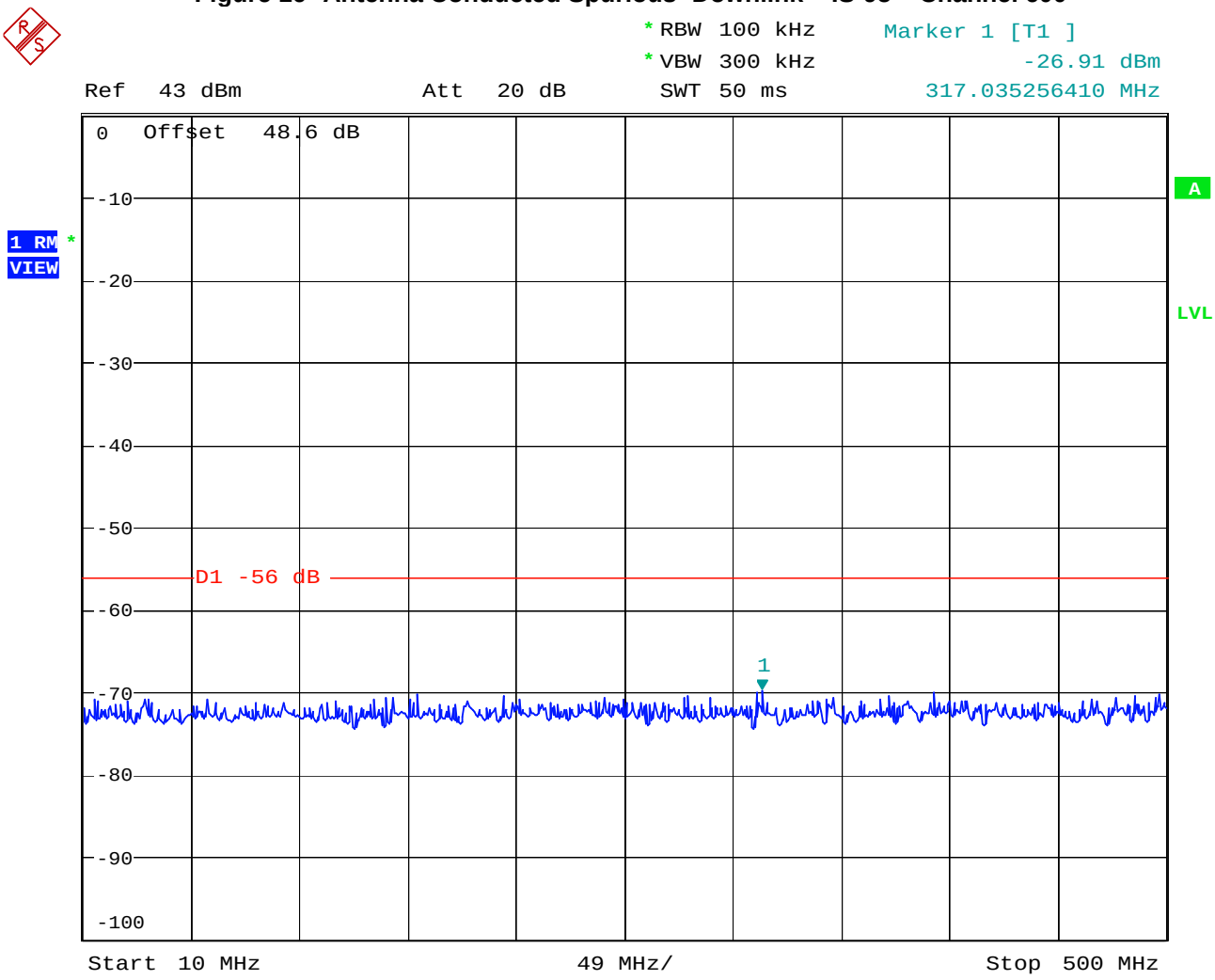
Date: 16.NOV.2006 00:01:26

Figure 15- Antenna Conducted Spurious- Downlink – IS-95 – Channel 25



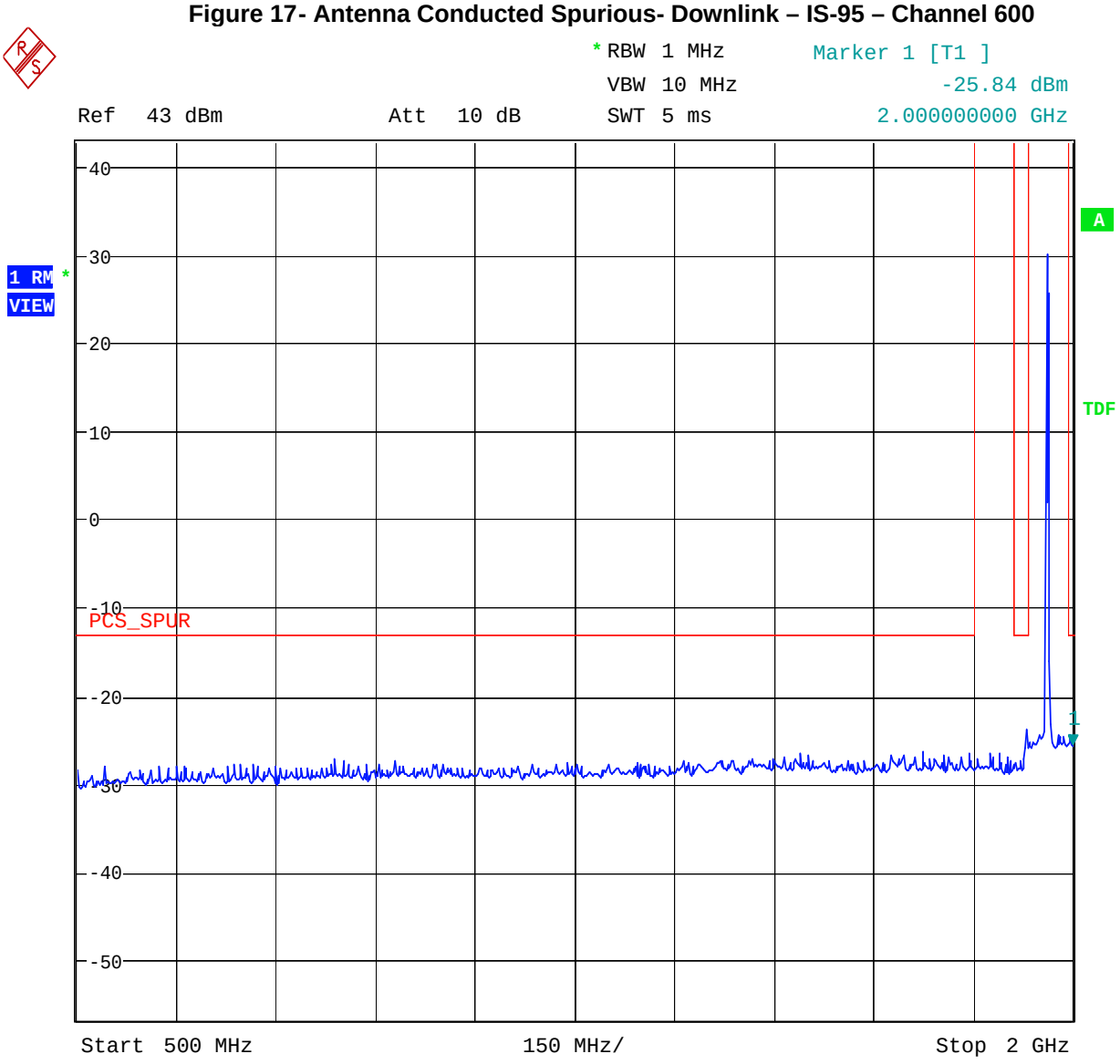
Date: 27.NOV.2006 19:28:48

Figure 16- Antenna Conducted Spurious- Downlink – IS-95 – Channel 600



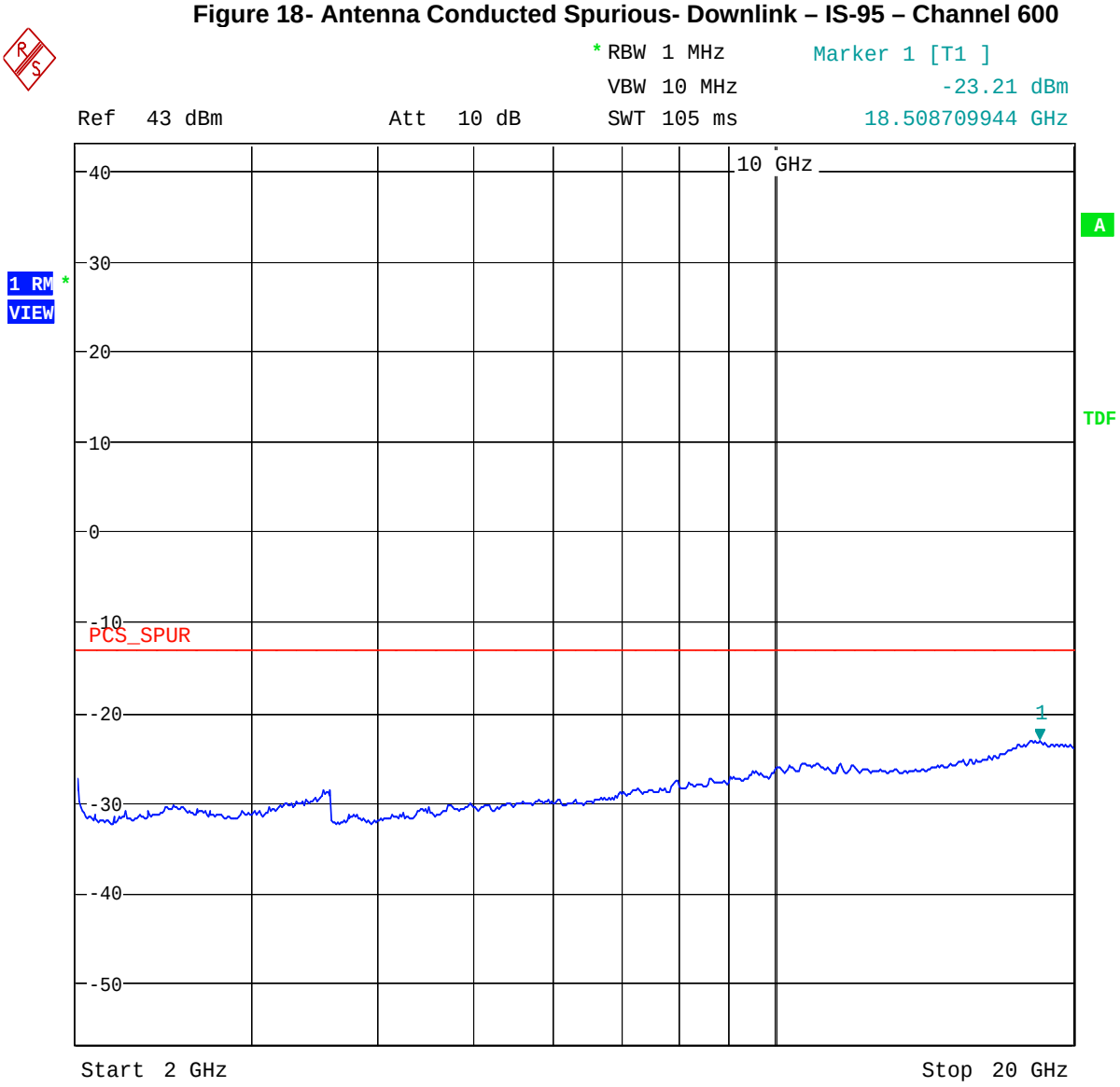
Date: 15.NOV.2006 22:51:16

Figure 17- Antenna Conducted Spurious- Downlink – IS-95 – Channel 600



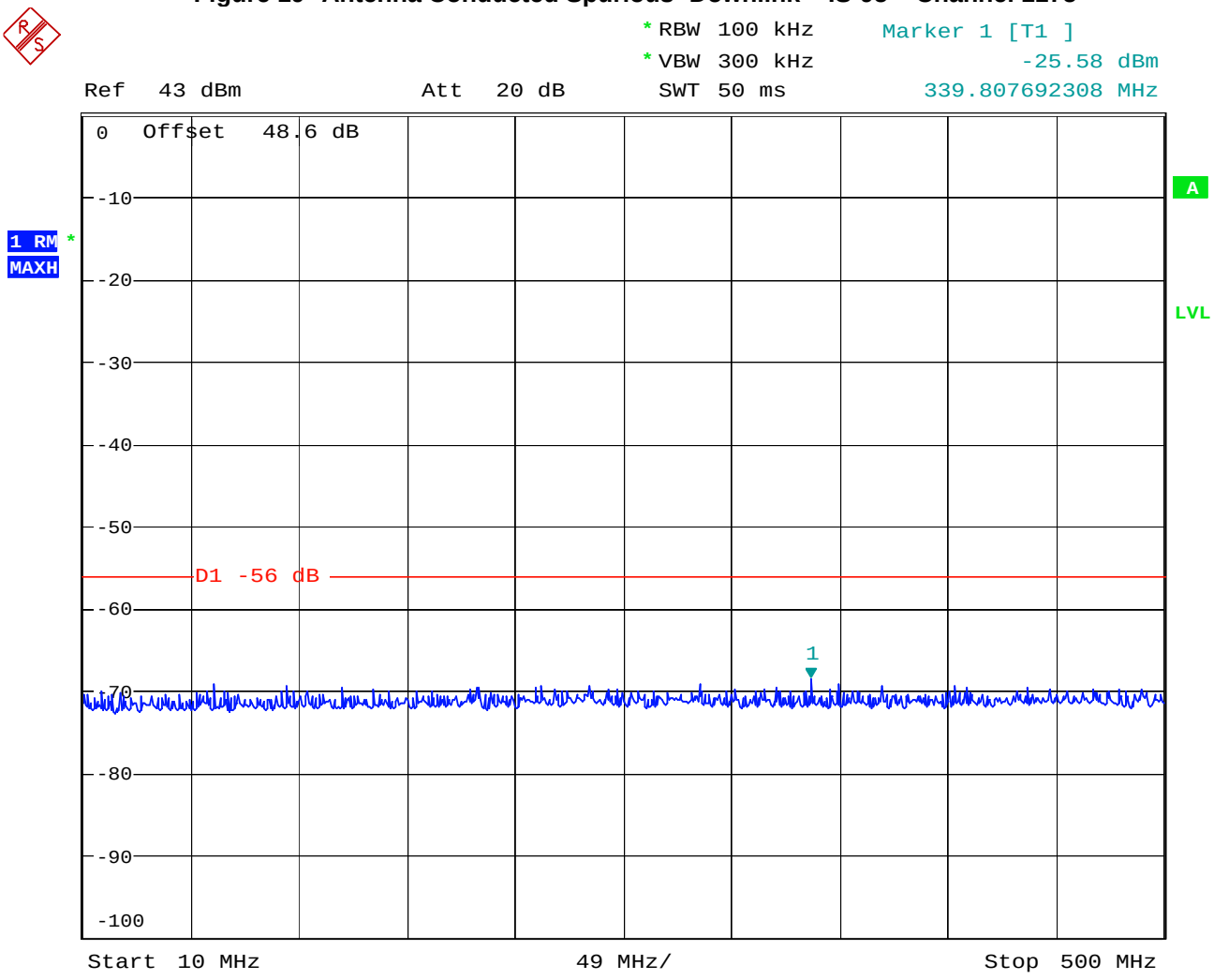
Date: 27.NOV.2006 19:20:54

Figure 18- Antenna Conducted Spurious- Downlink – IS-95 – Channel 600



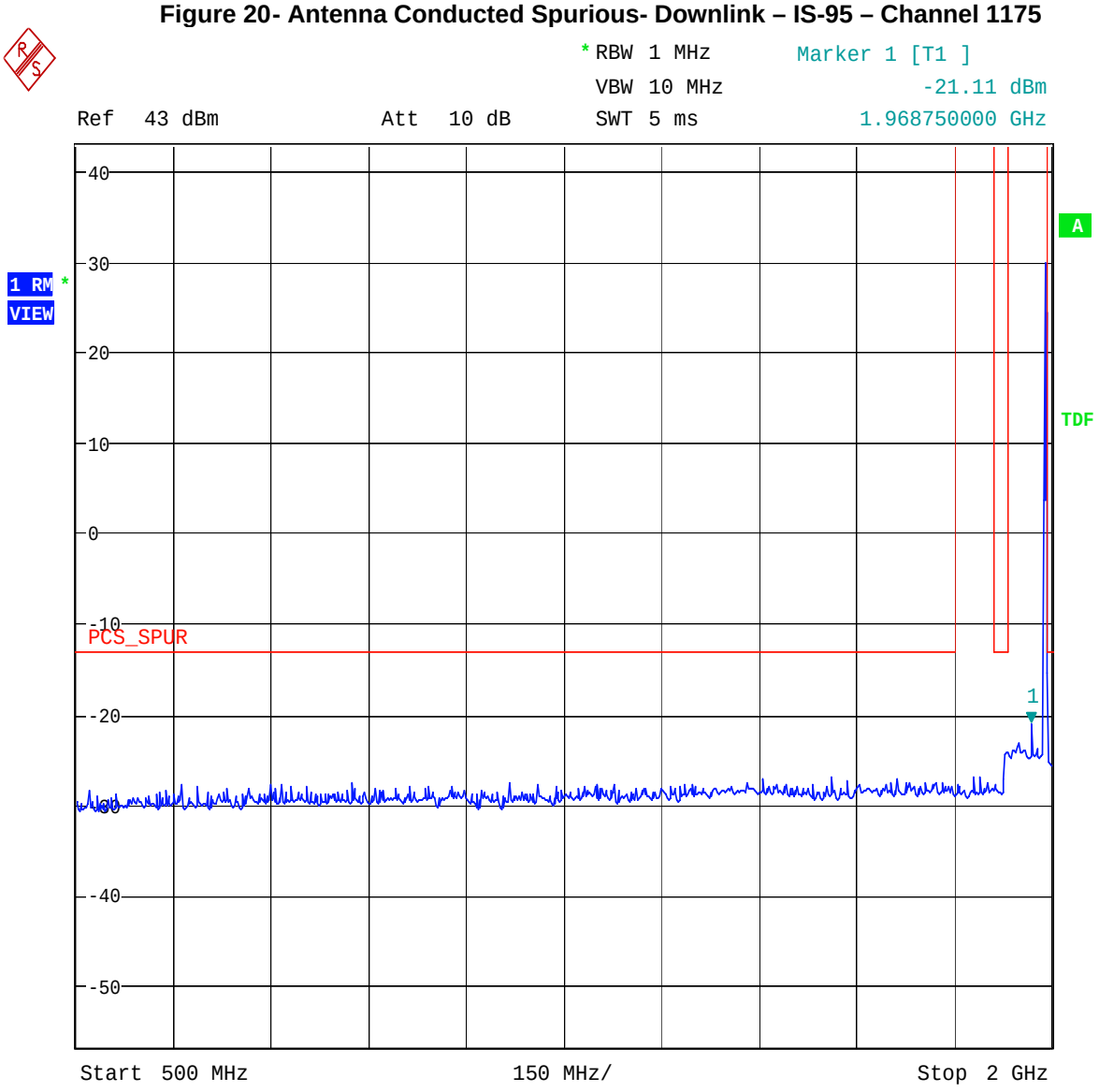
Date: 27.NOV.2006 19:27:05

Figure 19- Antenna Conducted Spurious- Downlink – IS-95 – Channel 1175



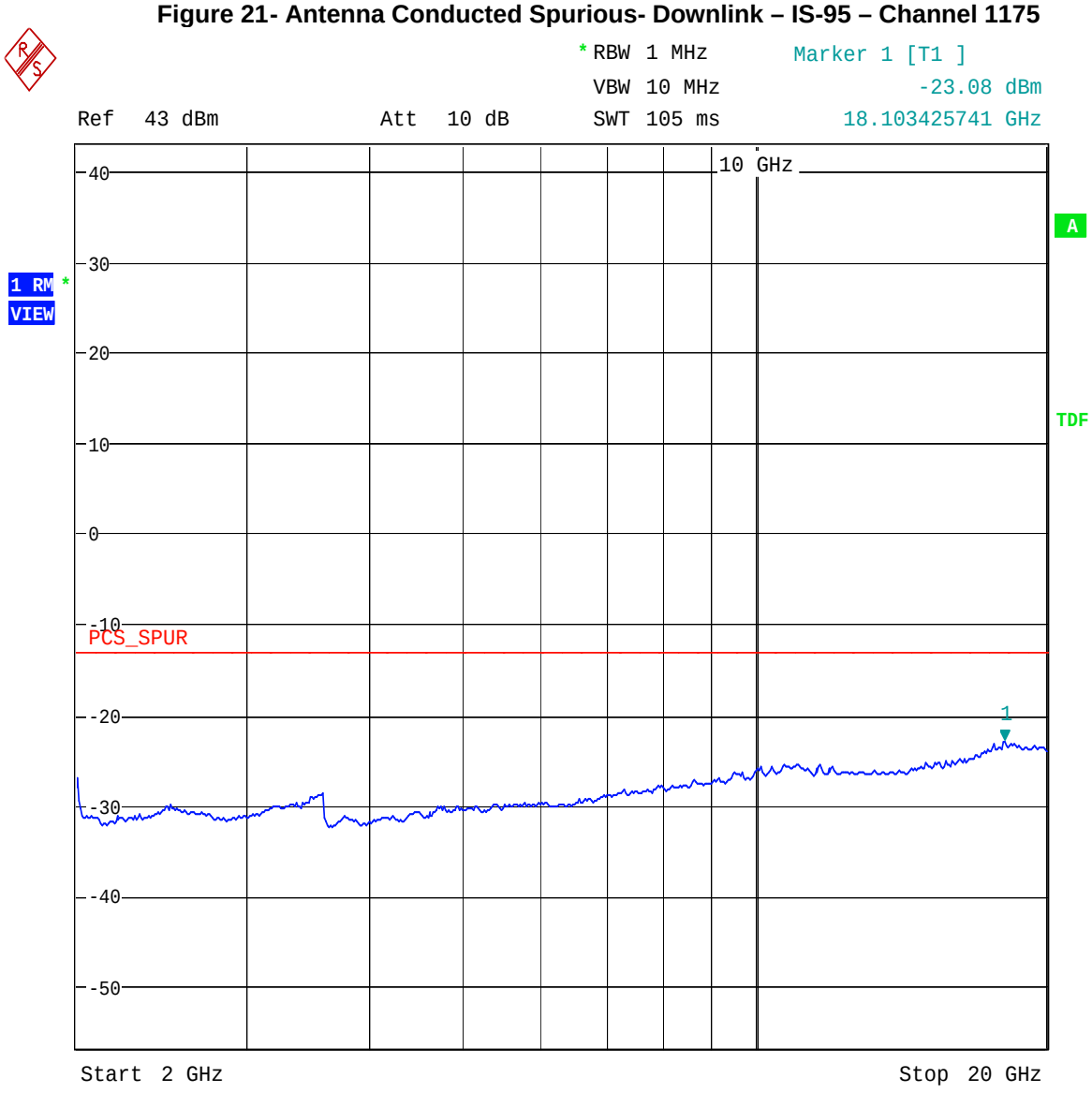
Date: 15.NOV.2006 22:56:40

Figure 20- Antenna Conducted Spurious- Downlink – IS-95 – Channel 1175



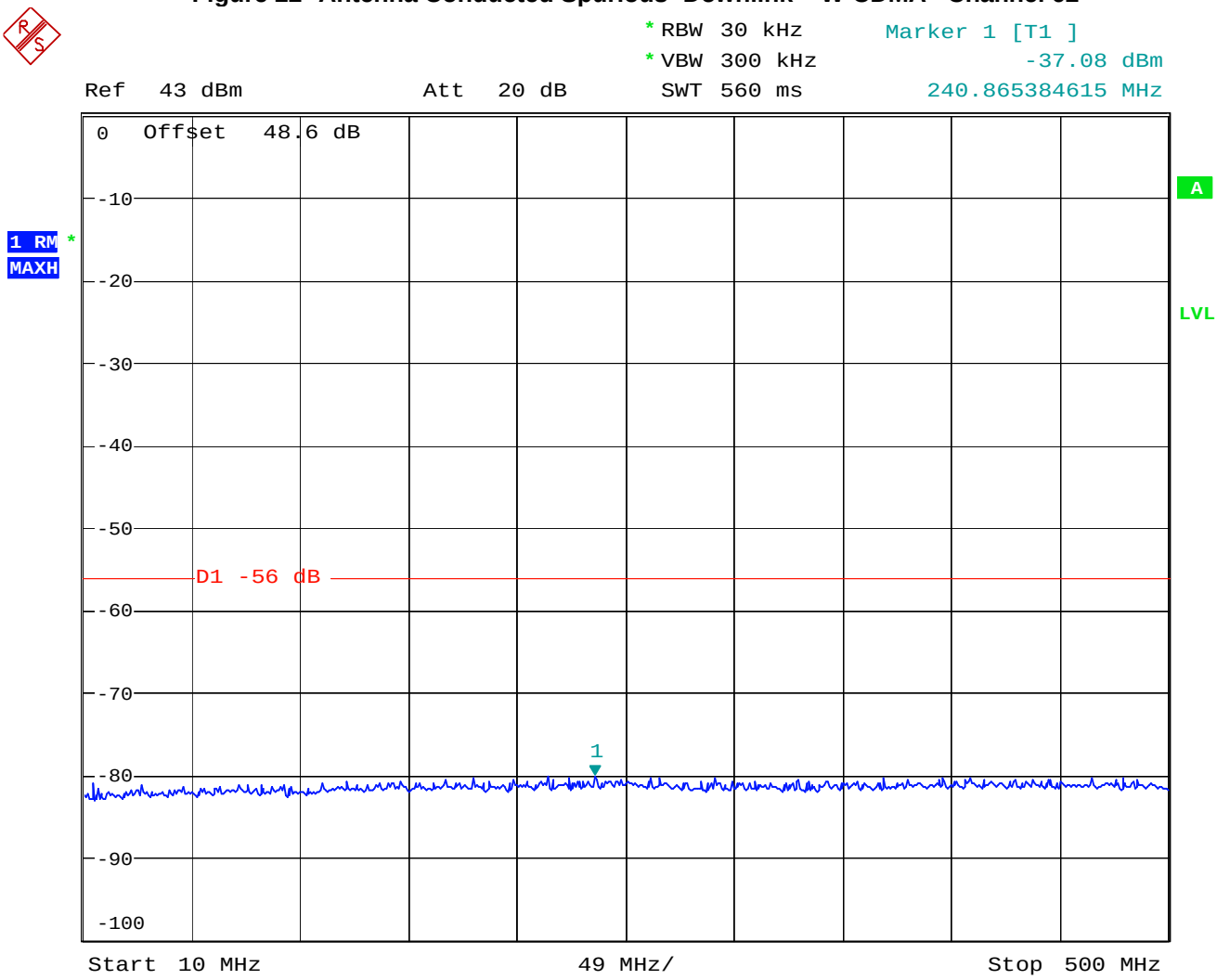
Date: 27.NOV.2006 19:22:32

Figure 21- Antenna Conducted Spurious- Downlink – IS-95 – Channel 1175



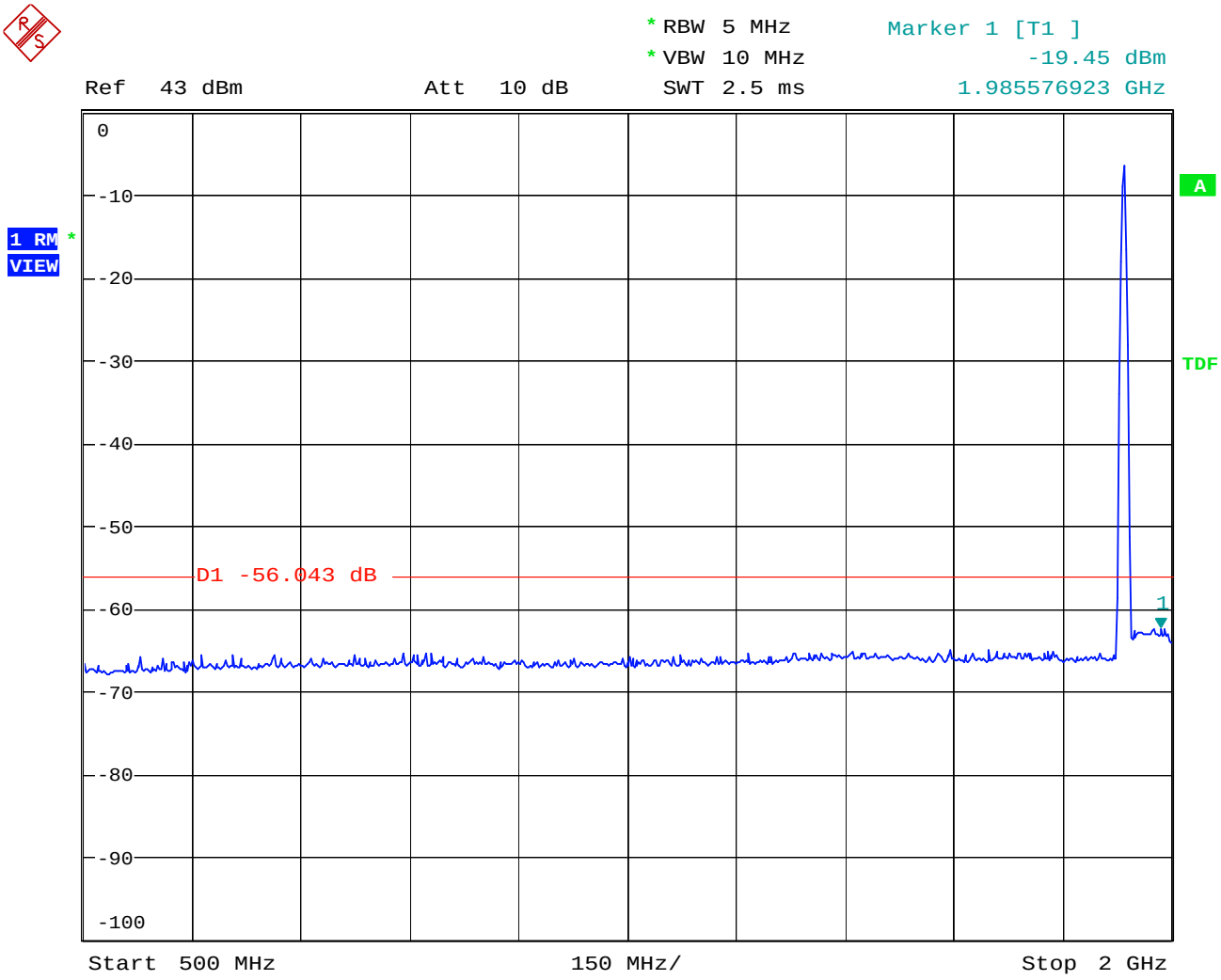
Date: 27.NOV.2006 19:25:51

Figure 22- Antenna Conducted Spurious- Downlink – W-CDMA –Channel 62



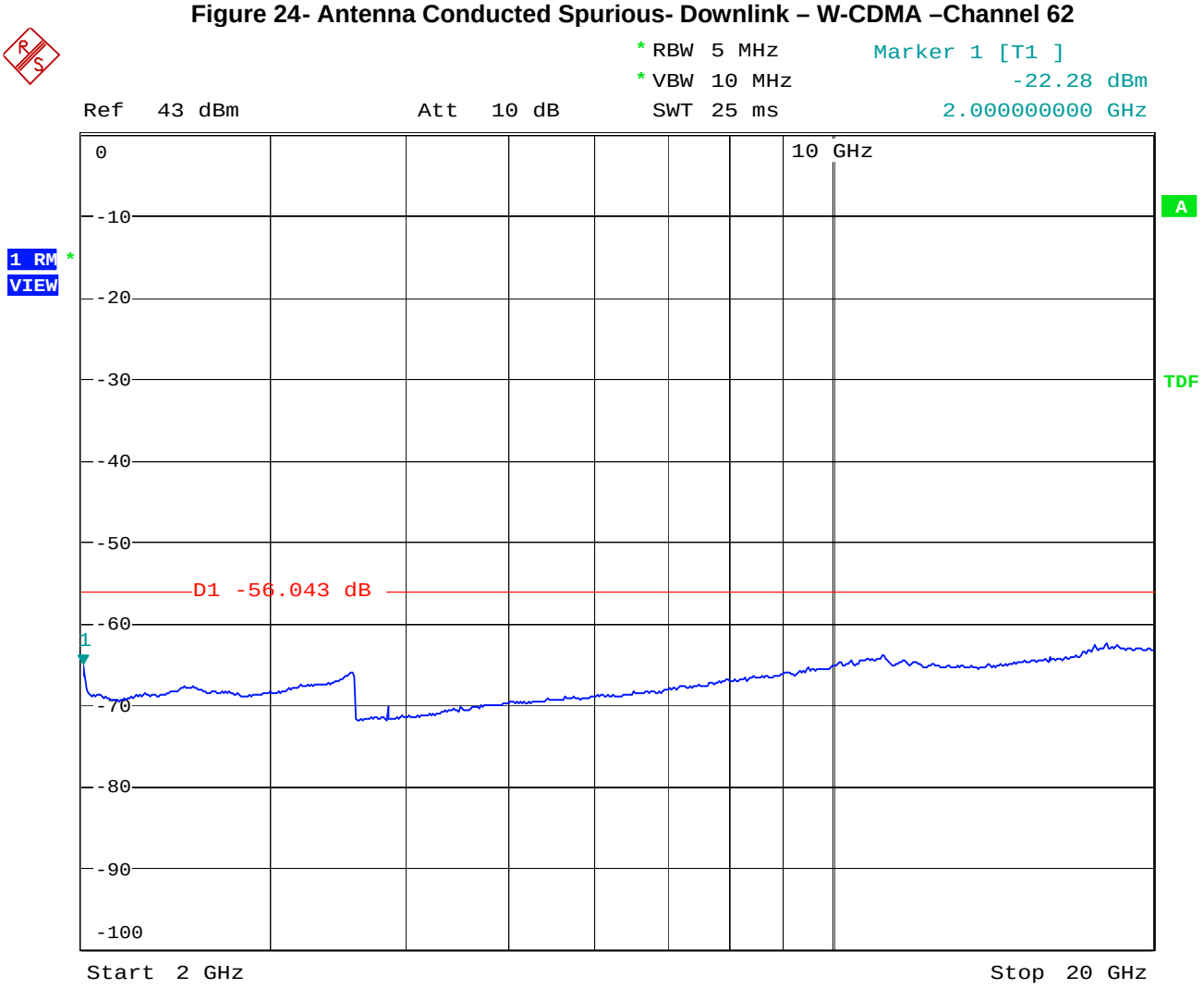
Date: 15.NOV.2006 23:29:27

Figure 23- Antenna Conducted Spurious- Downlink – W-CDMA – Channel 62



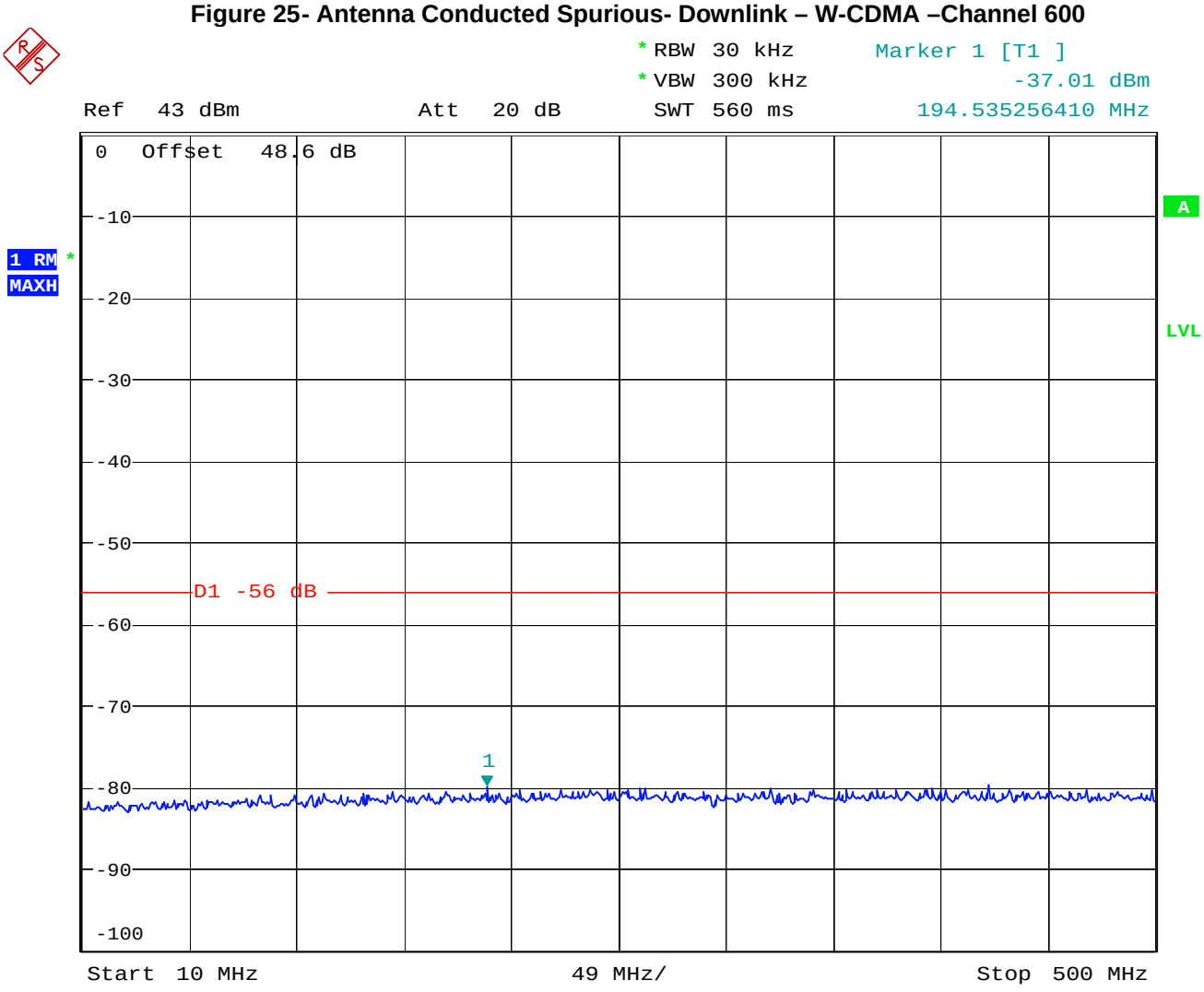
Date: 15.NOV.2006 23:44:20

Figure 24- Antenna Conducted Spurious- Downlink – W-CDMA –Channel 62



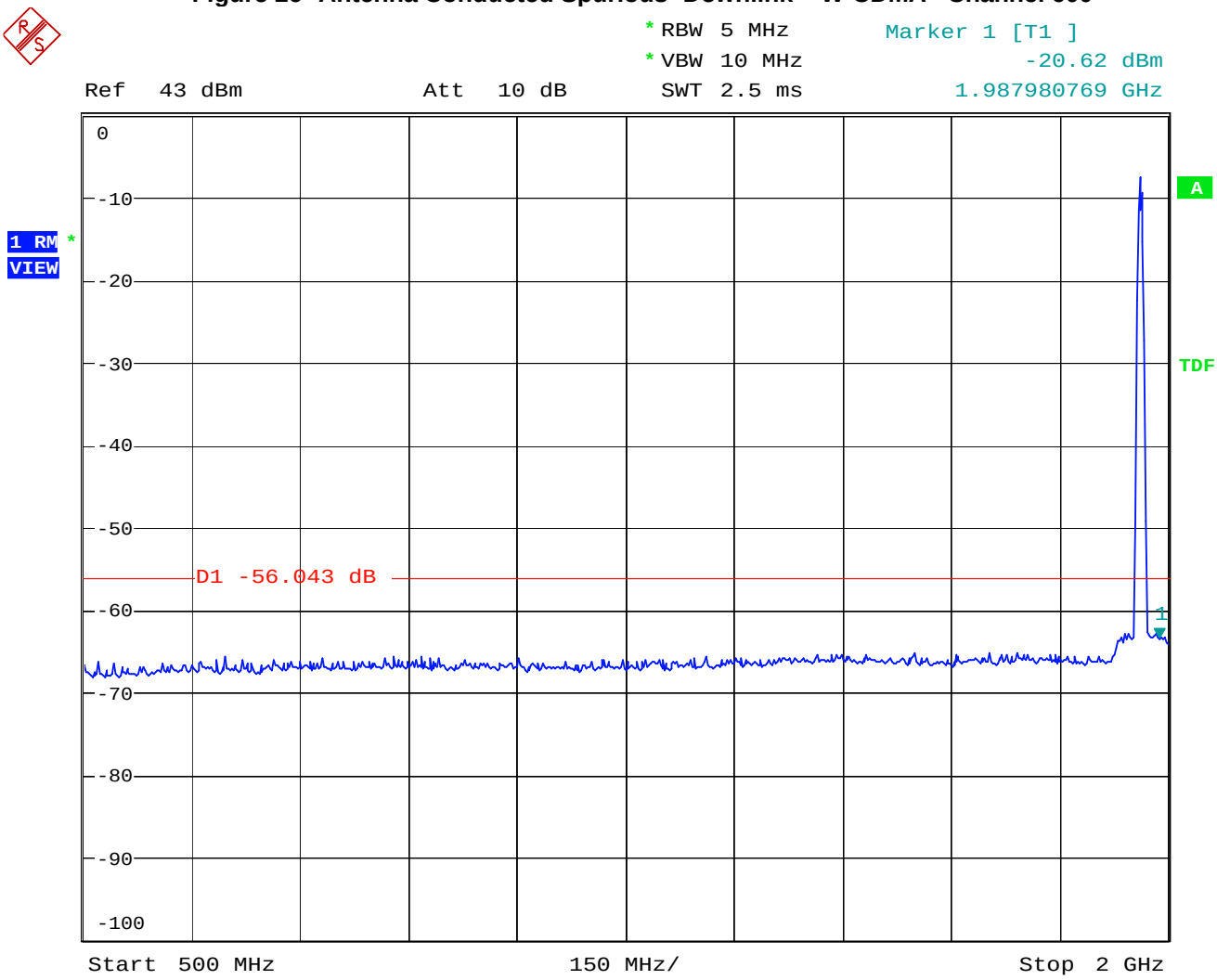
Date: 16.NOV.2006 00:03:23

Figure 25- Antenna Conducted Spurious- Downlink – W-CDMA –Channel 600



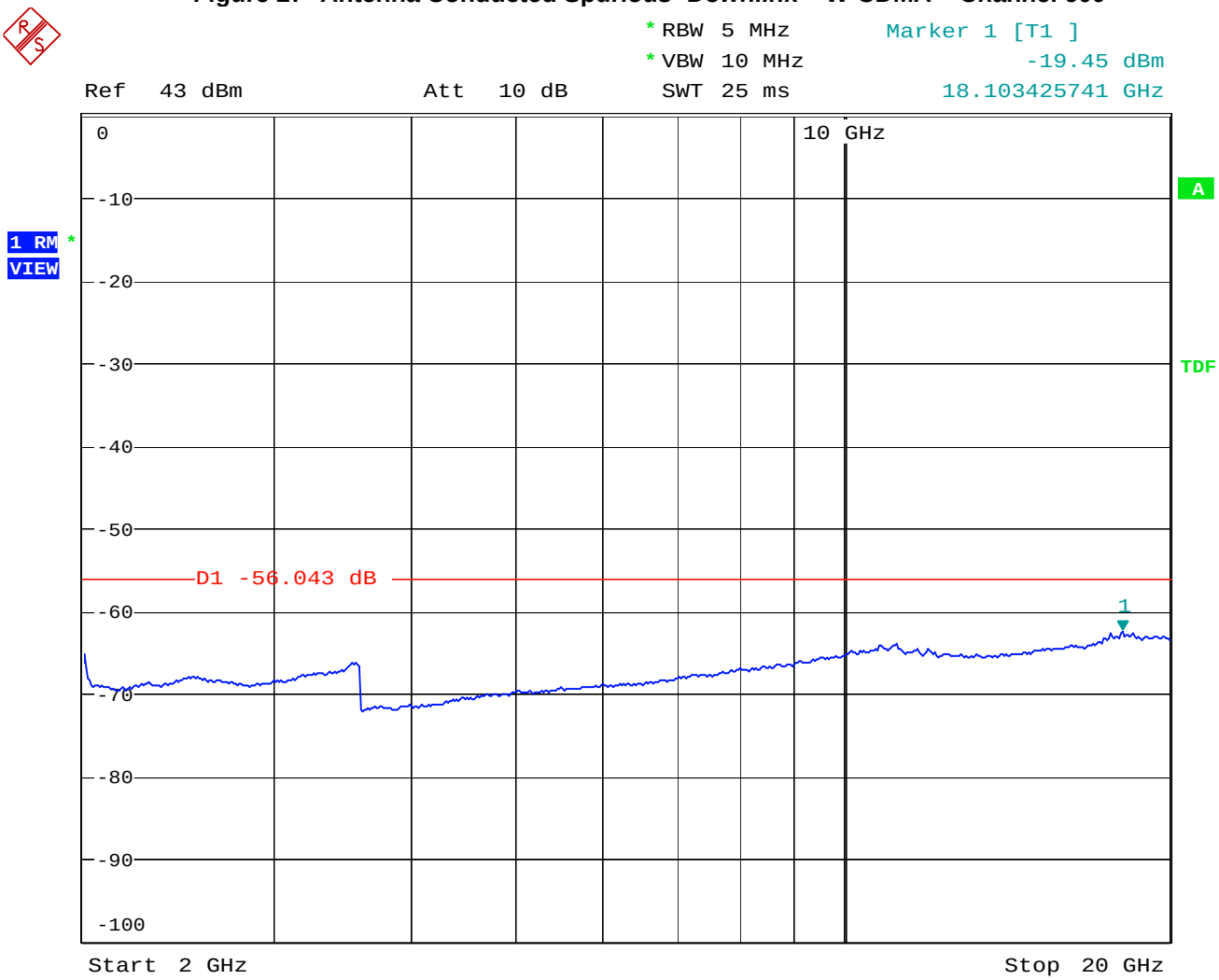
Date: 15.NOV.2006 23:30:06

Figure 26- Antenna Conducted Spurious- Downlink – W-CDMA –Channel 600



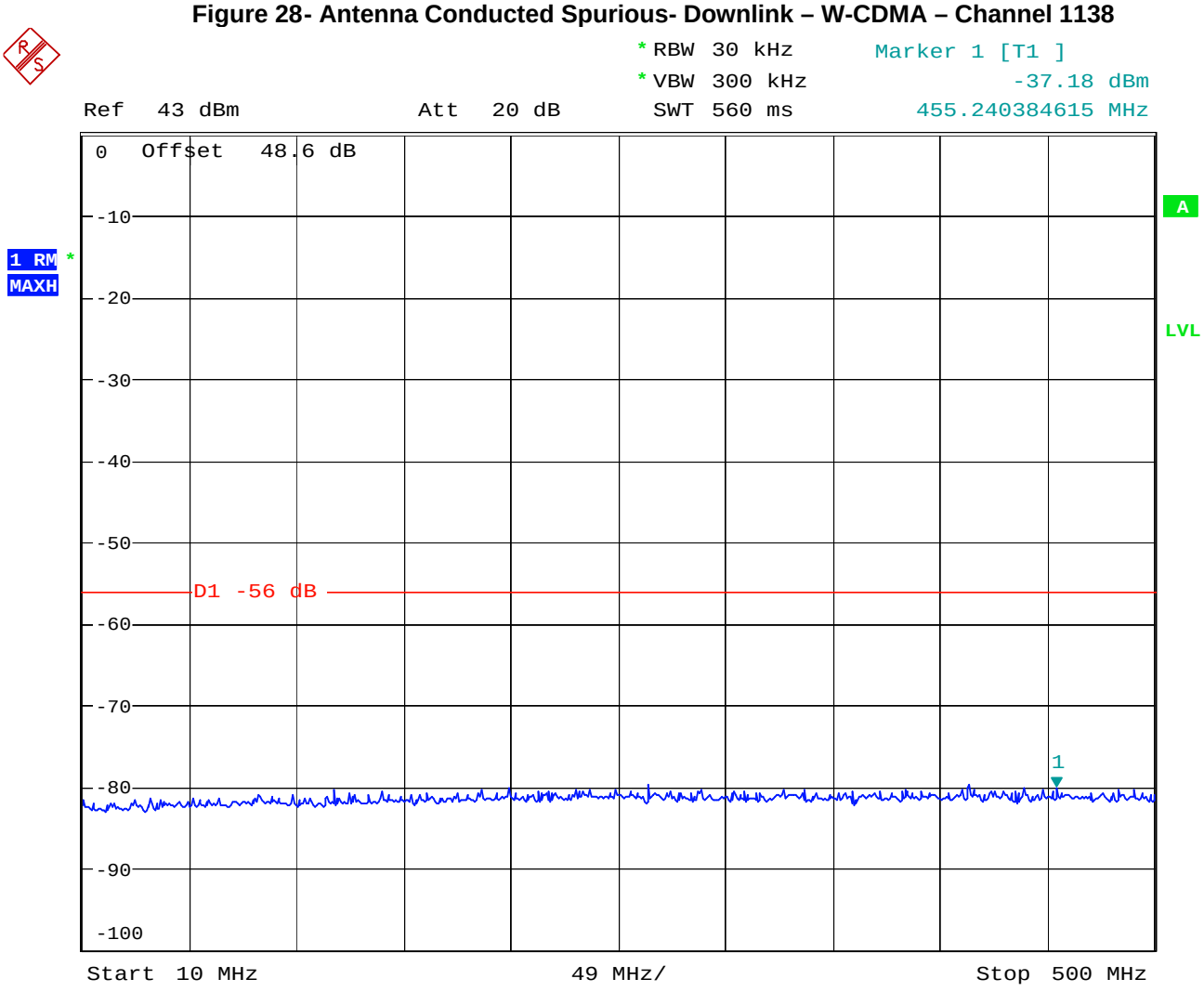
Date: 15.NOV.2006 23:46:47

Figure 27- Antenna Conducted Spurious- Downlink – W-CDMA – Channel 600



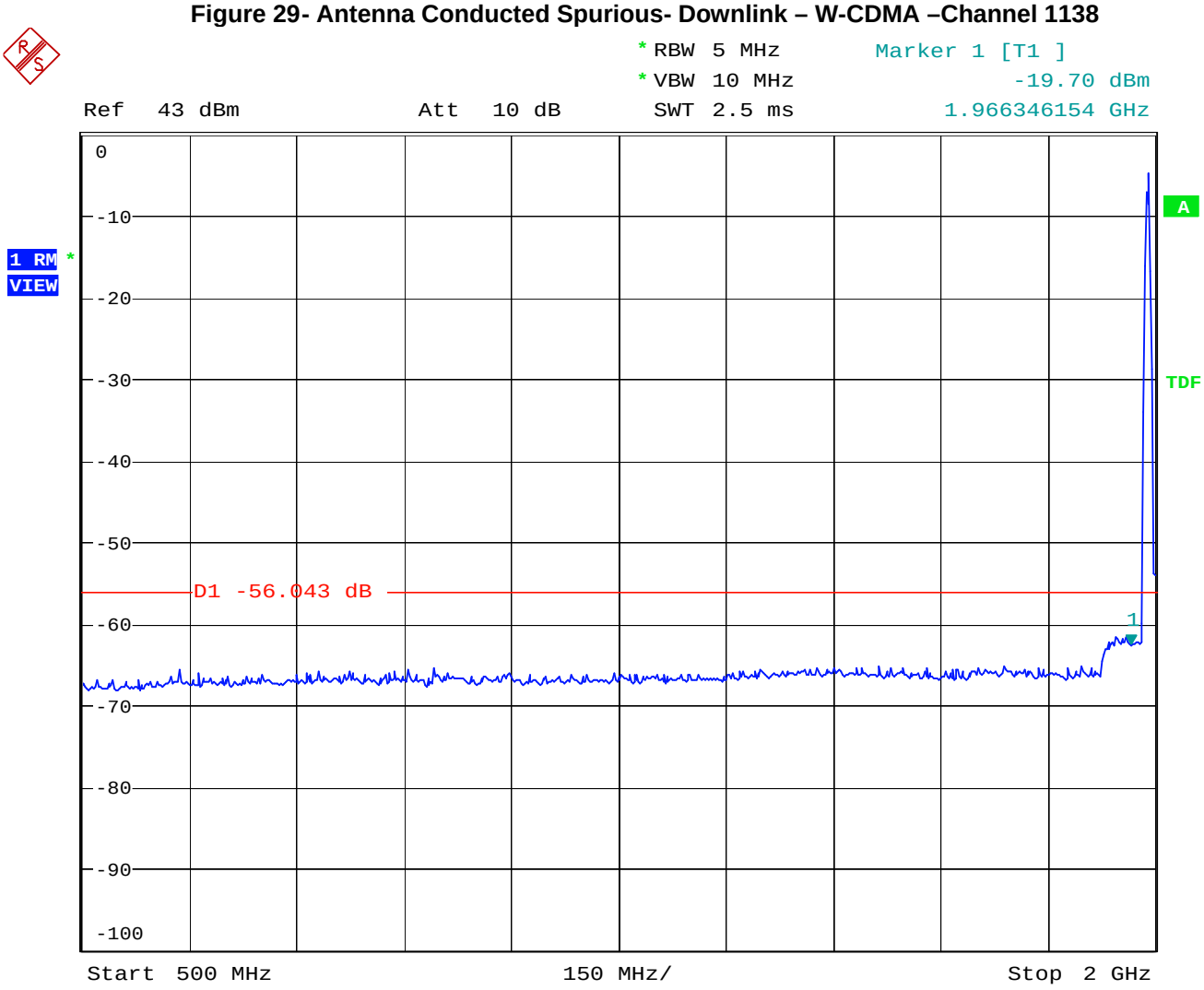
Date: 16.NOV.2006 00:04:22

Figure 28- Antenna Conducted Spurious- Downlink – W-CDMA – Channel 1138



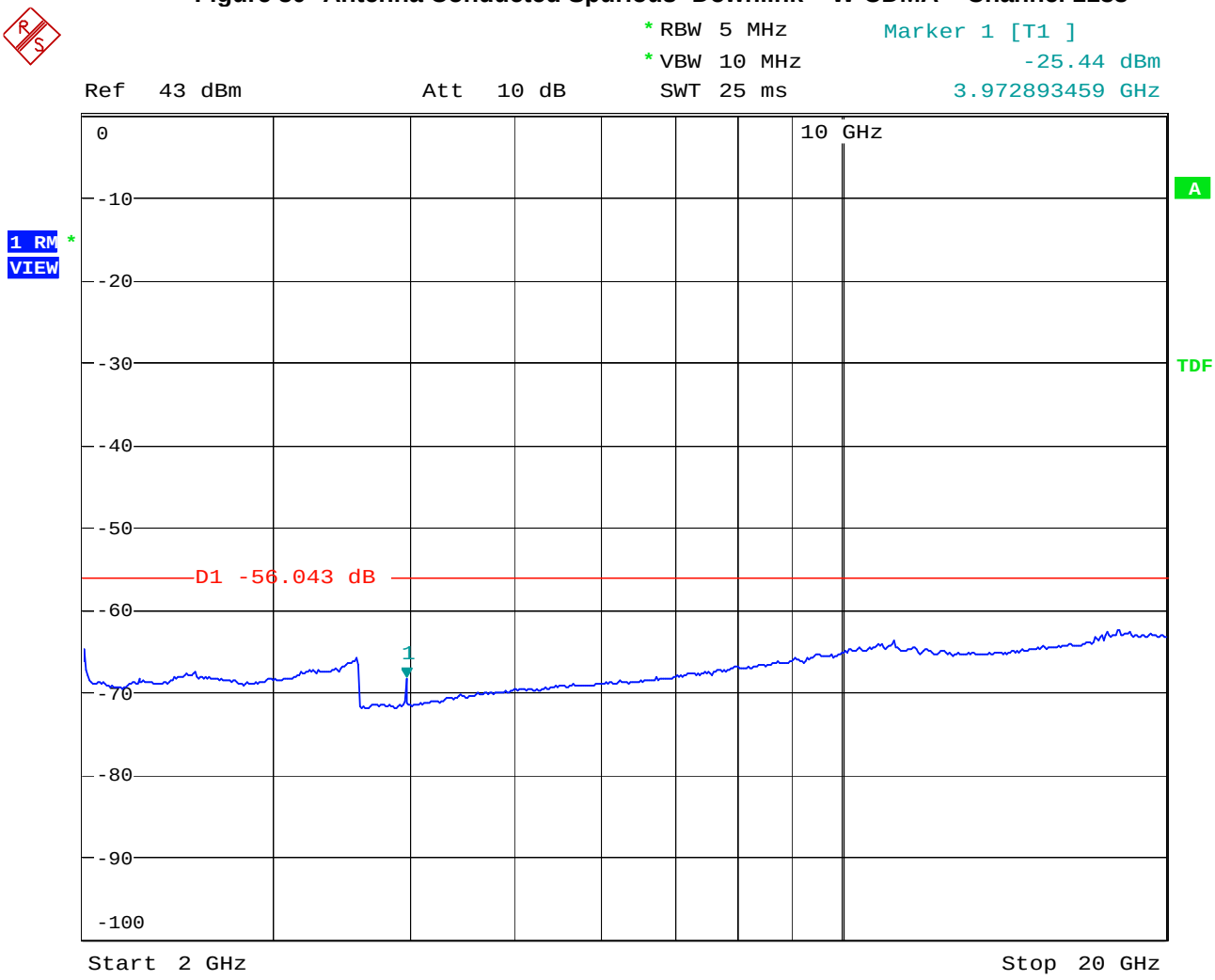
Date: 15.NOV.2006 23:30:50

Figure 29- Antenna Conducted Spurious- Downlink – W-CDMA –Channel 1138



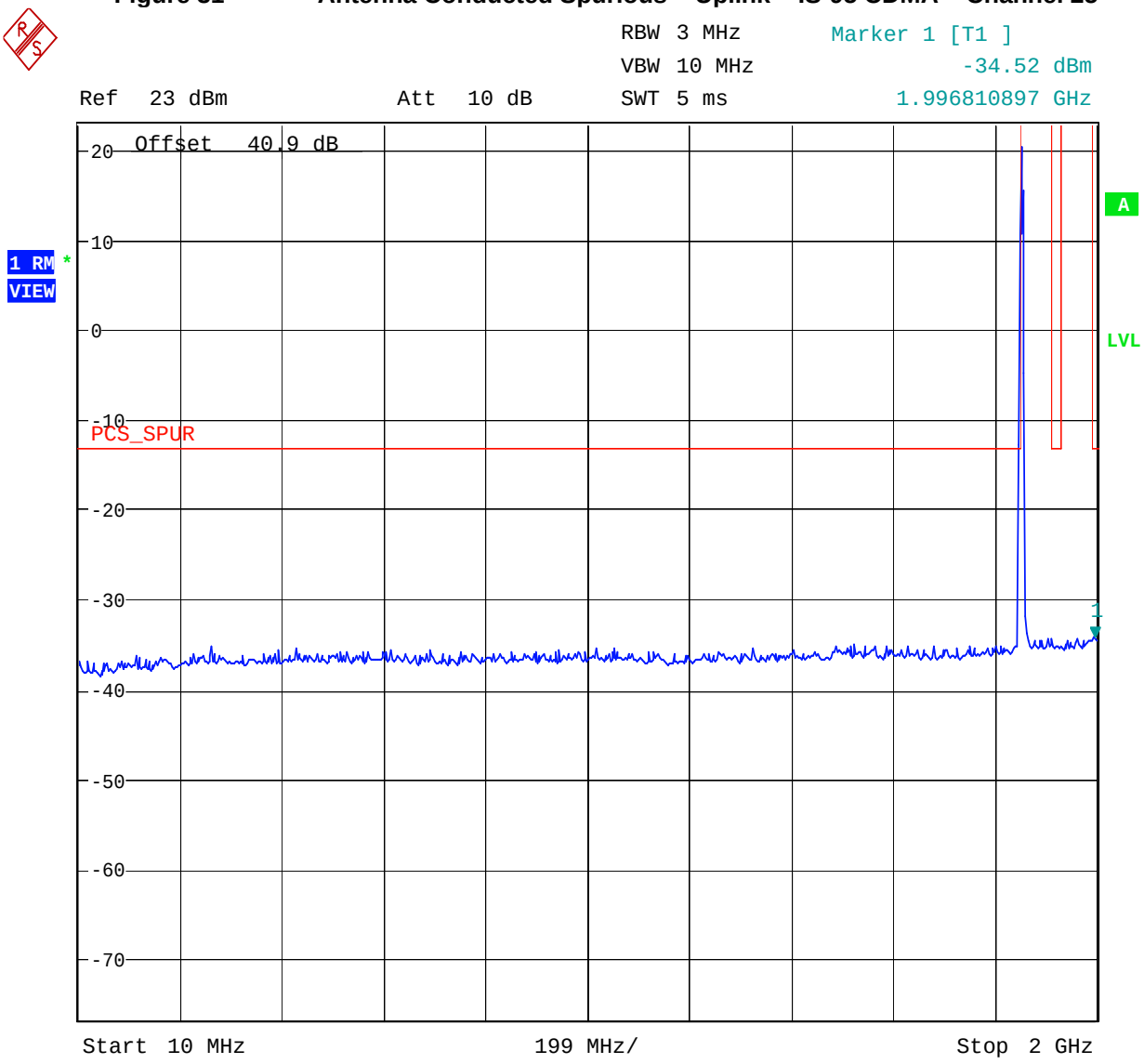
Date: 15.NOV.2006 23:51:29

Figure 30- Antenna Conducted Spurious- Downlink – W-CDMA – Channel 1138



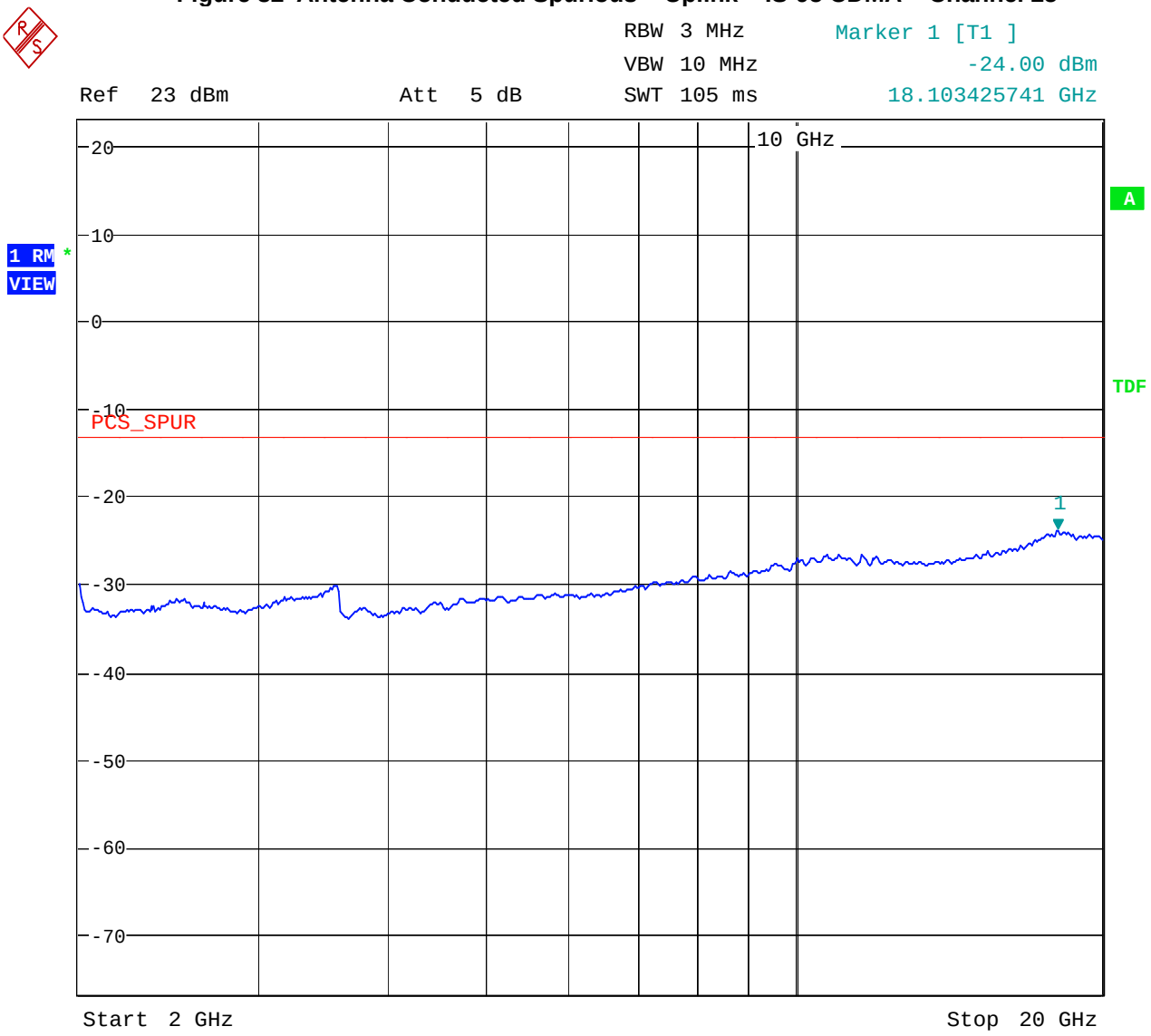
Date: 16.NOV.2006 00:06:02

Figure 31 Antenna Conducted Spurious – Uplink – IS-95 CDMA – Channel 25



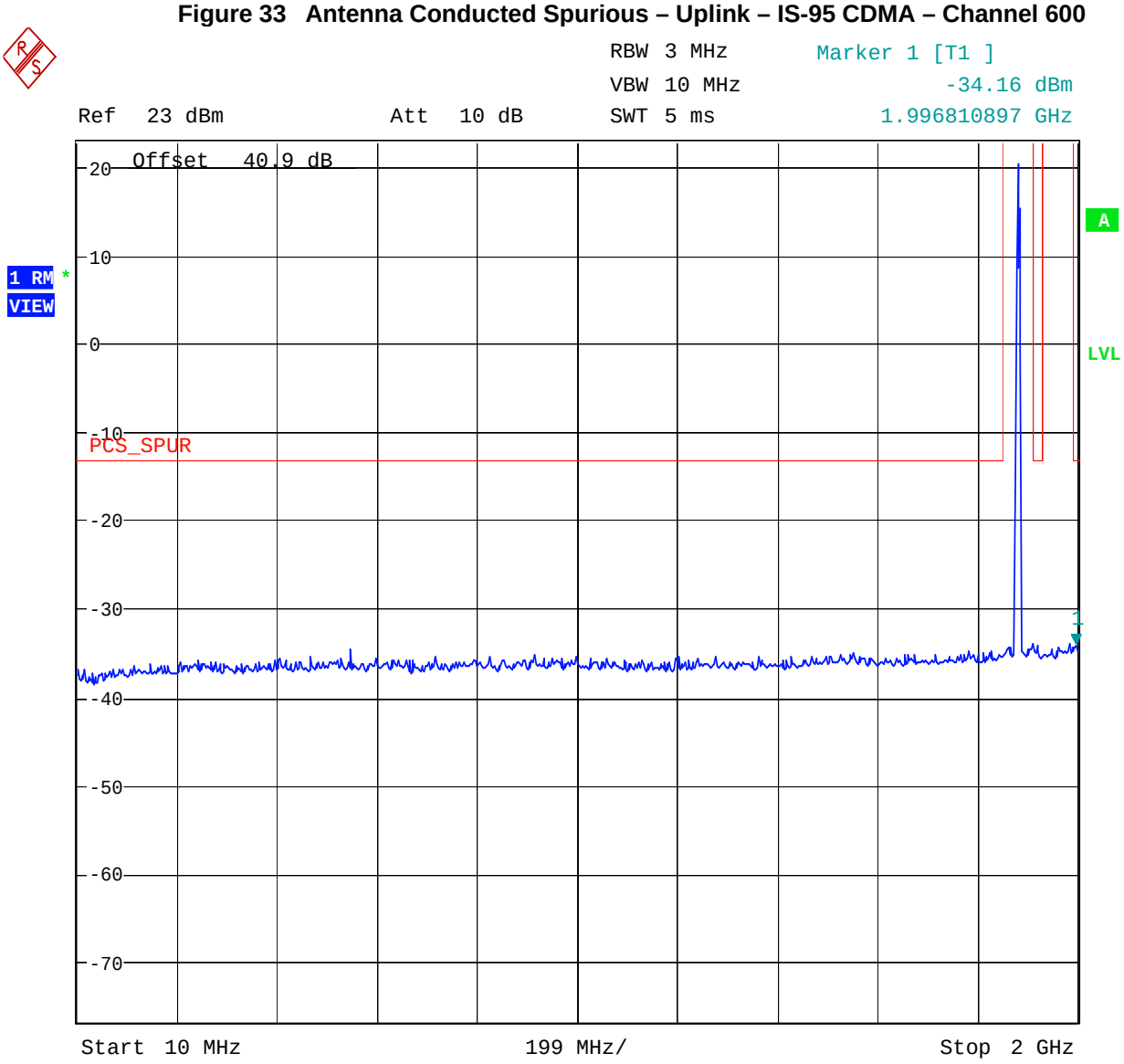
Date: 22.NOV.2006 22:47:26

Figure 32 Antenna Conducted Spurious – Uplink – IS-95 CDMA – Channel 25



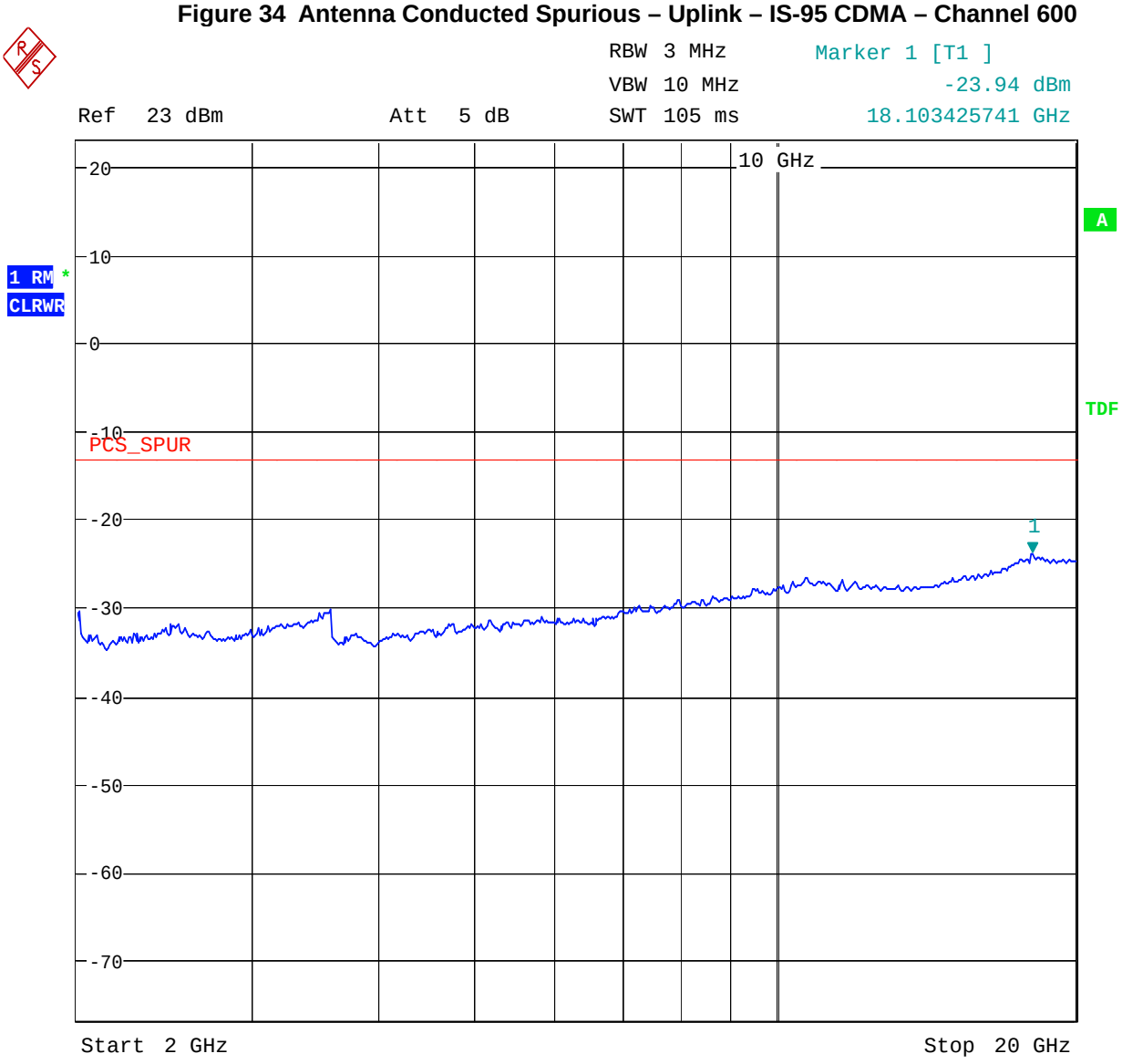
Date: 22.NOV.2006 22:55:00

Figure 33 Antenna Conducted Spurious – Uplink – IS-95 CDMA – Channel 600



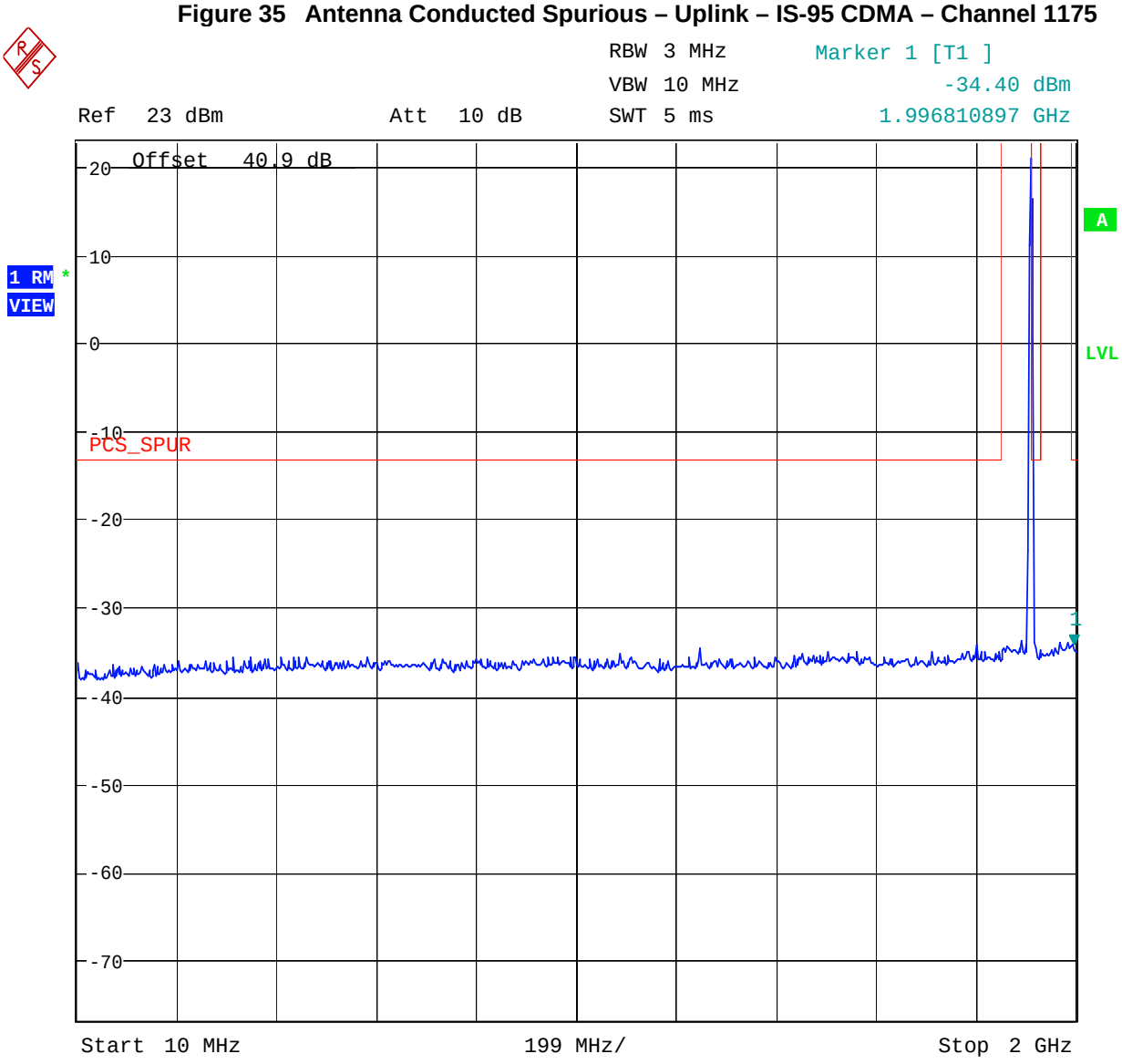
Date: 22.NOV.2006 22:45:02

Figure 34 Antenna Conducted Spurious – Uplink – IS-95 CDMA – Channel 600



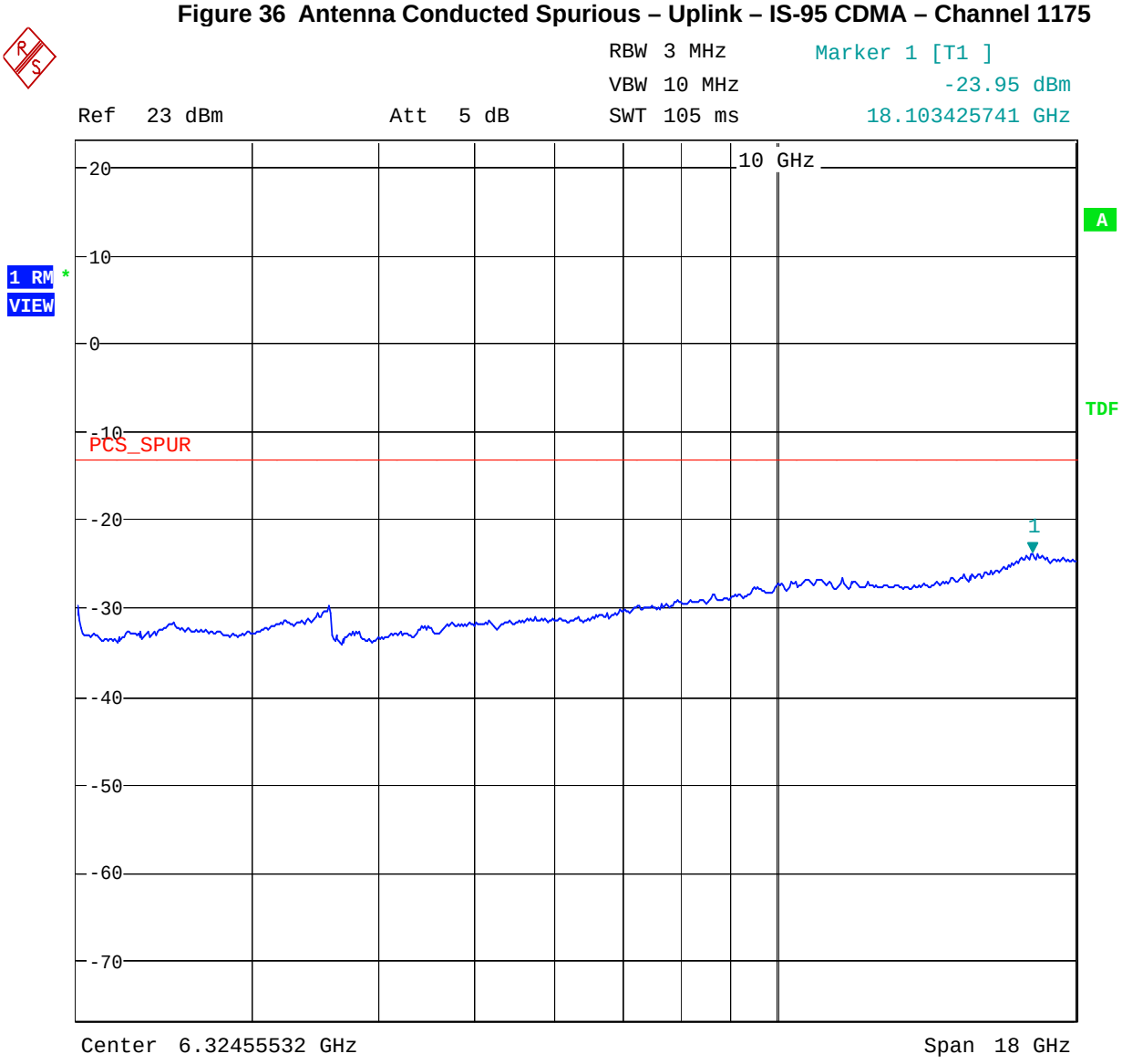
Date: 22.NOV.2006 22:53:46

Figure 35 Antenna Conducted Spurious – Uplink – IS-95 CDMA – Channel 1175



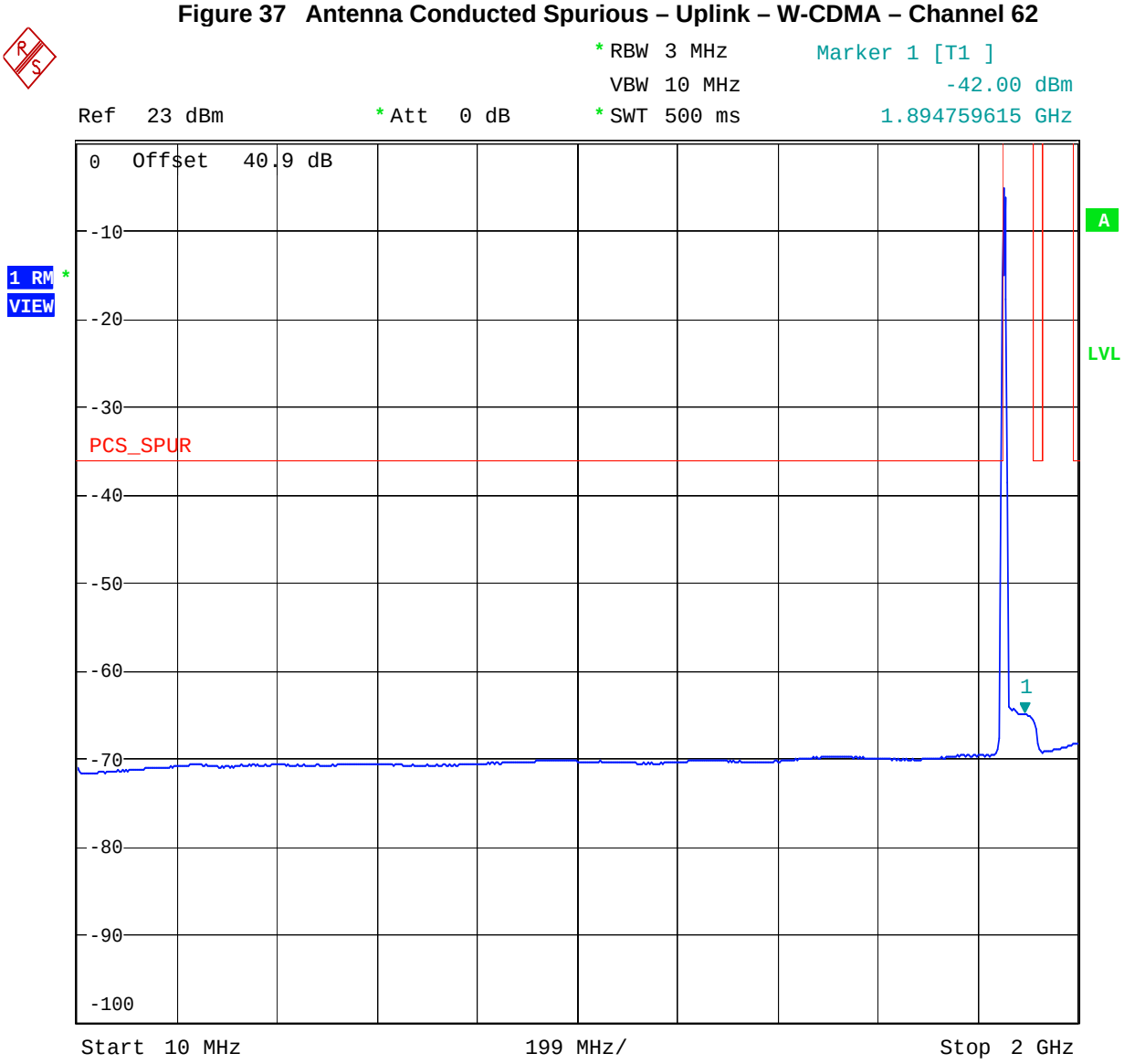
Date: 22.NOV.2006 22:49:15

Figure 36 Antenna Conducted Spurious – Uplink – IS-95 CDMA – Channel 1175



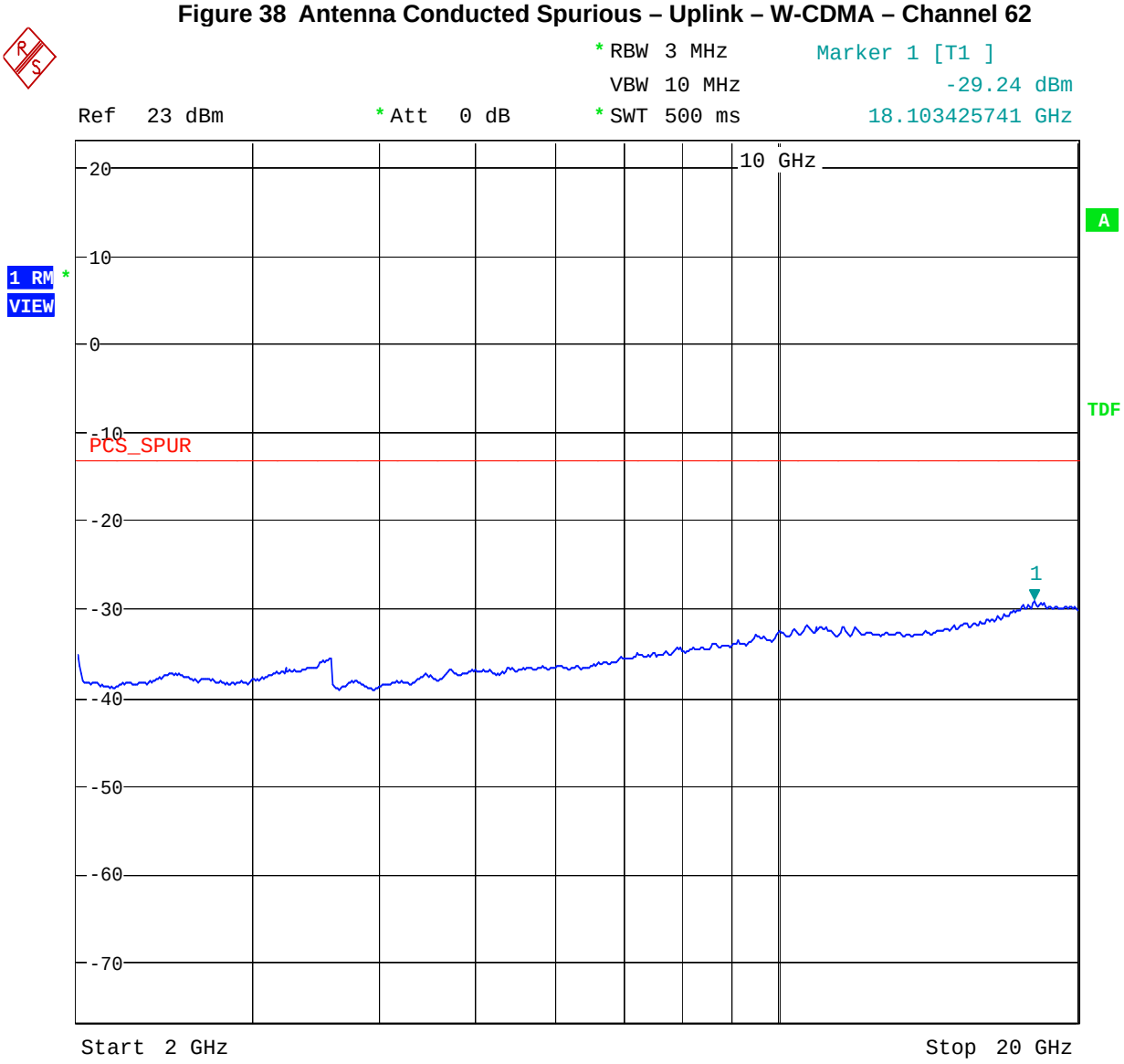
Date: 22.NOV.2006 22:52:22

Figure 37 Antenna Conducted Spurious – Uplink – W-CDMA – Channel 62



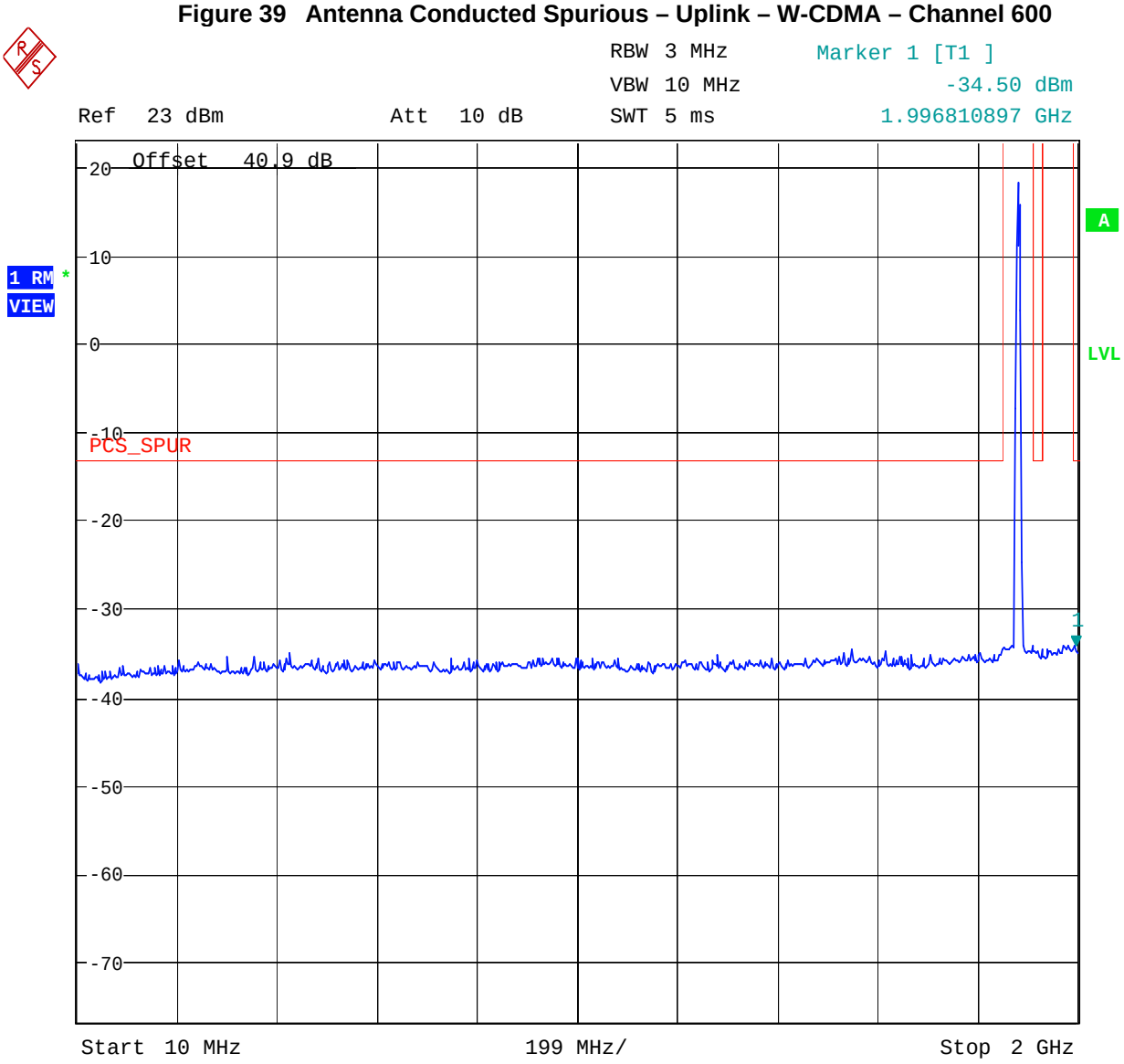
Date: 22.NOV.2006 22:11:59

Figure 38 Antenna Conducted Spurious – Uplink – W-CDMA – Channel 62



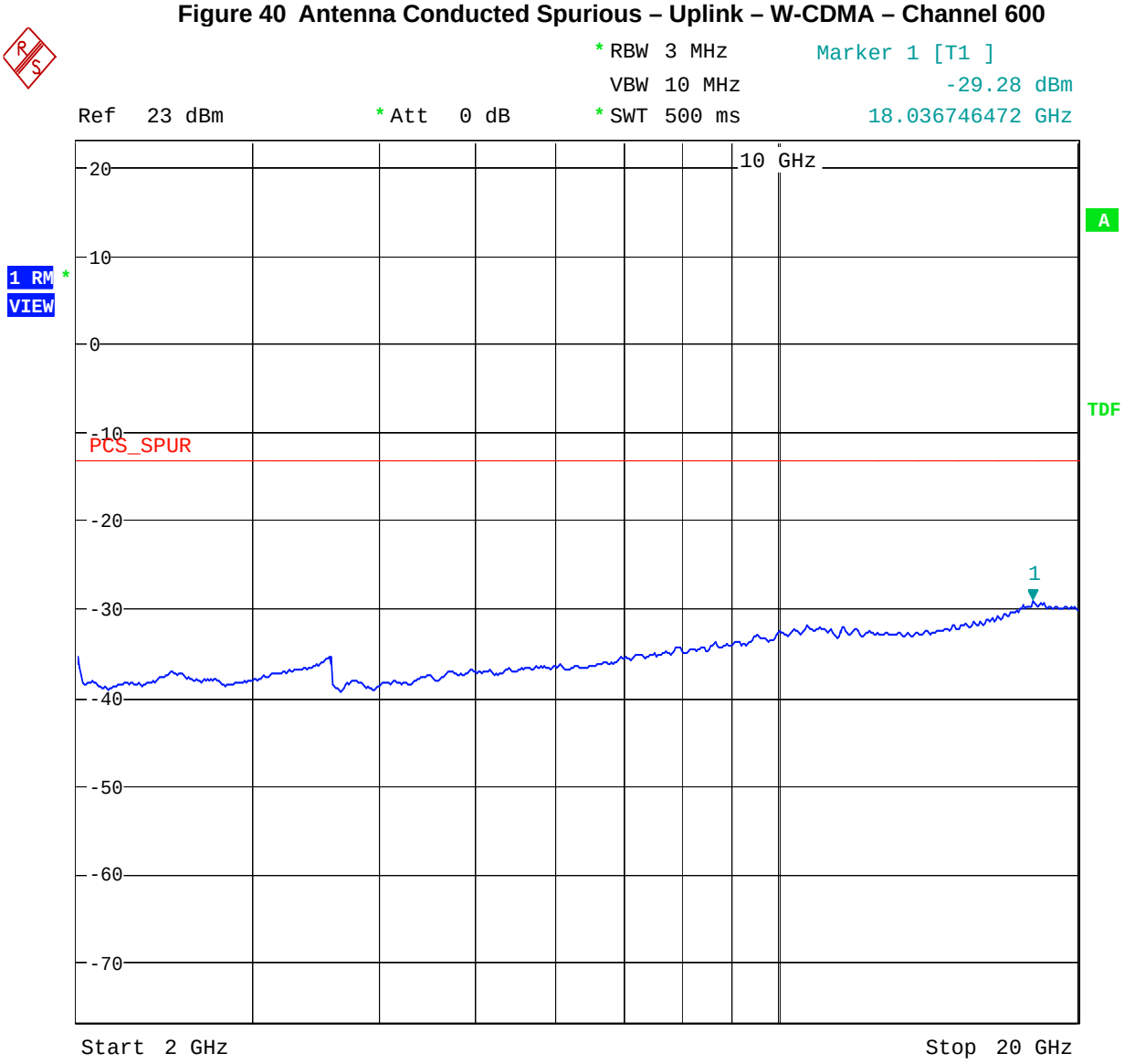
Date: 22.NOV.2006 22:19:00

Figure 39 Antenna Conducted Spurious – Uplink – W-CDMA – Channel 600



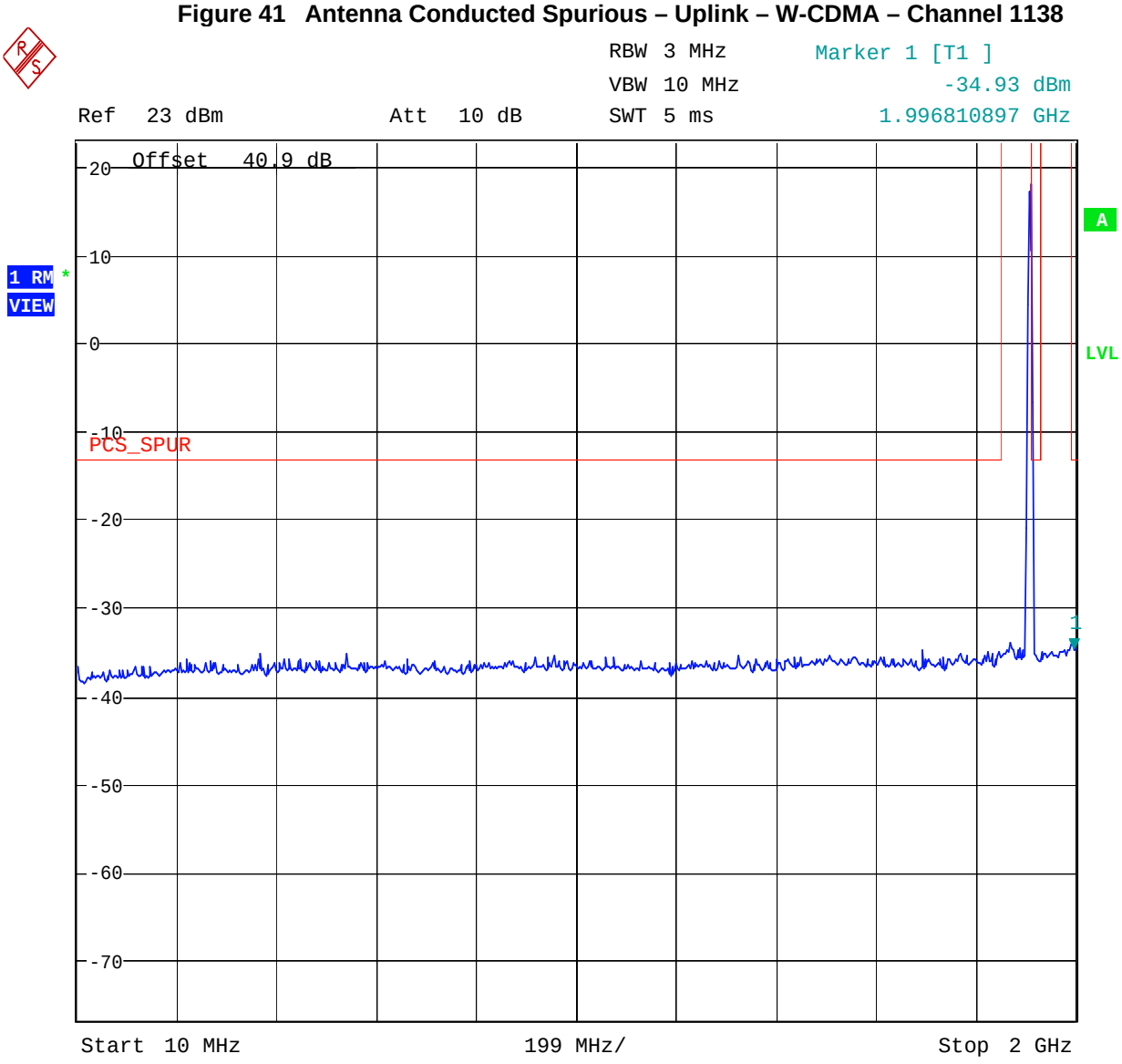
Date: 22.NOV.2006 22:43:20

Figure 40 Antenna Conducted Spurious – Uplink – W-CDMA – Channel 600



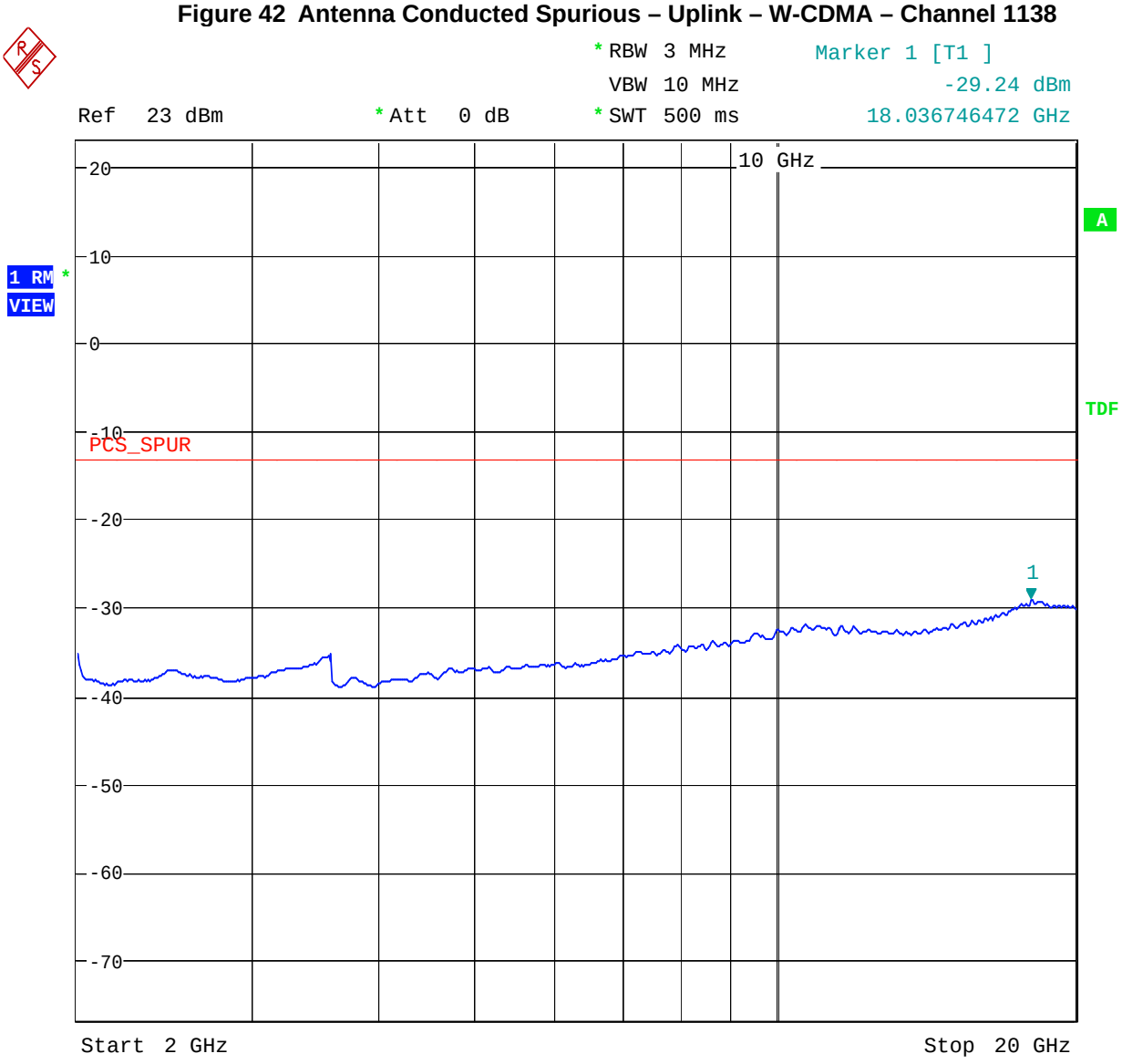
Date: 22.NOV.2006 22:21:08

Figure 41 Antenna Conducted Spurious – Uplink – W-CDMA – Channel 1138



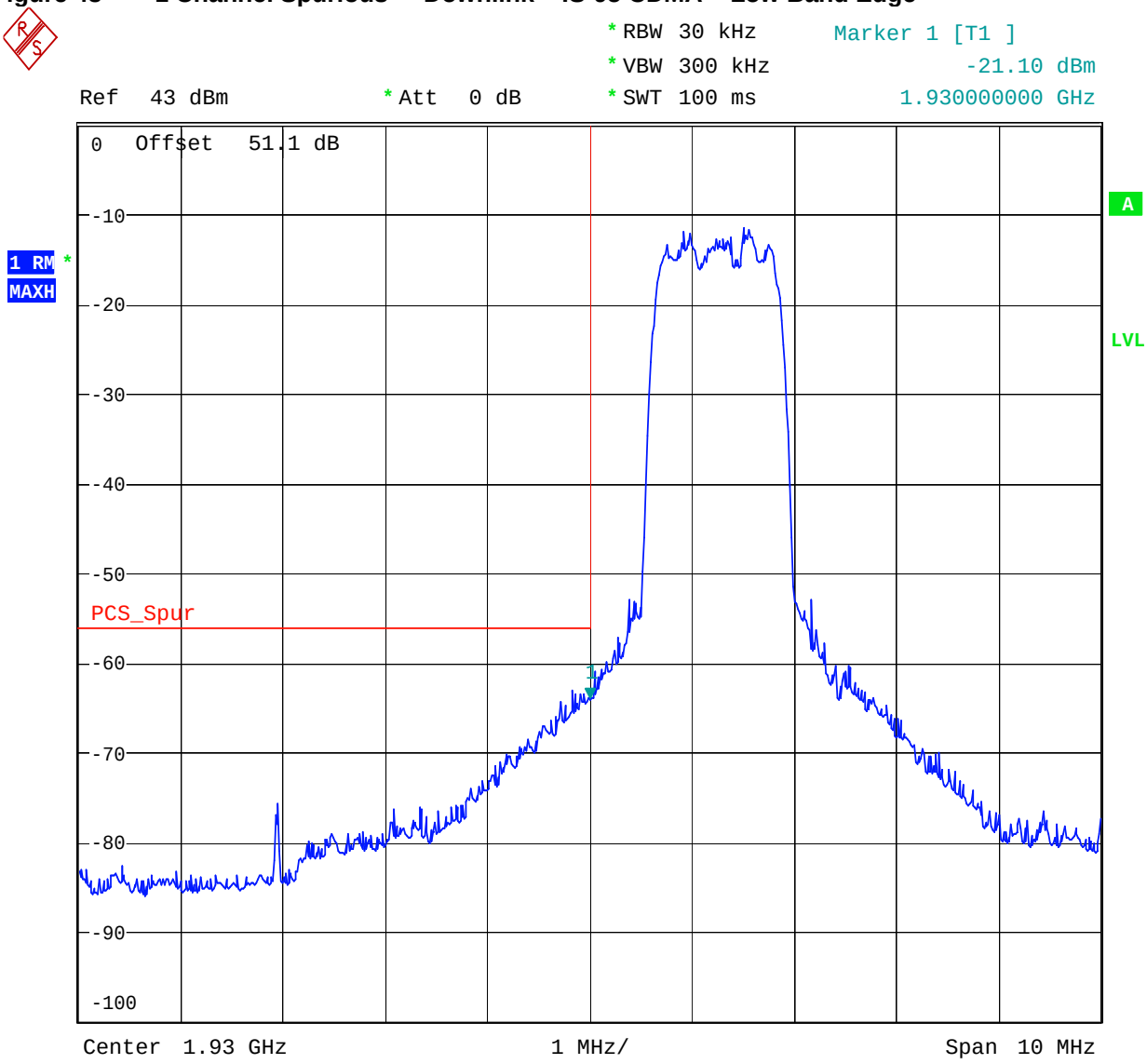
Date: 22.NOV.2006 22:41:48

Figure 42 Antenna Conducted Spurious – Uplink – W-CDMA – Channel 1138



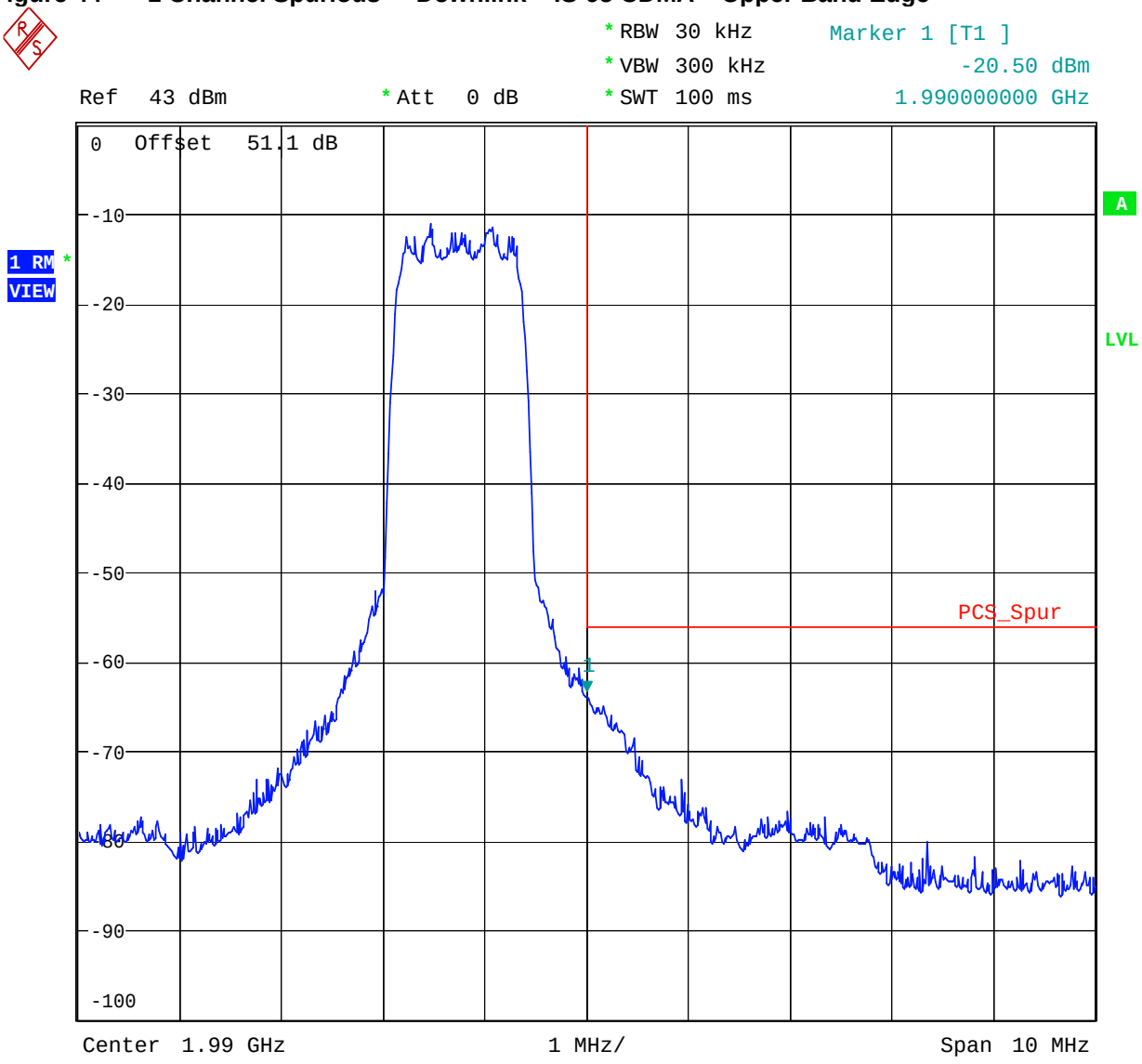
Date: 22.NOV.2006 22:22:37

Figure 43 1 Channel Spurious - Downlink – IS-95 CDMA – Low Band Edge



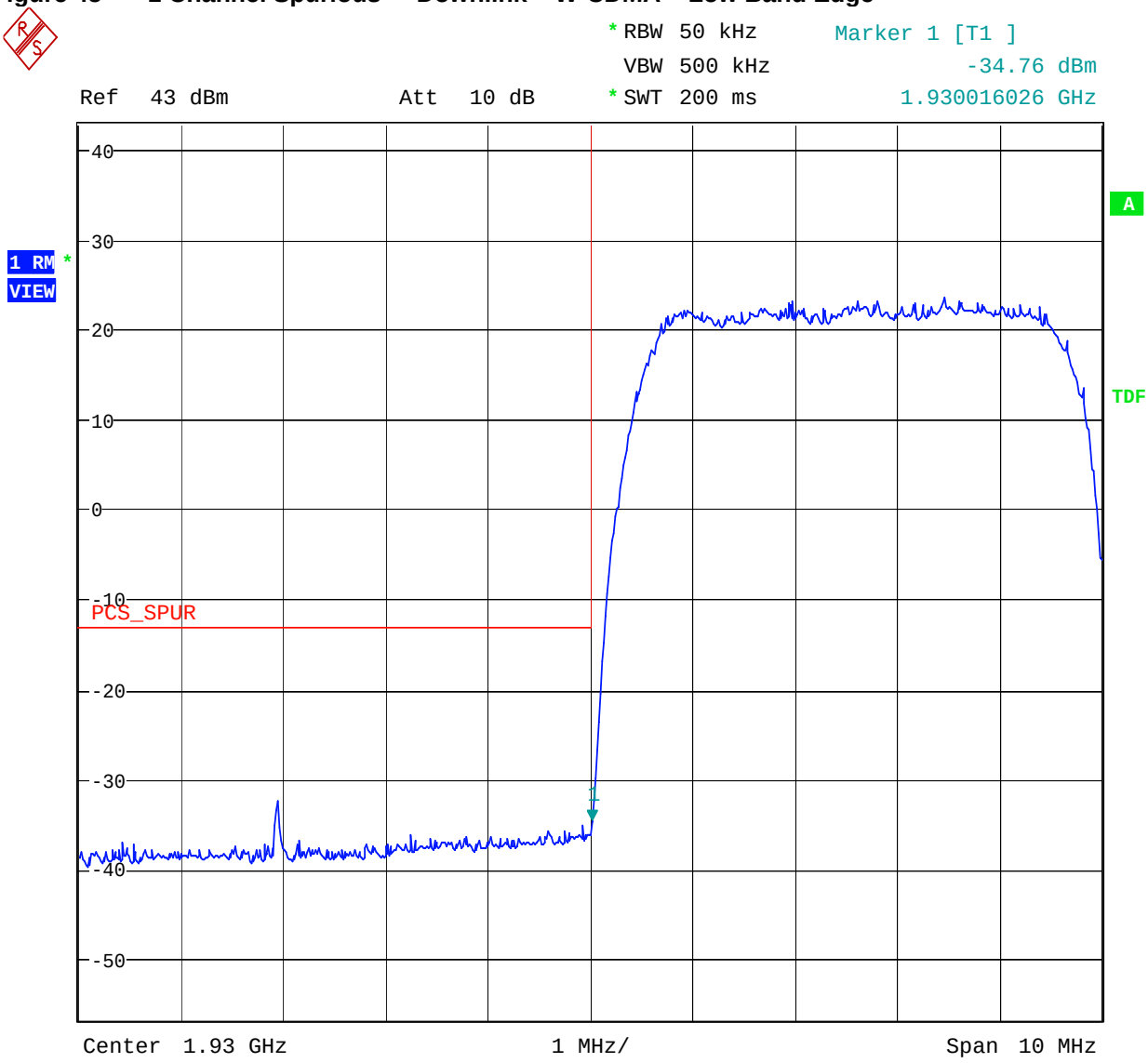
Date: 20.NOV.2006 23:45:25

Figure 44 1 Channel Spurious - Downlink – IS-95 CDMA – Upper Band Edge



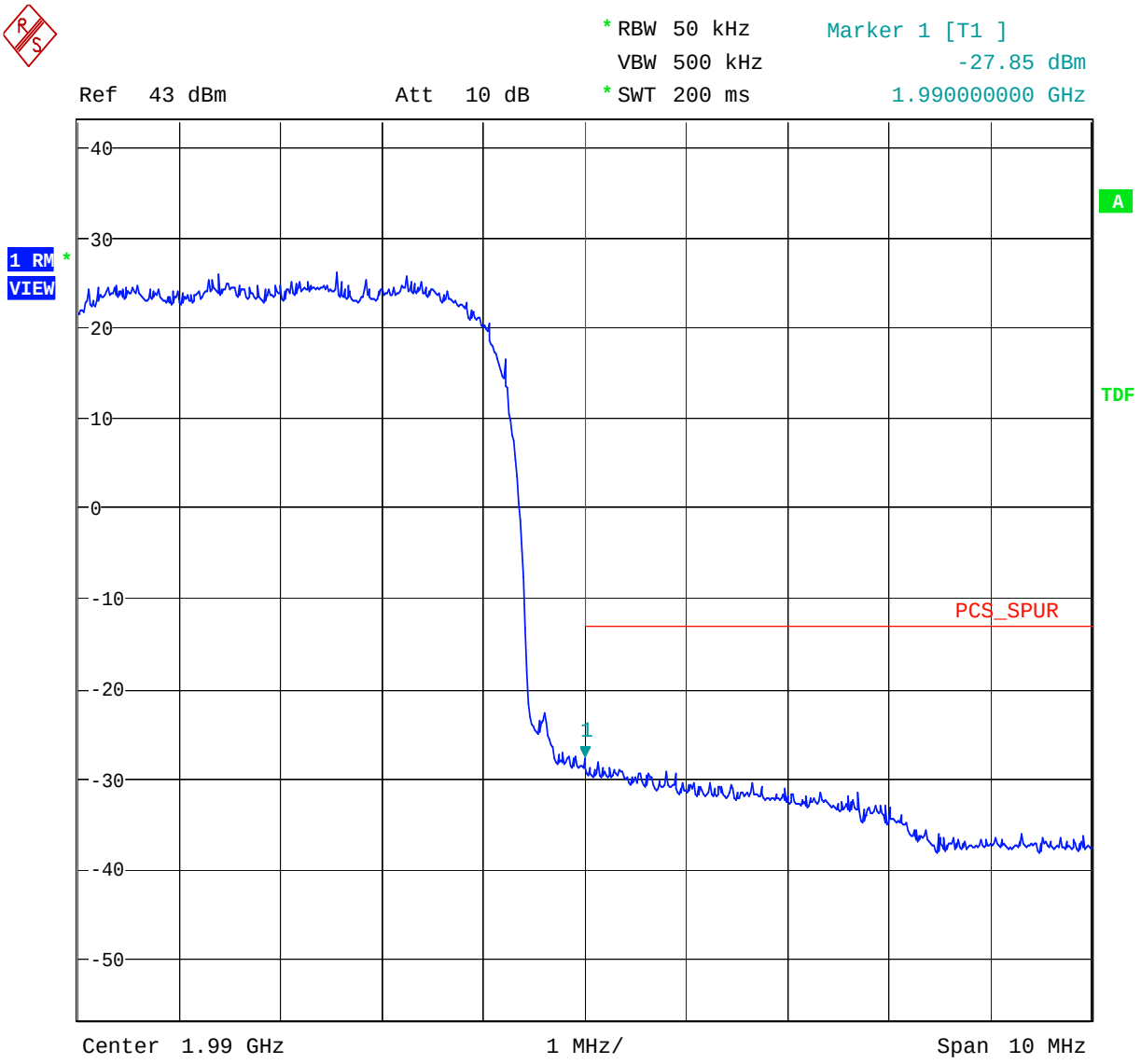
Date: 20.NOV.2006 23:58:25

Figure 45 1 Channel Spurious - Downlink – W-CDMA – Low Band Edge



Date: 28.NOV.2006 18:17:35

Figure 46 1 Channel Spurious - Downlink – W-CDMA – Upper Band Edge



Date: 28.NOV.2006 18:21:34

Figure 47 2 Channel Inter-modulation Spurious - Downlink – IS-95 CDMA – Low Band Edge

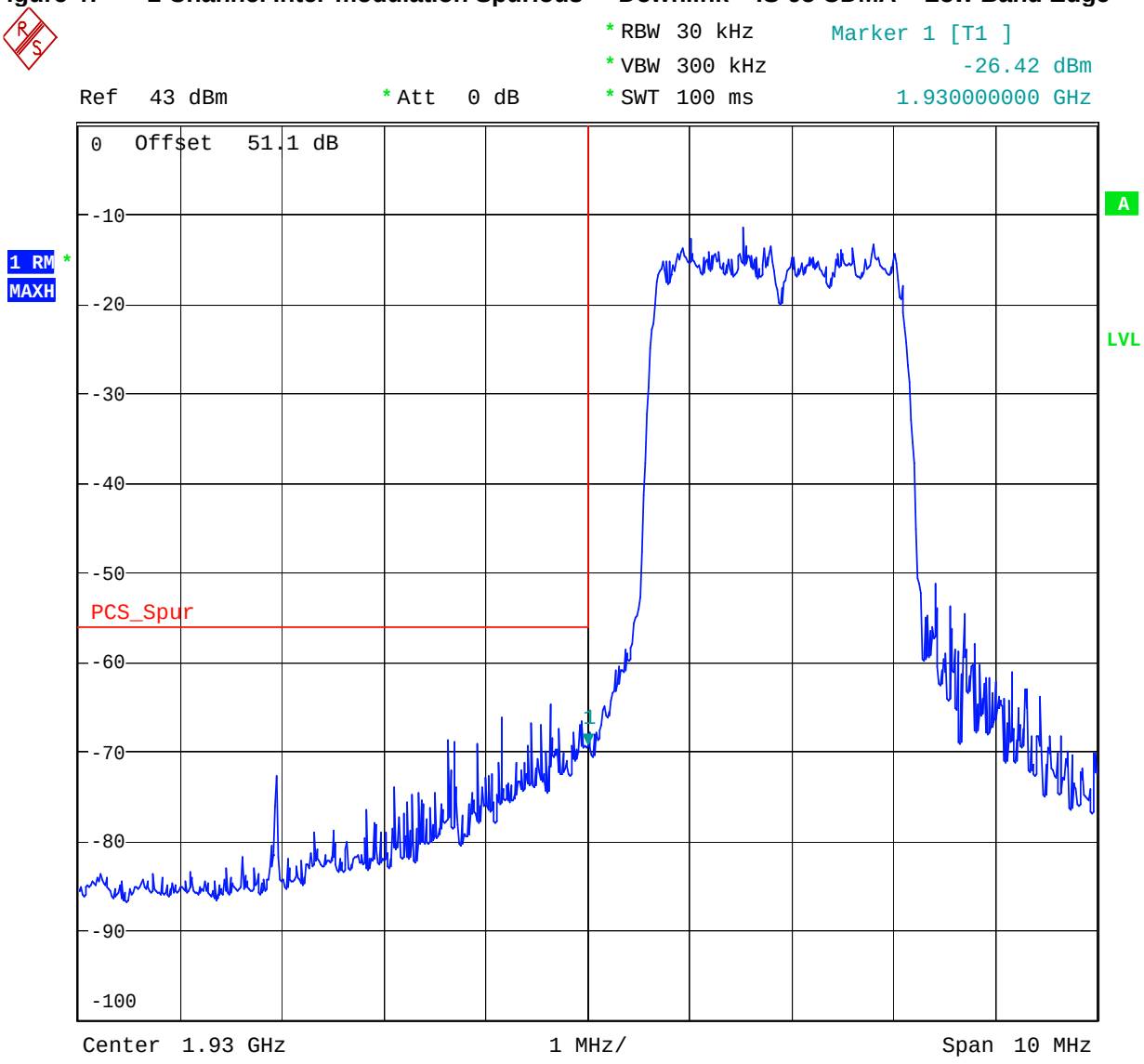
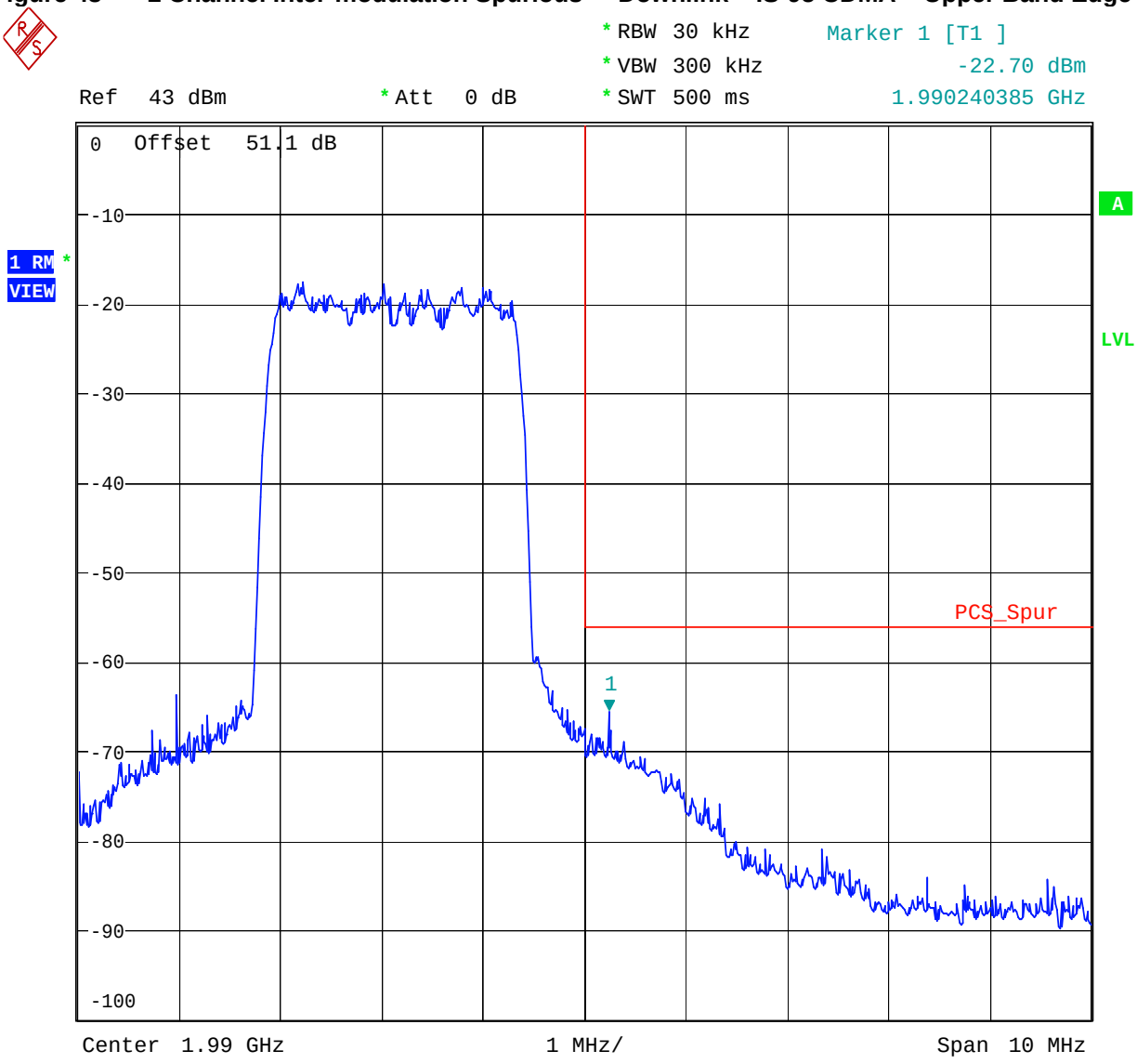
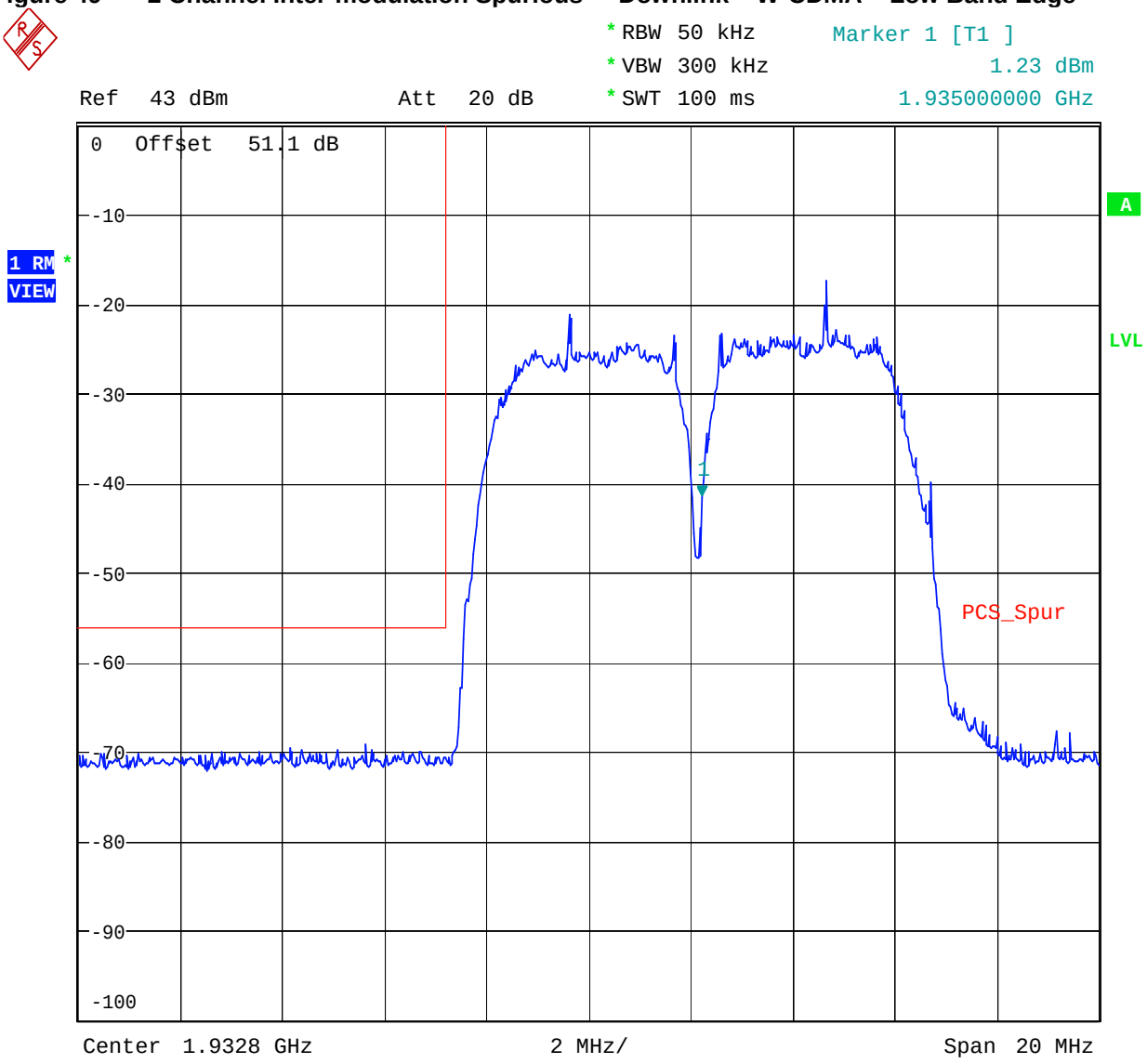


Figure 48 2 Channel Inter-modulation Spurious - Downlink – IS-95 CDMA – Upper Band Edge



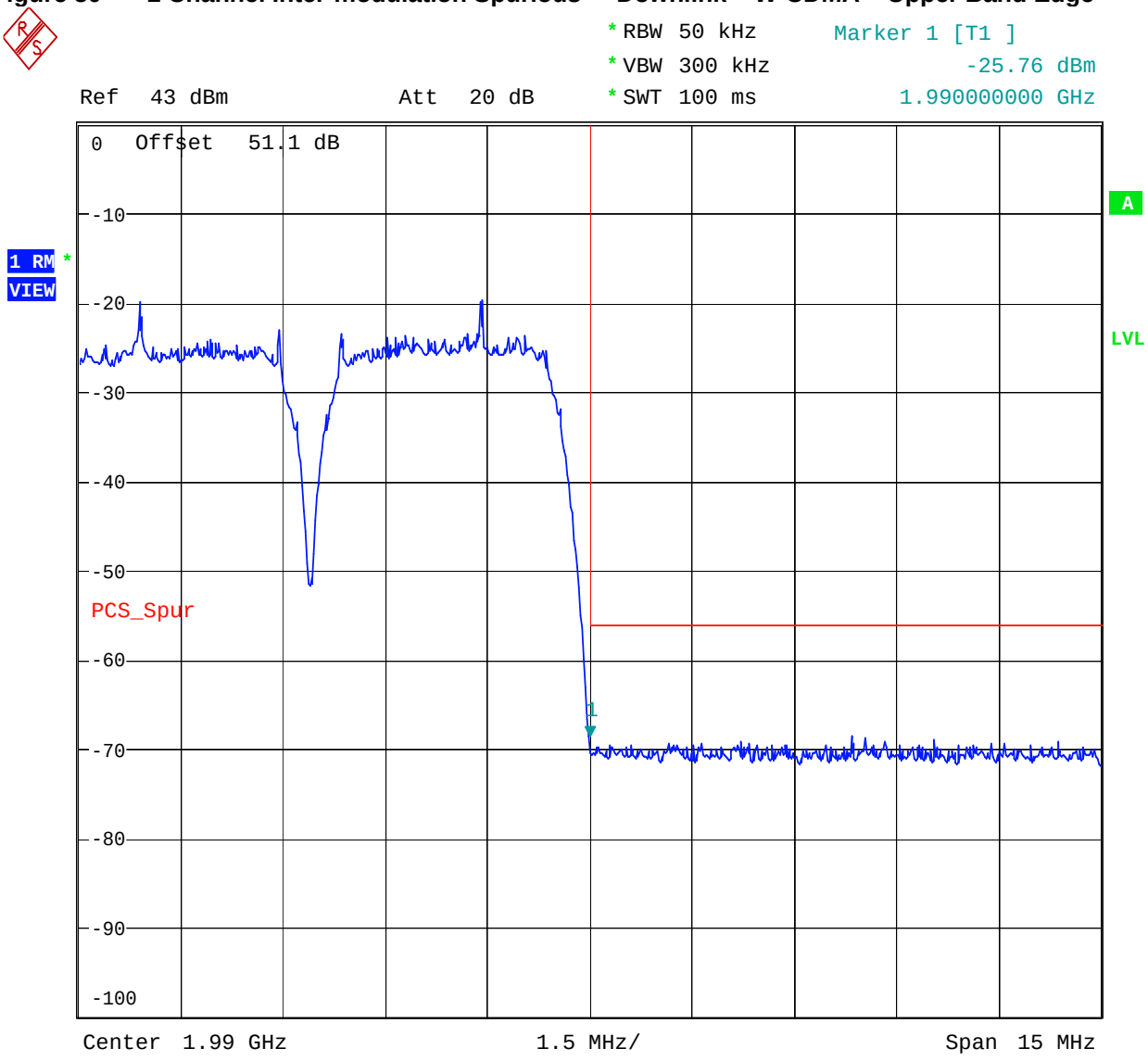
Date: 21.NOV.2006 15:10:07

Figure 49 2 Channel Inter-modulation Spurious - Downlink – W-CDMA – Low Band Edge



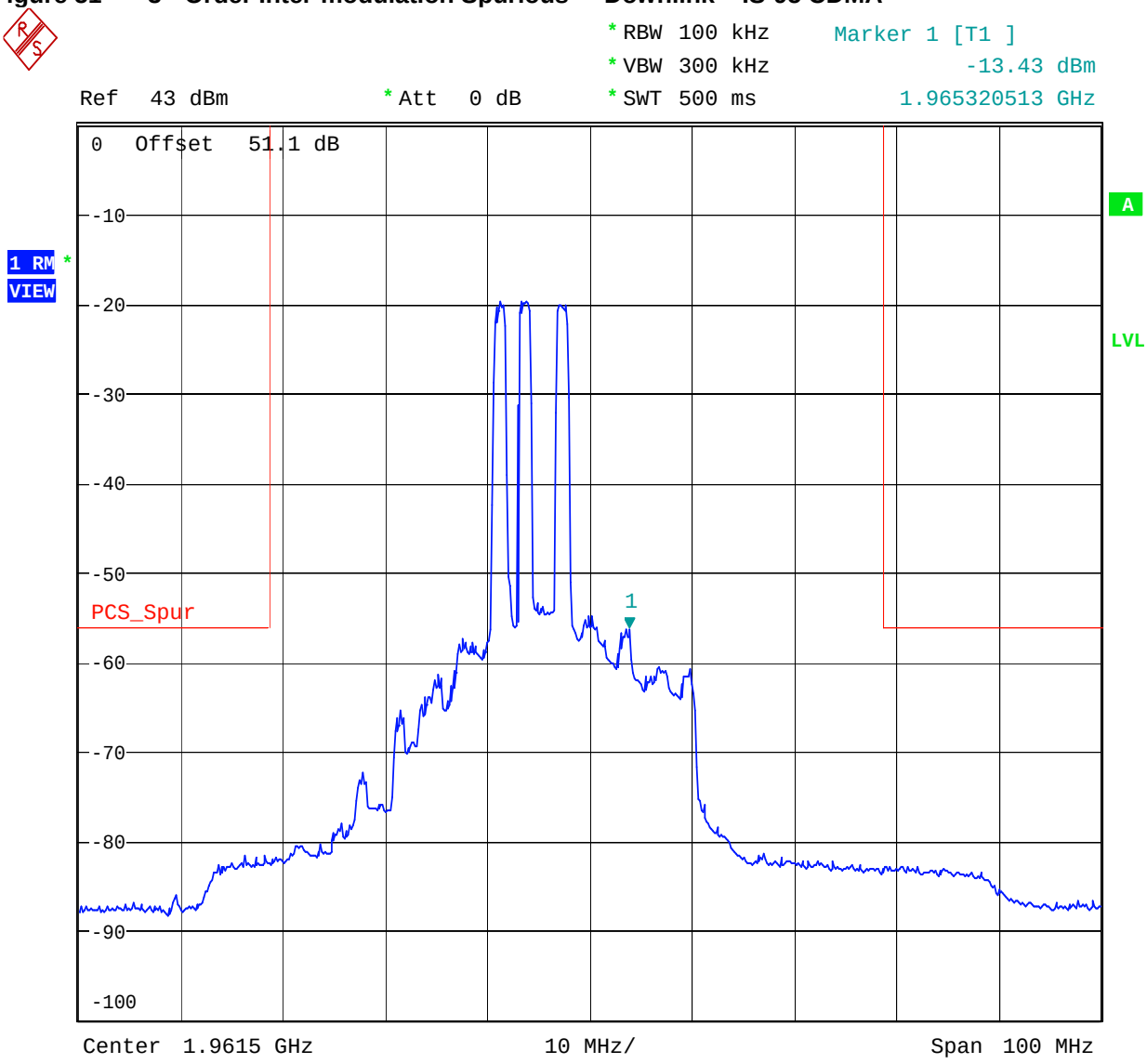
Date: 20.NOV.2006 22:48:07

Figure 50 2 Channel Inter-modulation Spurious - Downlink – W-CDMA – Upper Band Edge



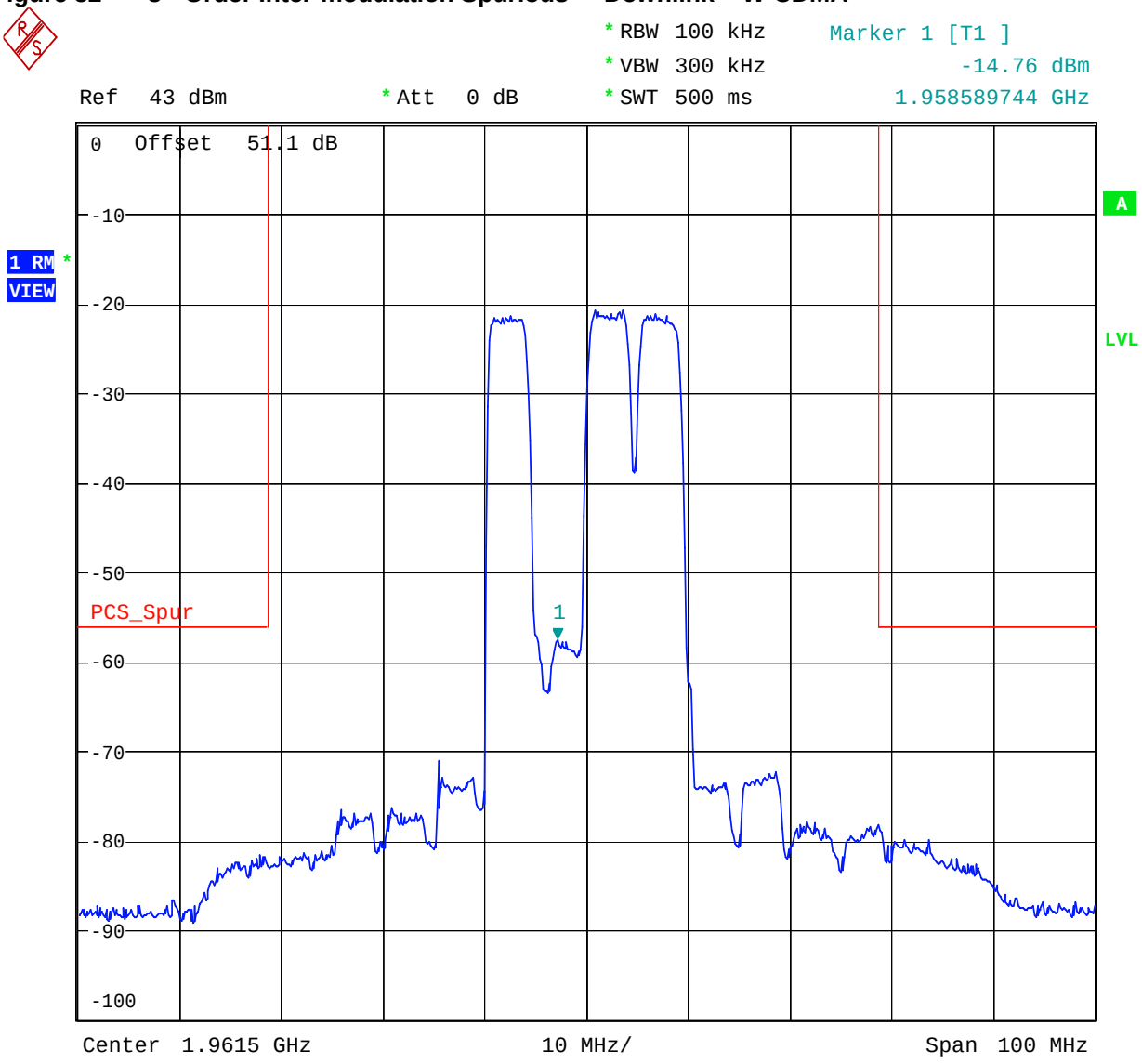
Date: 20.NOV.2006 23:03:20

Figure 51 3rd Order Inter-modulation Spurious - Downlink – IS-95 CDMA



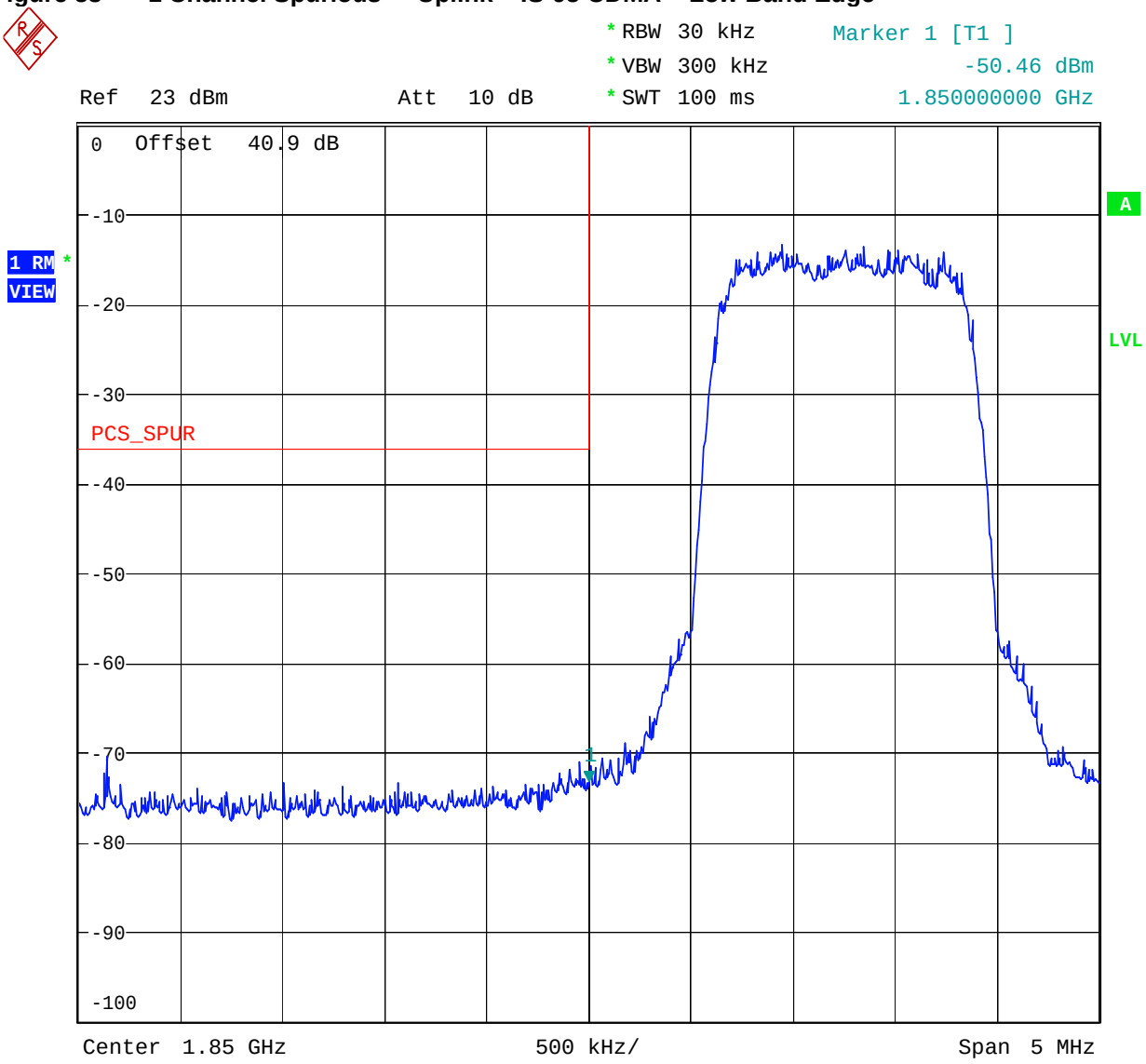
Date: 21.NOV.2006 16:06:09

Figure 52 3rd Order Inter-modulation Spurious - Downlink – W-CDMA



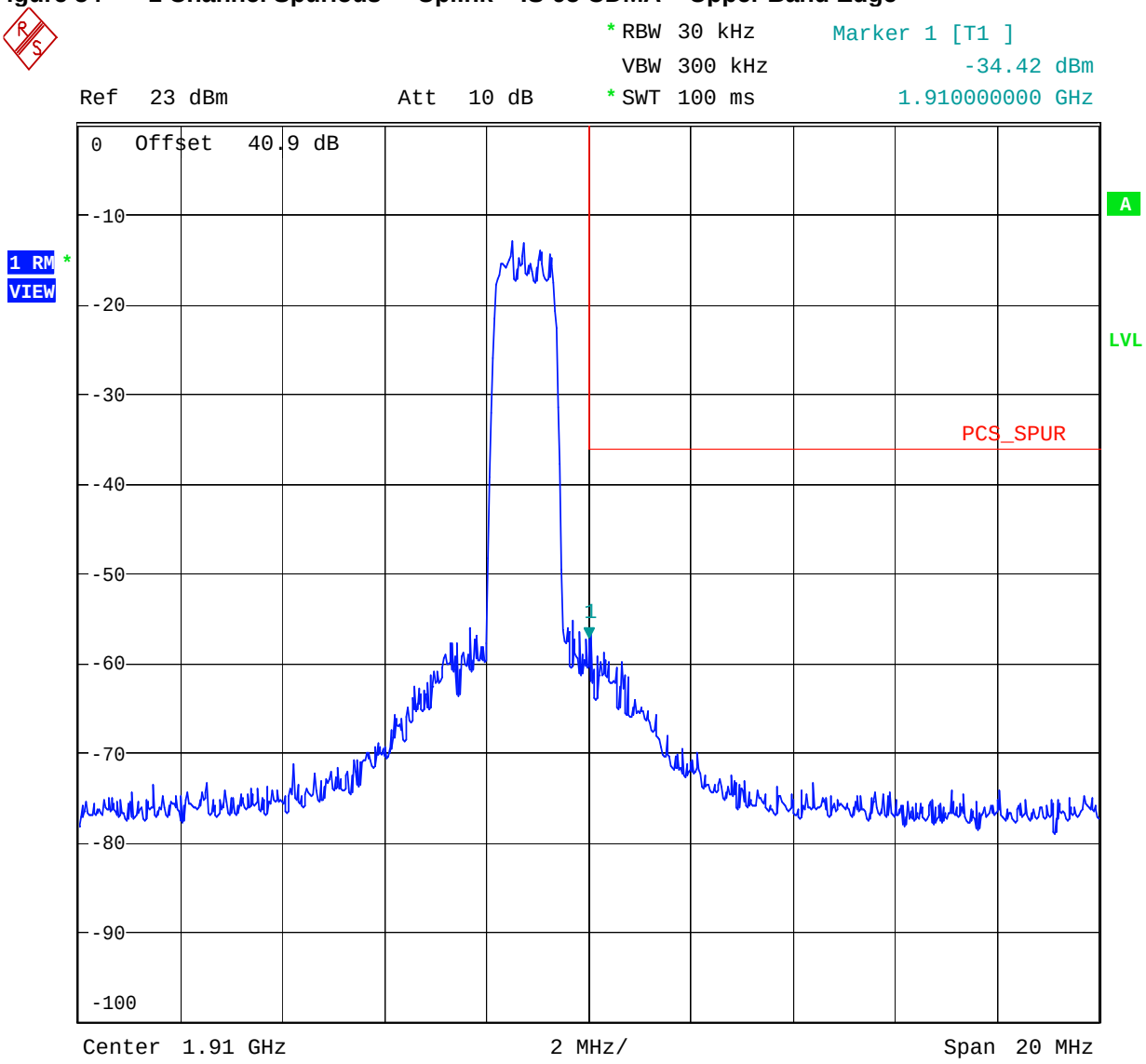
Date: 21.NOV.2006 16:17:31

Figure 53 1 Channel Spurious - Uplink – IS-95 CDMA – Low Band Edge



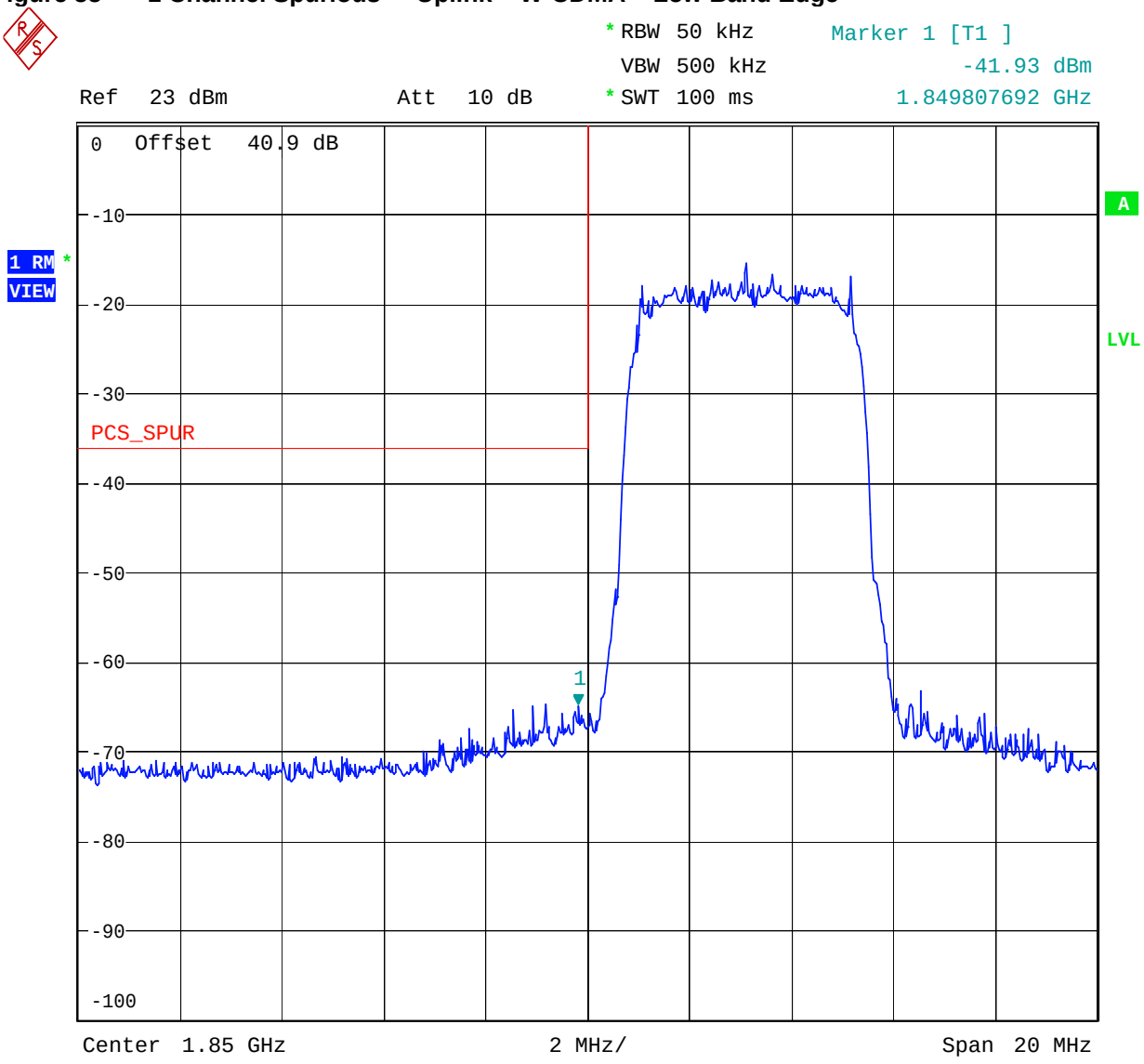
Date: 22.NOV.2006 23:09:34

Figure 54 1 Channel Spurious - Uplink – IS-95 CDMA – Upper Band Edge



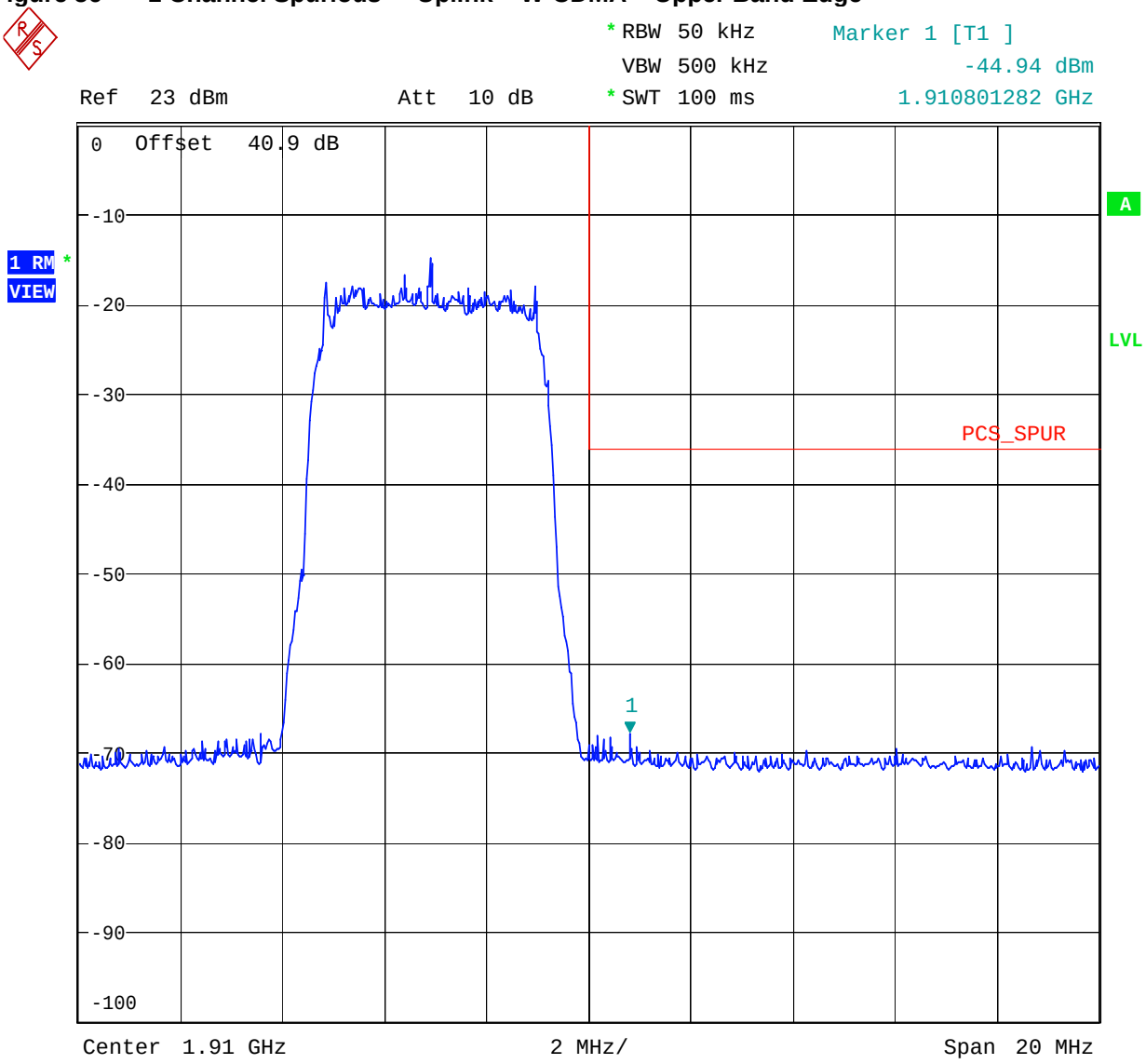
Date: 22.NOV.2006 23:18:34

Figure 55 1 Channel Spurious - Uplink – W-CDMA – Low Band Edge



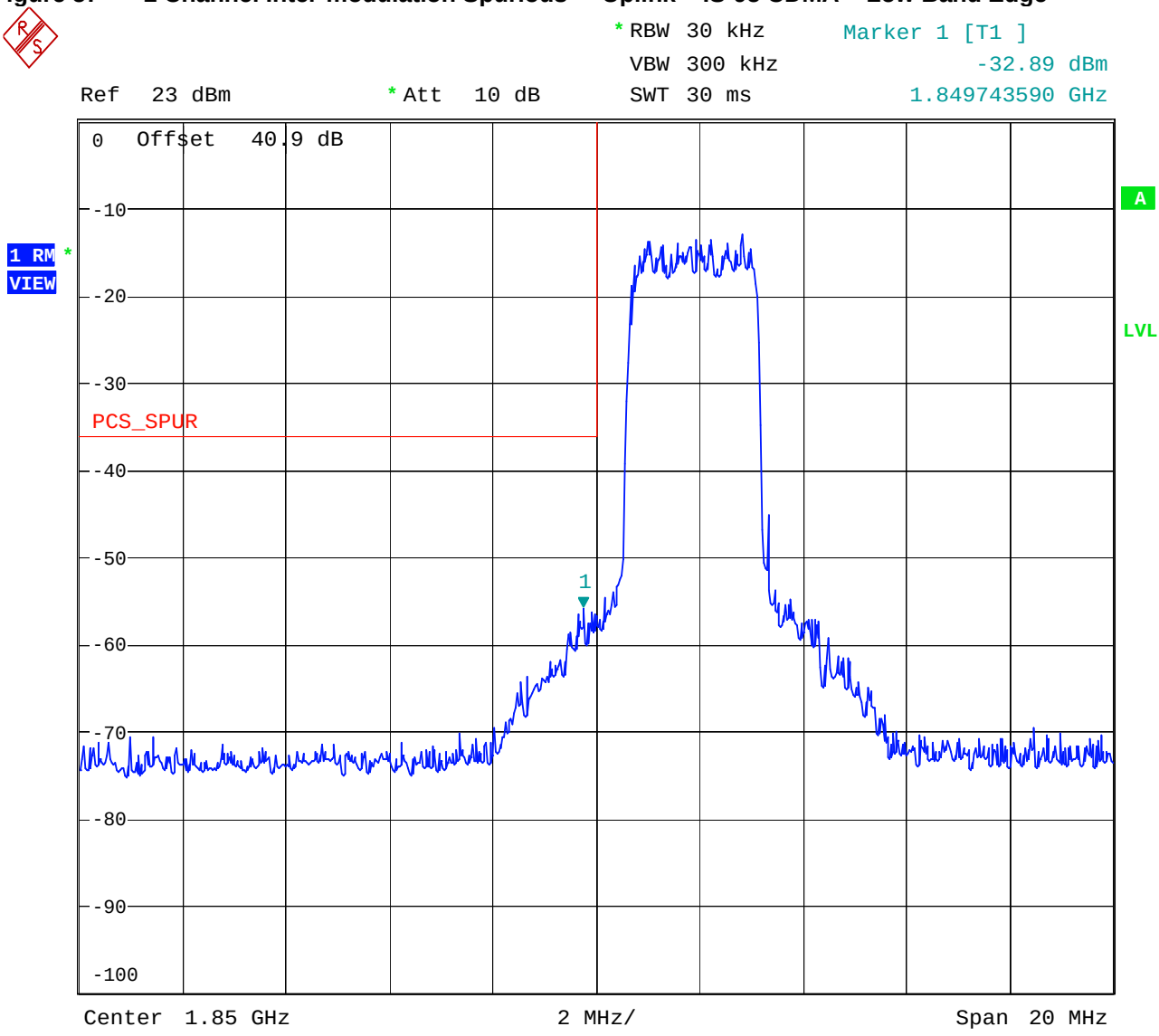
Date: 22.NOV.2006 23:13:12

Figure 56 1 Channel Spurious - Uplink – W-CDMA – Upper Band Edge



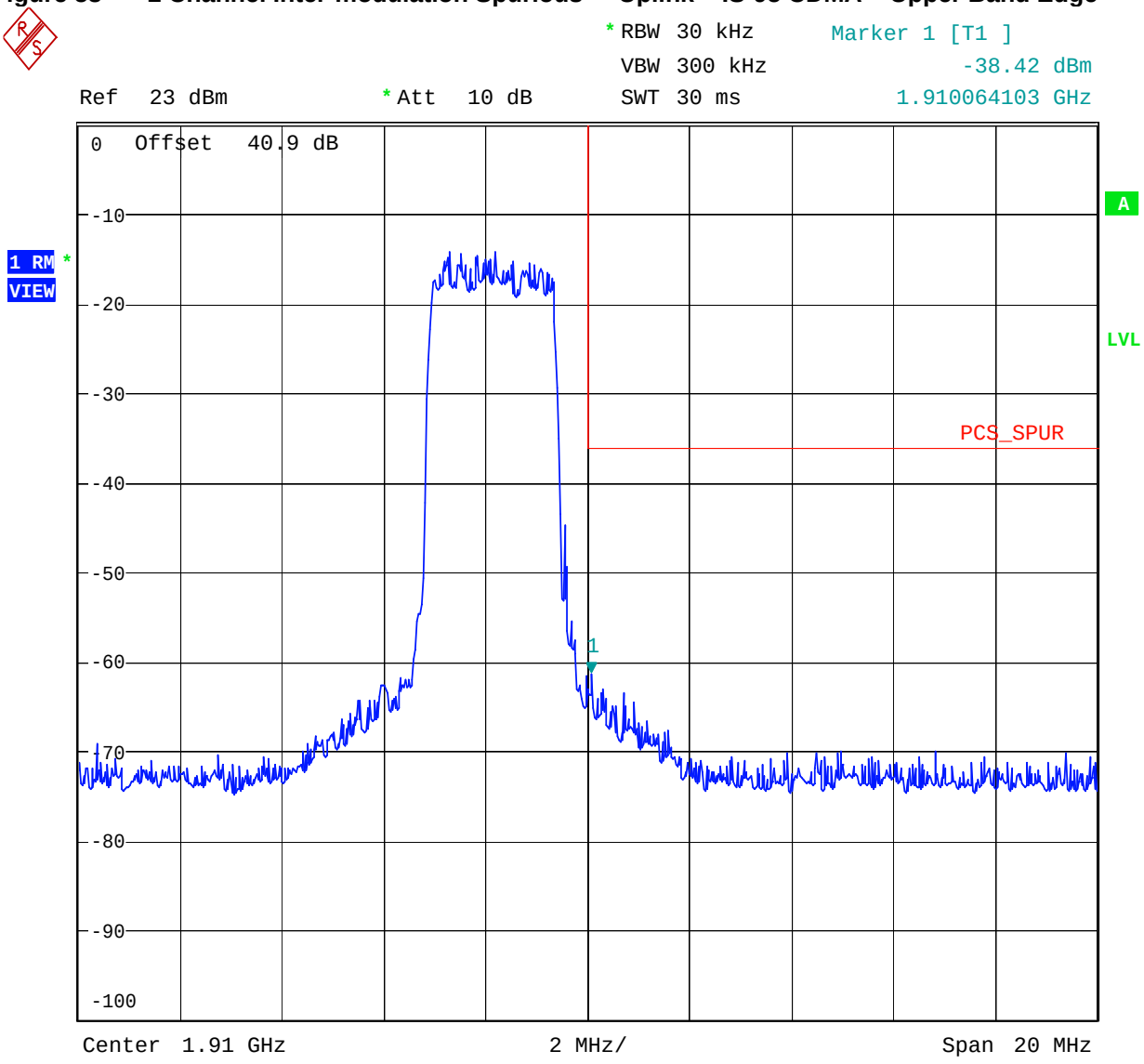
Date: 22.NOV.2006 23:14:48

Figure 57 2 Channel Inter-modulation Spurious - Uplink – IS-95 CDMA – Low Band Edge



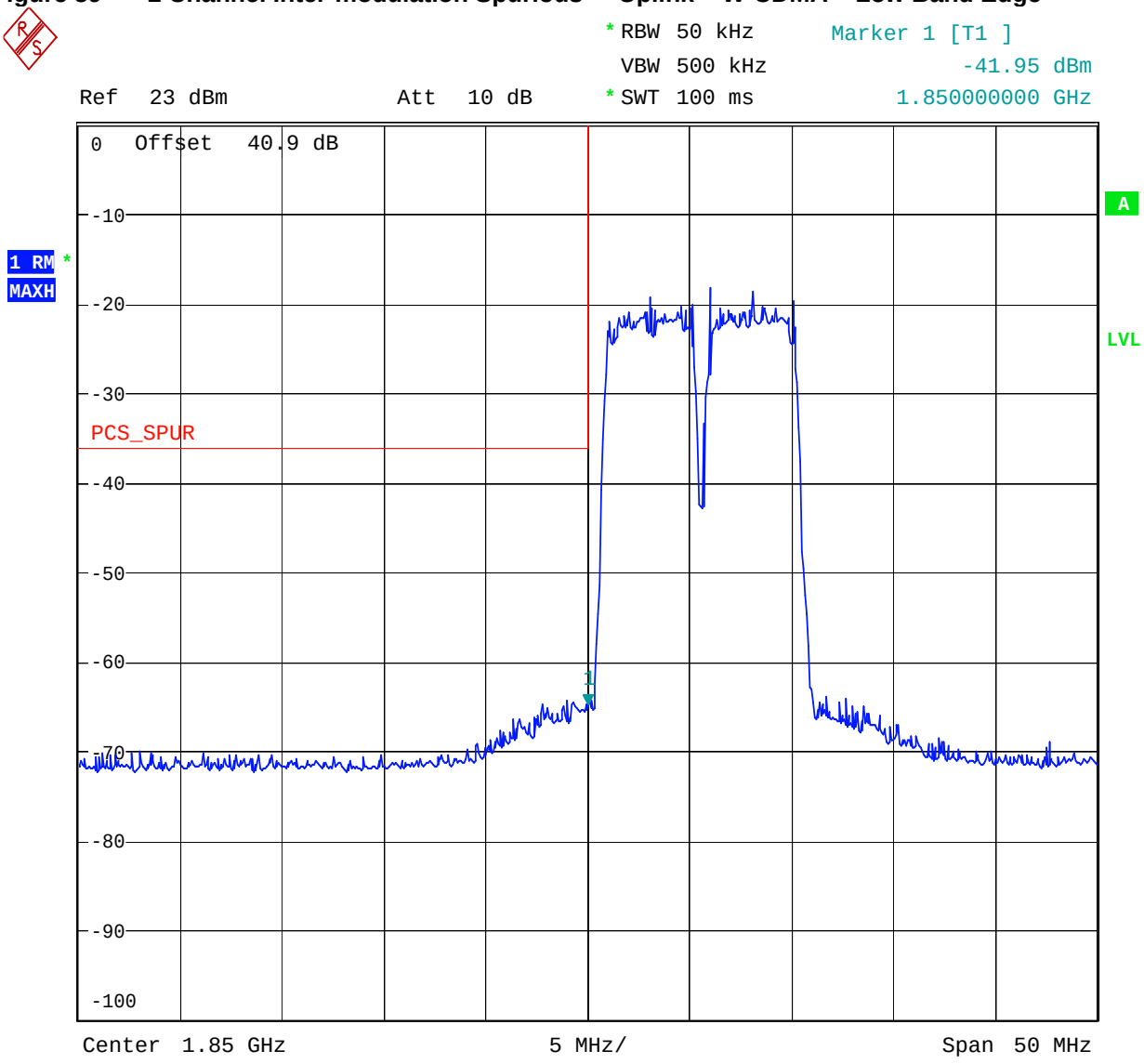
Date: 27.NOV.2006 16:49:00

Figure 58 2 Channel Inter-modulation Spurious - Uplink – IS-95 CDMA – Upper Band Edge



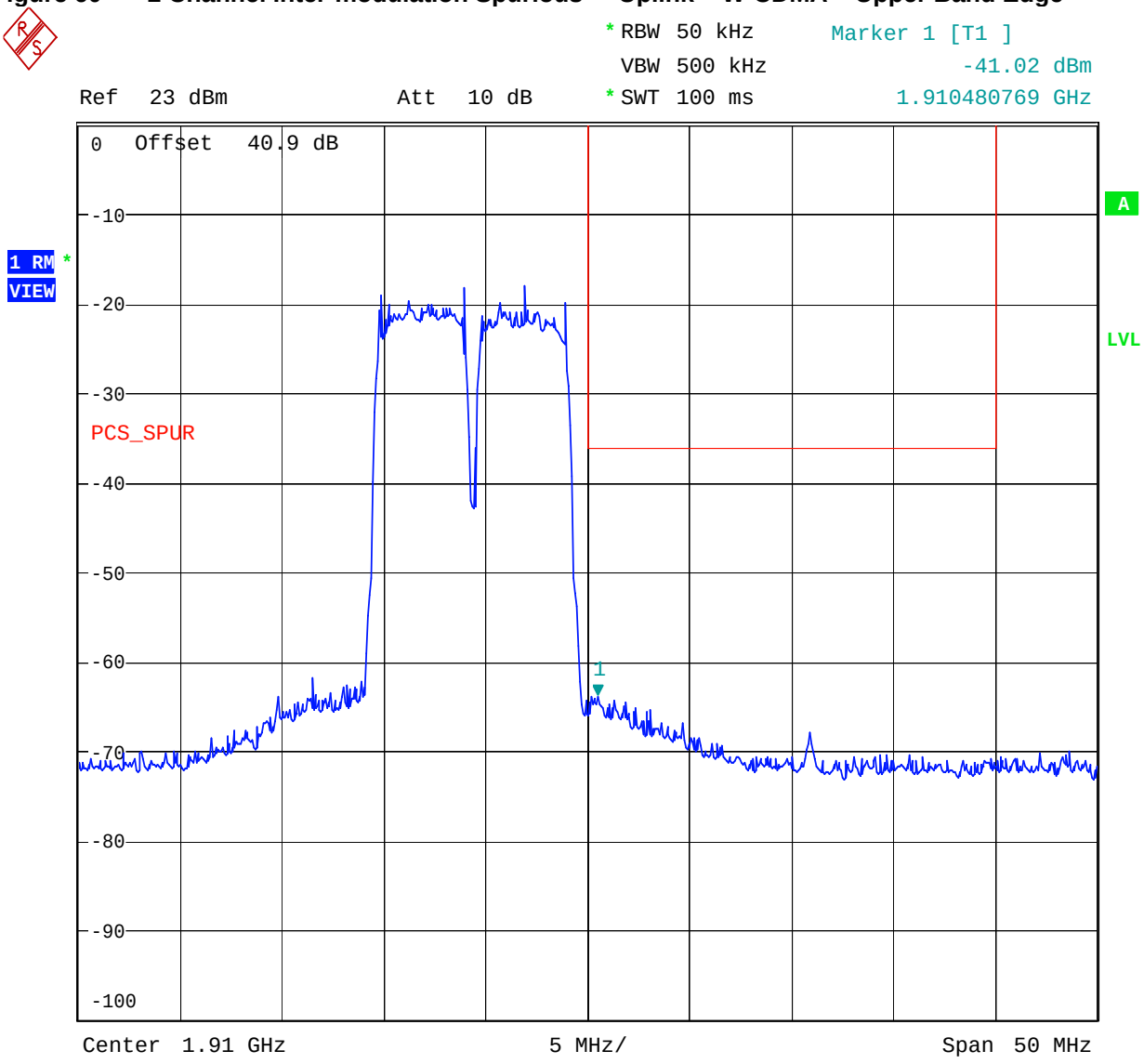
Date: 27.NOV.2006 16:54:48

Figure 59 2 Channel Inter-modulation Spurious - Uplink – W-CDMA – Low Band Edge



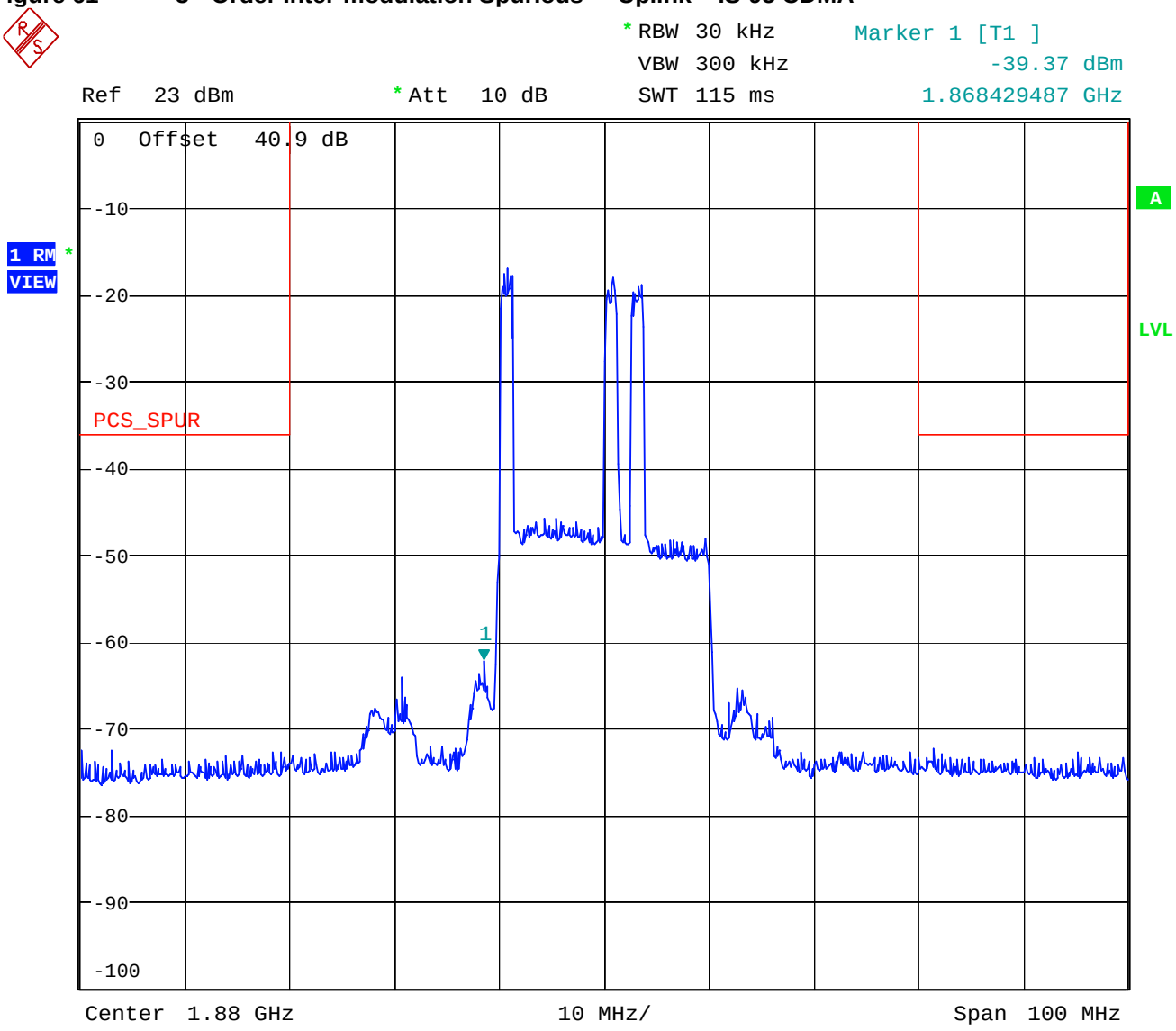
Date: 22.NOV.2006 23:39:18

Figure 60 2 Channel Inter-modulation Spurious - Uplink – W-CDMA – Upper Band Edge



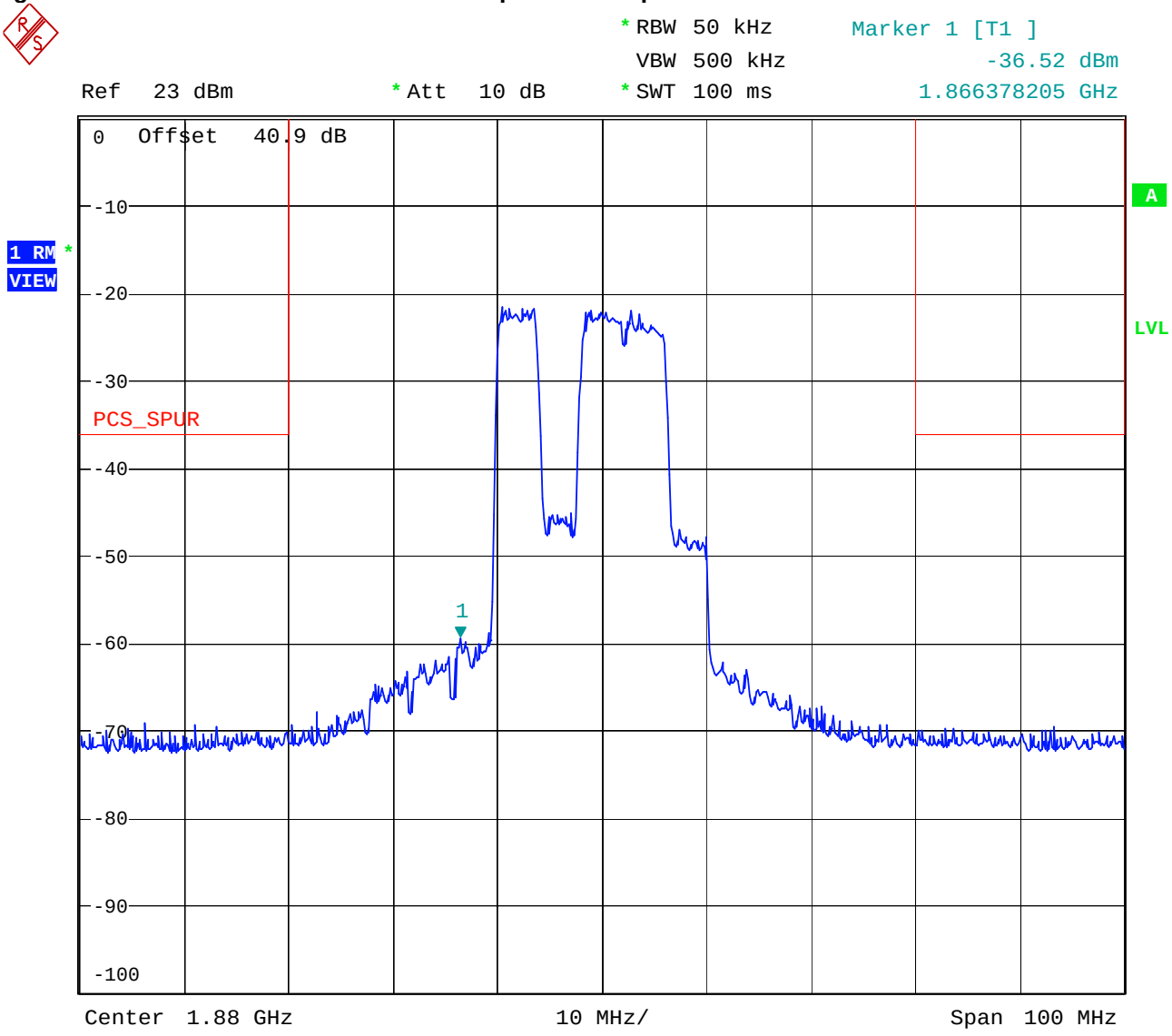
Date: 22.NOV.2006 23:37:24

Figure 61 3rd Order Inter-modulation Spurious - Uplink – IS-95 CDMA



Date: 27.NOV.2006 17:28:14

Figure 62 3rd Order Inter-modulation Spurious - Uplink – W-CDMA



Date: 27.NOV.2006 17:56:32

D.8. Tested By

Name: Tom Tidwell,
Function: Manager of Wireless Services
Date: 11/28/2006

APPENDIX E: 2.1053 FIELD STRENGTH OF SPURIOUS RADIATION

E.1. Base Standard & Test Basis

Base Standard	FCC 2.1053
Test Basis	FCC 2.1053 Field Strength of Spurious Radiation
Test Method	TIA 603-C, 2004 Substitution Antenna Method

E.2. Limits

24.238 Emission limitations for Broadband PCS equipment

(a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

E.3. Test Results

Compliant. The worst-case spurious emission level was -25.9 dBm at 3977.5 MHz. This level is 12.9 dB below the specification limit of -13 dBm. The spectrum was searched up to 20 GHz with the device operating on three channels in the Uplink direction and three channels in the Downlink direction.

E.4. Deviations from Normal Operating Mode During Test

None.

E.5. Sample Calculation

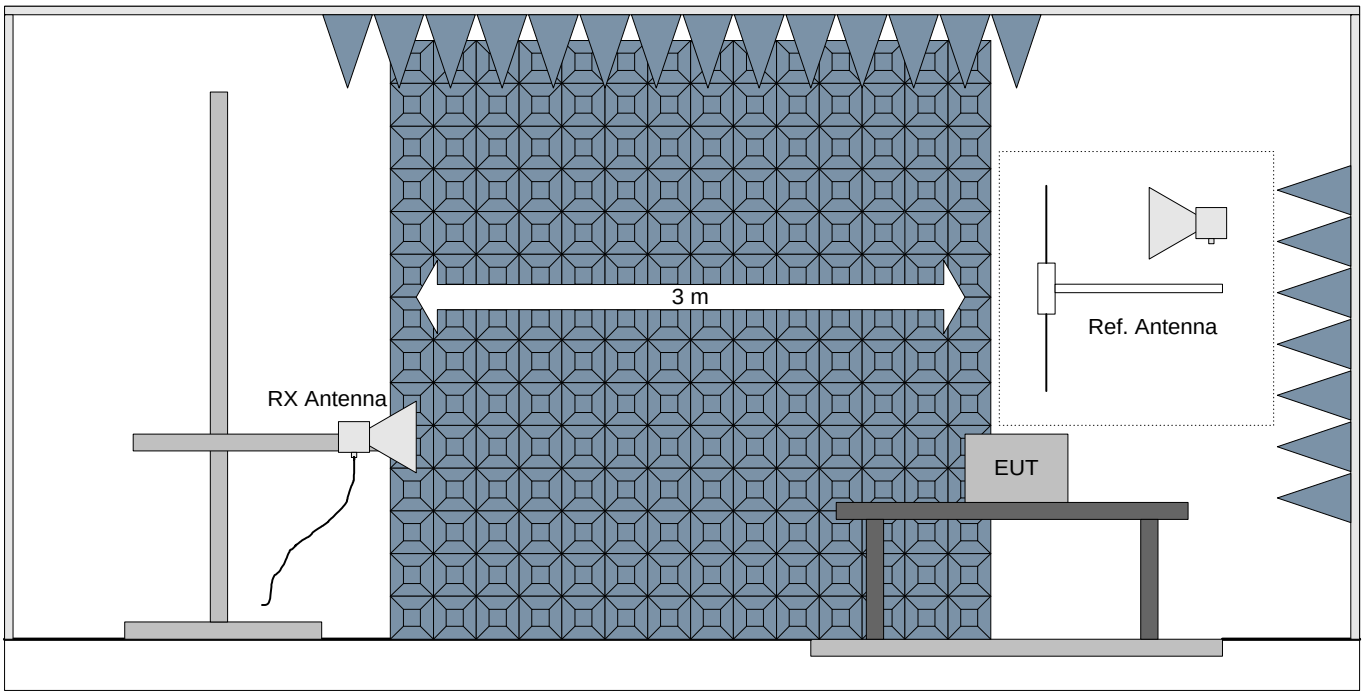
Final measured value (dBm) = Substitution level (dBm) + Antenna Gain (dBi)

Minimum attenuation limit (dB) = 43 + 10 log(P) where P = Peak power of the carrier in watts.

Min. Atten. Limit dB) = 43 + 10 * log(20 watts)
= 43 + 10 * 1.3
= 43 + 13
= 56 dB

43 dBm – 56 dB = -13 dBm

E.6. Test Diagram



Note: The EUT is set to repeat a signal at maximum rf output power into a coaxial load for this testing.

E.7. Test Data

Project No:	Andrew Corporation W6397
Model:	Node C/M 1943
Comments:	Transmit at full rf output power (20 watts), Ch. 25, 600, 1175
Date:	11/28/2006

Distance:	3 m	Standard:	CFR 47, Part 2.1043	RBW: (unless noted)	< 1 GHz = 120 kHz; > 1 GHz = 1 MHz
				VBW: (unless noted)	Peak = RBW; Avg. = RBW

Antenna	Polarization	Frequency	Measured	Substitution Level	Substitution Antenna Gain	Final Measured Value		Peak Carrier Power		Minimum Attenuation Limit	Margin
	(V/H)	(MHz)	(dBm)	(dBm)	(dBi)	(dBm)	(watts)	(dBm)	(watts)	(dBc)	(dB)
Ref. E1019	V	3862.5	-113.7	-39.662	7.71	-32.0	6.38E-07	43	20	56	19.0
Ref. E1019	H	3862.5	-115.1	-41.062	7.71	-33.4	4.62E-07	43	20	56	20.4
Ref. E1019	V	3920	-115.3	-41.334	7.71	-33.6	4.34E-07	43	20	56	20.6
Ref. E1019	H	3920	-115.3	-41.334	7.71	-33.6	4.34E-07	43	20	56	20.6
Ref. E1019	V	3977.5	-107.5	-33.601	7.71	-25.9	2.58E-06	43	20	56	12.9
Ref. E1019	H	3977.5	-110.4	-36.501	7.71	-28.8	1.32E-06	43	20	56	15.8
Ref. E1019	V	5793.75	-112.8	-40.475	8.68	-31.8	6.61E-07	43	20	56	18.8
Ref. E1019	H	5793.75	-113.1	-40.775	8.68	-32.1	6.17E-07	43	20	56	19.1
Ref. E1019	V	7725	-113.4	-42.568	9.15	-33.4	4.55E-07	43	20	56	20.4
Ref. E1019	H	7725	-114.1	-43.268	9.15	-34.1	3.87E-07	43	20	56	21.1
Ref. E1019	V	9656.25	-113.7	-44.084	9.85	-34.2	3.77E-07	43	20	56	21.2
Ref. E1019	H	9656.25	-113.7	-44.084	9.85	-34.2	3.77E-07	43	20	56	21.2
Ref. E1019	V	11587.50	-113.7	-45.62	10.59	-35.0	3.14E-07	43	20	56	22.0
Ref. E1019	H	11587.50	-113.7	-45.62	10.59	-35.0	3.14E-07	43	20	56	22.0
Ref. E1019	V	19312.50	-111.6	-48.052	5.7	-42.4	5.82E-08	43	20	56	29.4
Ref. E1019	H	19312.50	-111.6	-48.052	5.7	-42.4	5.82E-08	43	20	56	29.4

Notes:
(1) A positive margin indicates a passing result
(2) If duty cycle correction is indicated, plots are included in the test report to validate the factor used.
(3) The minimum threshold of sensitivity was sufficient to detect signals within 20 dB of the -13 dBm limit over the frequency range 30 MHz - 10 GHz.

NOTE: Measurements were made with the device operating in the following modes:

Downlink, 20 W rf output, Channel 25
Downlink, 20 W rf output, Channel 600
Downlink, 20 W rf output, Channel 1175
Uplink, 0.2 W rf output, Channel 25
Uplink, 0.2 W rf output, Channel 600
Uplink, 0.2 W rf output, Channel 1175

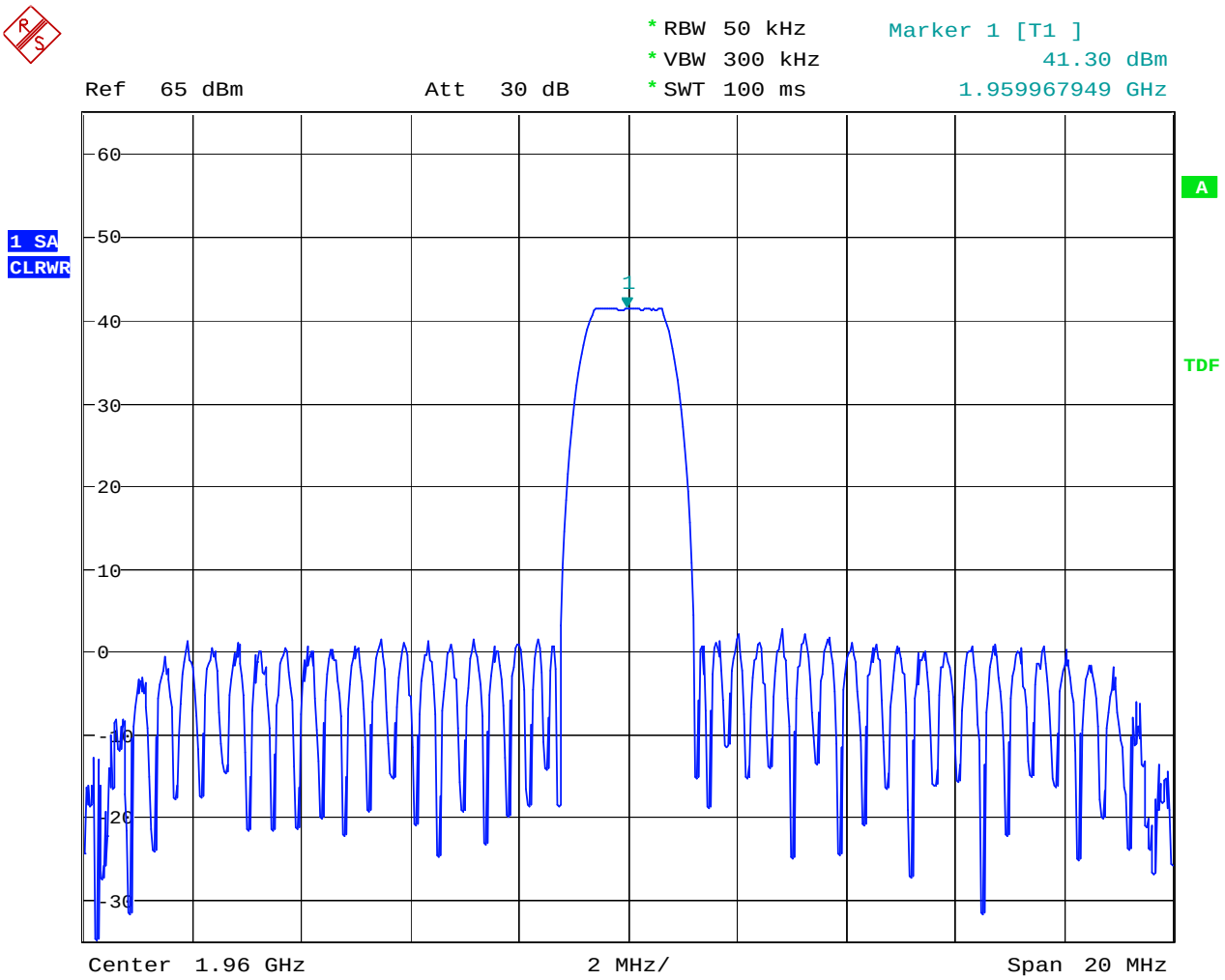
E.8. Test Photo

E.9. Tested By

Name: Tom Tidwell,
Function: Manager of Wireless Services
Date: 11/28/2006

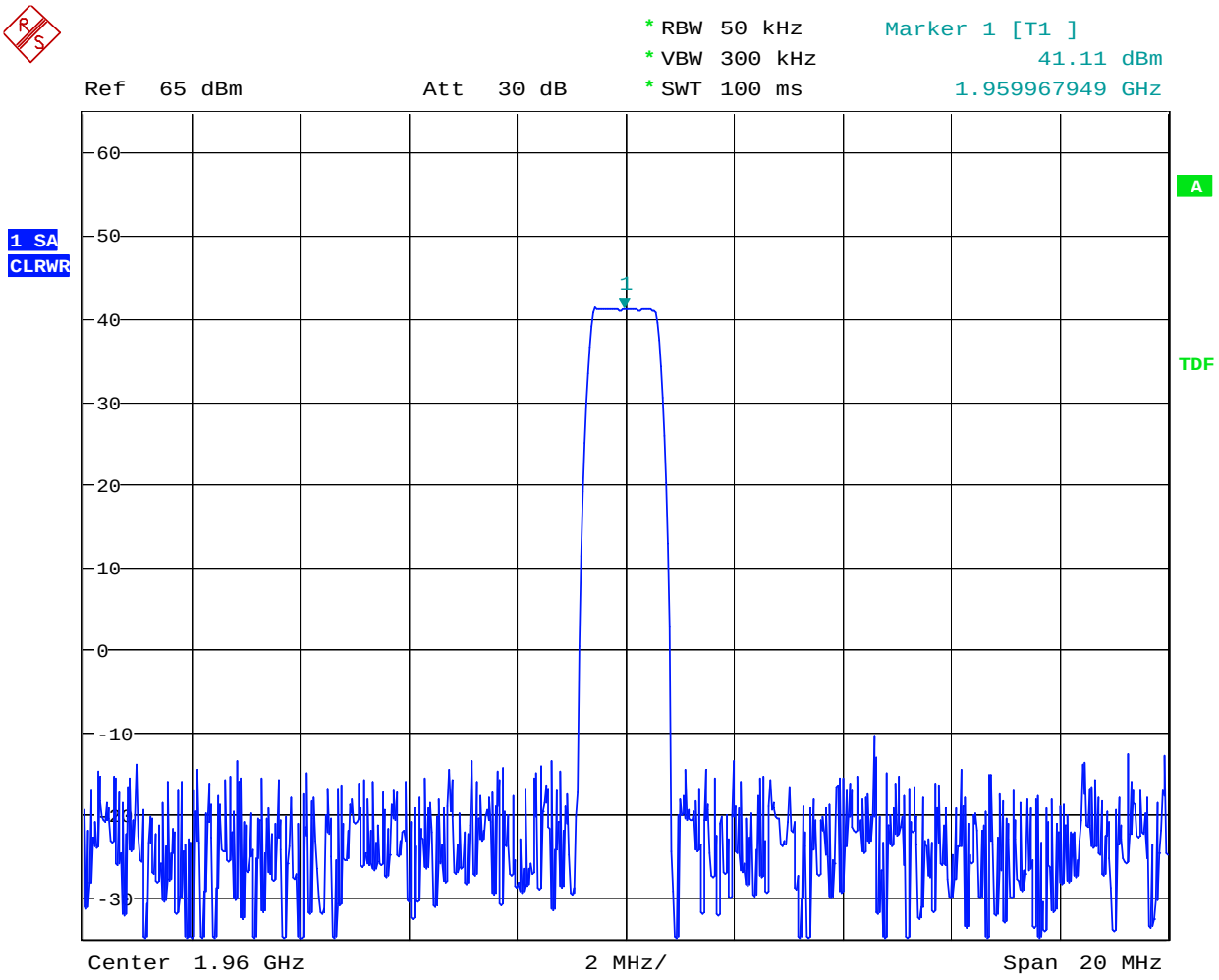
APPENDIX F: 2.1053 FILTER PLOTS

These plots demonstrate the filter band pass characteristics of the device.



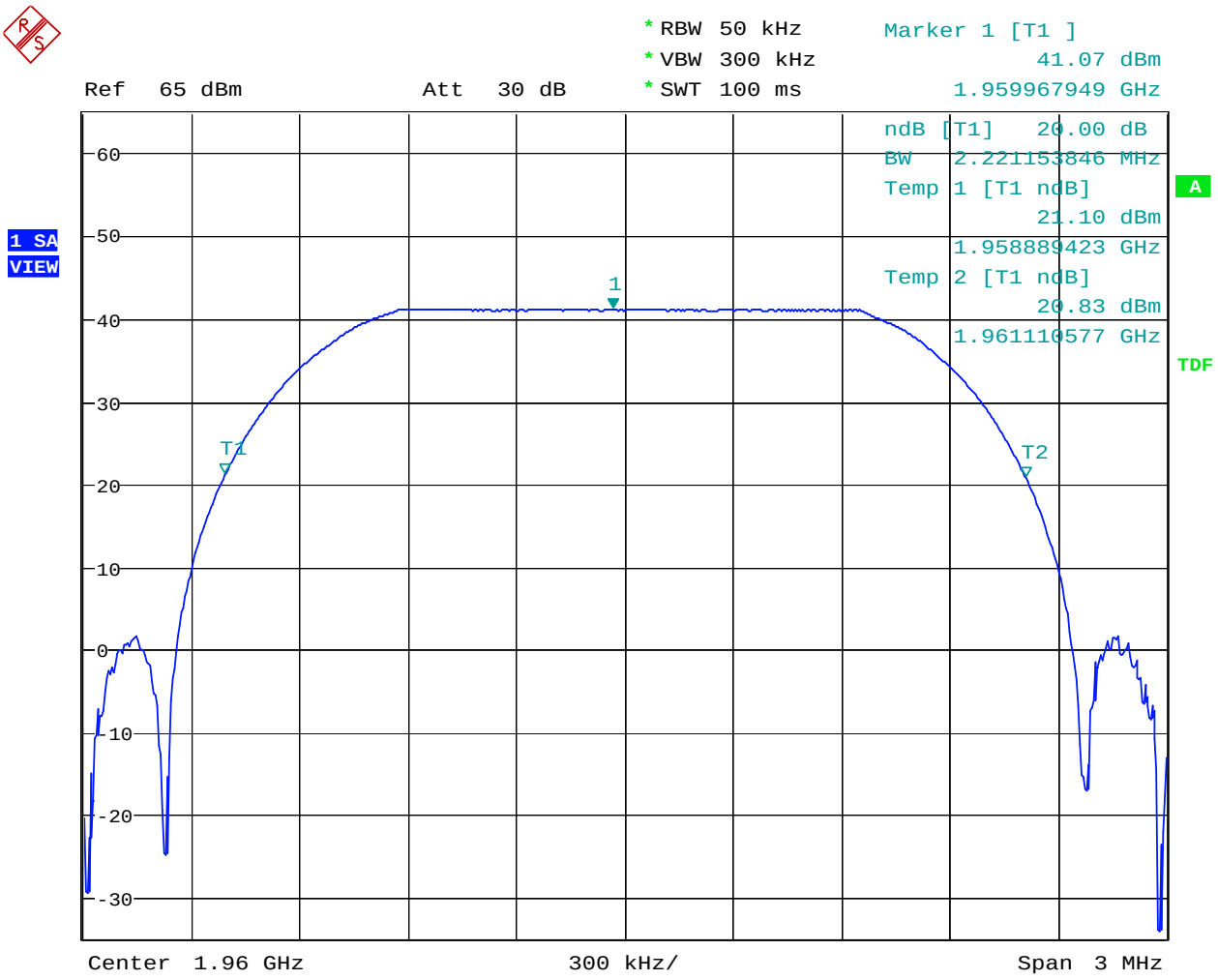
Date: 8.NOV.2006 23:03:50

One Channel Filter – Normal Attenuation



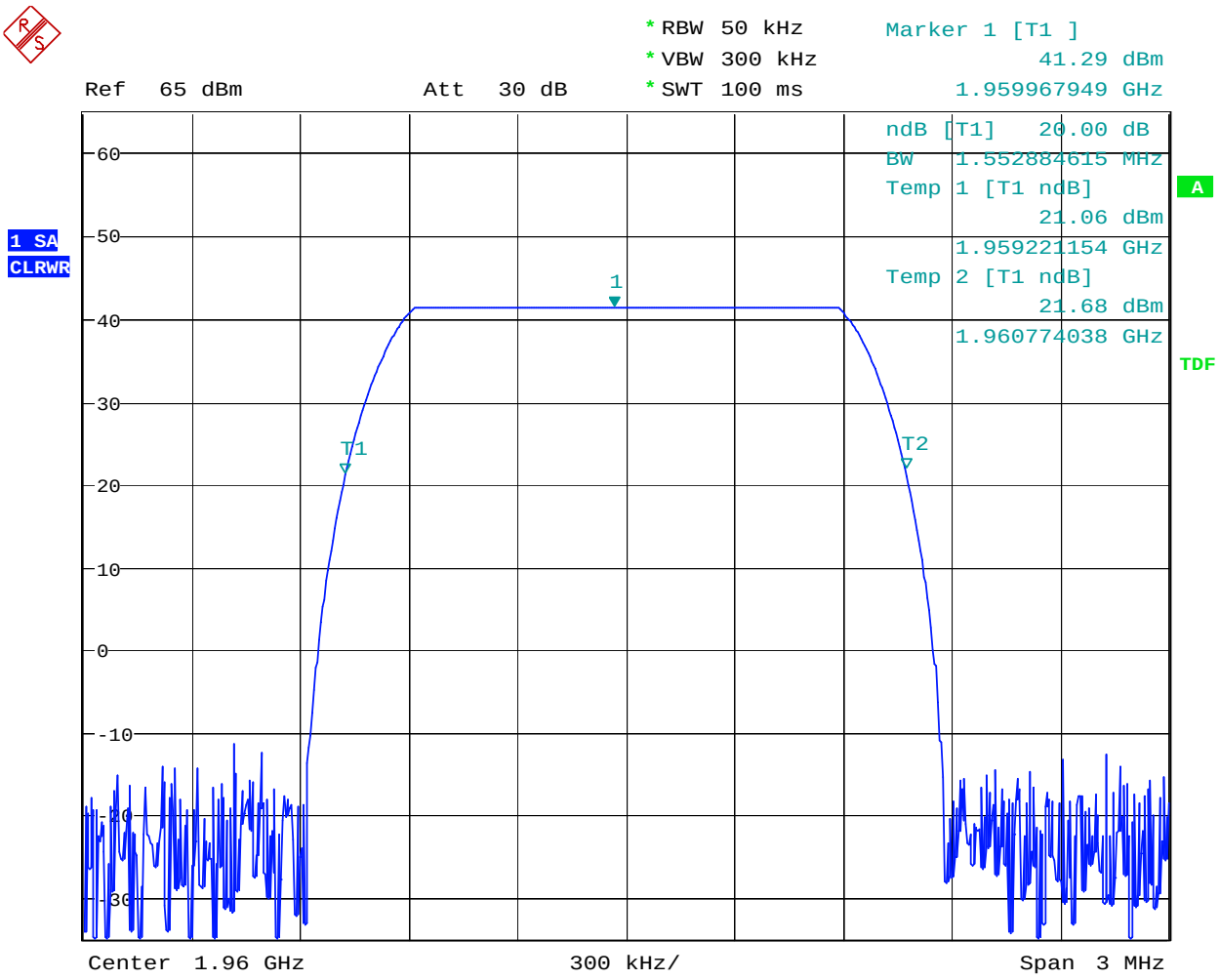
Date: 8.NOV.2006 23:06:23

1 Channel Filter – High Attenuation



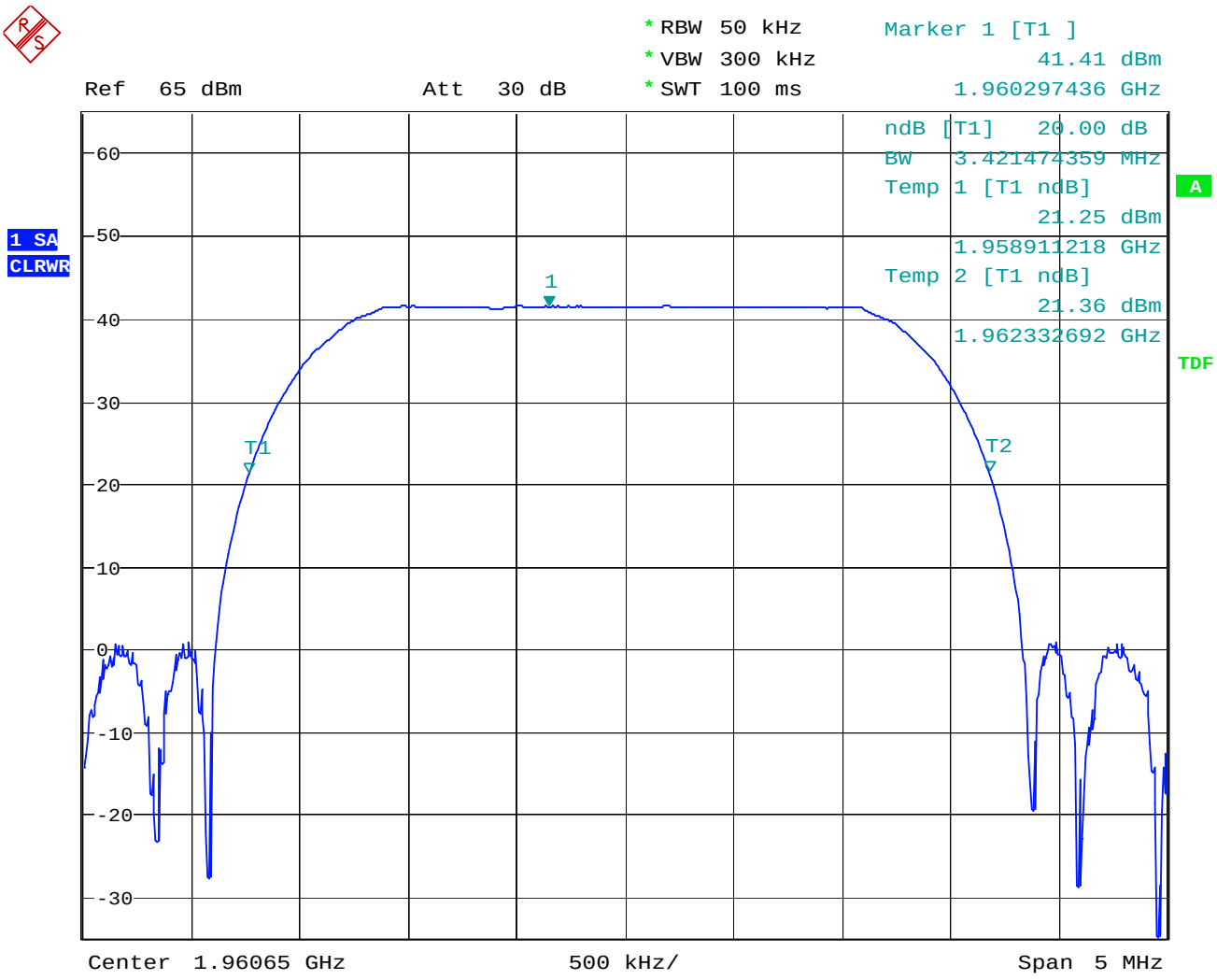
Date: 8.NOV.2006 23:14:09

1 Channel Filter – Normal Attenuation



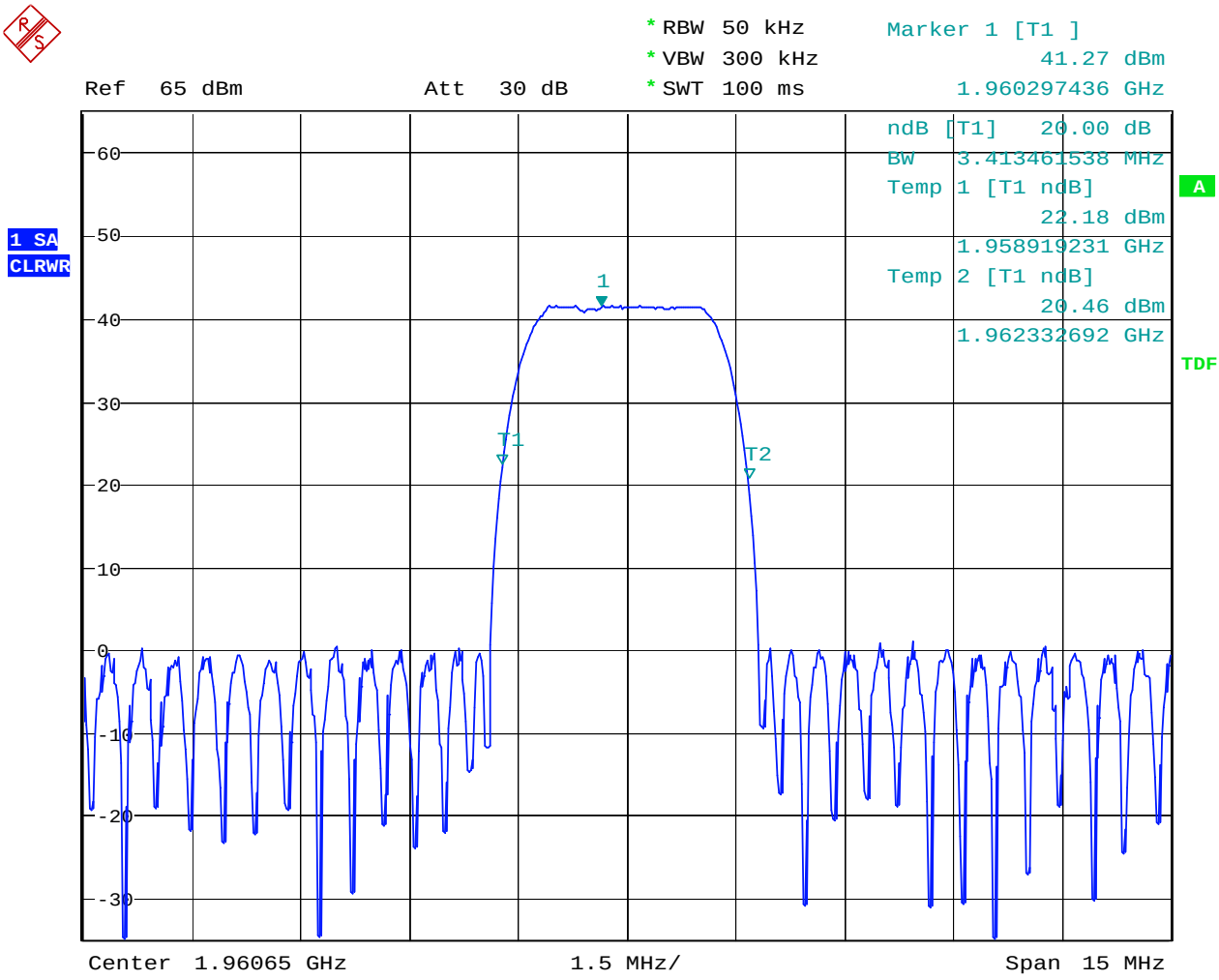
Date: 8.NOV.2006 23:18:33

1 Channel Filter – High Attenuation



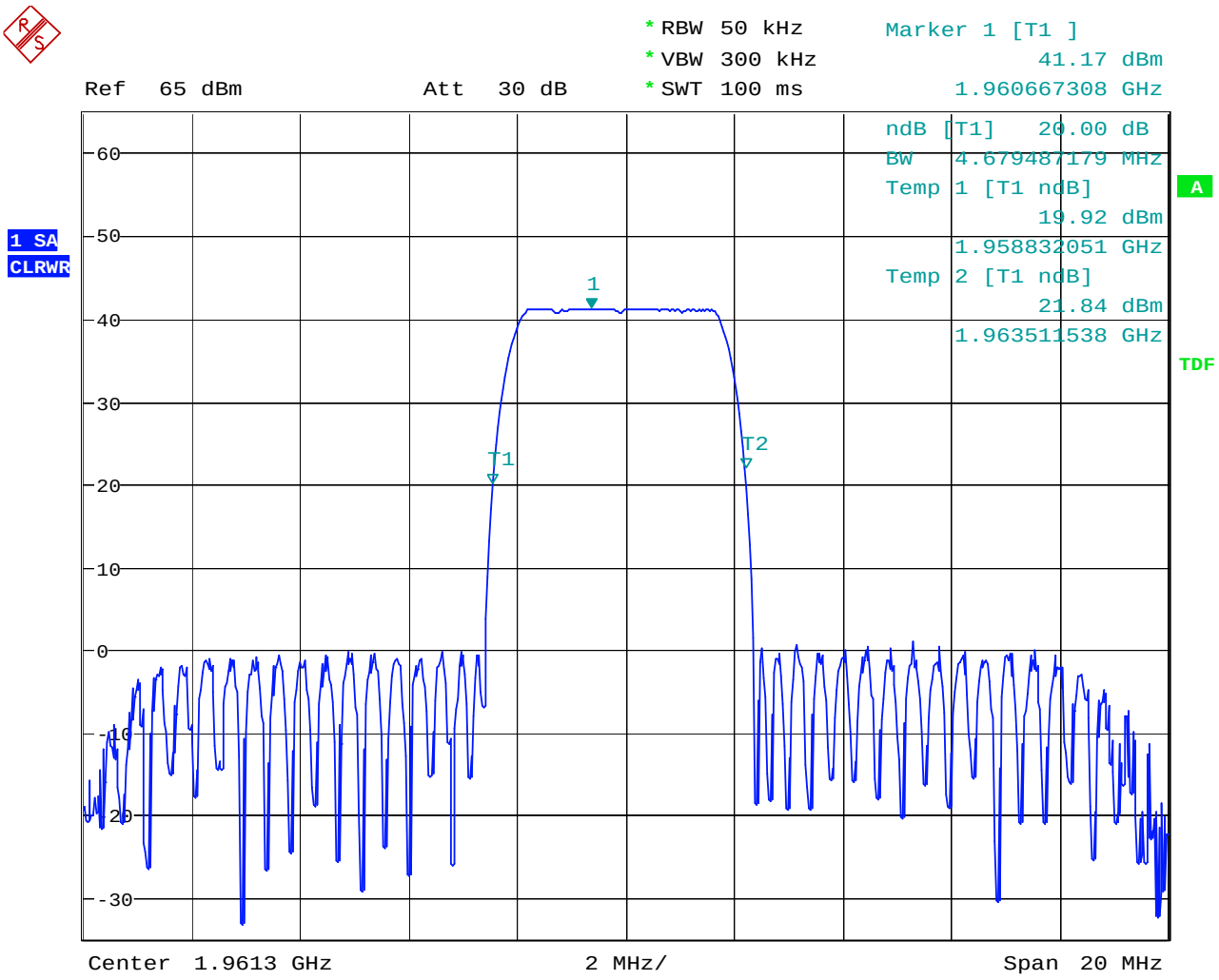
Date: 8.NOV.2006 23:25:20

2 Channel Filter



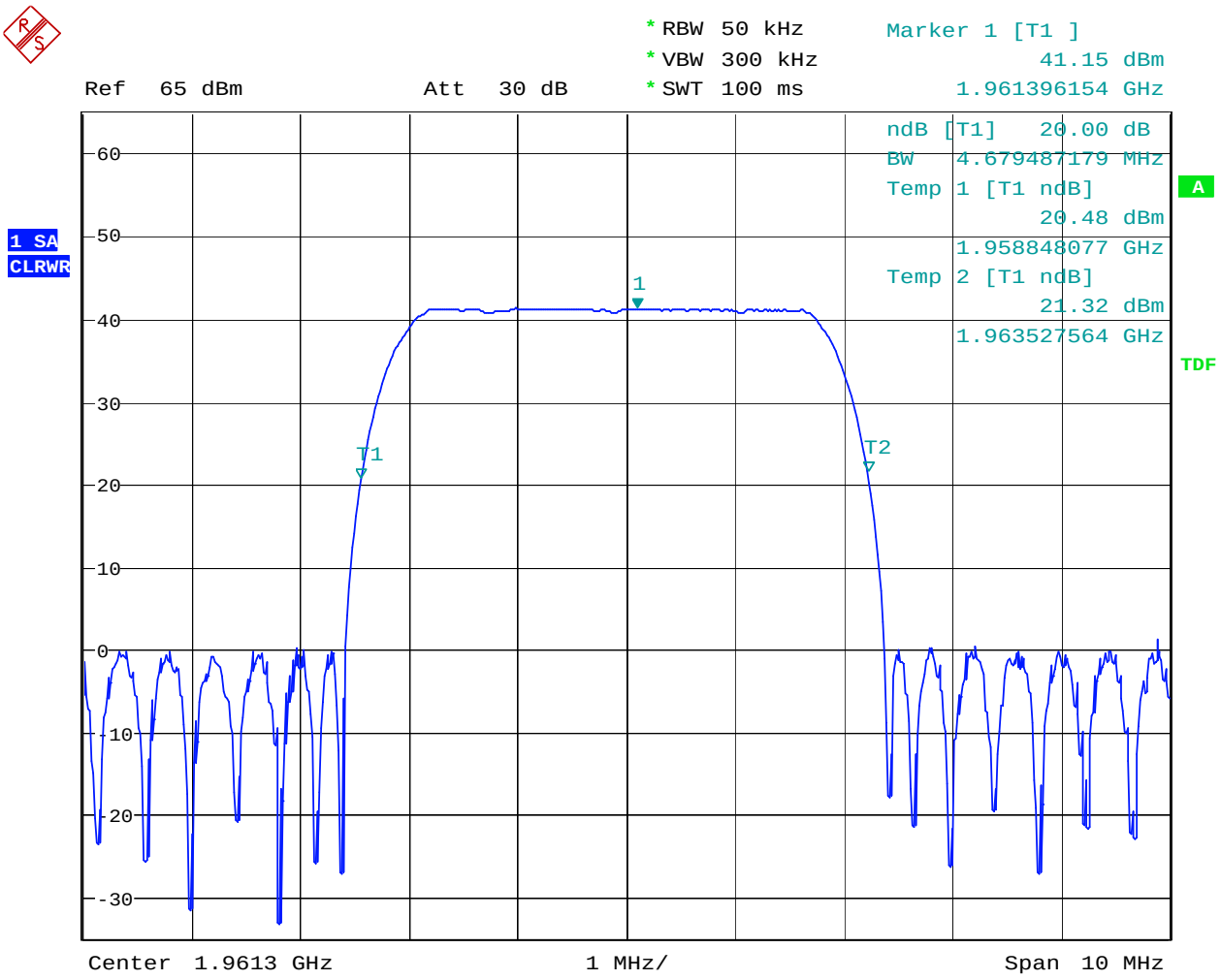
Date: 8.NOV.2006 23:28:37

2 Channel Filter



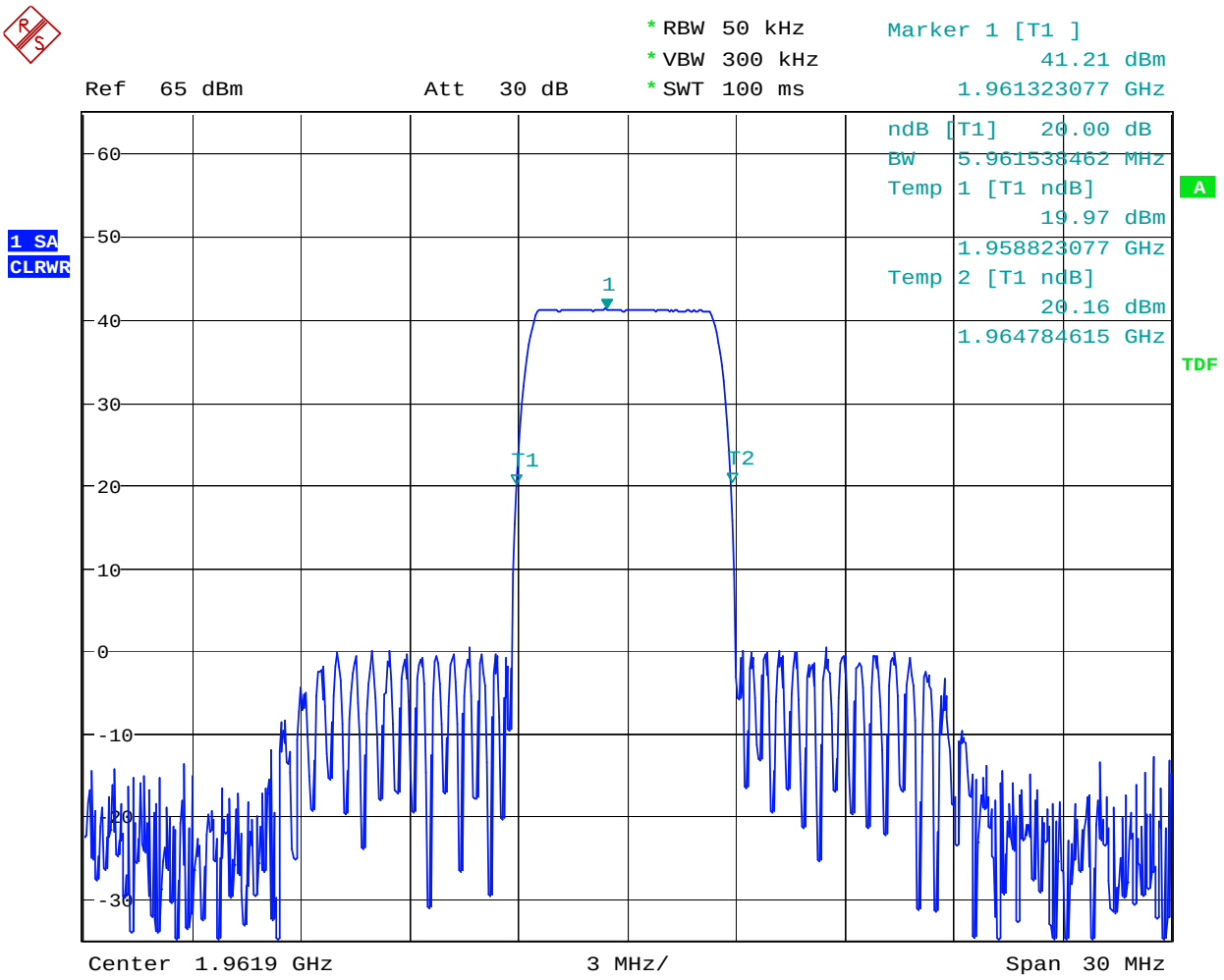
Date: 8.NOV.2006 23:34:20

3 Channel Filter



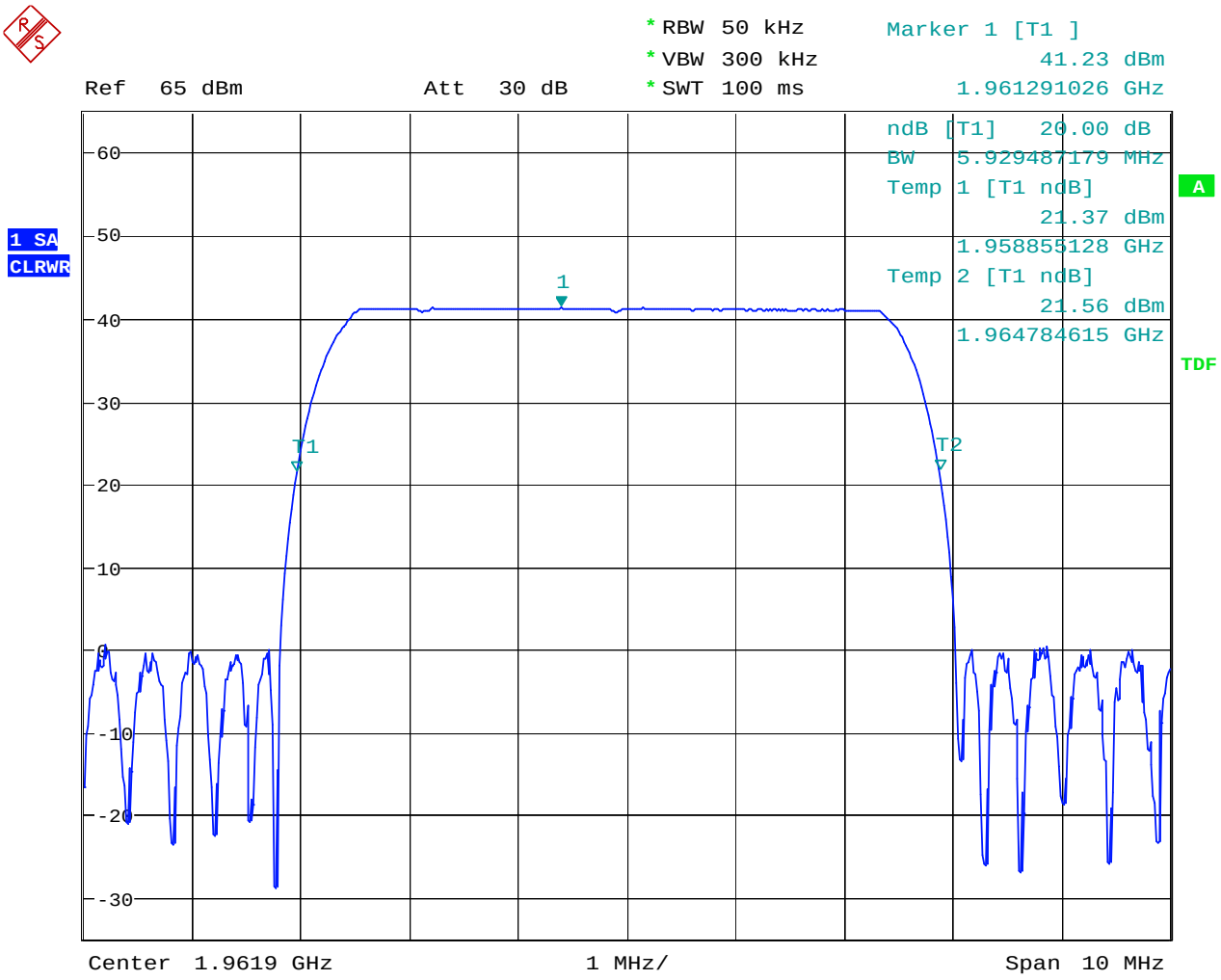
Date: 8.NOV.2006 23:35:48

3 Channel Filter



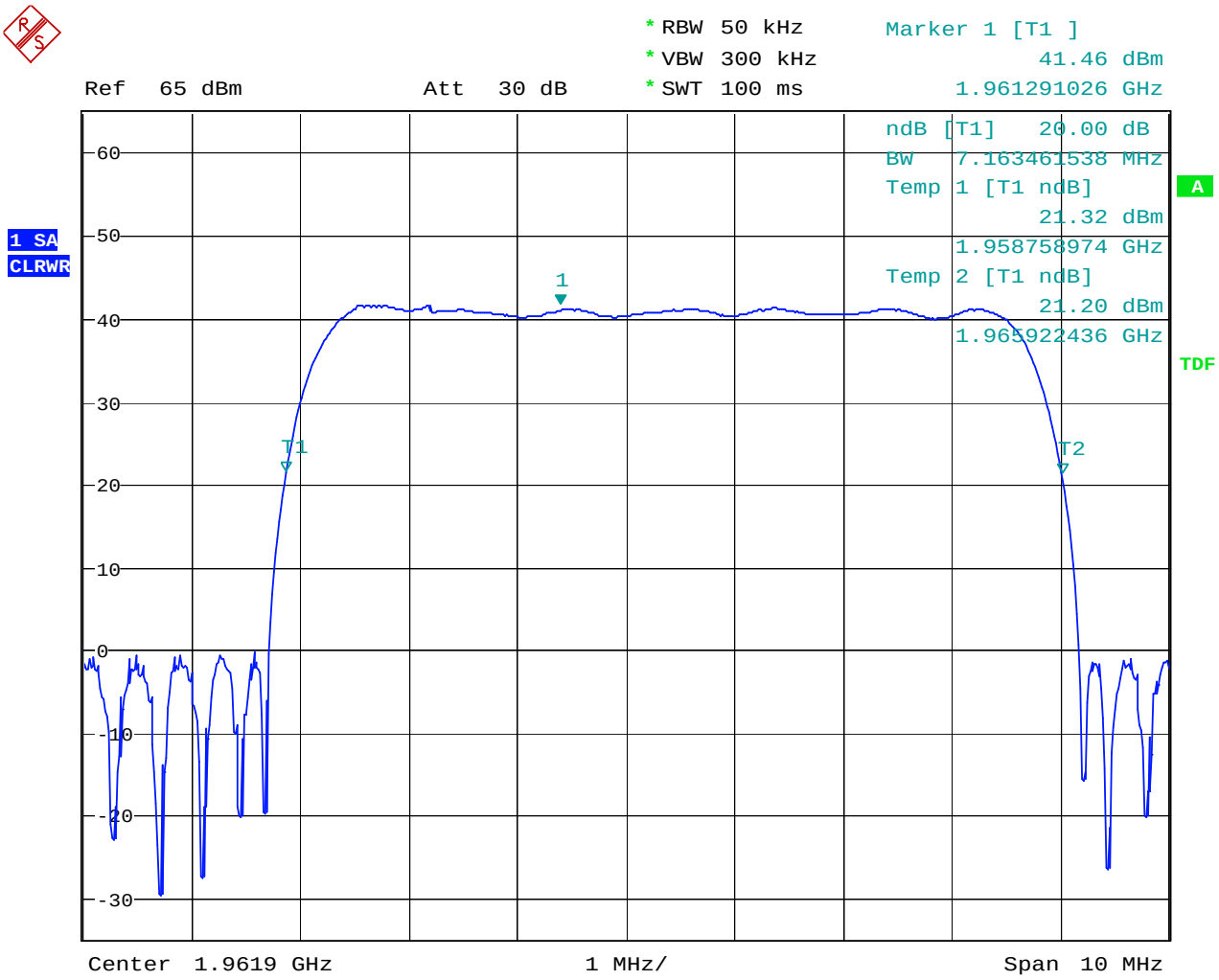
Date: 8.NOV.2006 23:38:52

4 Channel Filter



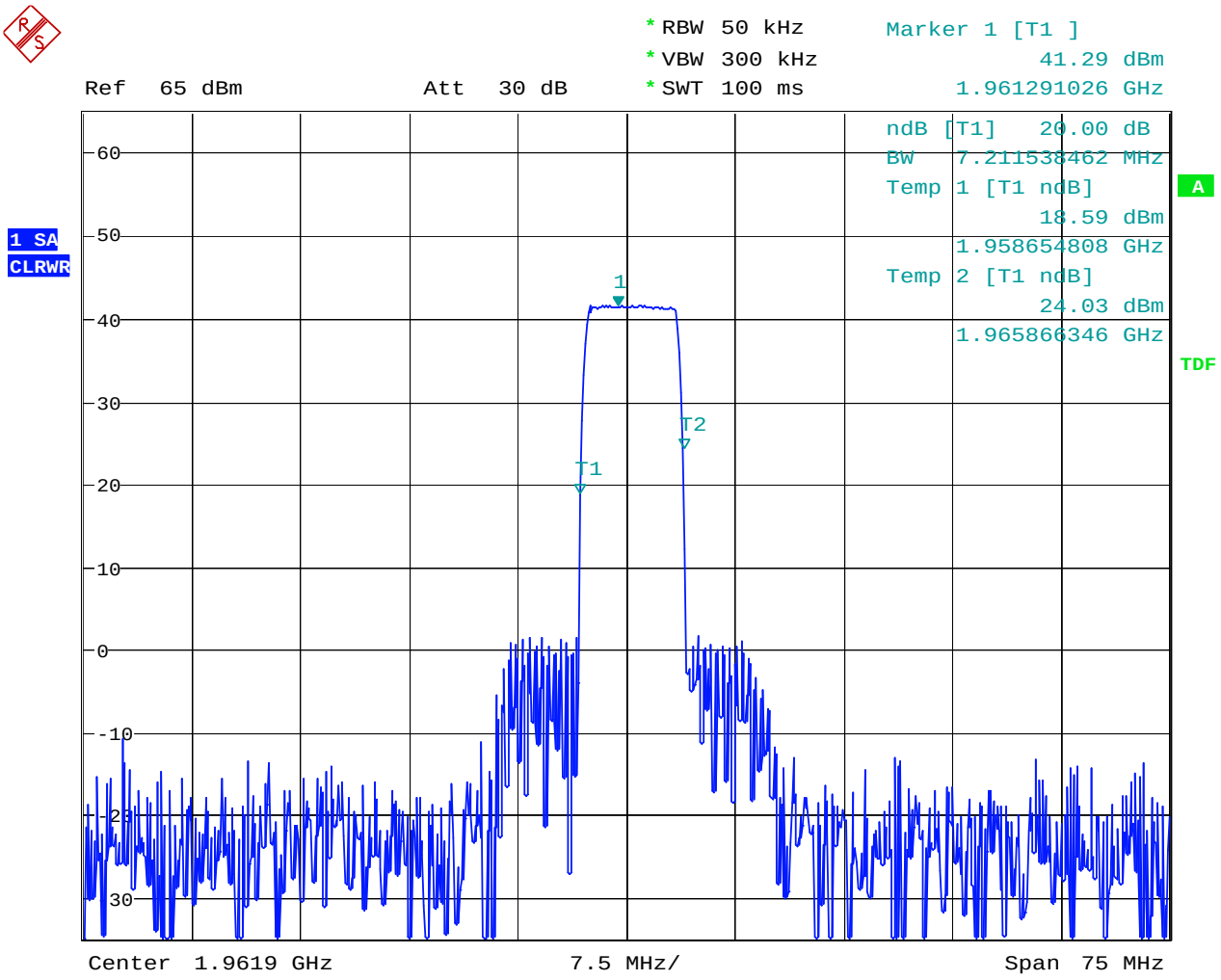
Date: 8.NOV.2006 23:42:44

4 Channel Filter



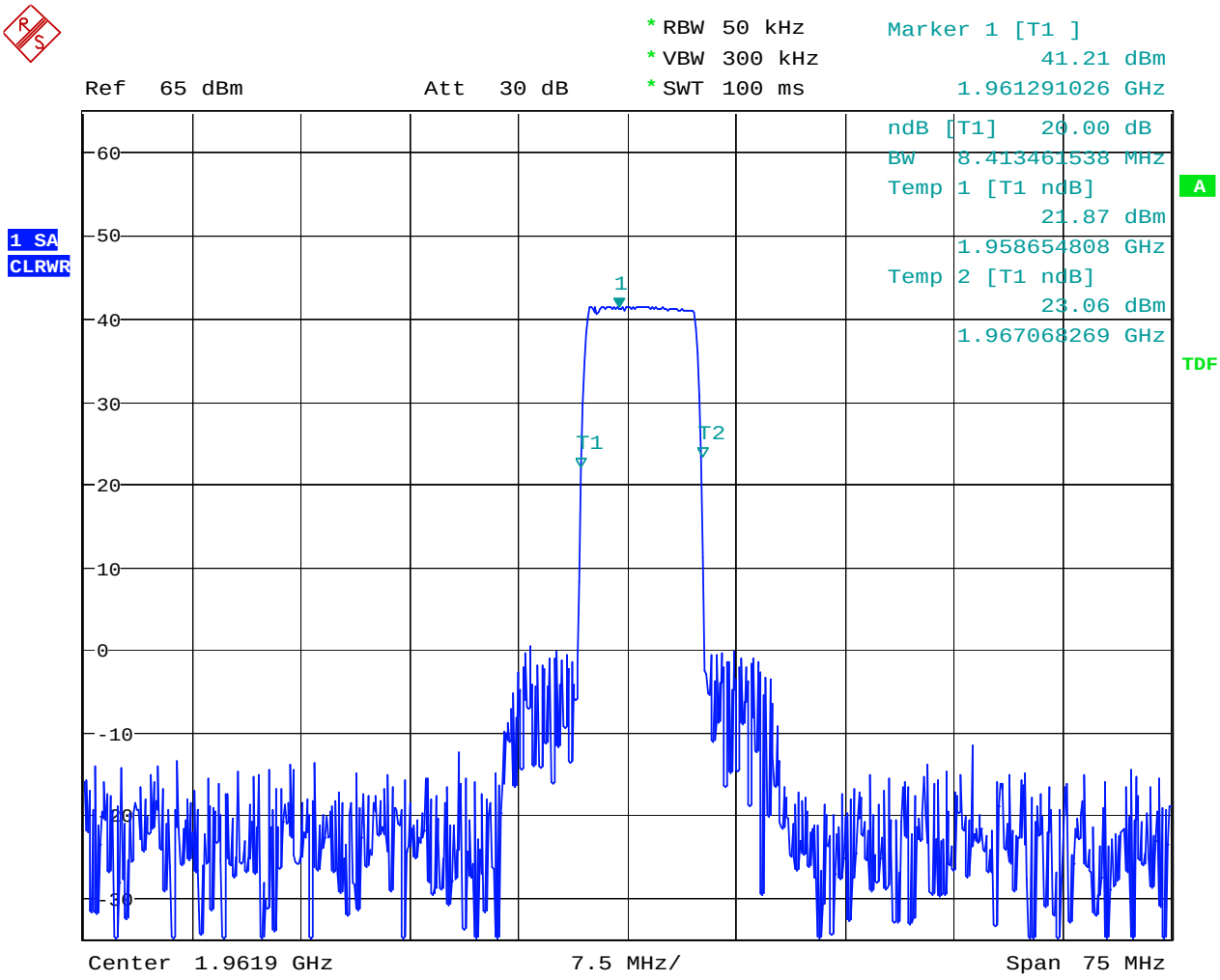
Date: 8.NOV.2006 23:46:22

5 Channel Filter



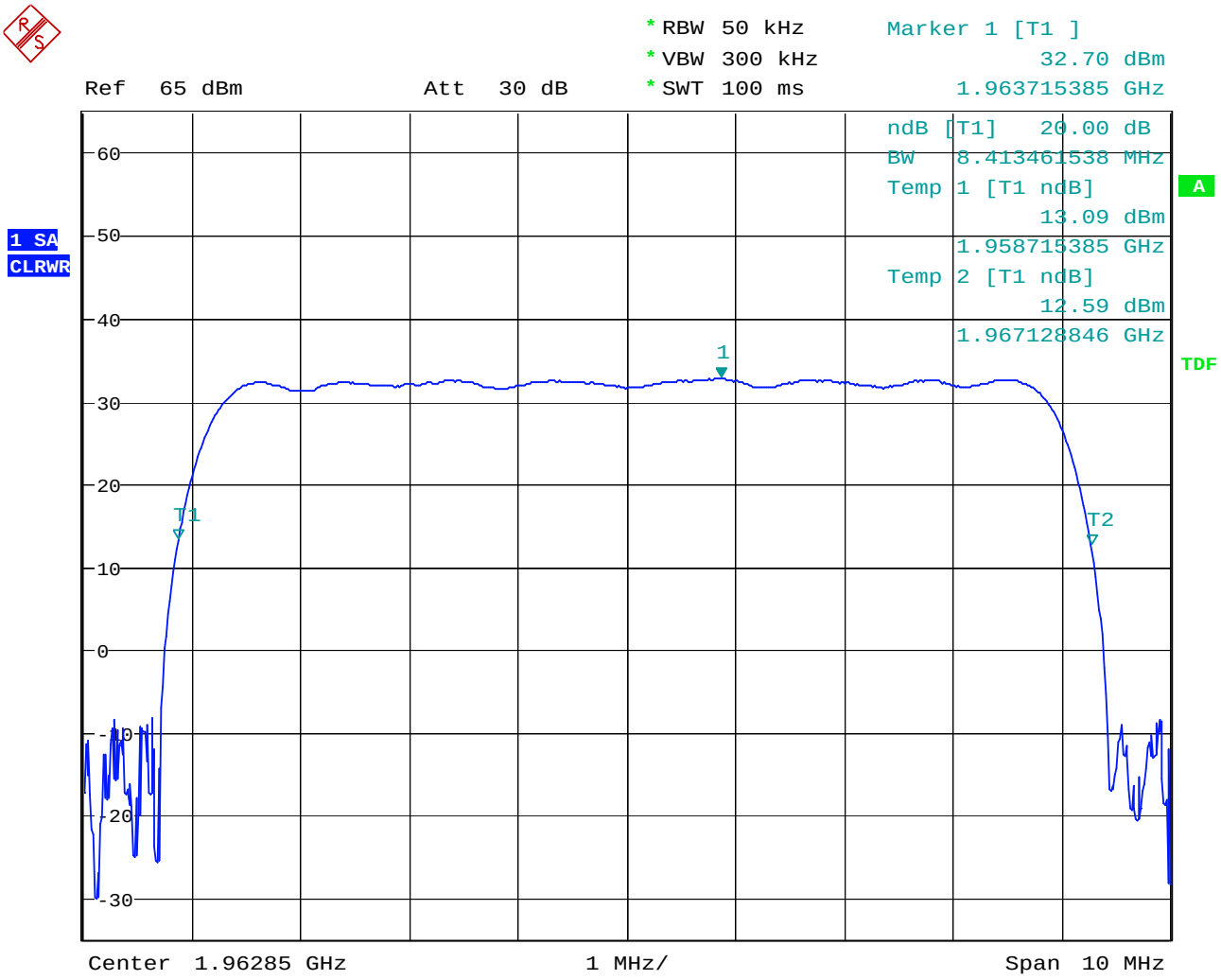
Date: 8.NOV.2006 23:47:32

5 Channel Filter



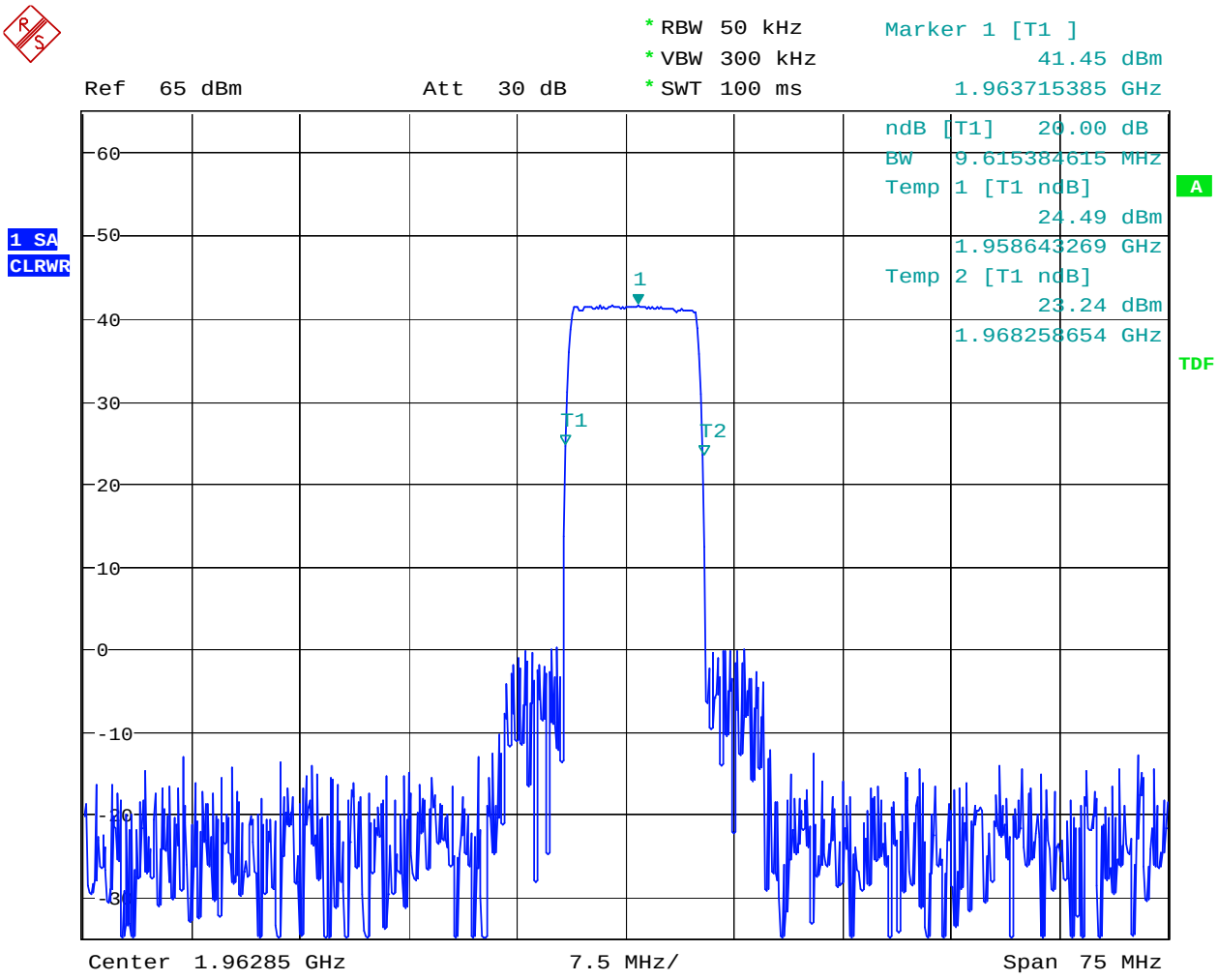
Date: 8.NOV.2006 23:49:17

6 Channel Filter



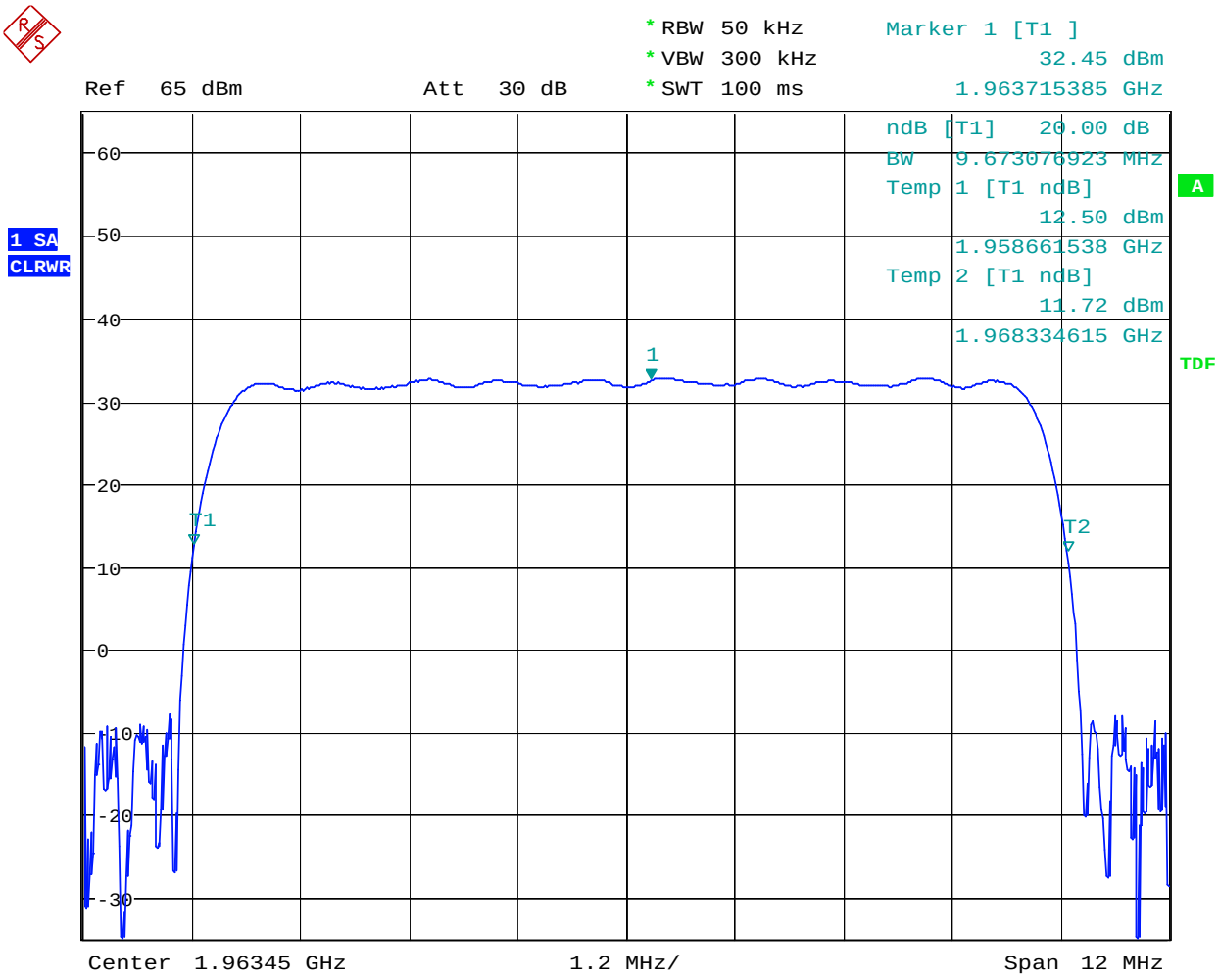
Date: 8.NOV.2006 23:51:05

6 Channel Filter



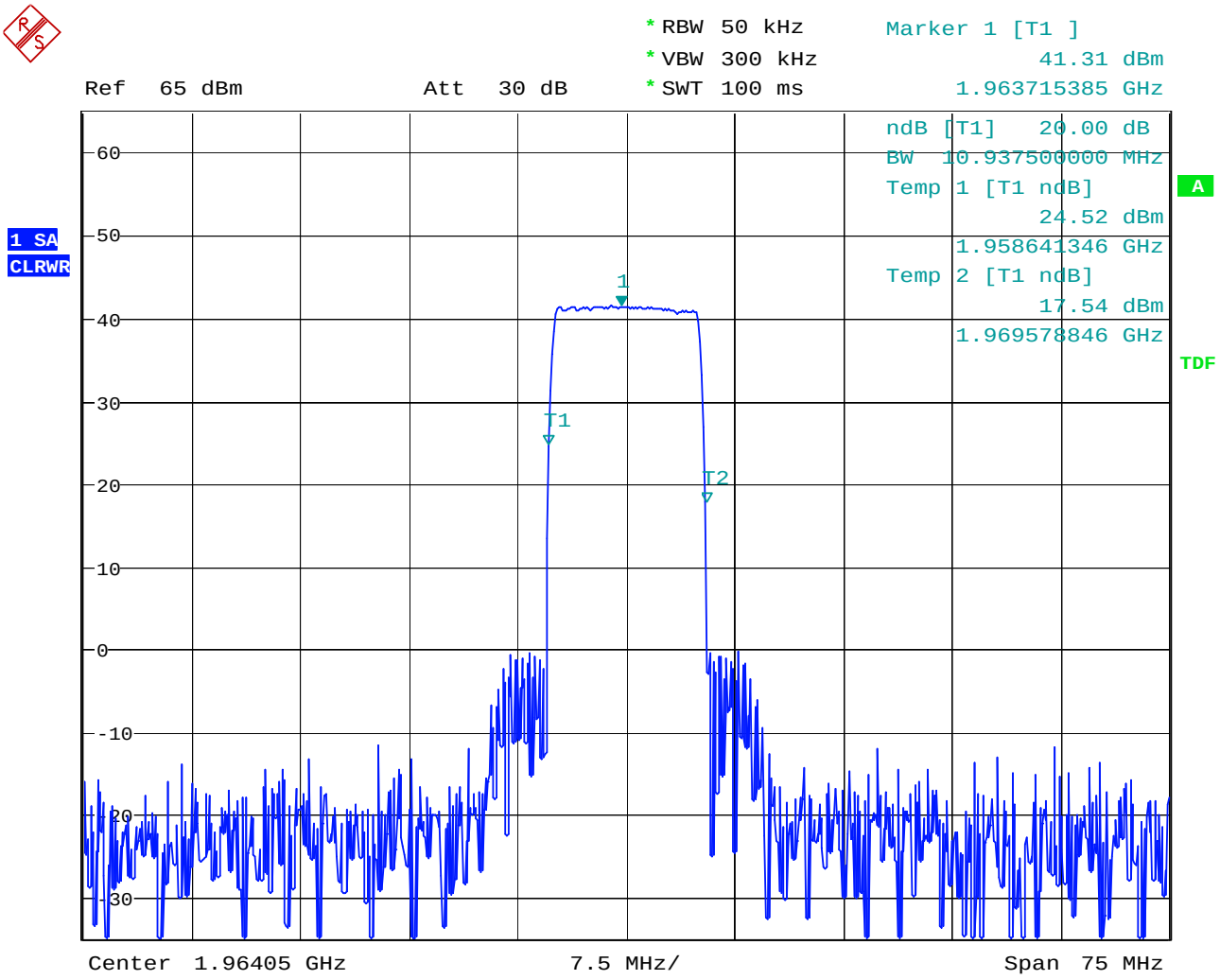
Date: 8.NOV.2006 23:53:07

7 Channel Filter



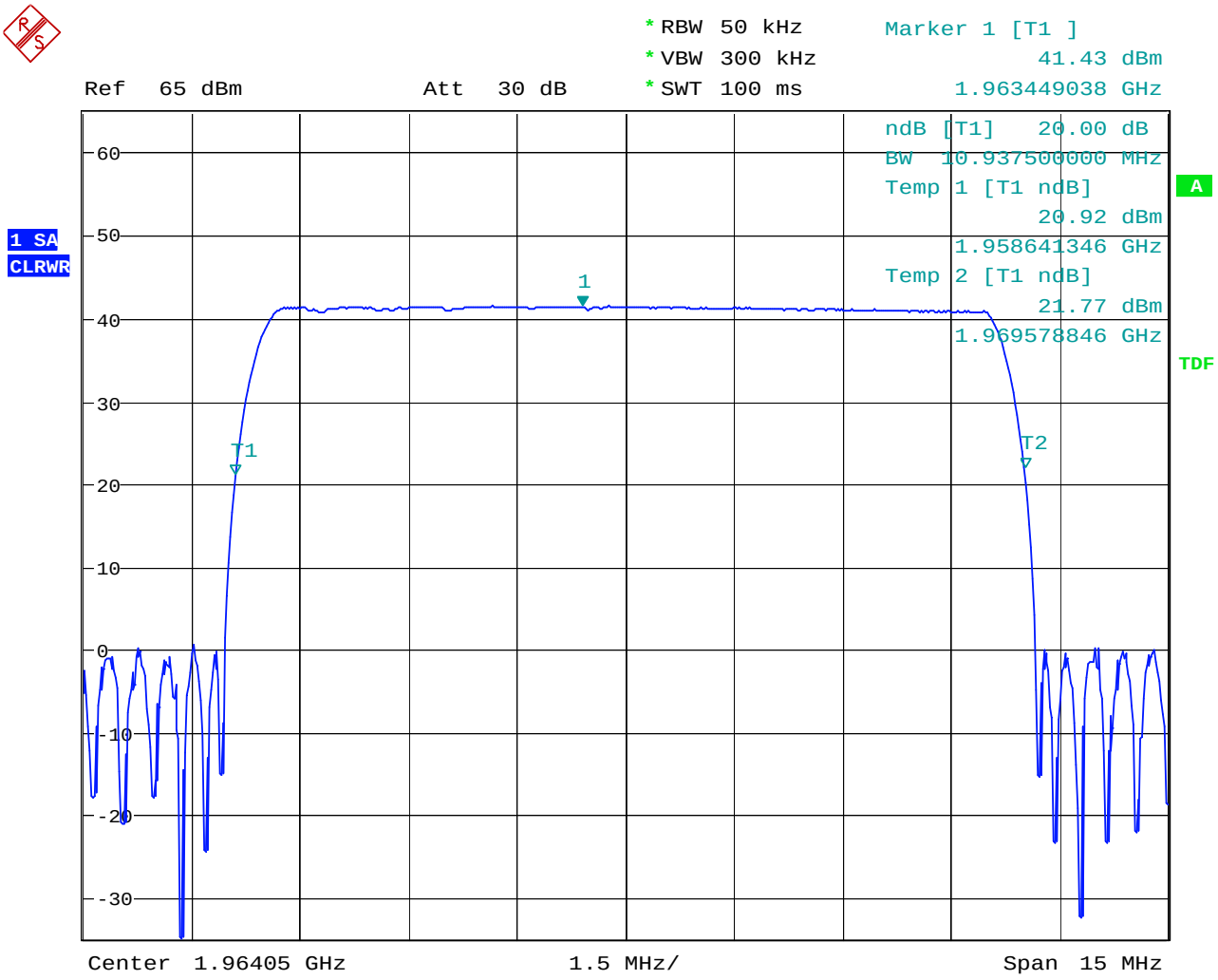
Date: 8.NOV.2006 23:54:33

7 Channel Filter



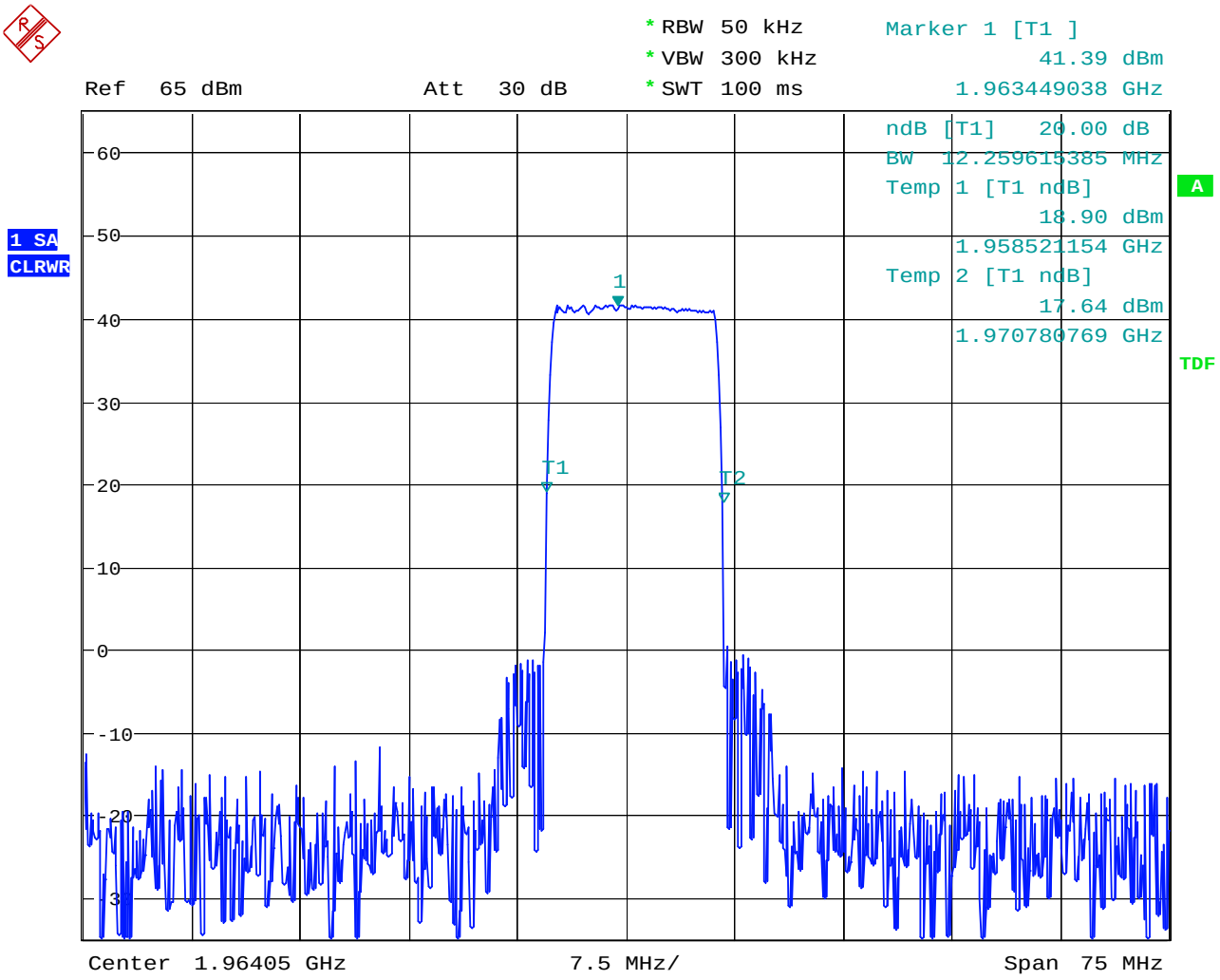
Date: 8.NOV.2006 23:57:06

8 Channel Filter



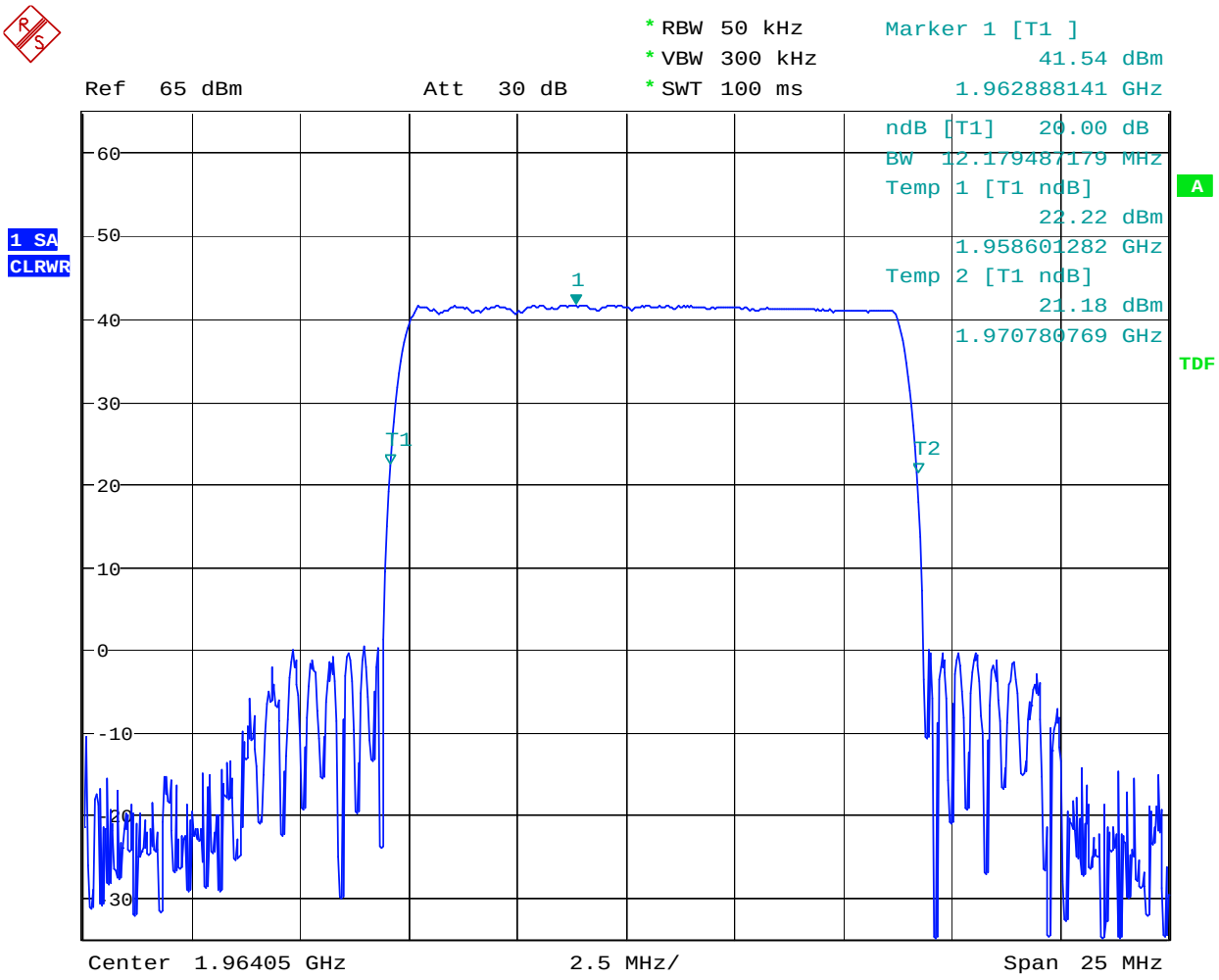
Date: 8.NOV.2006 23:58:01

8 Channel Filter



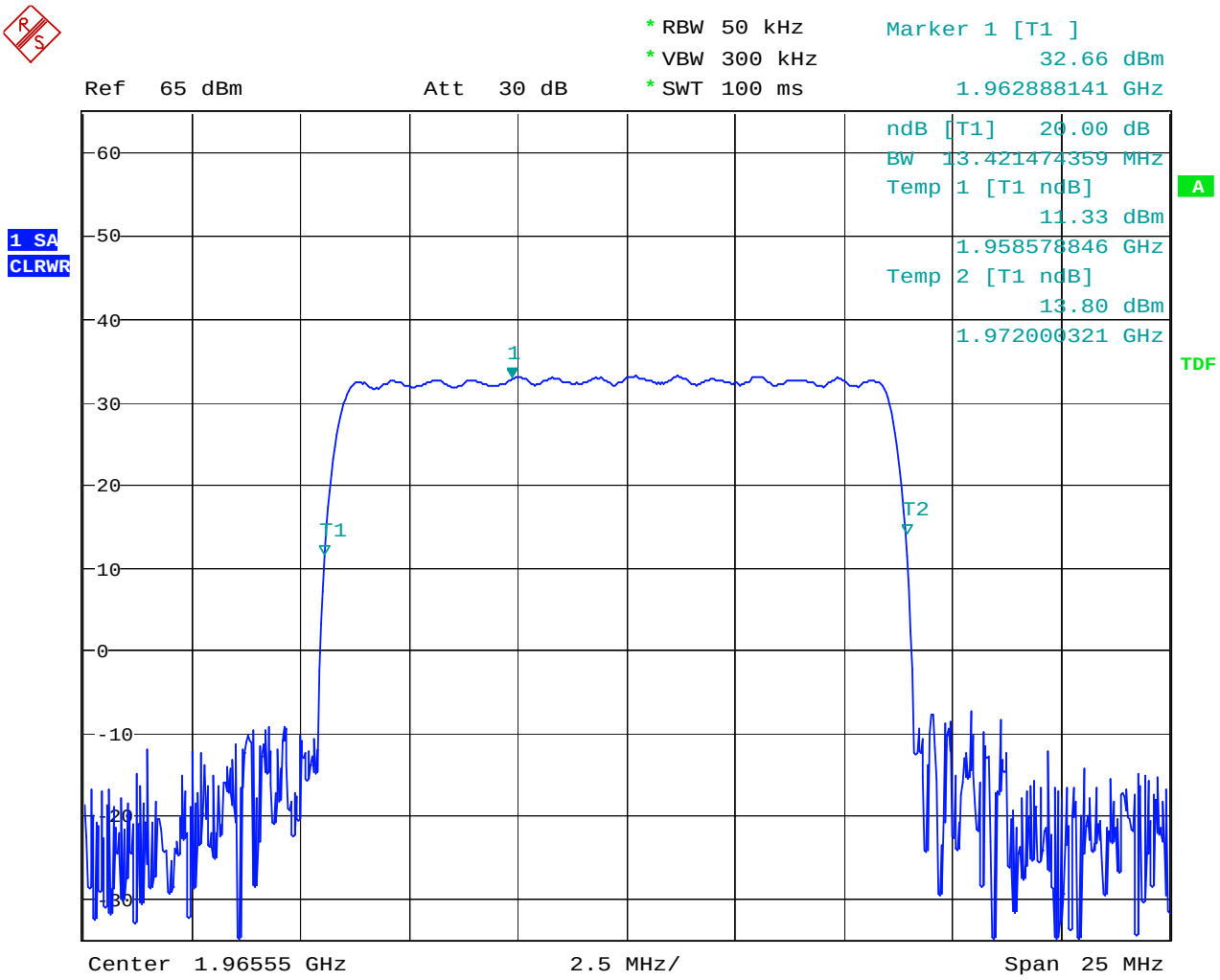
Date: 9.NOV.2006 00:00:42

9 Channel Filter



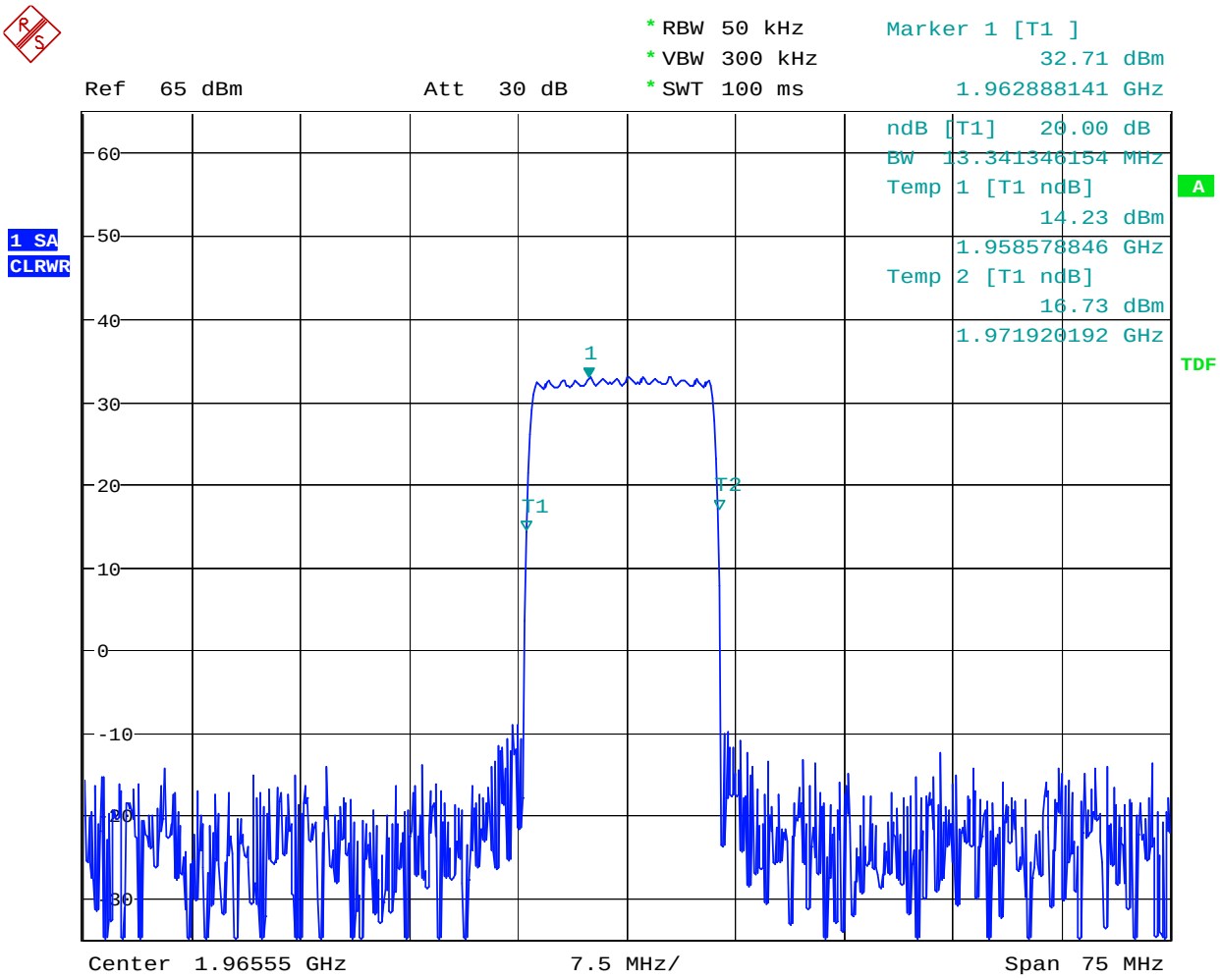
Date: 9.NOV.2006 00:01:25

9 Channel Filter



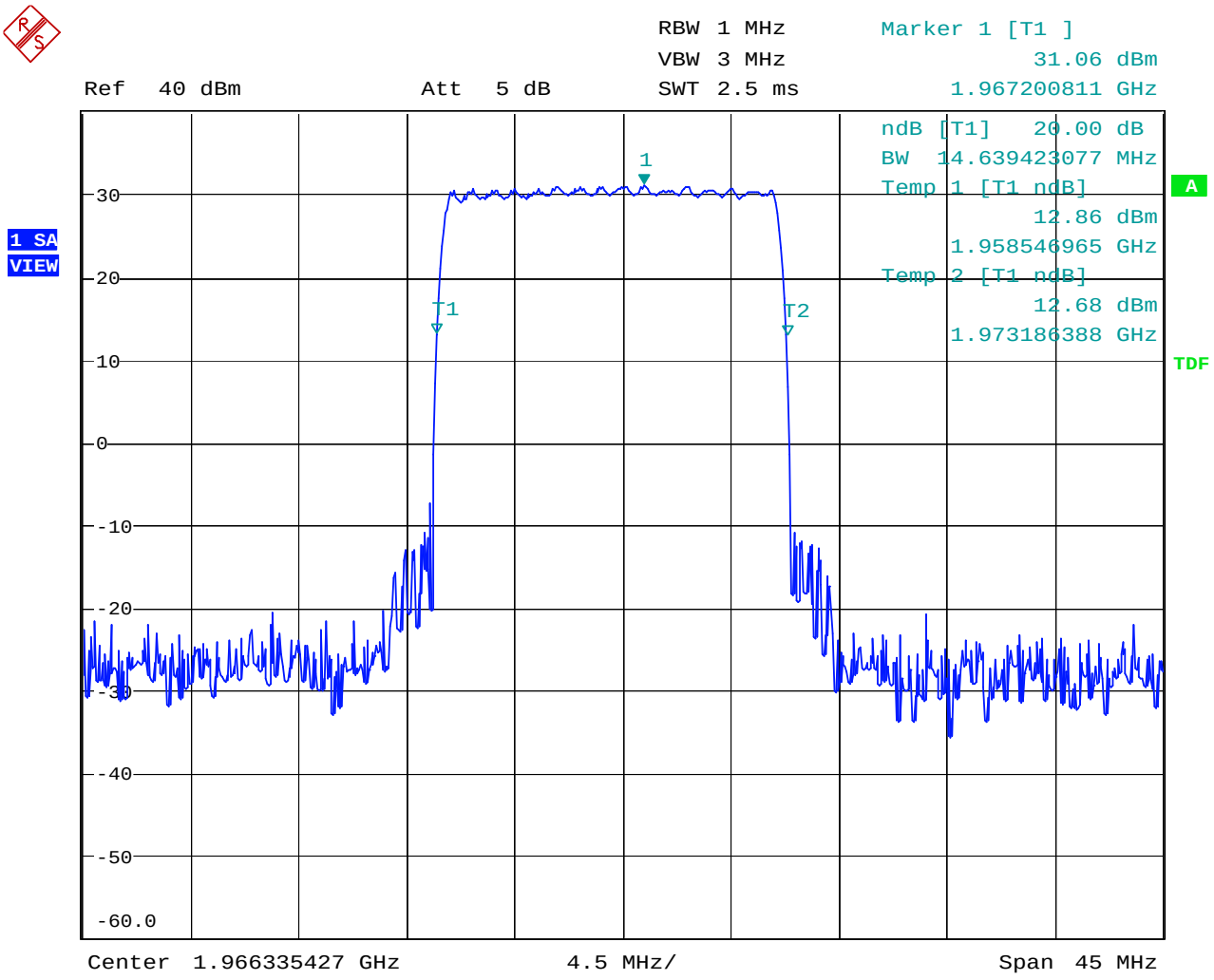
Date: 9.NOV.2006 16:48:37

10 Channel Filter



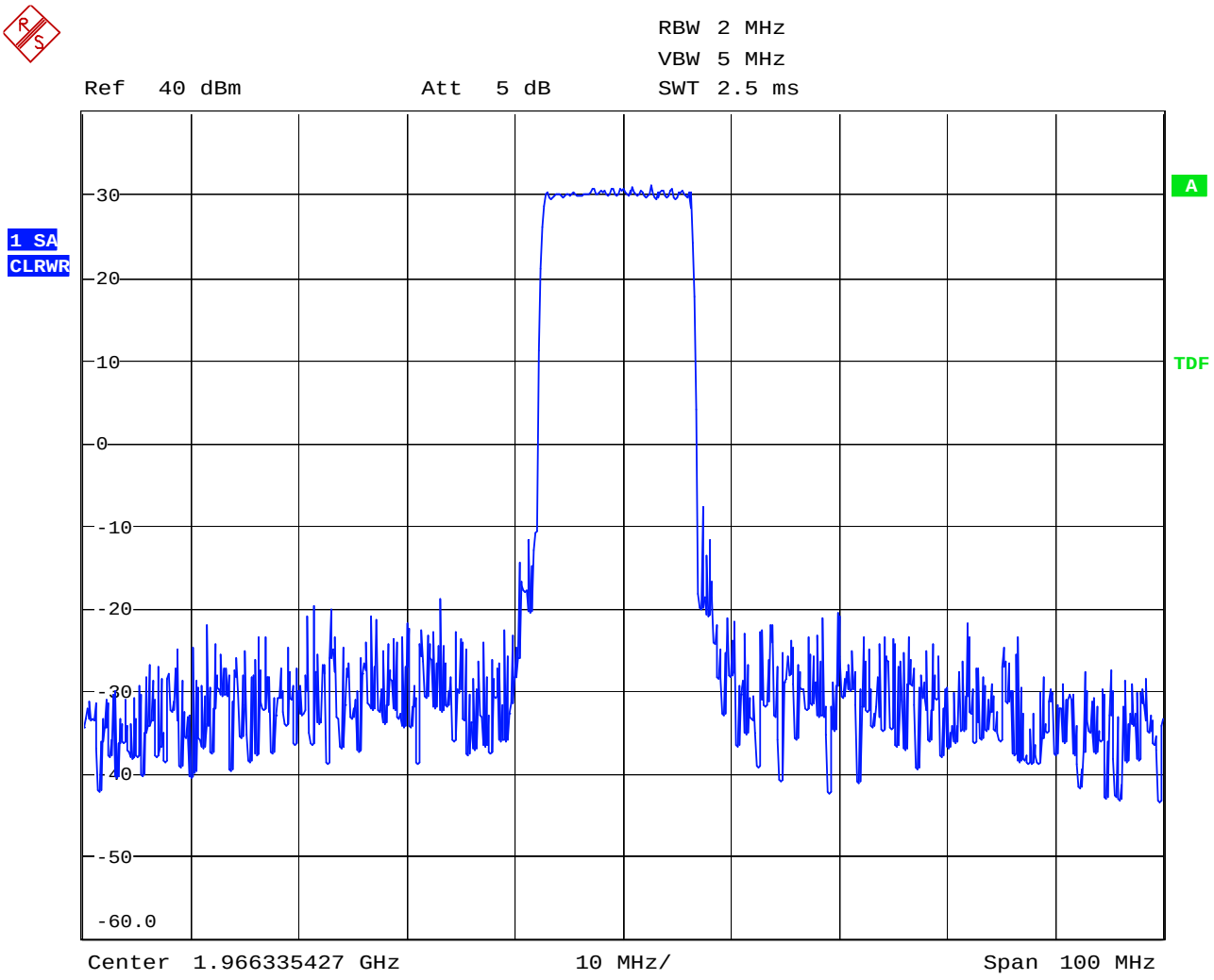
Date: 9.NOV.2006 16:49:46

10 Channel Filter



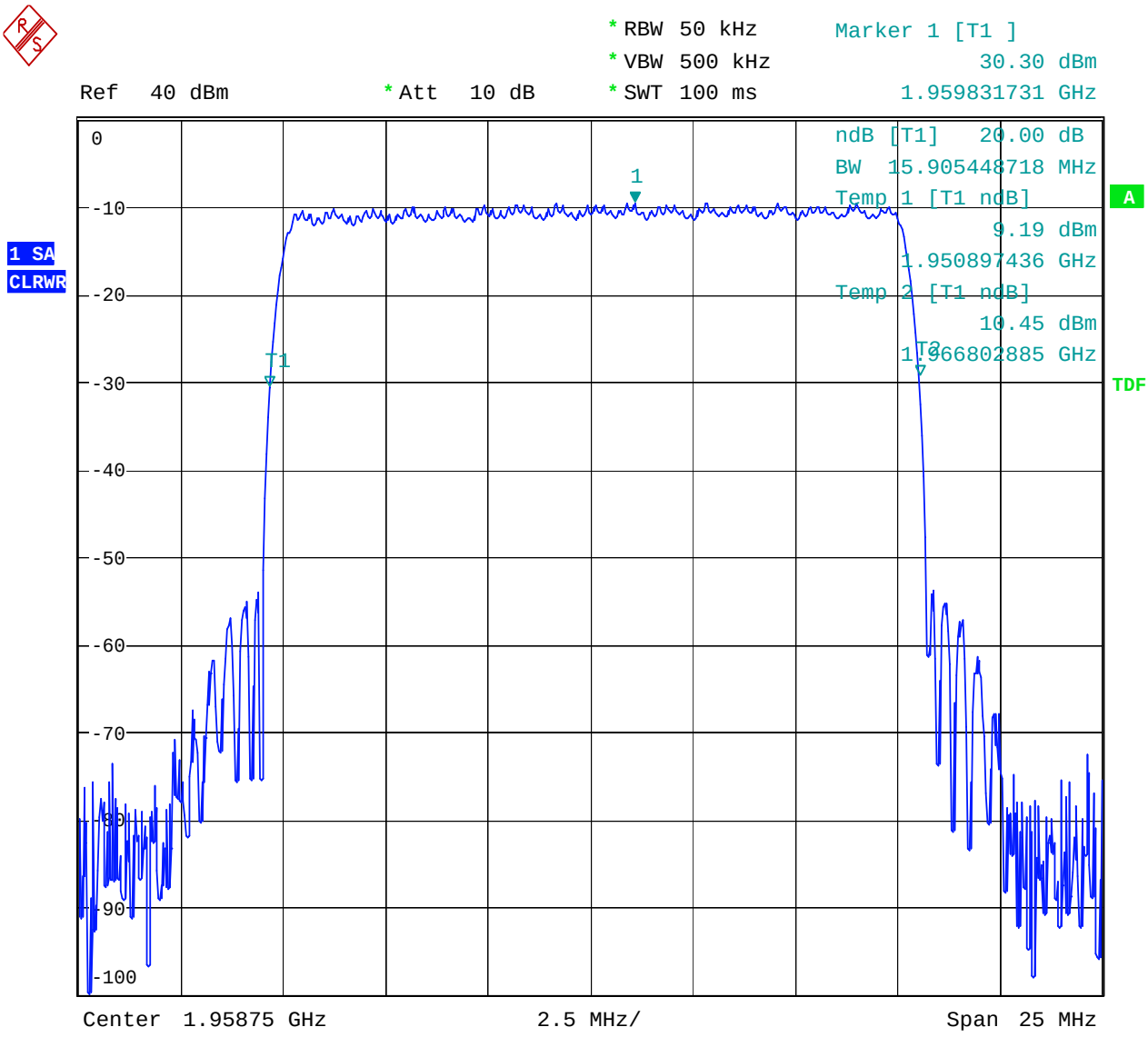
Date: 15.NOV.2006 16:09:40

11 Channel Filter



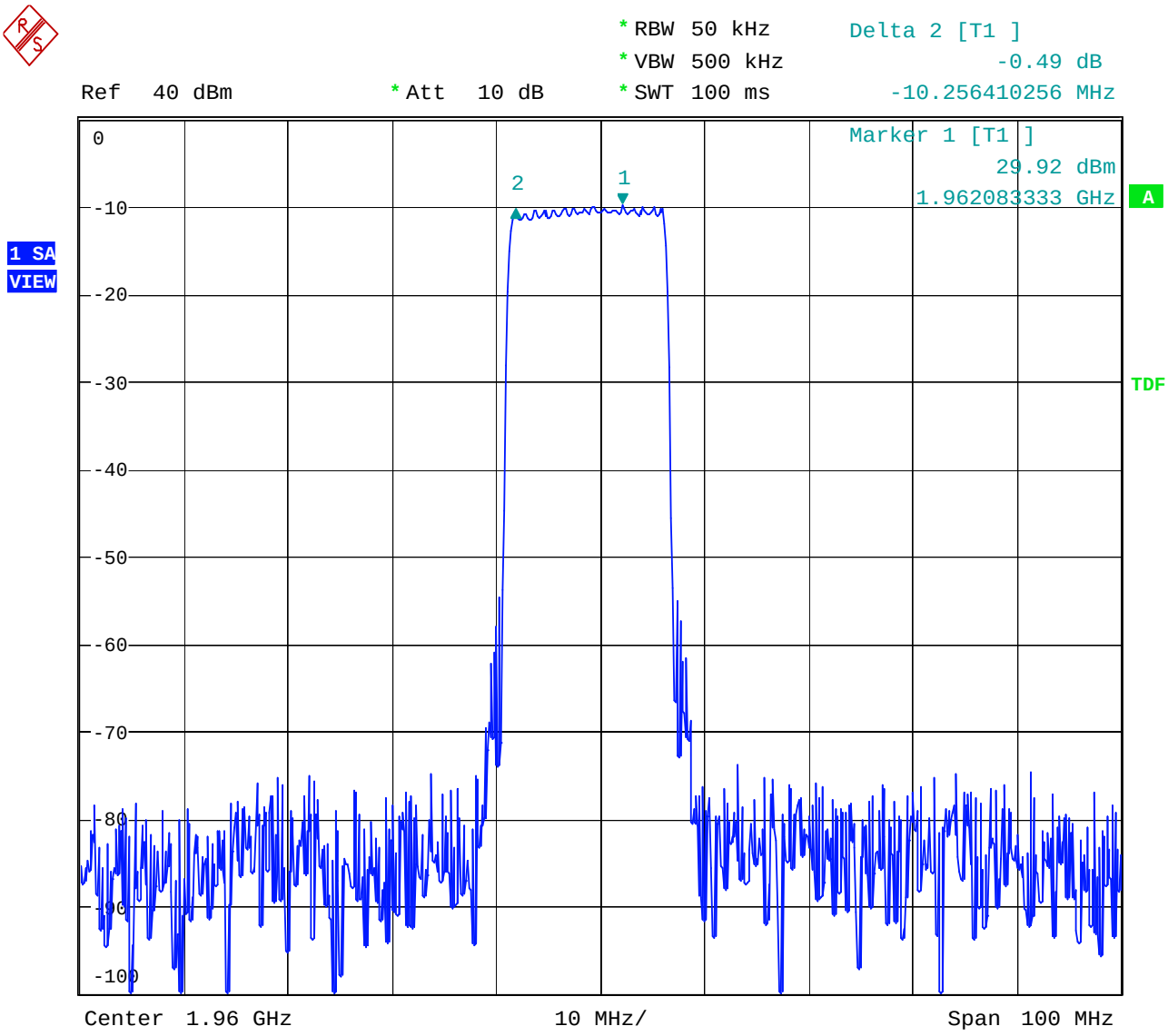
Date: 15.NOV.2006 16:08:03

11 Channel Filter



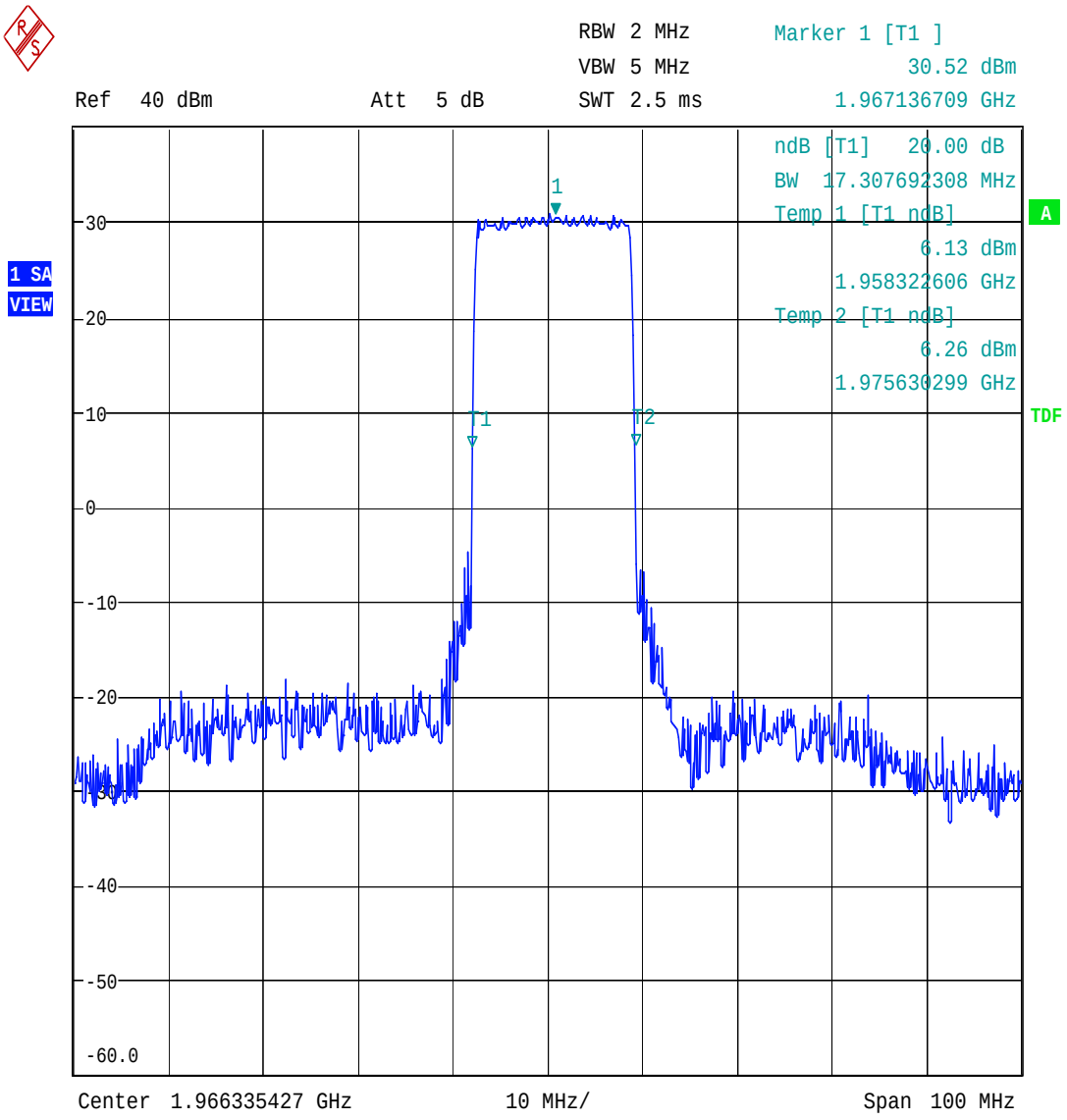
Date: 27.NOV.2006 18:59:11

12 Channel Filter



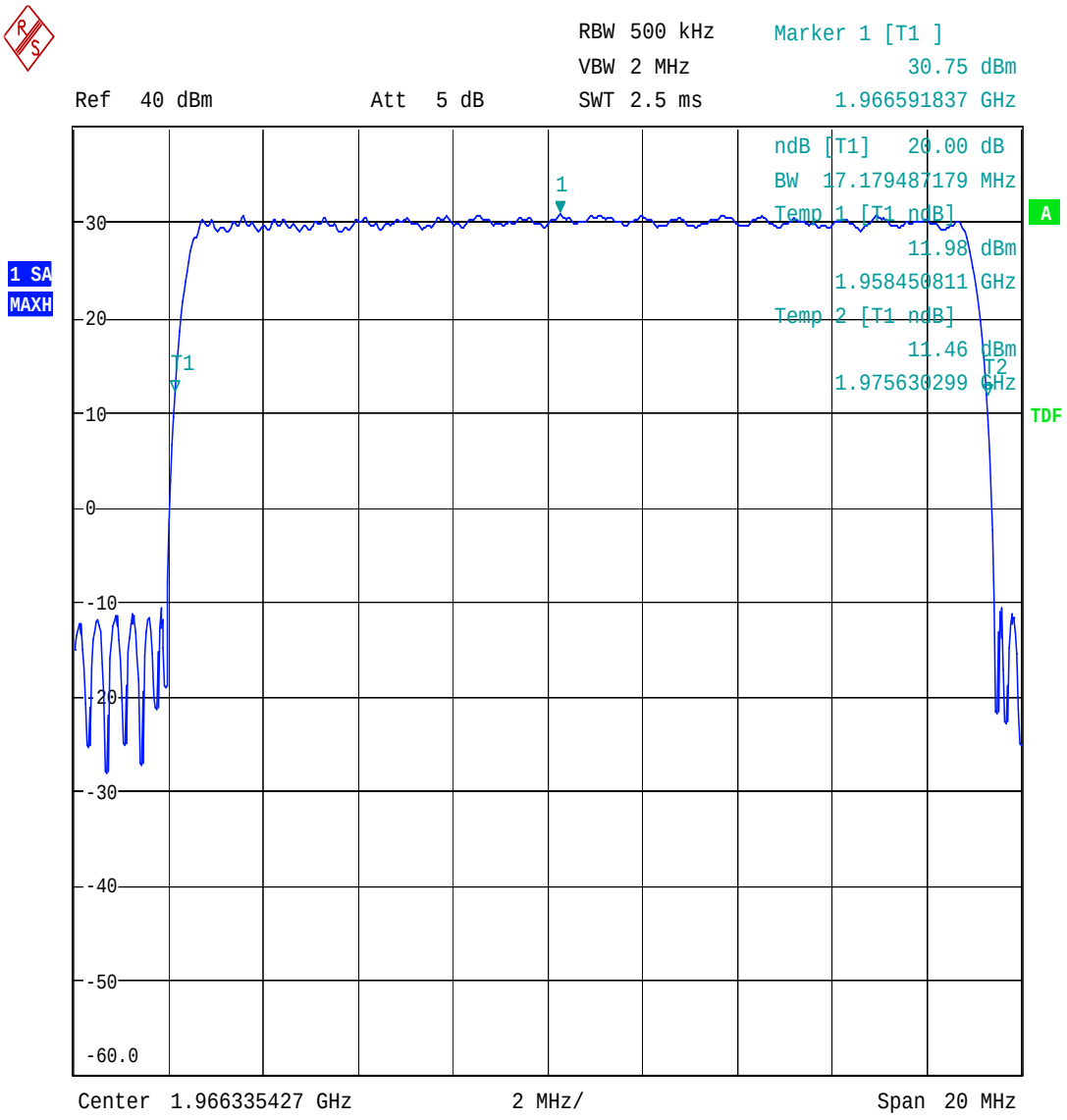
Date: 27.NOV.2006 18:53:23

12 Channel Filter



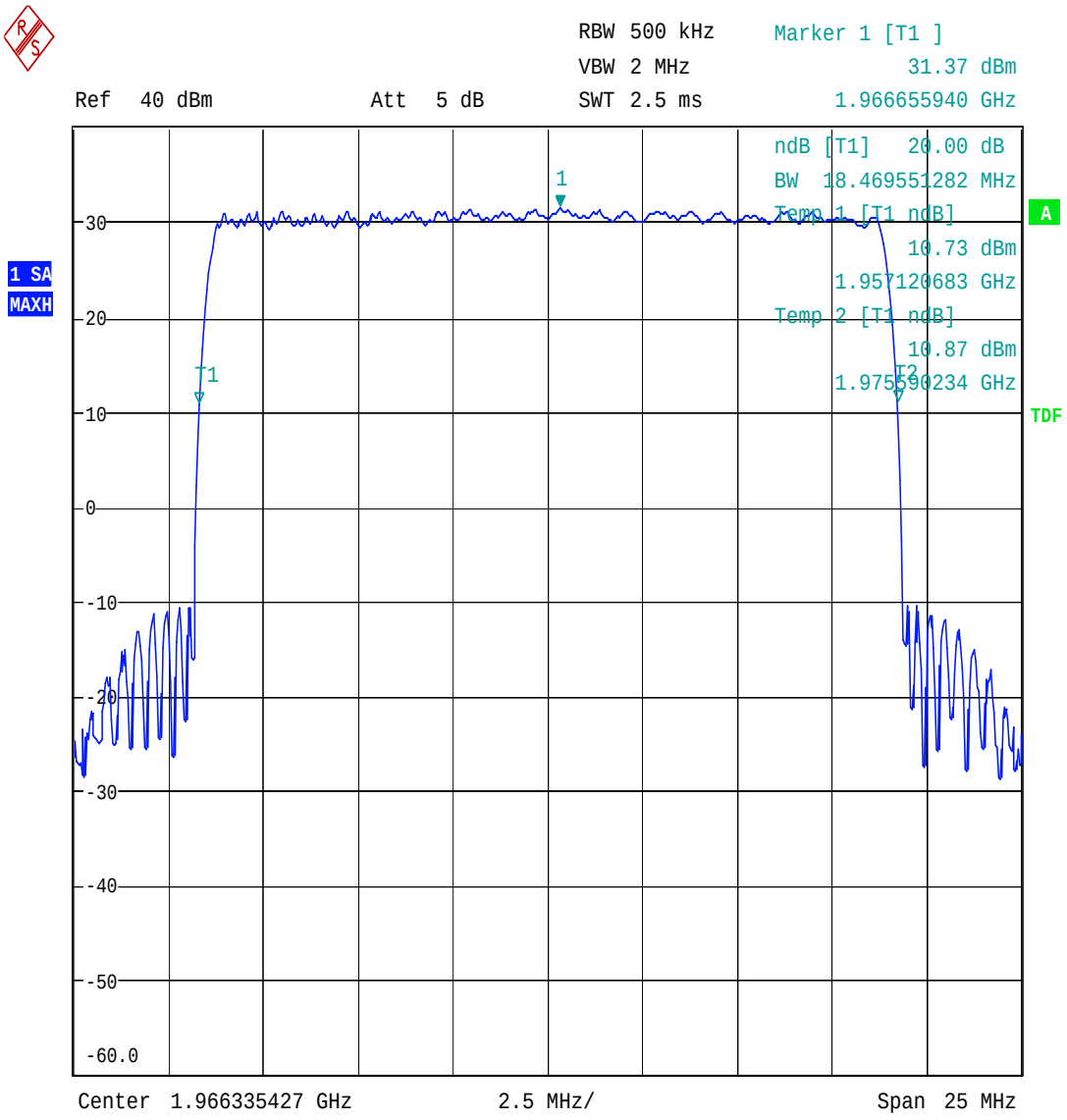
Date: 15.NOV.2006 16:18:43

13 Channel Filter



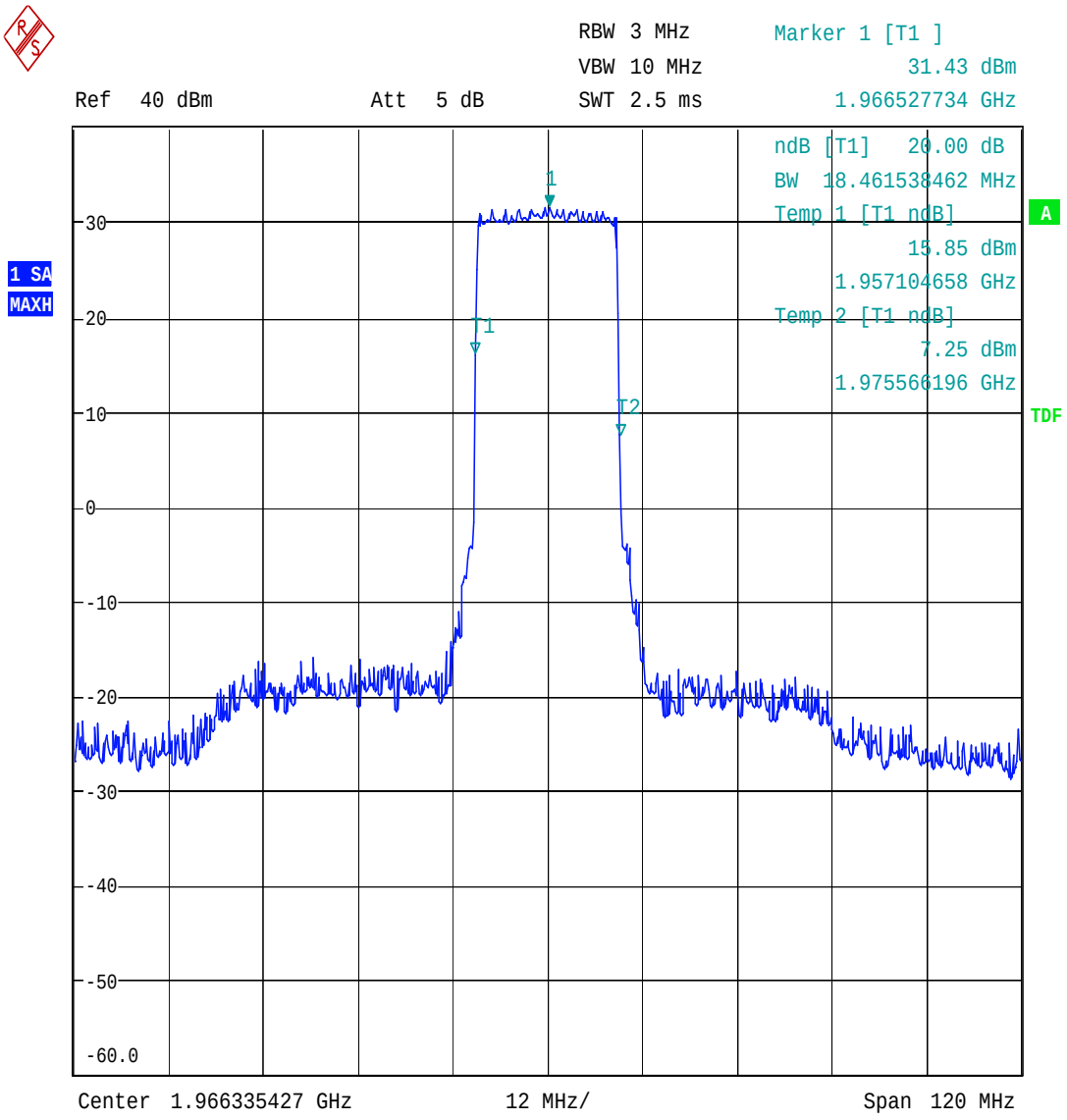
Date: 15.NOV.2006 16:19:54

13 Channel Filter

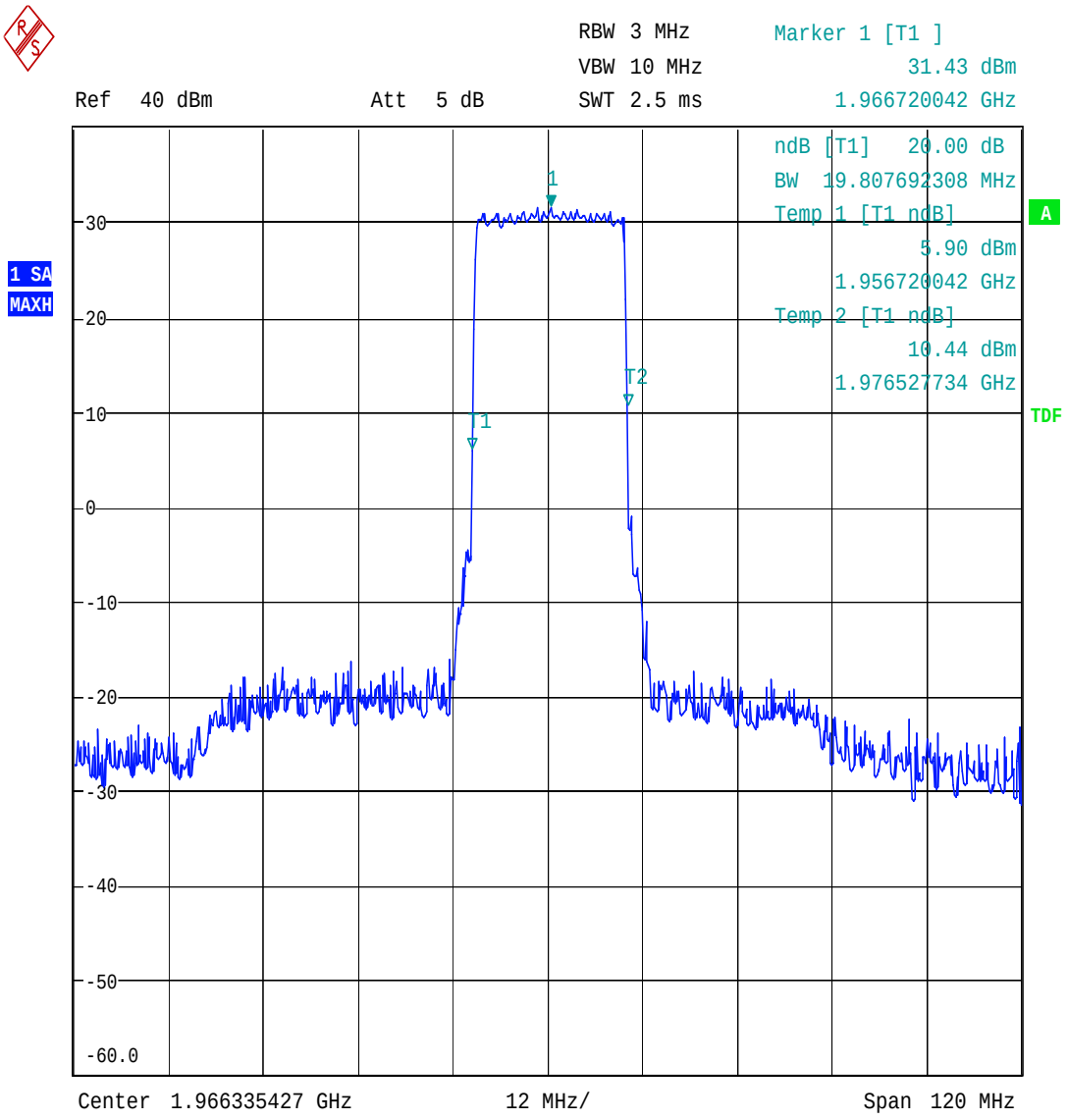


Date: 15.NOV.2006 16:34:10

14 Channel Filter

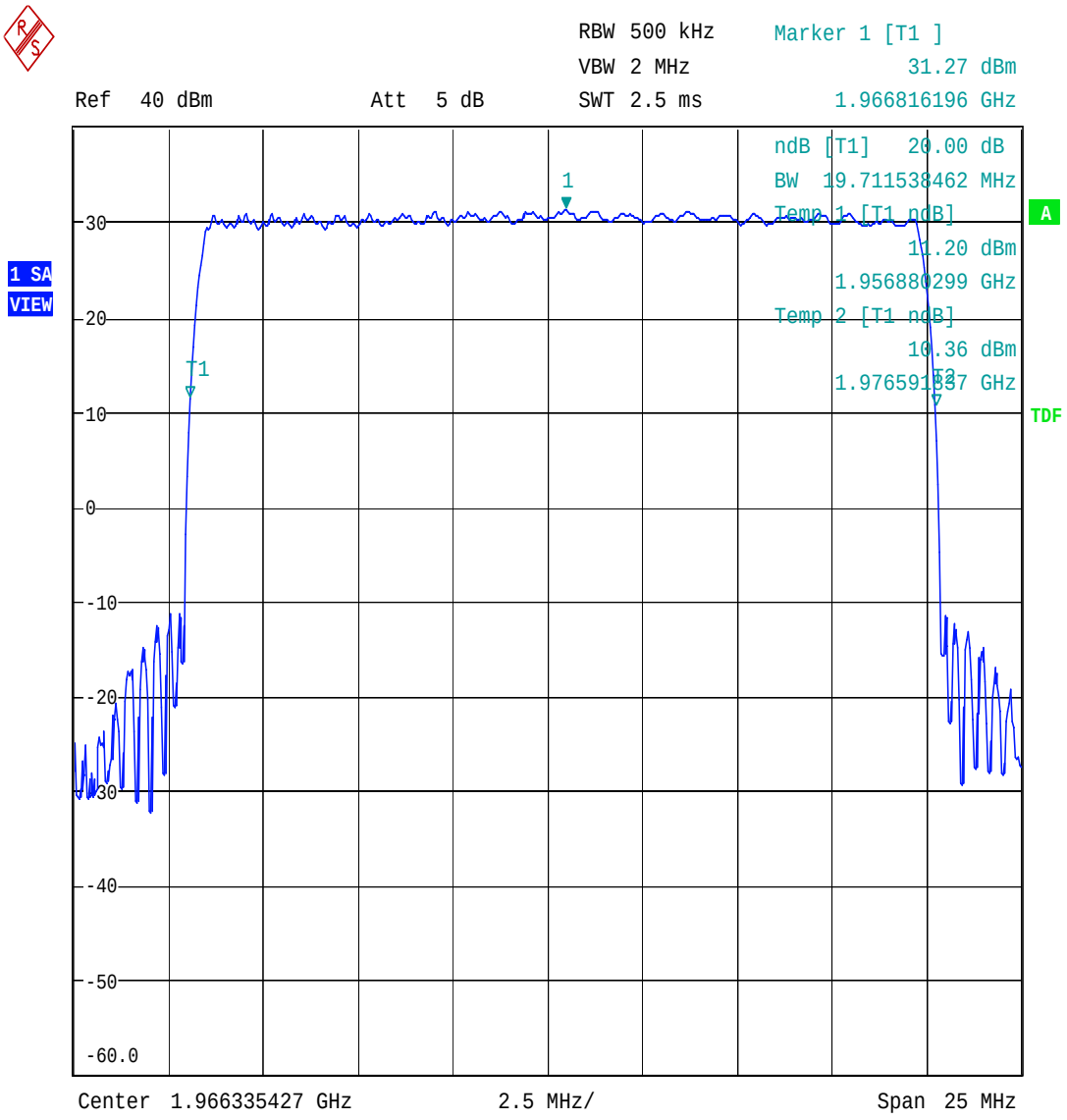


14 Channel Filter



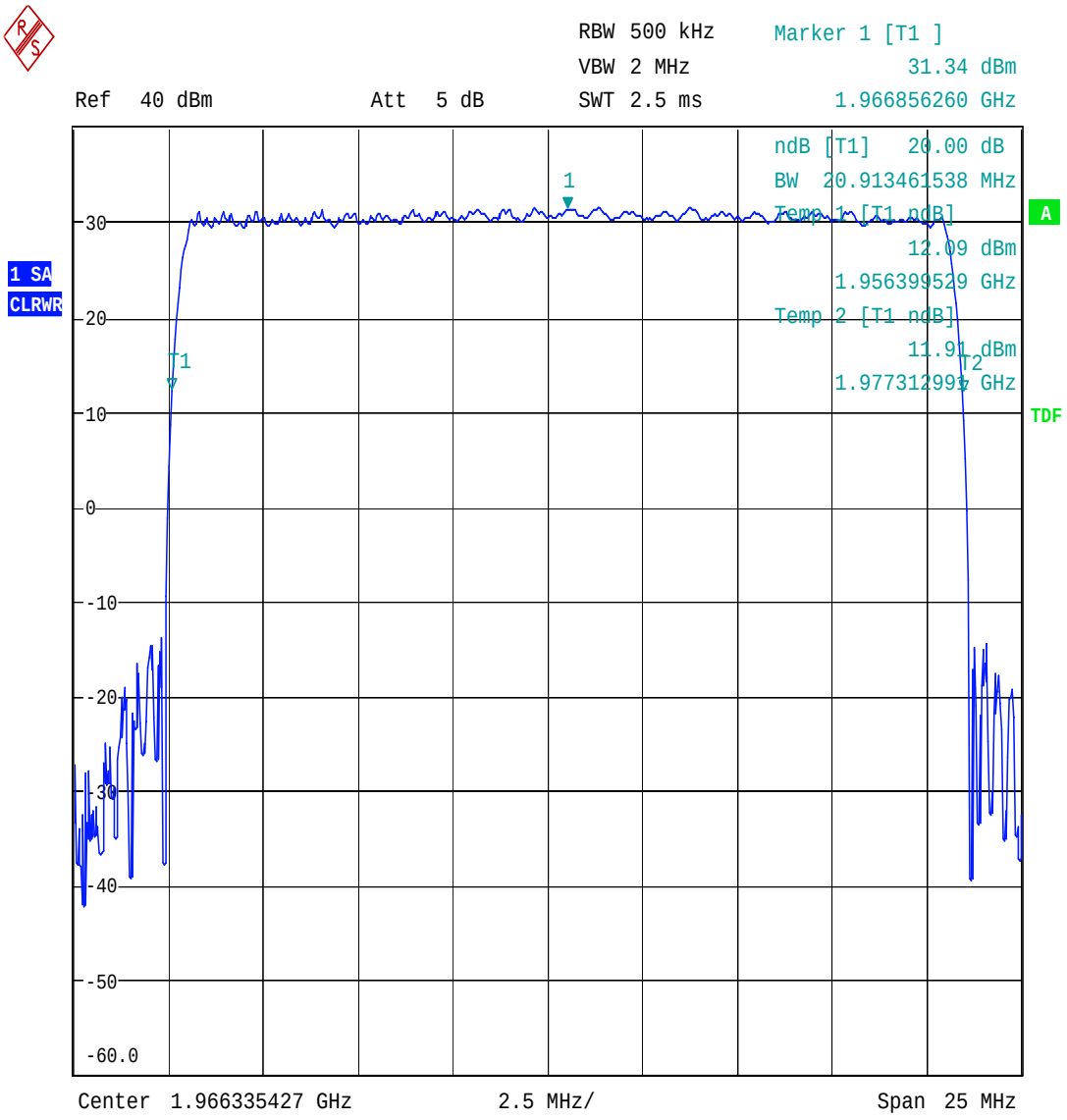
Date: 15.NOV.2006 16:36:38

15 Channel Filter



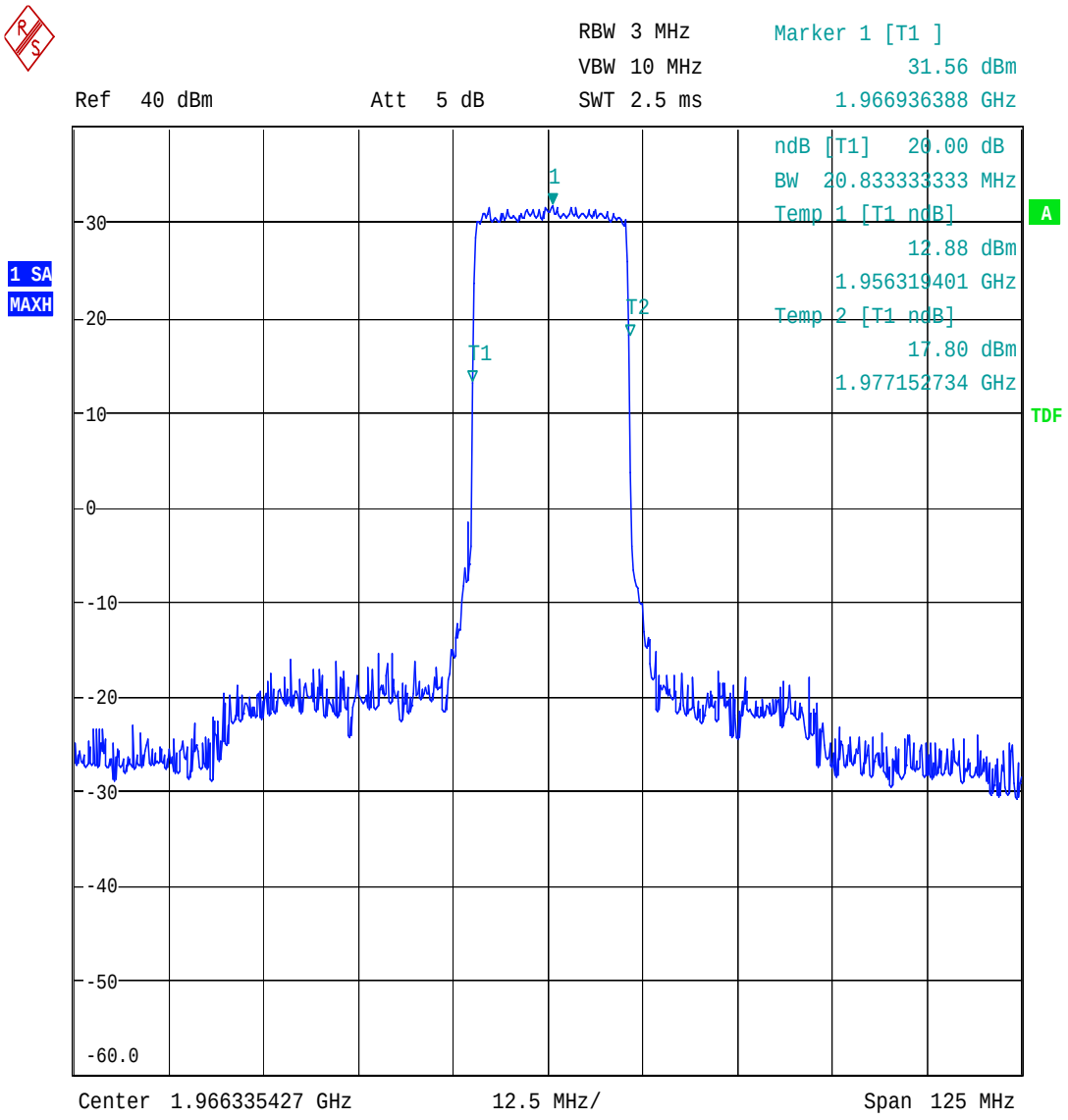
Date: 15.NOV.2006 16:37:43

15 Channel Filter



Date: 15.NOV.2006 16:38:50

16 Channel Filter



16 Channel Filter

APPENDIX G: 2.1055 FREQUENCY STABILITY

G.1. Base Standard & Test Basis

Base Standard	FCC 2.1055
Test Method	TIA 603-C, 2004

Specifications

24.235 Frequency Stability
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

G.2. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

G.3. Test Results

Not Applicable. This device uses a common oscillator to down-convert and up-convert the modulated rf carrier so that the output frequency tracks the input frequency. This was determined by inspection of the schematics provided by the client.

G.4. Observations

None

G.5. Deviations from Normal Operating Mode During Test

None.

G.6. Sample Calculation

Frequency drift (ppm) = Frequency Drift (Hz)/Authorized frequency (MHz)

G.7. Test Data

None

G.8. Test Diagram

None

G.9. Tested By

.

Name: Tom Tidwell,
Function: Manager of Wireless Services

APPENDIX H: TEST EQUIPMENT LIST

H.1. Field Strength of Spurious Emissions 30 MHz – 26.5 GHz Measurement Equipment

Description	Manufacturer	Type/Model	Calibration Frequency	Cal Due	NTS Control No.
3m ANECHOIC CHAMBER					
RX Bilog Antenna	ETS	3142C	12 Months	8/17/07	E1288P
Ref. Horn Antenna	ETS	3115	12 Months	11/1/07	E1019P
RX Horn Antenna	ETS	3115	12 Months		E1022P
High Frequency - Cable 1	MegaPhase	TM26-3135-144	12 Months	8/23/07	W1010P
Tunable Notch Filter	K&L Microwave	3TNF-1000/2000-N/N	N/A*	N/A*	S/N 614
Reference Antenna	ETS	3121 Dipole Set	12 months	8/8/07	S/N. 274
CONTROL ROOM					
Test Receiver	Rohde & Schwarz	FSQ 26	12 Months	9/21/07	W1020P
High Frequency - Cable 2	MegaPhase	NA	12 Months	8/23/07	W1011P
Amplifier	HP	8449B	12 Months	5/4/07	E1010P

H.2. Antenna Conducted Emissions Measurement Equipment

Instrument	Manufacturer	Model	Calibration Frequency	Calibration Due
ANTENNA CONDUCTED EMISSIONS				
Spectrum Analyzer	Rohde & Schwarz	FSQ 26	12 Months	9/21/07
High Frequency - Cable 1	MegaPhase	TM26-3135-144	12 Months	8/23/07
Directional Coupler	Narda	3020A	12 Months	8/28/07
Directional Coupler	Narda	4242-10	12 Months	8/28/07
50 ohm loads	Amphenol	50R	12 Months	8/28/07
I/Q Signal Generator	Rohde & Schwarz	SMIQ 03	12 Months	8/25/07
I/Q Modulation Generator	Rohde & Schwarz	AMIQ	12 Months	8/28/07
Combiner	Mini-Circuits	ZFSC-2-2500	N/A*	N/A*
IS-95 CDMA BTS simulator	Rohde & Schwarz	CMD80	N/A*	N/A*

*This device was not used for calibrated measurements.

END OF DOCUMENT