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 22, Subpart C

Model: X47 EXTA

FCC ID No.: VNBEXTA-01

Project Code: W7058-1

Revision: 1

Prepared for:	Nokia 6000 Connection Drive Building 4 Irving, Texas 75039
Author:	Tom Tidwell, Manager of Wireless Services
Issued:	20 June, 2007

Report Summary

NTS Plano

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

Applicant: Nokia
6000 Connection Drive
Building 4
Irving, Texas 75039

Customer Representative: Steve Mitchell

EUT Description:

EUT Description	Manufacturer	Model	Revision	Serial Number
The EUT is a Base Station Transceiver (BTS) operating in the GSM850	Nokia	X47 EXTA	0	9063900978

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 22, Para. 22.913
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 22, Para. 22.917
D	Spurious Emissions at Antenna Terminals	No	No	No	PASS	CFR 47, Part 2, Para. 2.1051 CFR 47, Part 22, Para. 22.917
E	Field Strength of Spurious Radiation	No	No	No	PASS	CFR 47, Part 2, Para. 2.1053 CFR 47, Part 22, Para. 22.917
F	Frequency Stability	No	No	No	PASS	CFR 47, Part 2, Para. 2.1055 CFR 47, Part 22, Para. 22.355

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	19 March, 2007

INTRODUCTION

1.1 PURPOSE

The purpose of this document is to describe the tests applied by NTS Plano to demonstrate compliance of the equipment identified below to FCC Part 22 Subpart C and Subpart H for Cellular Radiotelephone Service in accordance with the certification requirements of CFR 47, Part 2.

2.0 EUT DESCRIPTION

2.1 CONFIGURATION

Description of EUT

<table>
<tr><th></th><th>Name</th><th>Model</th><th>Revision</th><th>Serial Number</th></tr>
<tr><td>EUT</td><td>X47 EXTA</td><td>X47 EXTA</td><td>0</td><td>9063900978</td></tr>
<tr><td>RF Exposure Classification</td><td colspan="4">Fixed. The antenna is mounted on a fixed outdoor structure.</td></tr>
<tr><td>Channels/Frequency Range</td><td colspan="4">824 – 849 MHz TX, 869 – 894 MHz RX</td></tr>
<tr><td>Power (rated)</td><td colspan="4">
<table>
<tr><th>Carrier Mode</th><th>Modulation Mode</th><th>Rated Power (W)</th></tr>
<tr><td>Combined</td><td>8PSK</td><td>70</td></tr>
<tr><td>Single</td><td>8PSK</td><td>20</td></tr>
<tr><td>Combined</td><td>GMSK</td><td>75</td></tr>
<tr><td>Single</td><td>GMSK</td><td>40</td></tr>
</table>
Note: On channels 128 and 251 the rf power is reduced to the following levels:
<table>
<tr><th>Carrier Mode</th><th>Modulation Mode</th><th>Rated Power</th></tr>
<tr><td>Combined</td><td>8PSK</td><td>11</td></tr>
<tr><td>Single</td><td>8PSK</td><td>9</td></tr>
<tr><td>Combined</td><td>GMSK</td><td>6</td></tr>
<tr><td>Single</td><td>GMSK</td><td>5</td></tr>
</table>
</td></tr>
<tr><td>Emission Designator:</td><td colspan="4">270KGXW: GMSK(GSM)
270KG7W: 8PSK(EDGE)</td></tr>
<tr><td>TX antenna details</td><td colspan="4">Antenna is specified at time of licensing</td></tr>
<tr><td>Functional Description</td><td colspan="4">The EUT is used as a base station transceiver in a GSM network.</td></tr>
</table>

2.1.1 EUT POWER

Voltage	208 Vac, 60 Hz (27 Vdc and 48 Vdc supplied by DC supplies in EUT rack)
Number of Feeds	Two phase (X and Y)

2.2 EUT CABLES

Quantity	Model/Type	Routing		Shielded / Unshielded	Description	Cable Length (m)
		From	To			
1	None	EUT	AC power main	Unshielded	Power cord	1.25
1						
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:

- GSM mode (GMSK modulation) with a single carrier
- EDGE mode (8PSK modulation) with a single carrier
- GSM mode (GMSK modulation) with combined carrier
- EDGE mode (8PSK modulation) with combined carrier

In combined carrier mode two transmitted carriers **on the same channel** are combined with phase adjustment in order to increase the transmitted rf power output.

Rated RF power at antenna port on channels 129 - 250

Carrier Mode	Modulation Mode	Rated Power
Combined	8PSK	70
Single	8PSK	20
Combined	GMSK	75
Single	GMSK	40

Rated RF power at antenna port on channels 128 and 251

Carrier Mode	Modulation Mode	Rated Power
Combined	8PSK	11
Single	8PSK	9
Combined	GMSK	6
Single	GMSK	5

Note that power is reduced when operating on the lowest and highest channels.

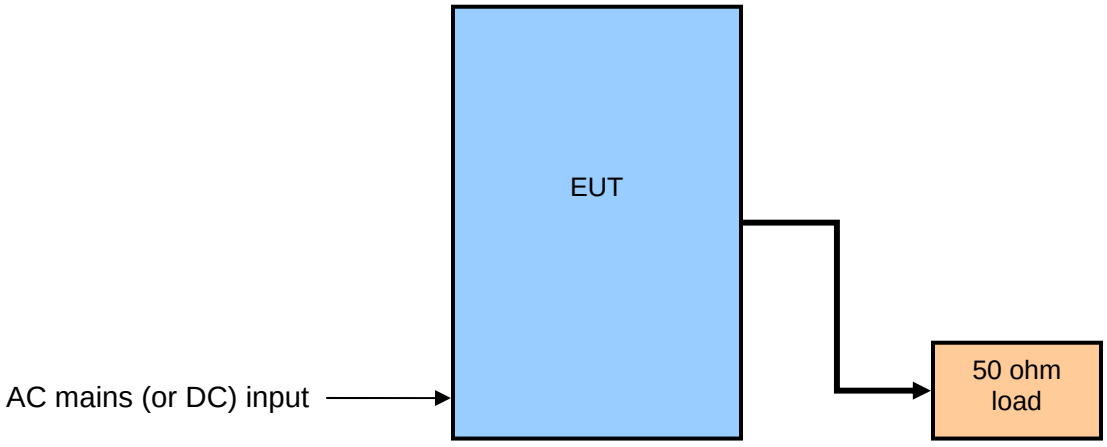
3.0 SUPPORT EQUIPMENT

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

(a) *Maximum ERP*. In general, the effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts. However, for those systems operating in areas more than 72 km (45 miles) from international borders that:

(1) 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; or,

(2) Extend coverage on a secondary basis into cellular unserved areas, as those areas are defined in §22.949, the ERP of base transmitters and cellular repeaters of such systems must not exceed 1000 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

Applicable RF Power Limit from Above: 500 watts erp

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

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 72.61 watts.

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. Both GMSK(GSM) and 8PSK(EDGE) modulation modes were tested.

A.7. Sample Calculation

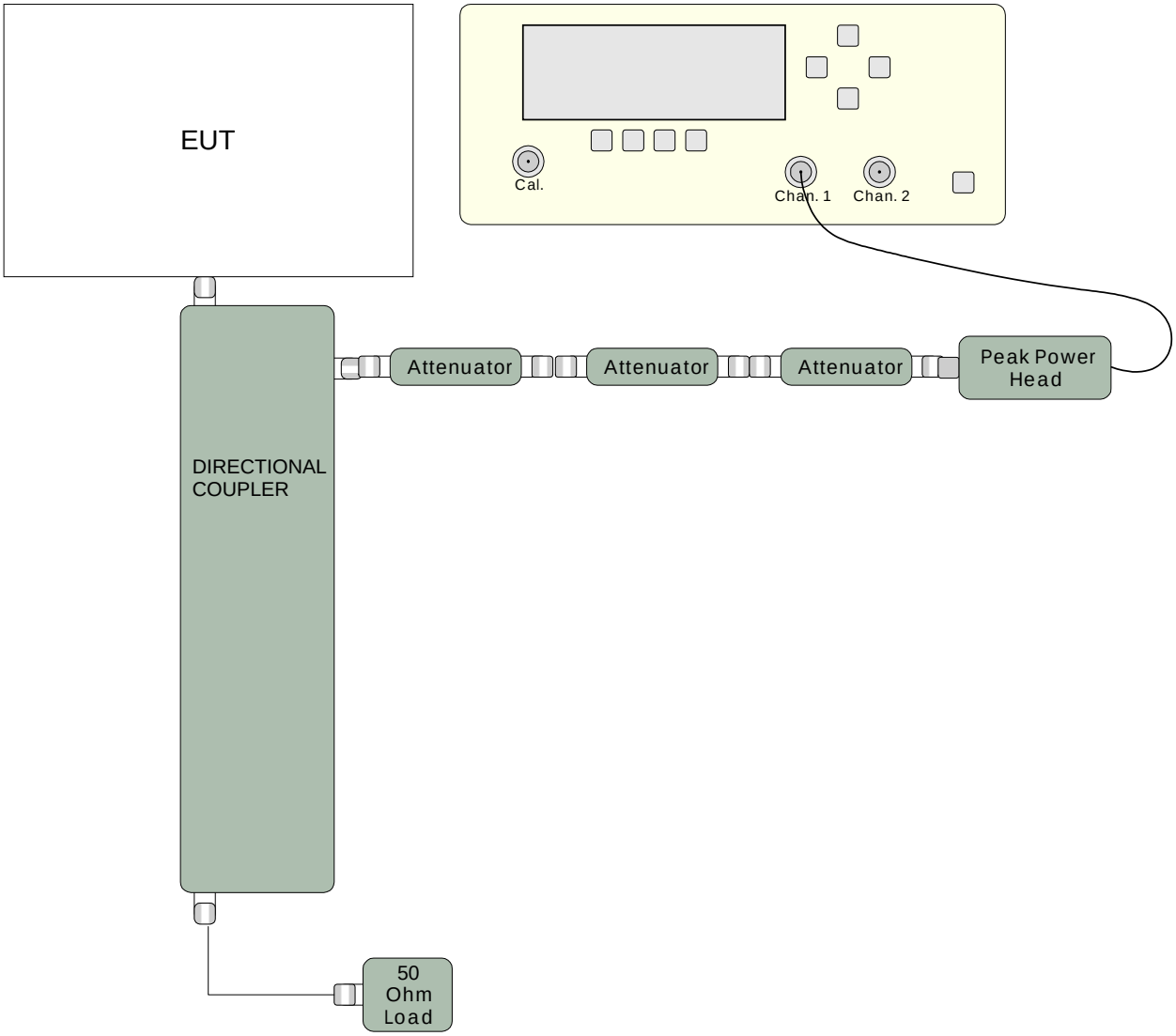
Rf power(watts) = $10^{(\text{rf power(dBm)}/10)}$ x 1000

A.8. Test Data

Band	Channel	Carrier Mode	Modulation Mode	RF Power Output at Antenna Terminals (dBm)	RF Power Output at Antenna Terminals (W)
GSM850	Low	Combined	GMSK	38.17	6.56
GSM850	Mid	Combined	GMSK	48.61	72.61
GSM850	High	Combined	GMSK	37.91	6.18
GSM850	Low	Combined	8PSK	40.31	10.74
GSM850	Mid	Combined	8PSK	48.52	71.12
GSM850	High	Combined	8PSK	40.10	10.23
GSM850	Low	Bypass	GMSK	37.10	5.13
GSM850	Mid	Bypass	GMSK	45.86	38.55
GSM850	High	Bypass	GMSK	37.02	5.04
GSM850	Low	Bypass	8PSK	39.52	8.95
GSM850	Mid	Bypass	8PSK	43.03	20.09
GSM850	High	Bypass	8PSK	39.21	8.34

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.

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 is digitally modulated and does not provide for analogue or voice modulation.

B.5. Test Results

Not applicable – This device is digitally modulated and does not provide for analogue or voice modulation.

Test Data Summary

Emission Designators

GSM: 270KGXW
EDGE: 270KG7W

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

22.917

(b) 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

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

Data source: PRBS (Pseudo-Random Bit Sequence)
Modulation: GMSK
Symbol Rate: 270 kbps

Data source: PRBS (Pseudo-Random Bit Sequence)
Modulation: 8PSK
Symbol Rate: 270 kbps

C.5. Test Results

Compliant. See plots following.

C.6. Deviations from Normal Operating Mode During Test

None.

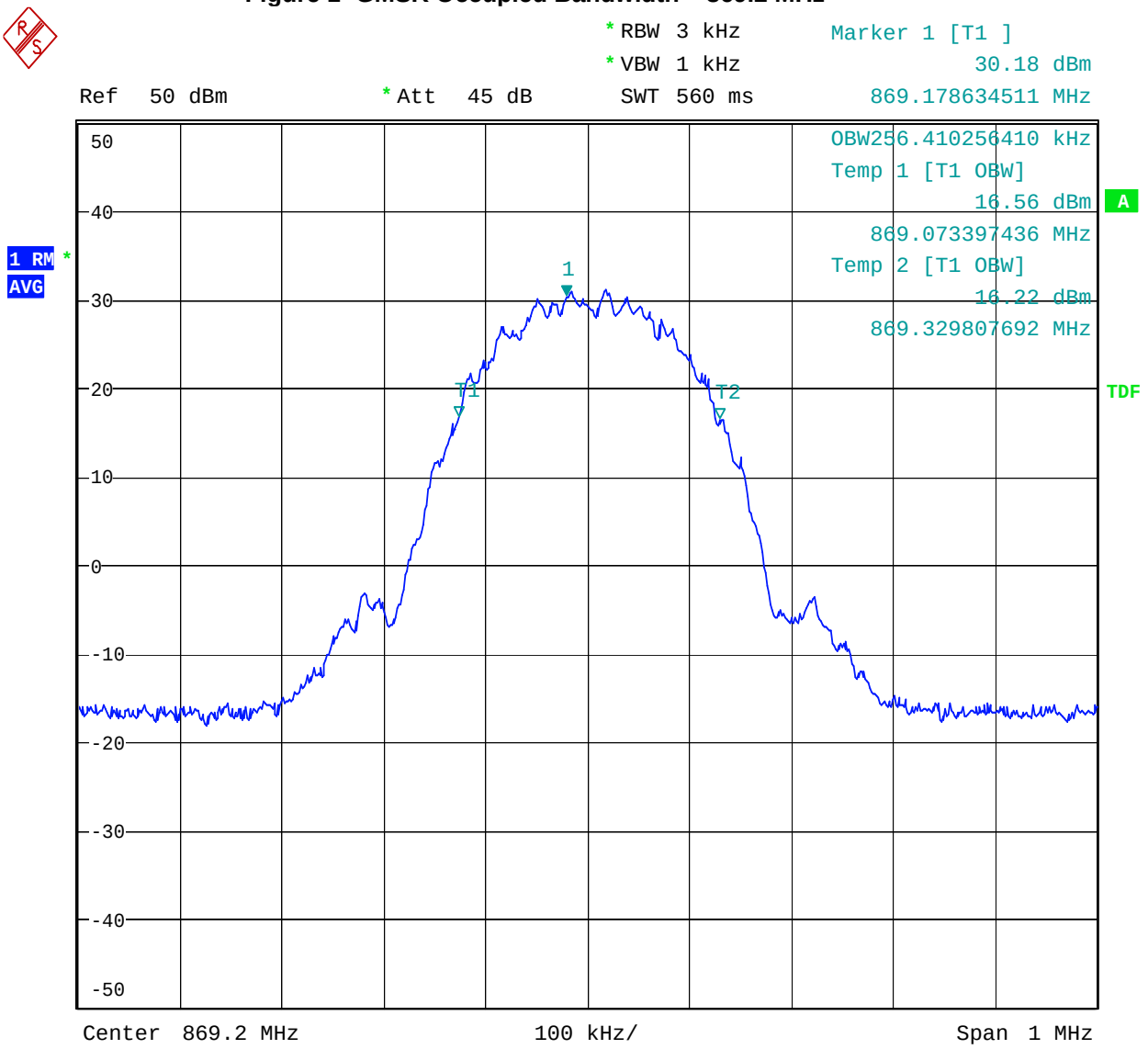
C.7. Sample Calculation

None.

C.8. Test Data

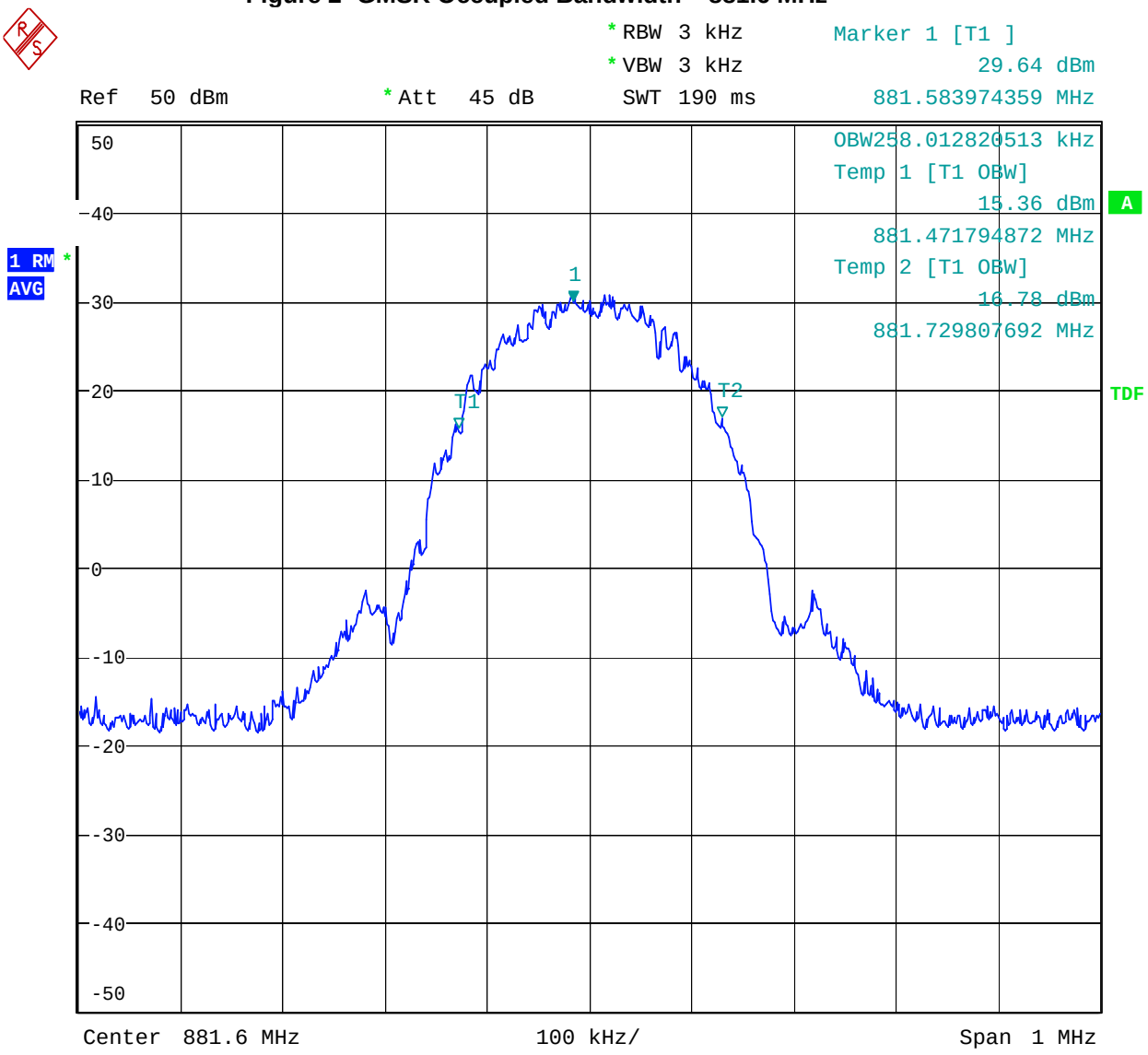
See plots following.

Figure 1 GMSK Occupied Bandwidth – 869.2 MHz



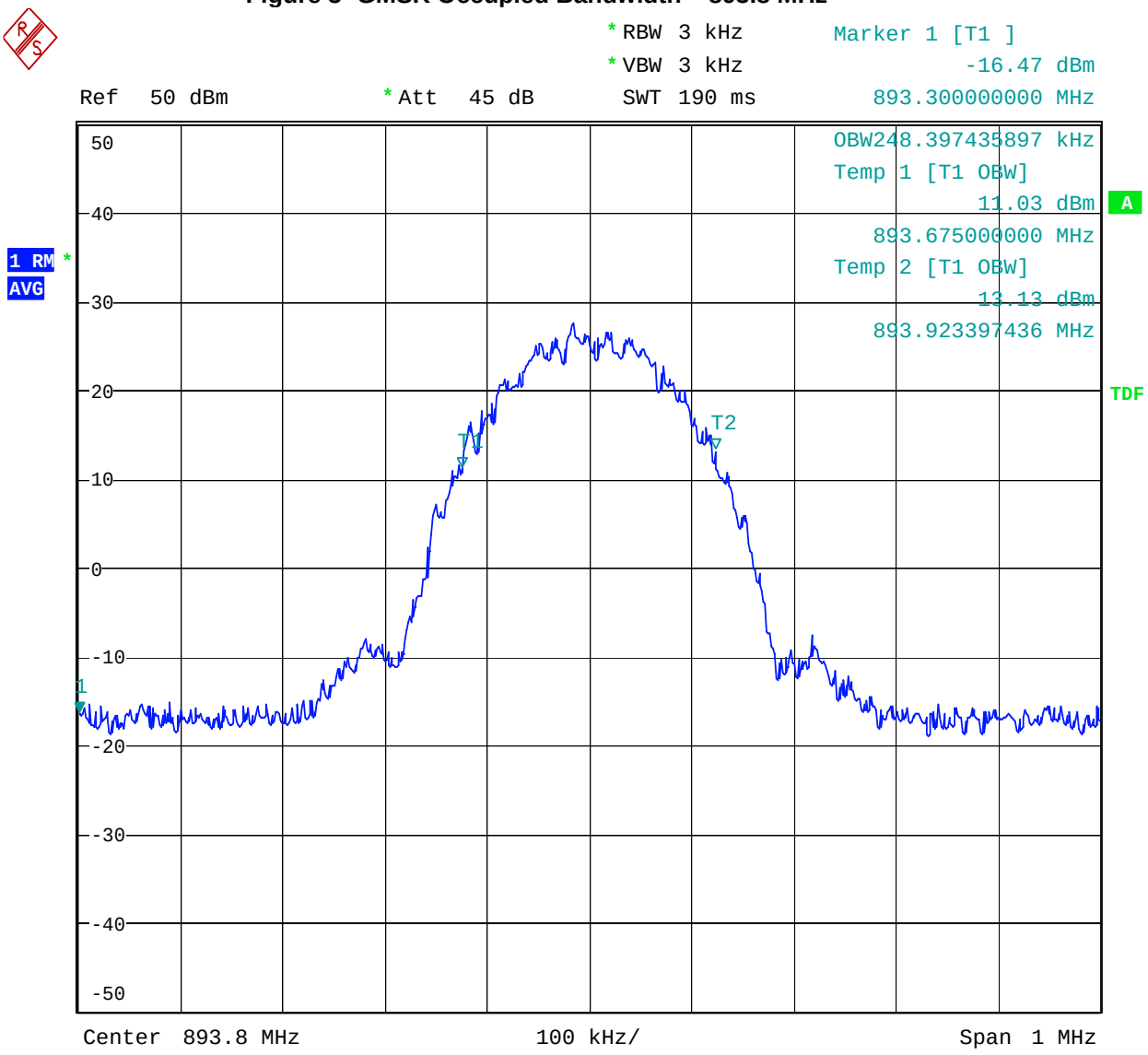
Date: 27.FEB.2007 20:42:30

Figure 2 GMSK Occupied Bandwidth – 881.6 MHz



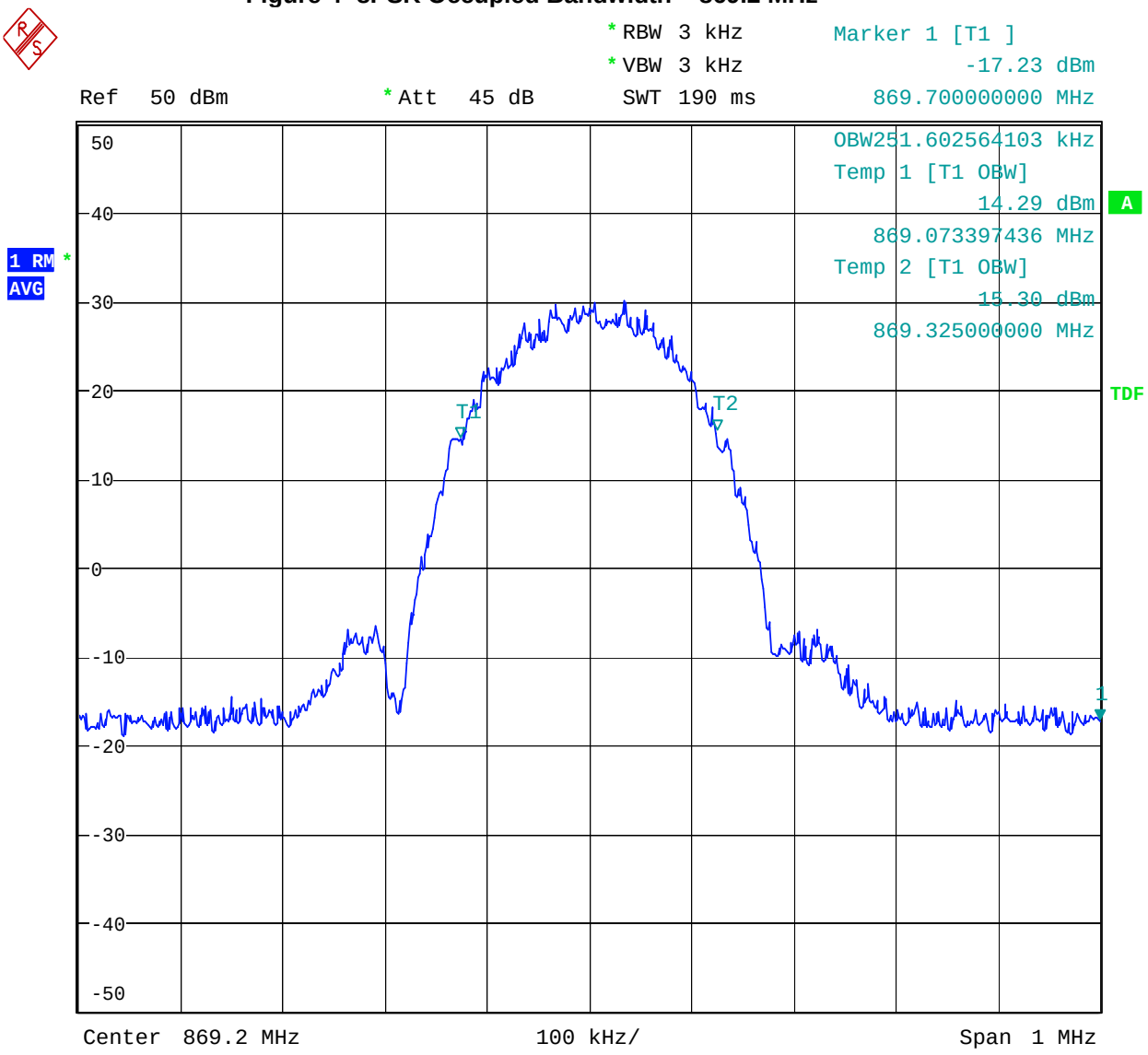
Date: 27.FEB.2007 22:32:55

Figure 3 GMSK Occupied Bandwidth – 893.8 MHz



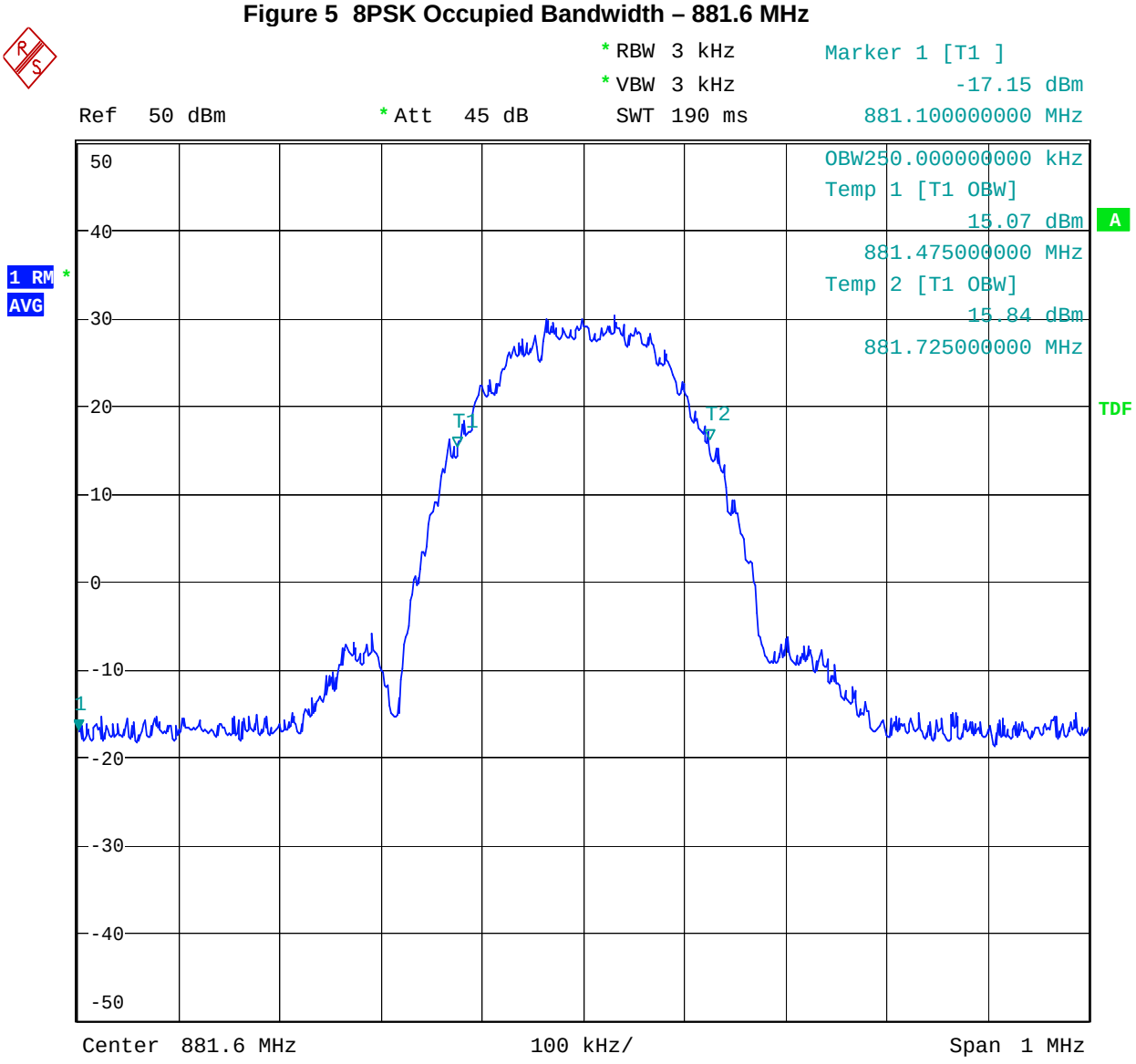
Date: 27.FEB.2007 22:42:50

Figure 4 8PSK Occupied Bandwidth – 869.2 MHz



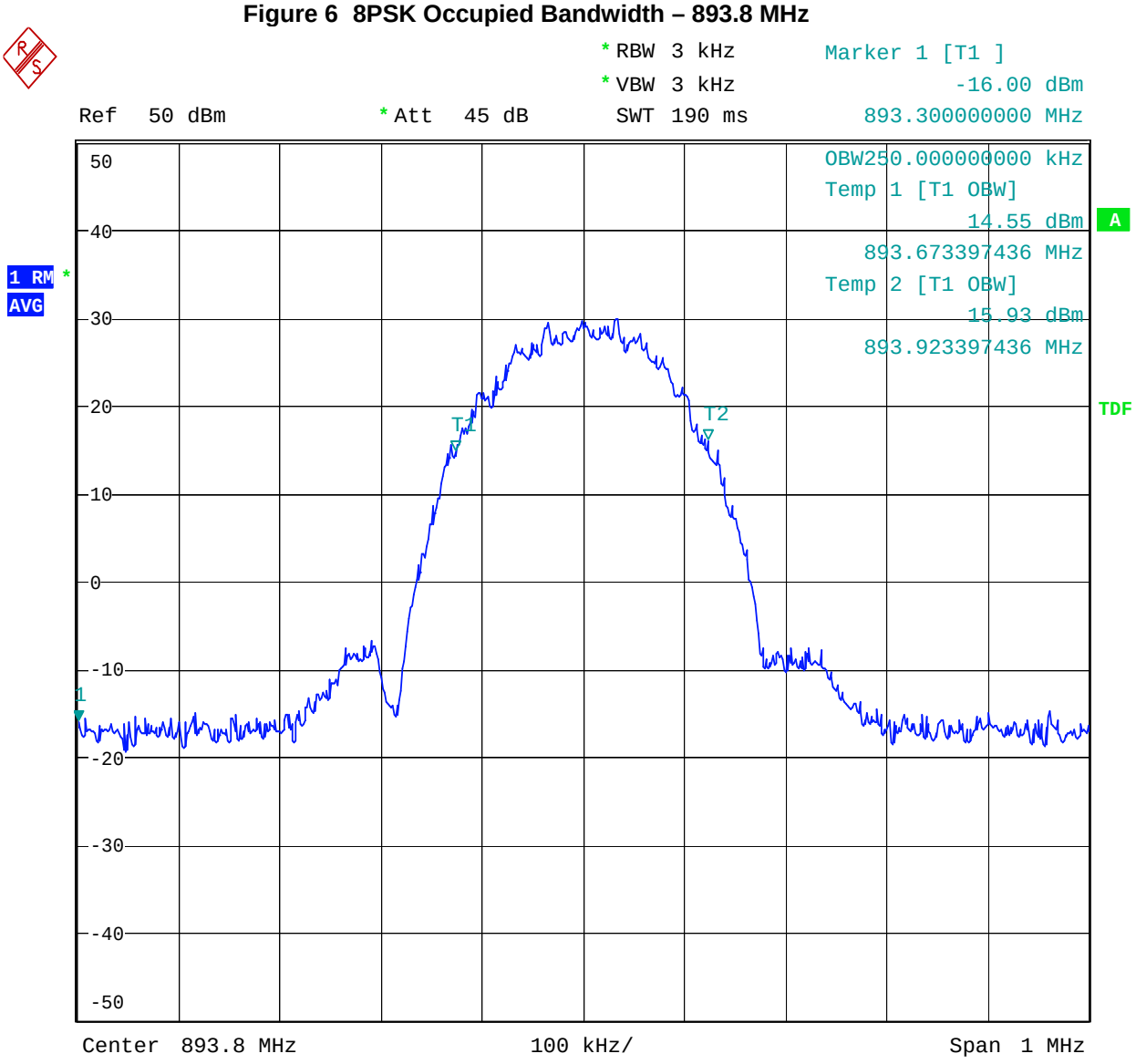
Date: 28.FEB.2007 00:28:42

Figure 5 8PSK Occupied Bandwidth – 881.6 MHz



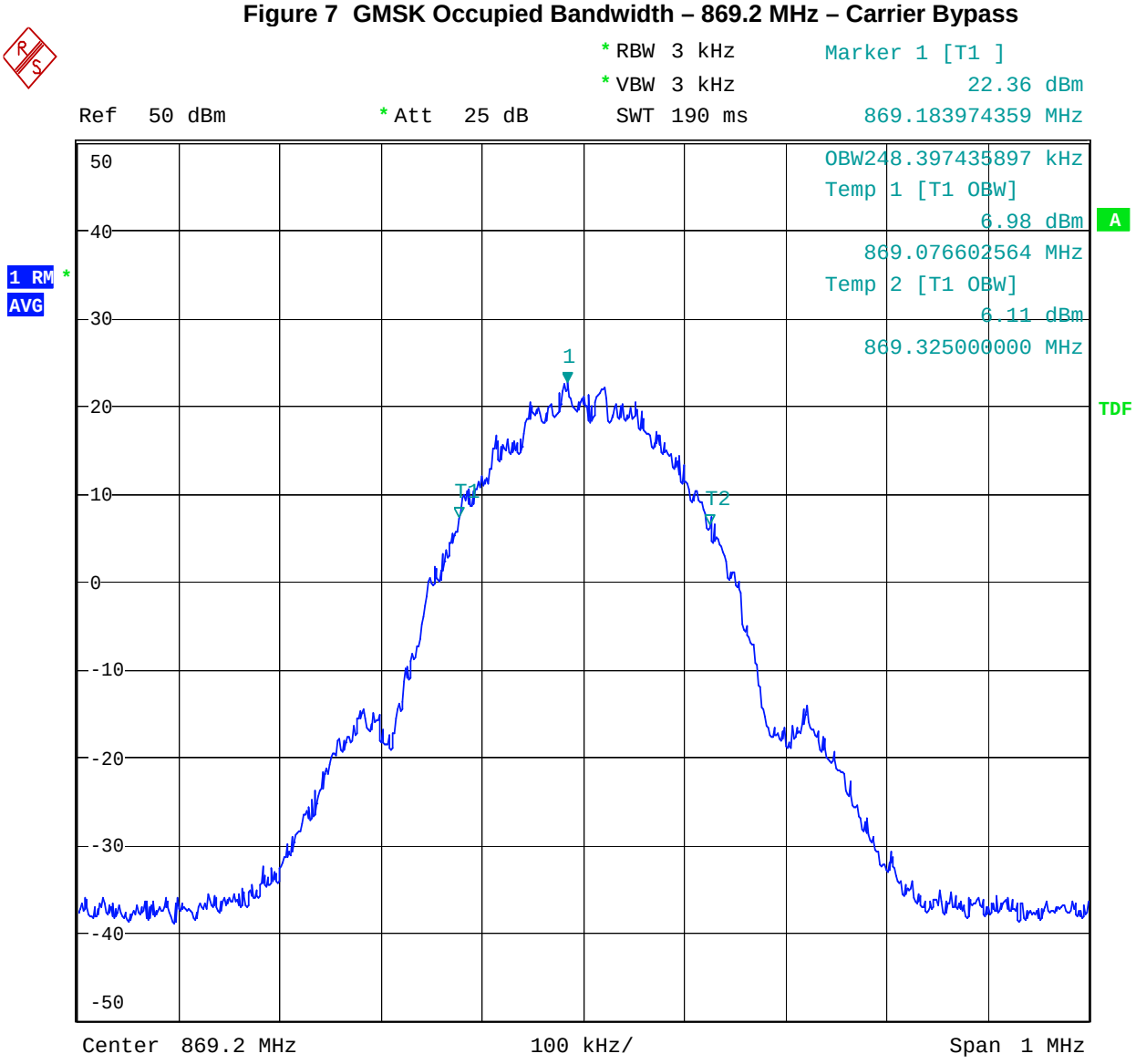
Date: 28.FEB.2007 00:31:23

Figure 6 8PSK Occupied Bandwidth – 893.8 MHz



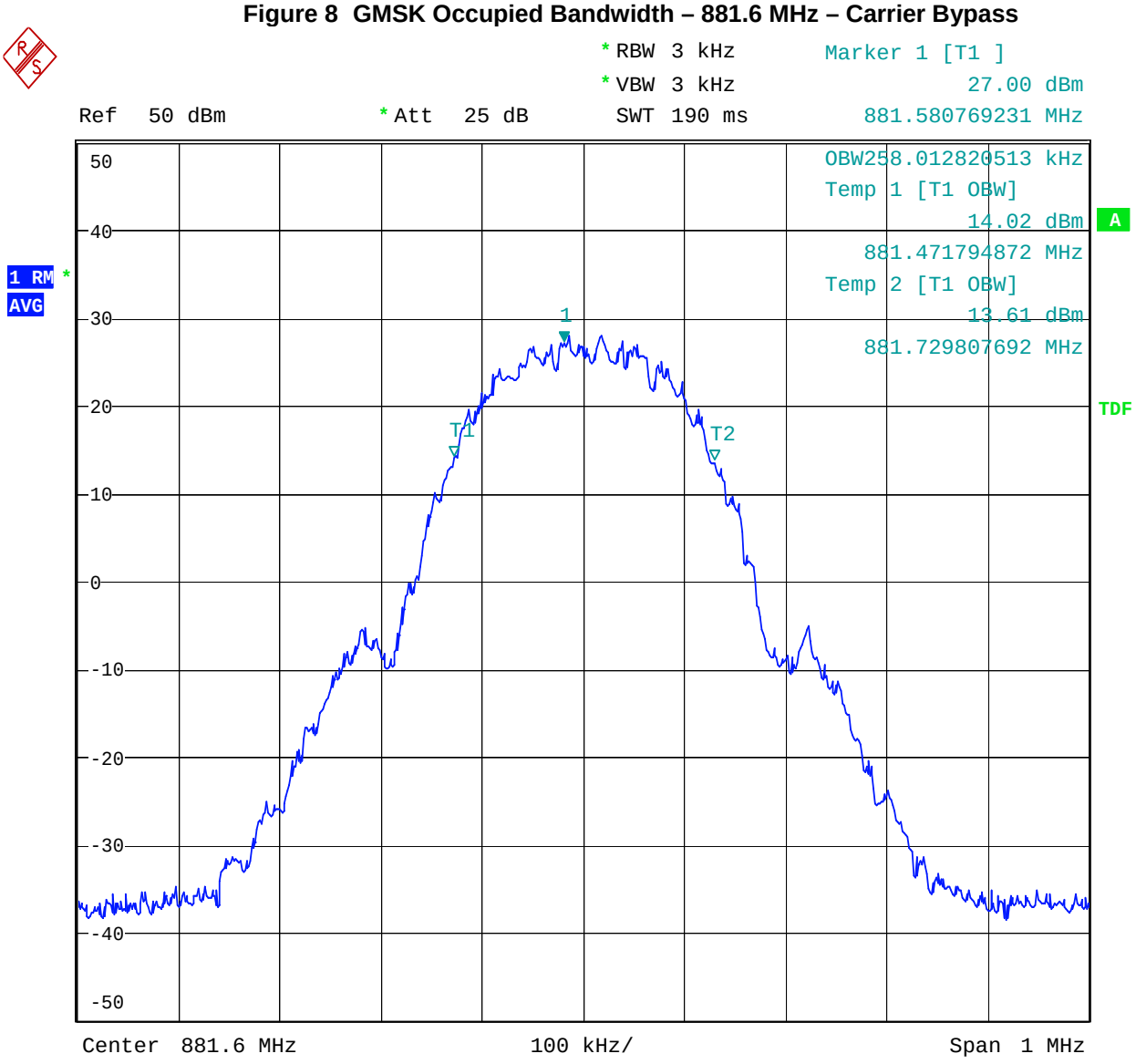
Date: 28.FEB.2007 00:14:48

Figure 7 GMSK Occupied Bandwidth – 869.2 MHz – Carrier Bypass



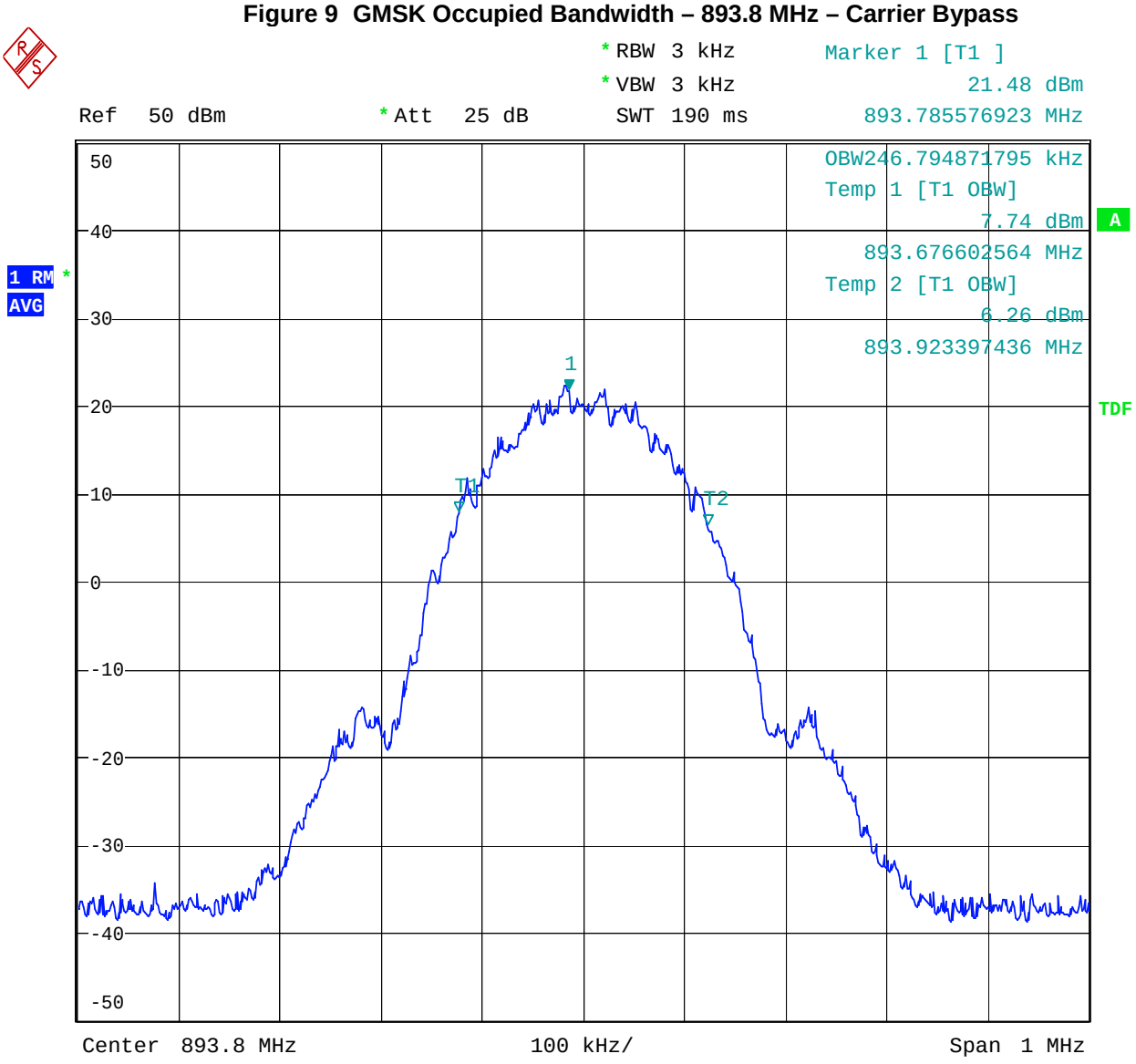
Date: 28.FEB.2007 19:55:01

Figure 8 GMSK Occupied Bandwidth – 881.6 MHz – Carrier Bypass



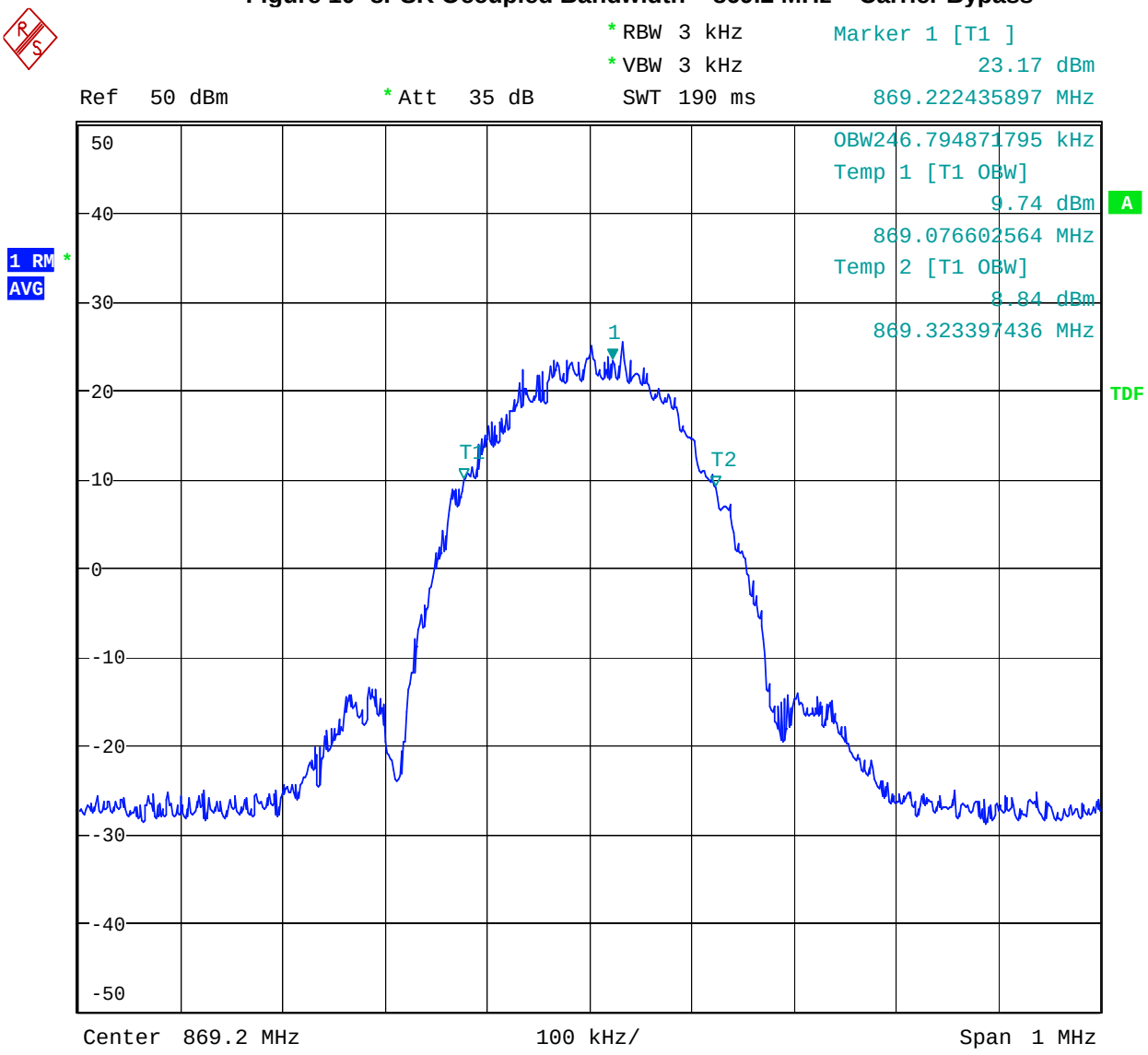
Date: 28.FEB.2007 19:59:30

Figure 9 GMSK Occupied Bandwidth – 893.8 MHz – Carrier Bypass



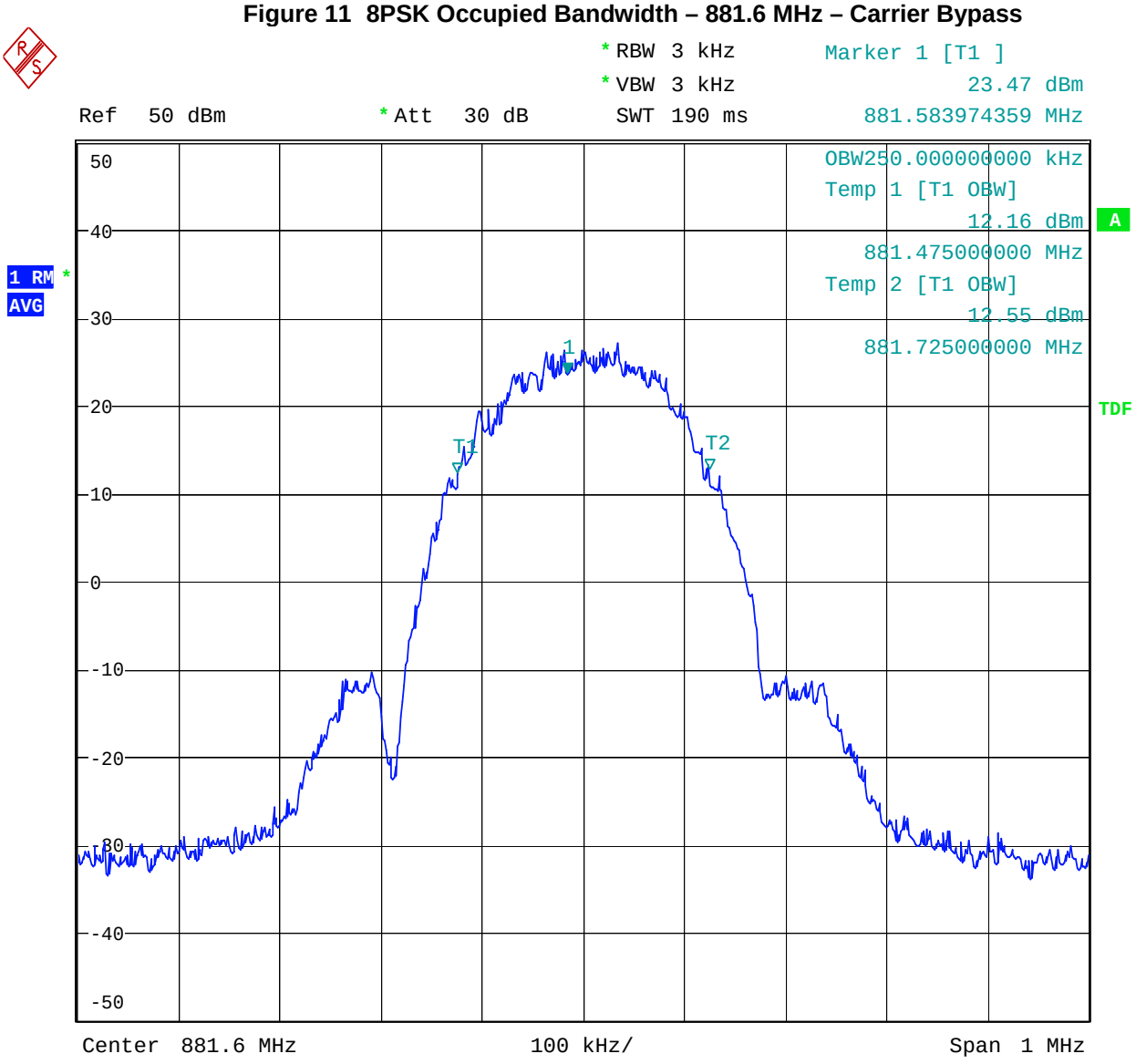
Date: 28.FEB.2007 20:04:13

Figure 10 8PSK Occupied Bandwidth – 869.2 MHz – Carrier Bypass



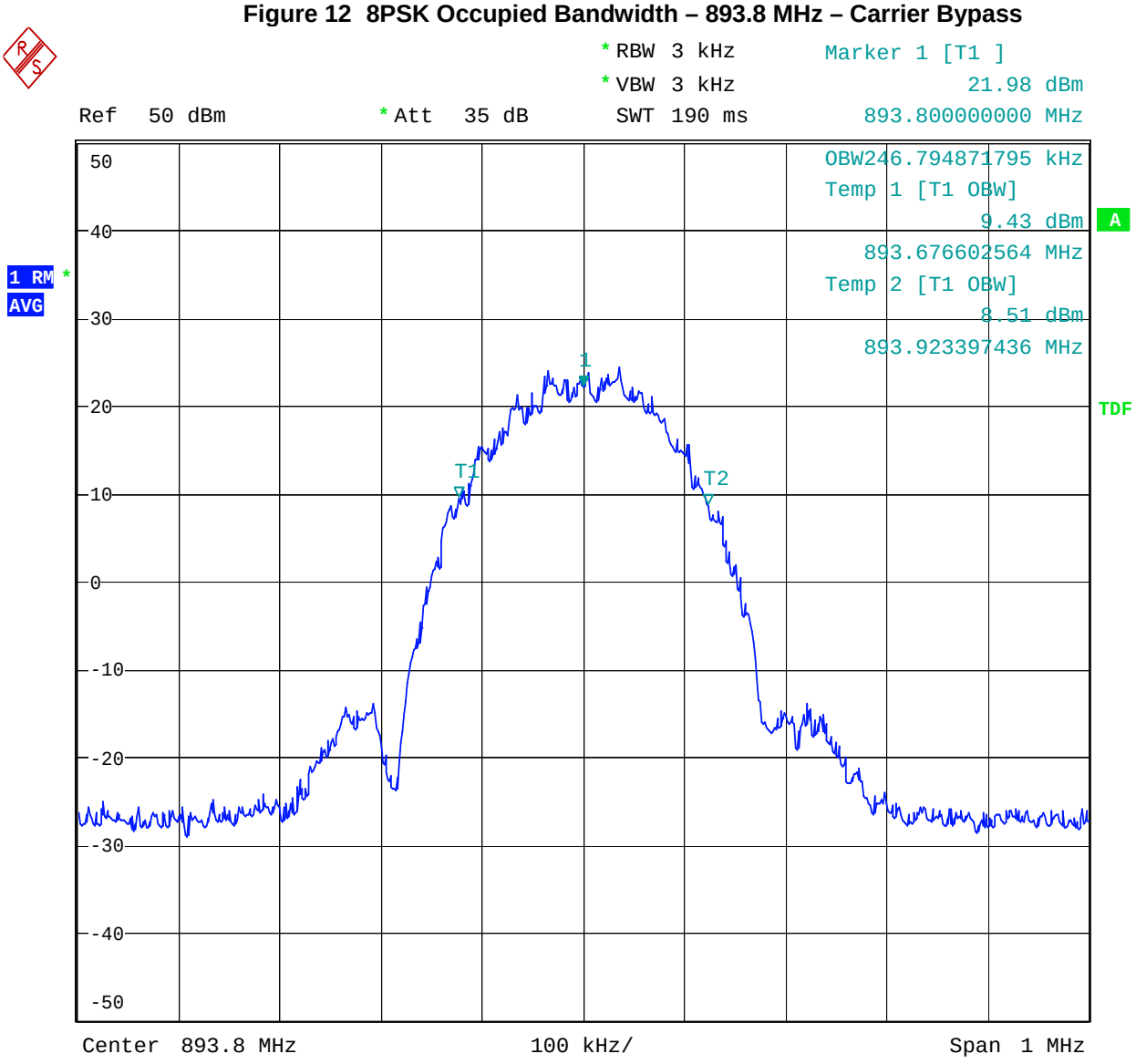
Date: 28.FEB.2007 18:03:23

Figure 11 8PSK Occupied Bandwidth – 881.6 MHz – Carrier Bypass



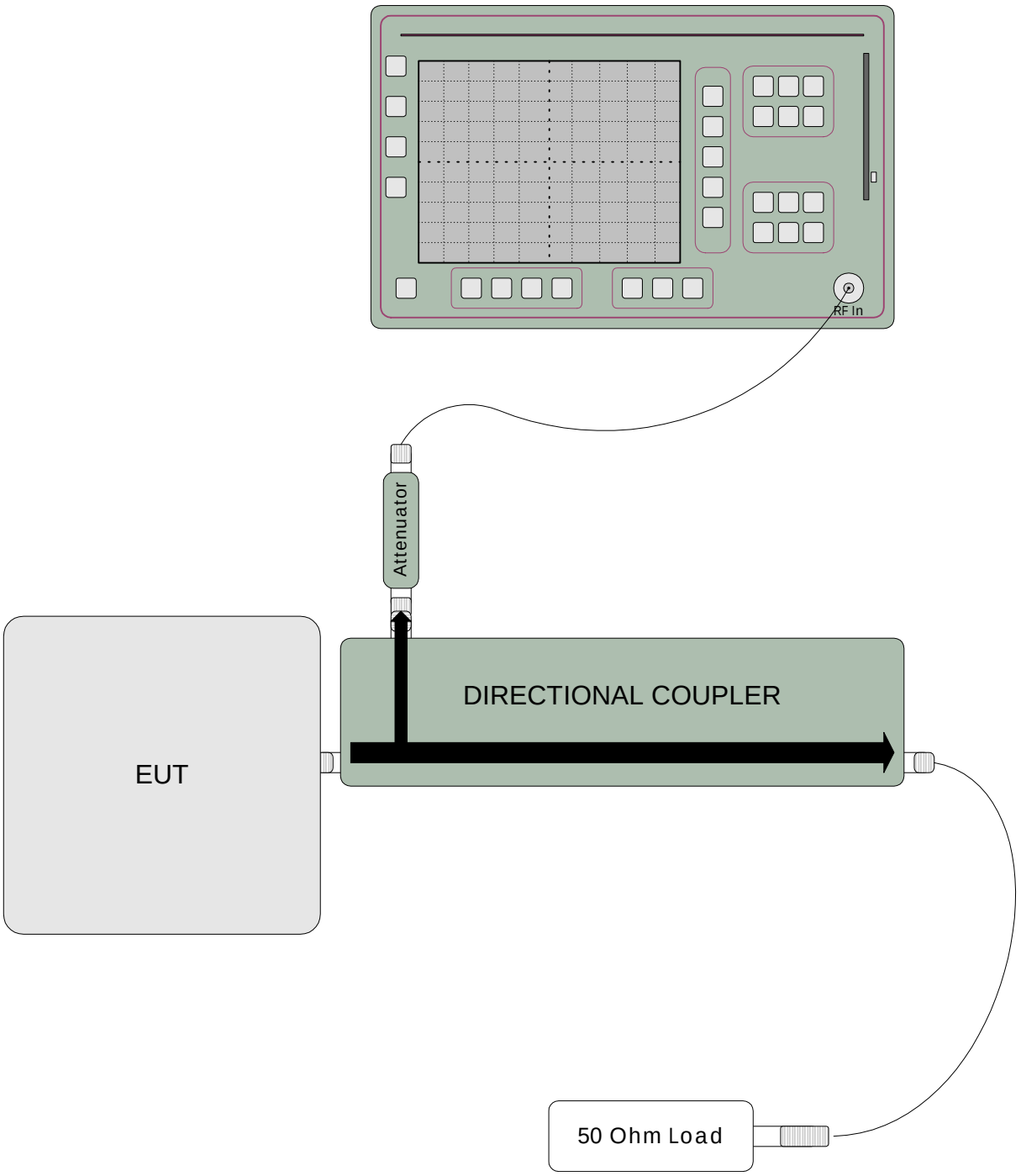
Date: 28.FEB.2007 19:29:45

Figure 12 8PSK Occupied Bandwidth – 893.8 MHz – Carrier Bypass



Date: 28.FEB.2007 19:41:08

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

22.917

(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

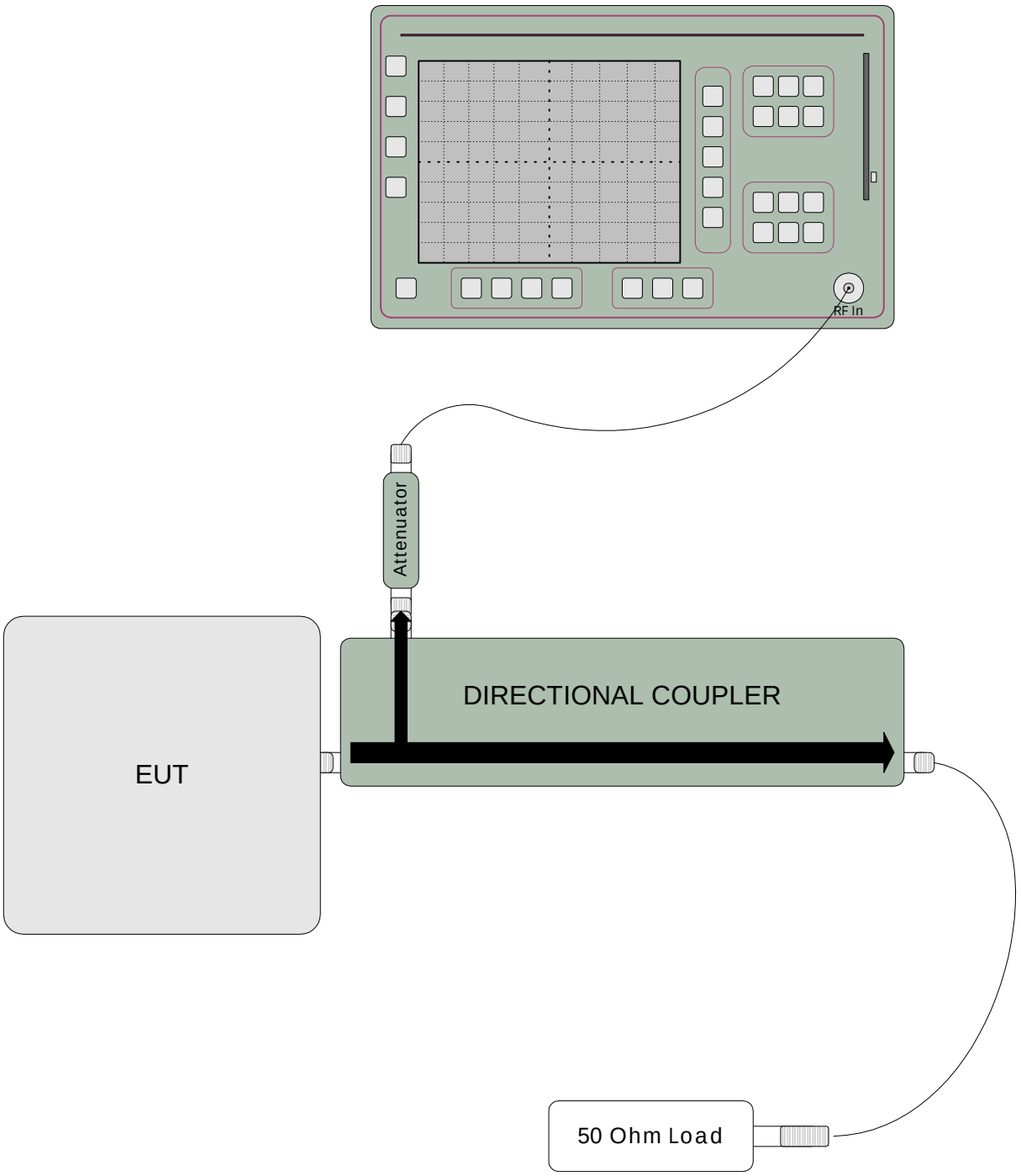
Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

D.5. Test Results

Compliant. 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.

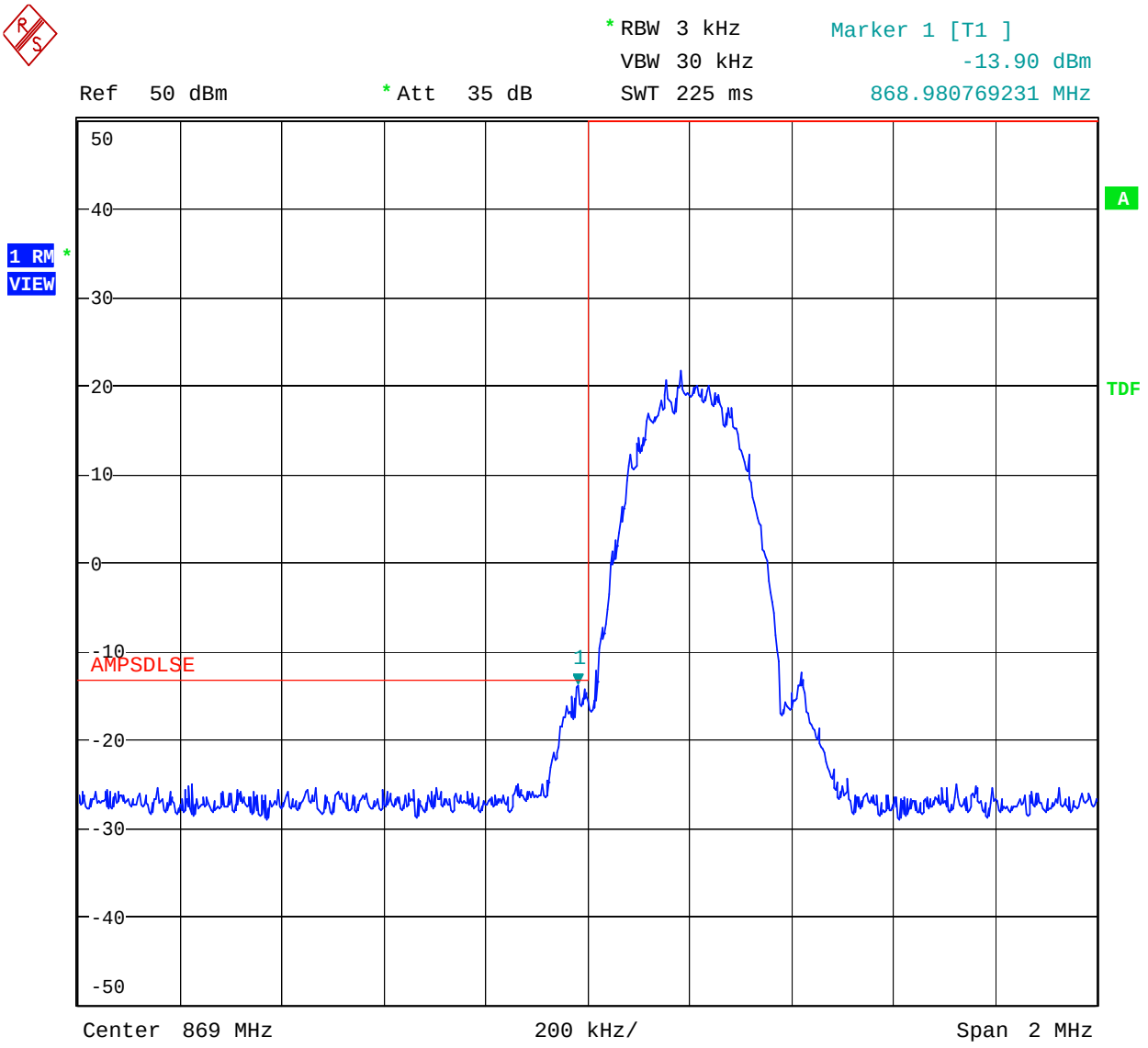
D.6. Test Diagram



D.7. Test Data

See following pages.

Figure 13 Antenna Conducted Spurious – Lower Band Edge – GMSK mode – Combined Carrier



Date: 27.FEB.2007 20:35:45

Figure 14 Antenna Conducted Spurious – Upper Band Edge – GMSK mode – Combined Carrier

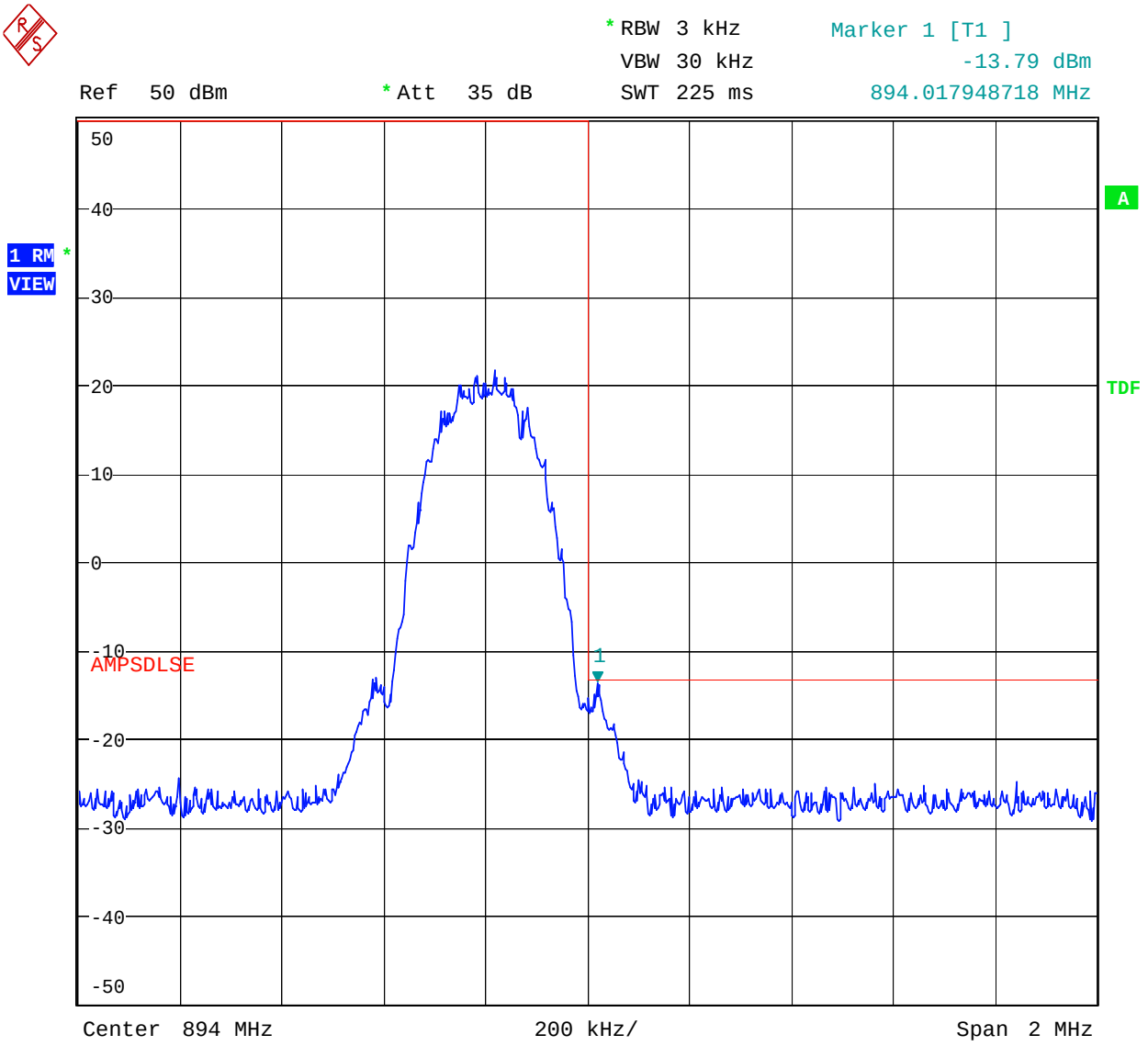


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Figure 15 Antenna Conducted Spurious – Lower Band Edge – 8PSK mode – Combined Carrier

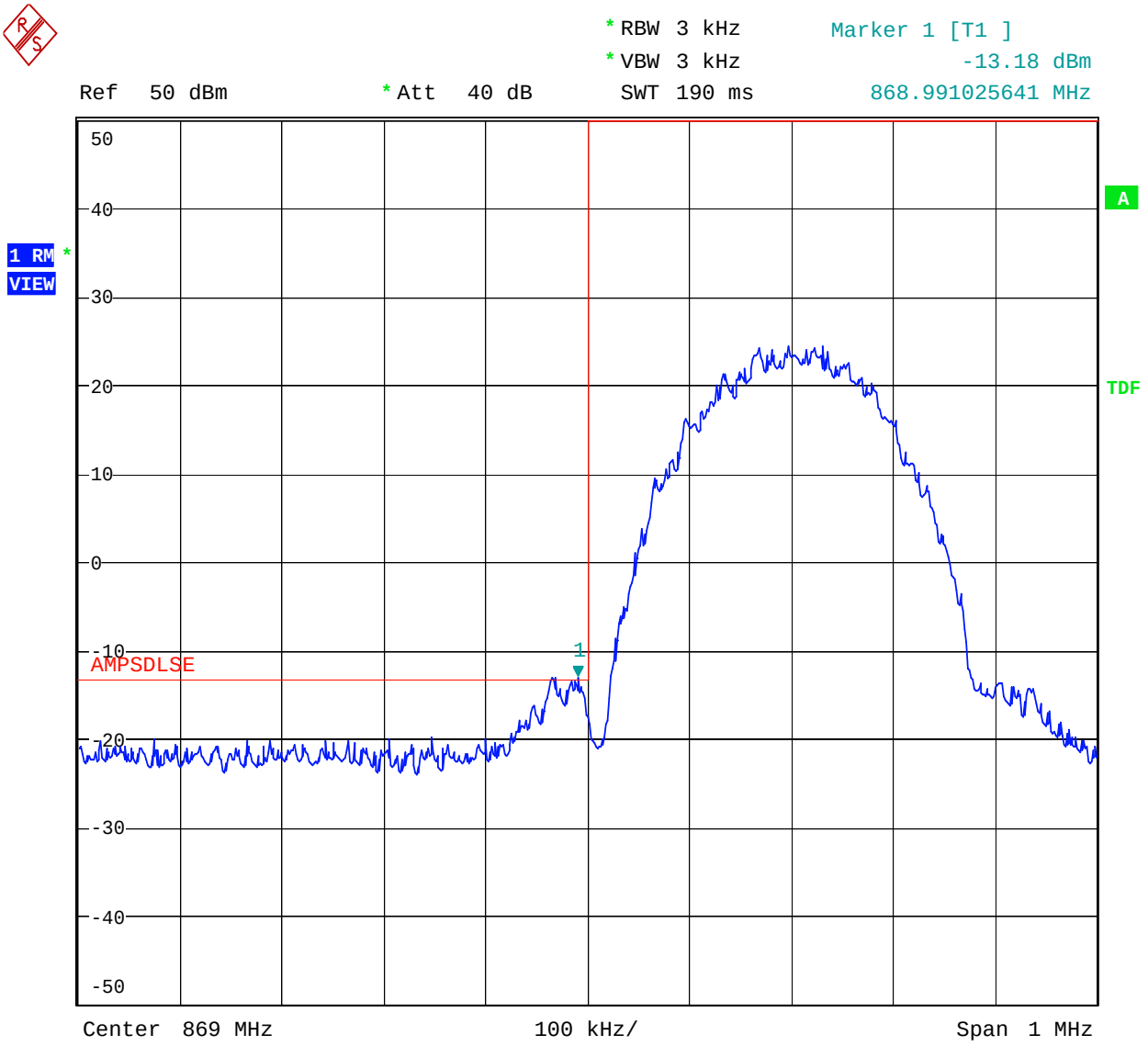

Figure 16 Antenna Conducted Spurious – Lower Band Edge – 8PSK mode – Combined Carrier

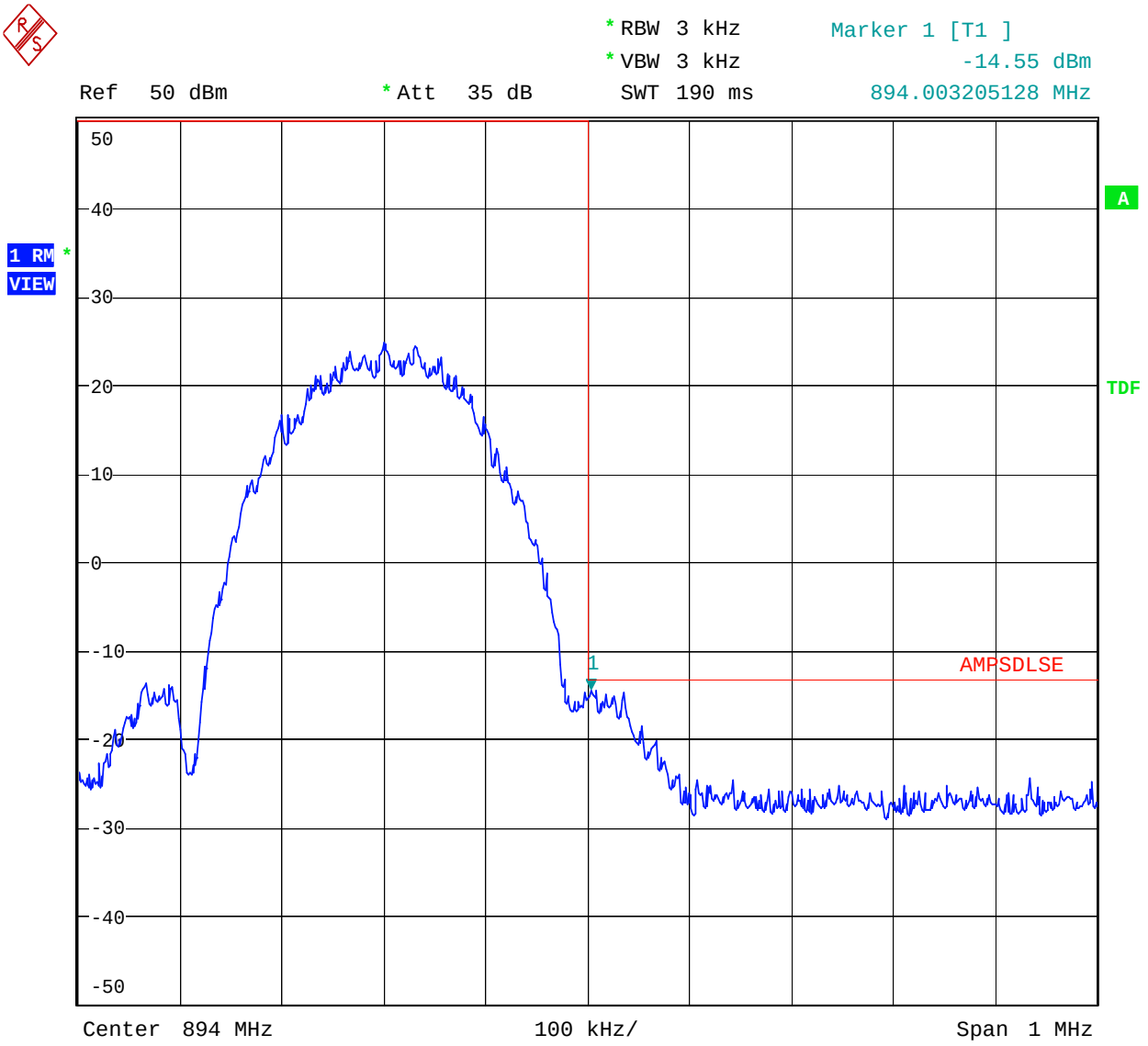

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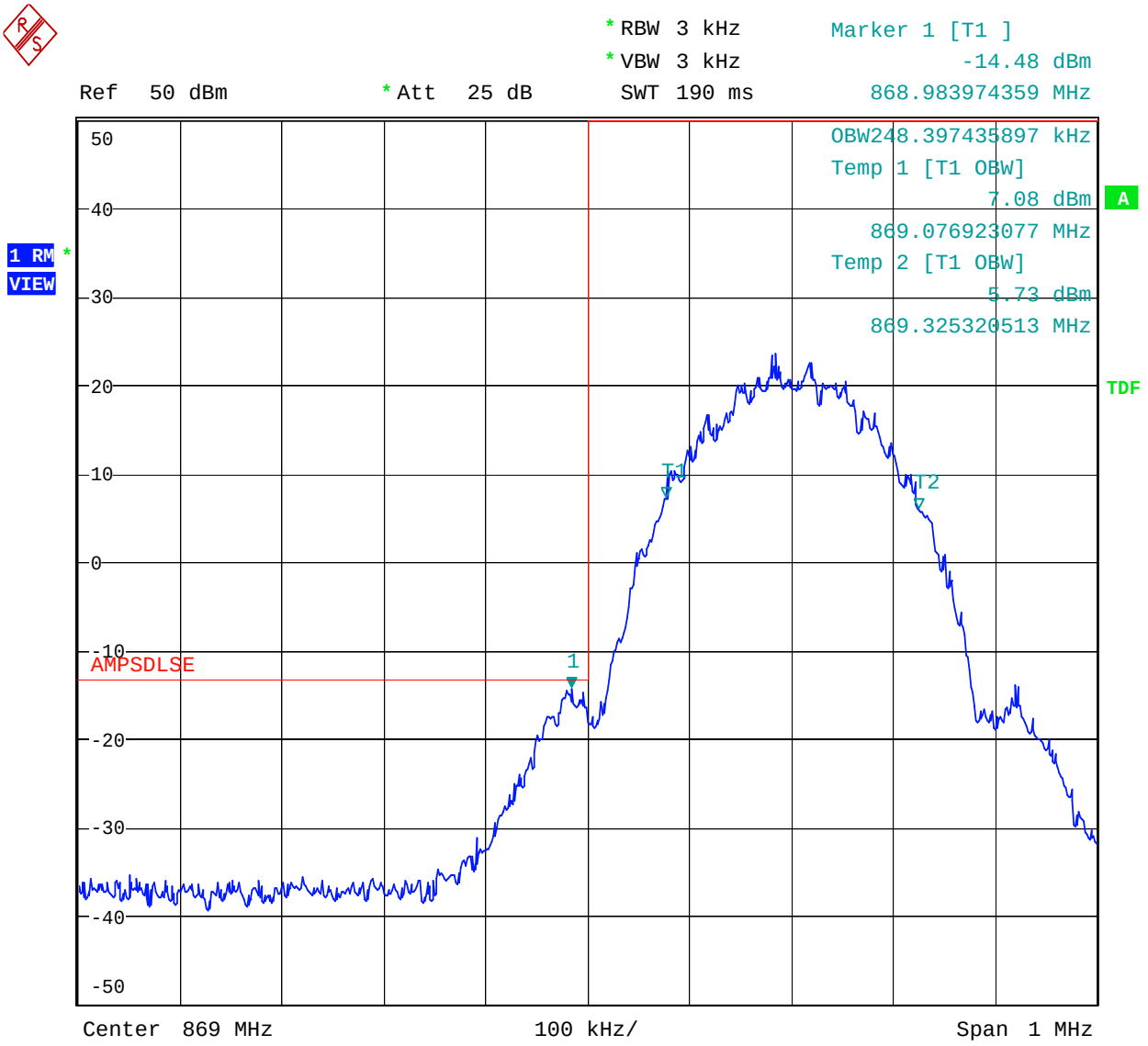
Figure 17 Antenna Conducted Spurious – Lower Band Edge – GMSK mode – Single Carrier



Date: 28.FEB.2007 19:53:51

Figure 18 Antenna Conducted Spurious – Upper Band Edge – GMSK mode – Single Carrier

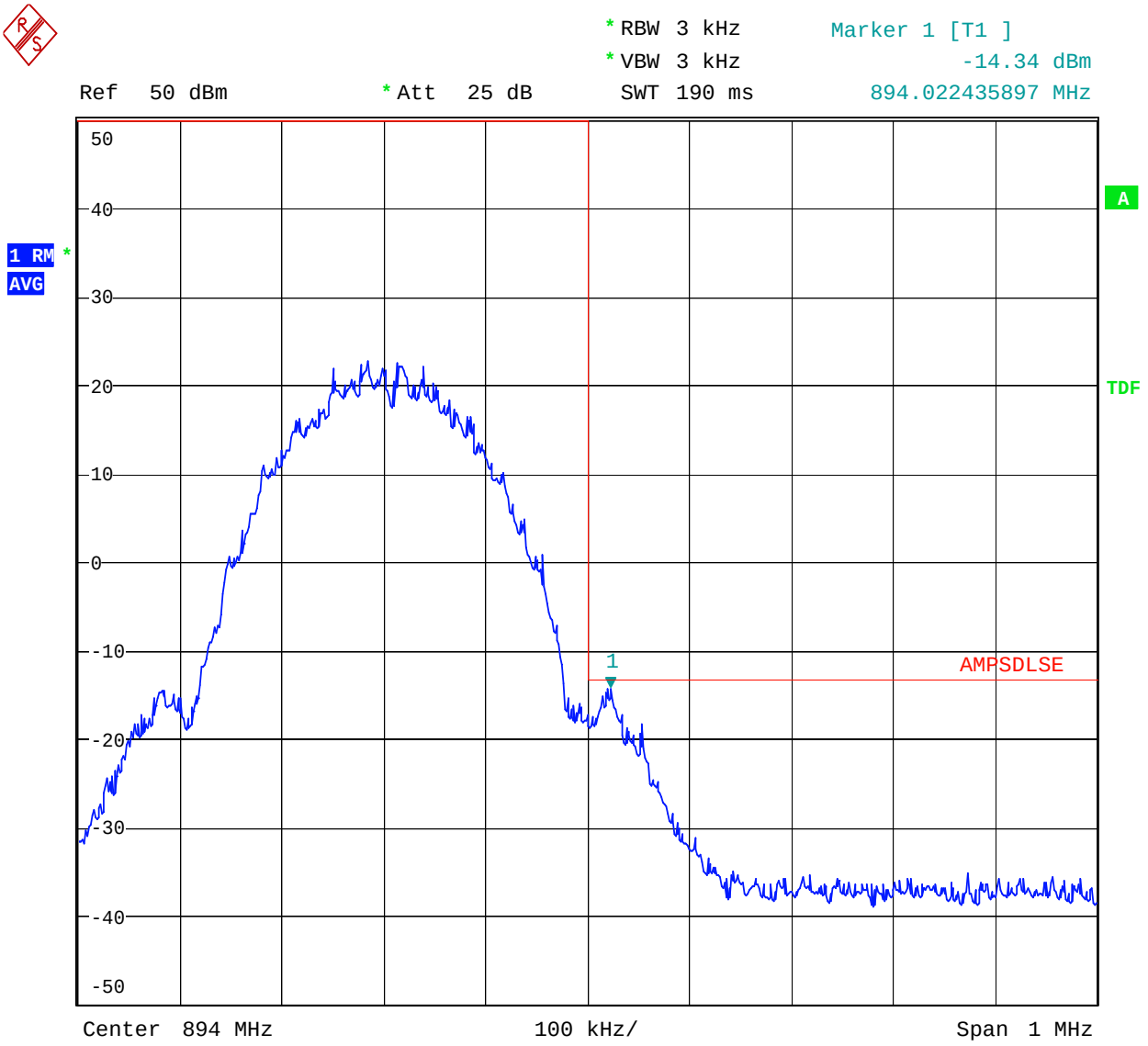
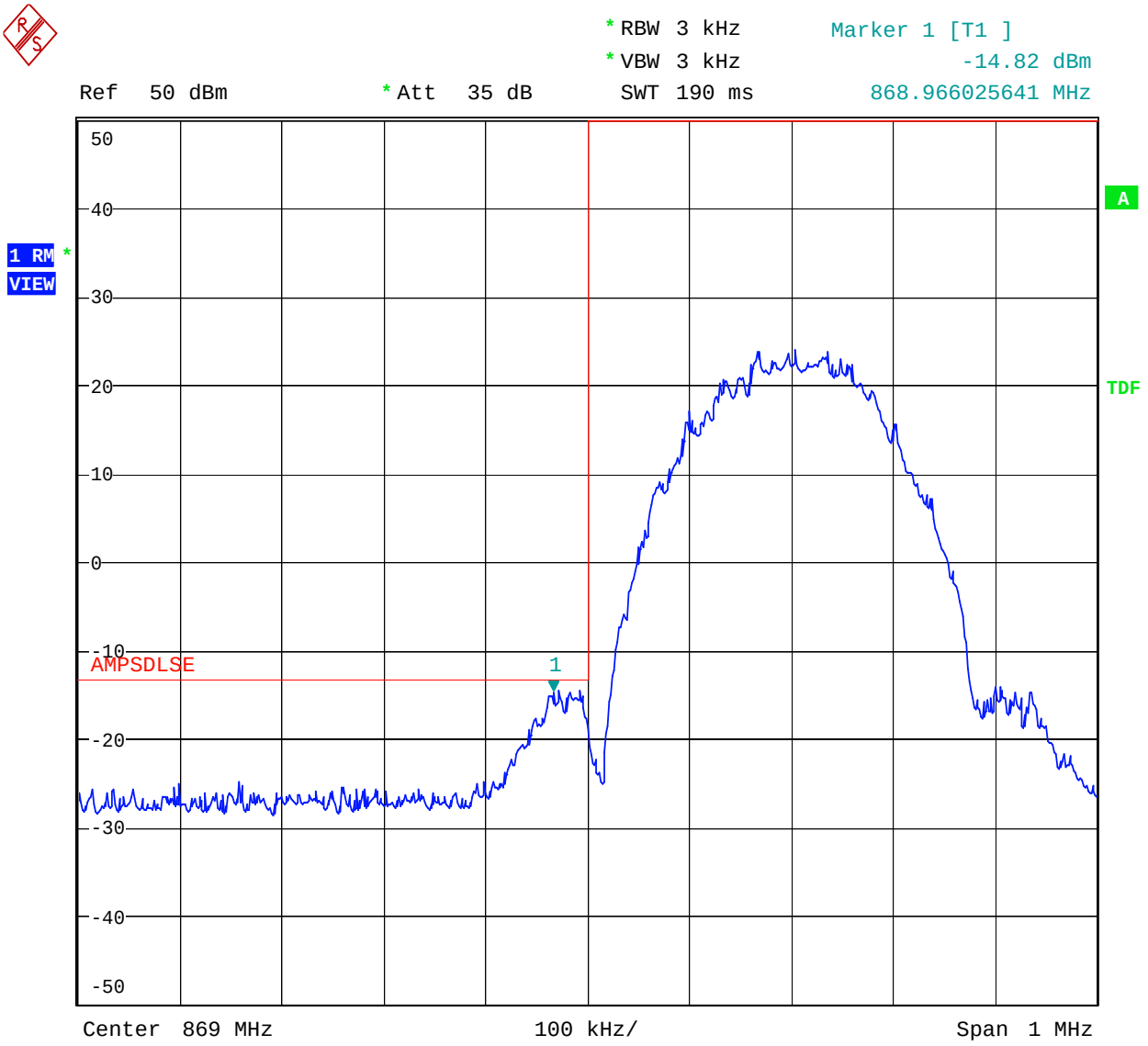
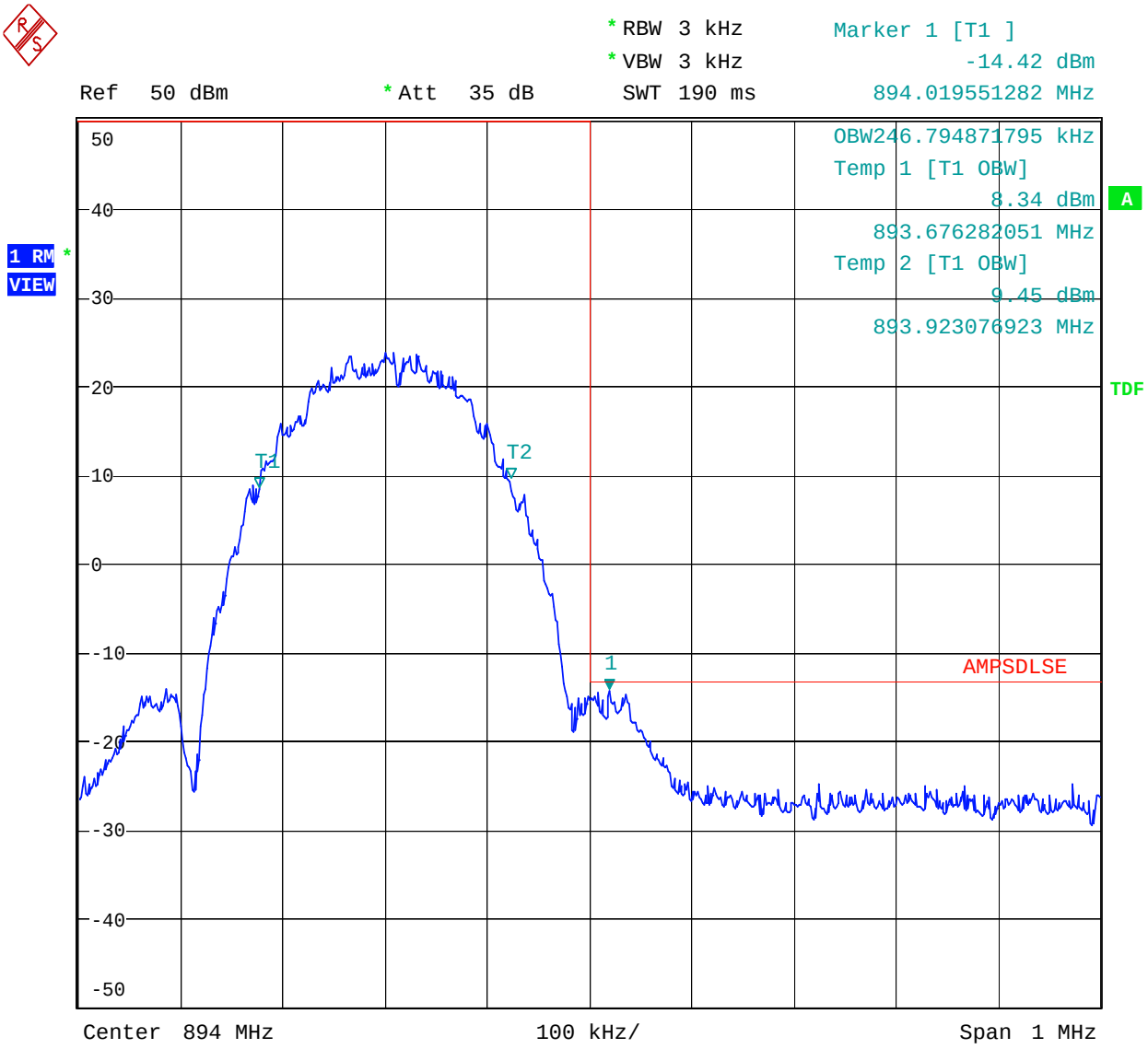


Figure 19 Antenna Conducted Spurious – Lower Band Edge – 8PSK mode – Single Carrier



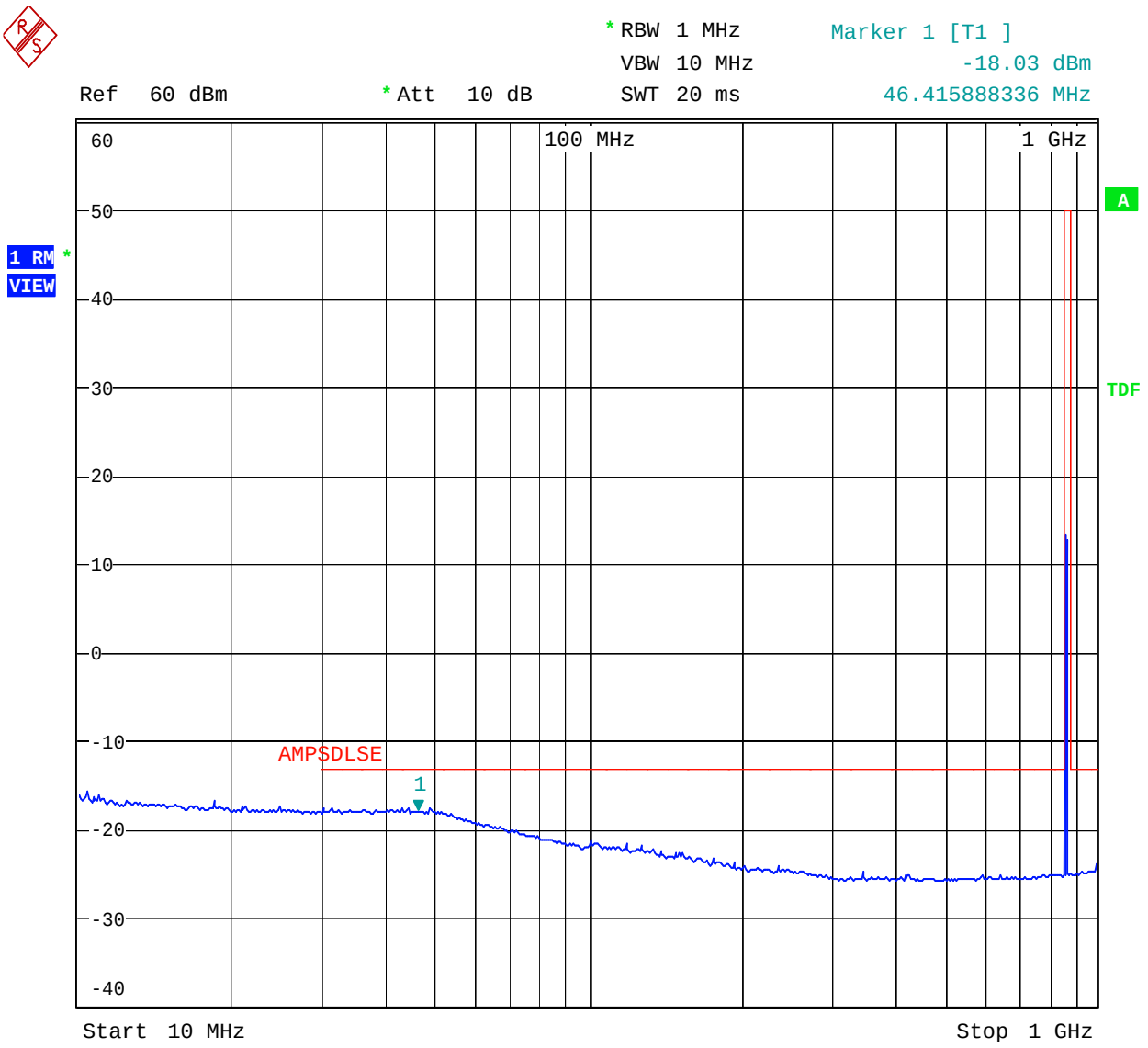
Date: 28.FEB.2007 18:01:49

Figure 20 Antenna Conducted Spurious – Upper Band Edge – 8PSK mode – Single Carrier



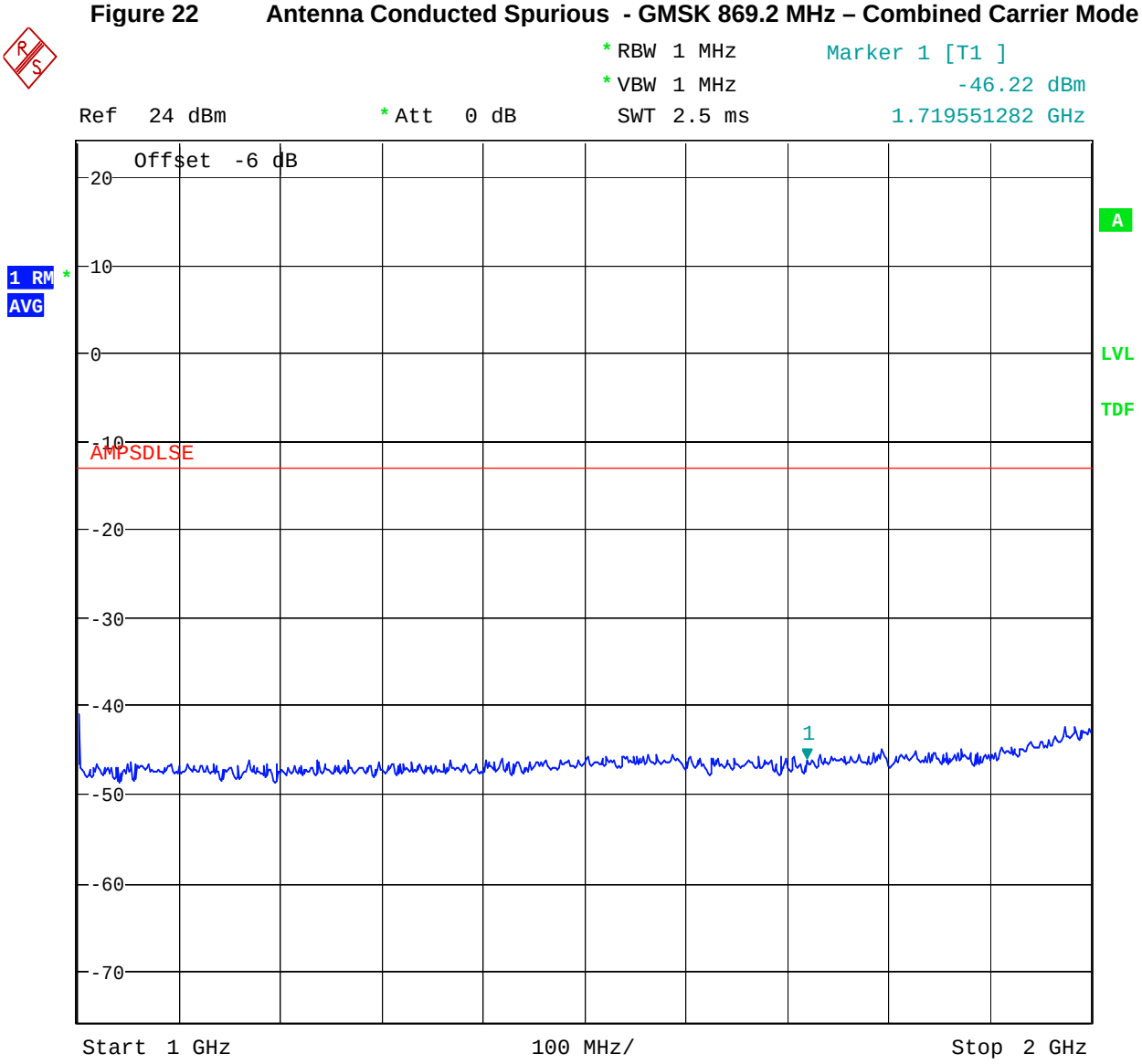
Date: 28.FEB.2007 19:37:36

Figure 21 Antenna Conducted Spurious – GMSK 869.2 MHz - Combined Carrier Mode



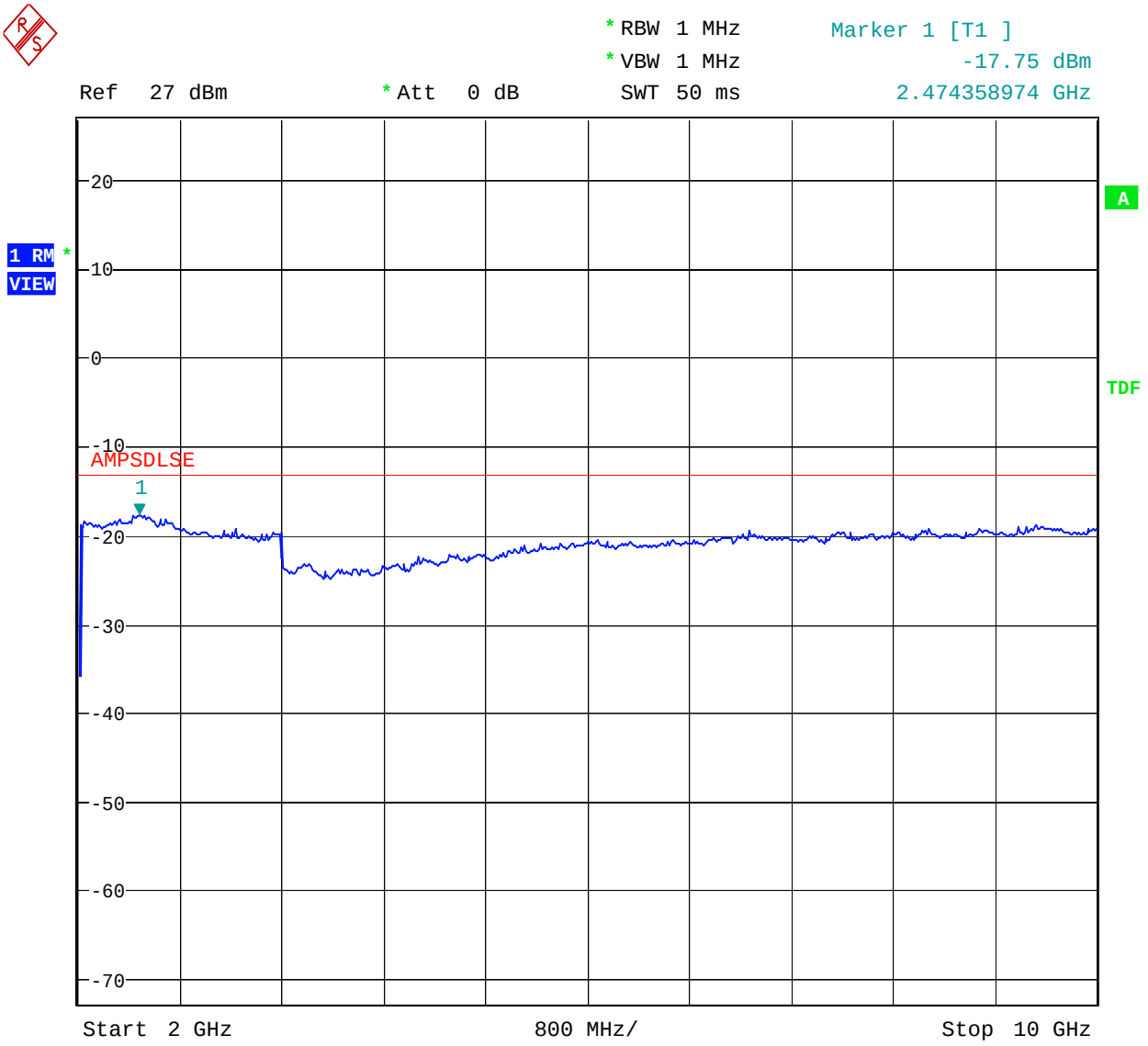
Date: 27.FEB.2007 20:47:59

Figure 22 Antenna Conducted Spurious - GMSK 869.2 MHz – Combined Carrier Mode



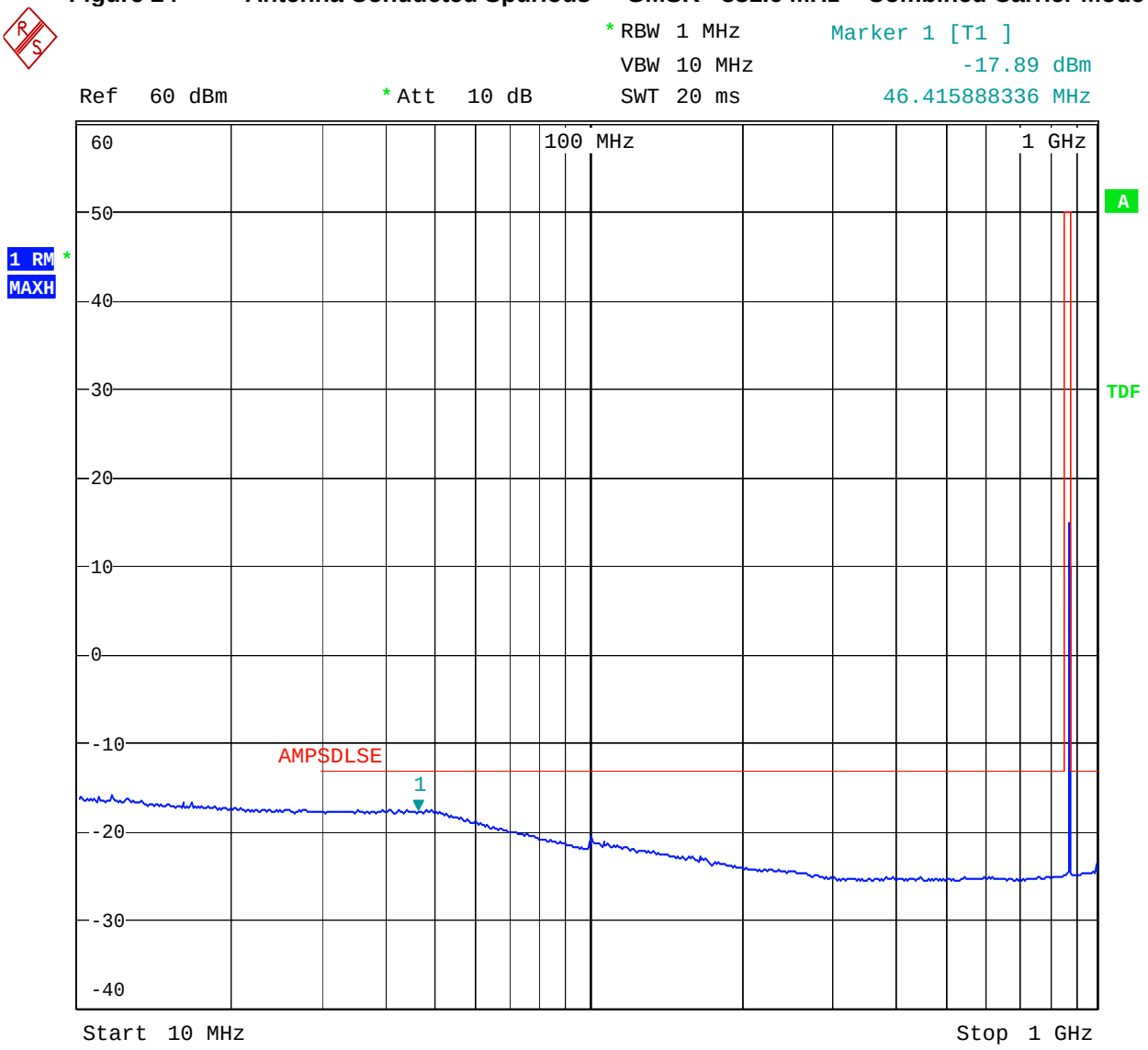
Date: 27.FEB.2007 22:51:20

Figure 23 Antenna Conducted Spurious - GMSK – 869.2 MHz – Combined Carrier Mode



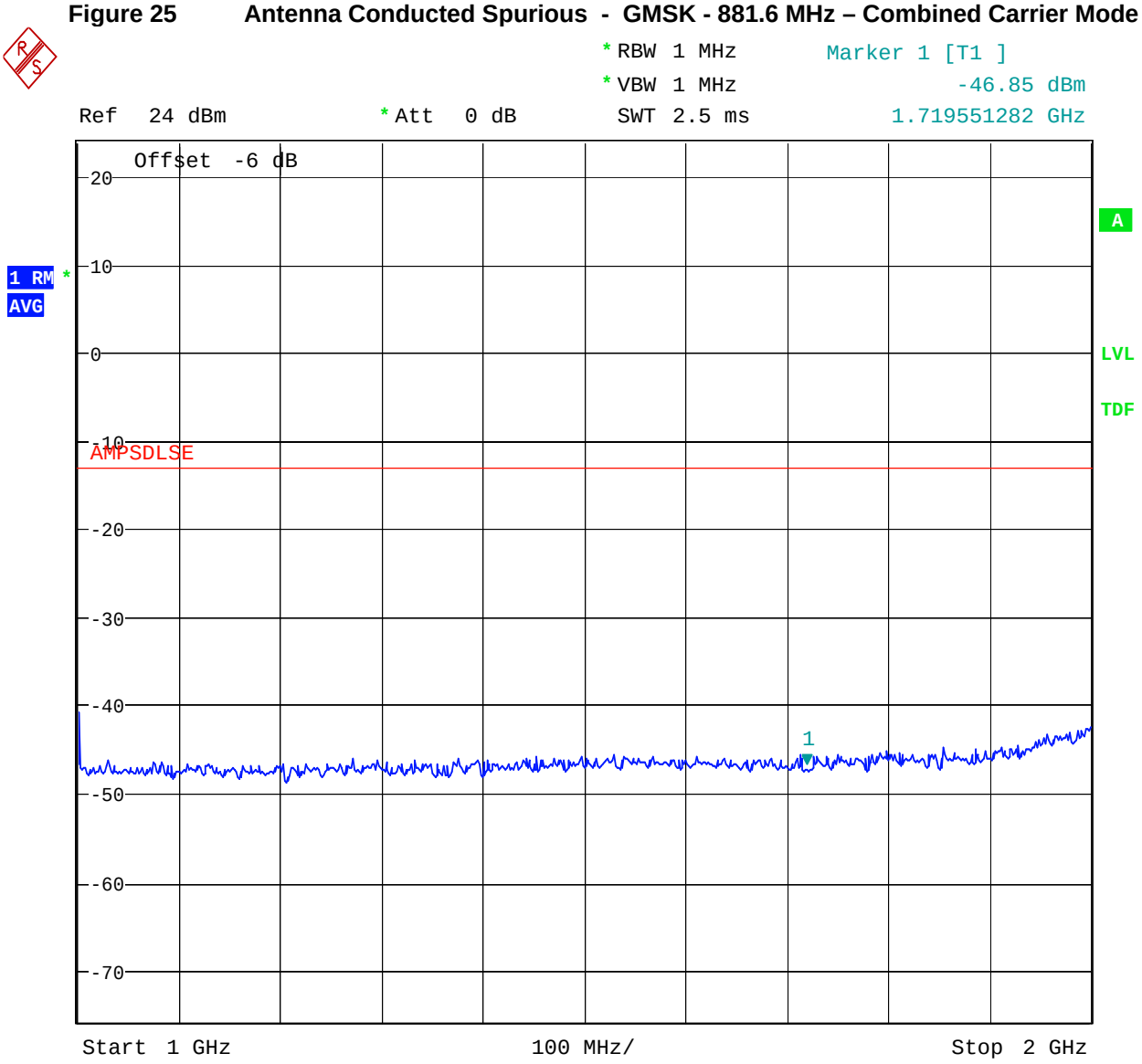
Date: 27.FEB.2007 22:15:54

Figure 24 Antenna Conducted Spurious - GMSK - 881.6 MHz – Combined Carrier Mode



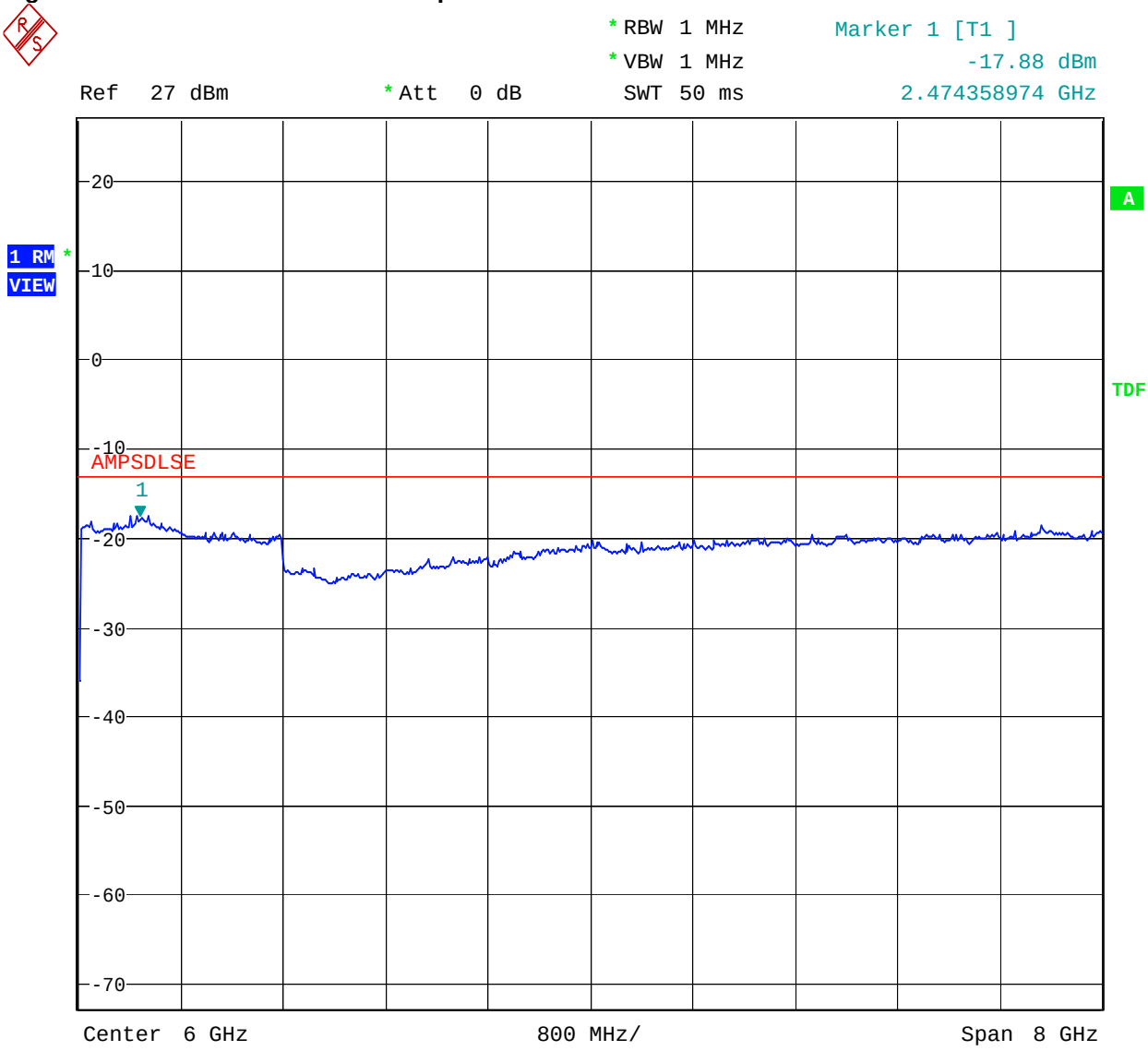
Date: 27.FEB.2007 20:54:59

Figure 25 Antenna Conducted Spurious - GMSK - 881.6 MHz – Combined Carrier Mode



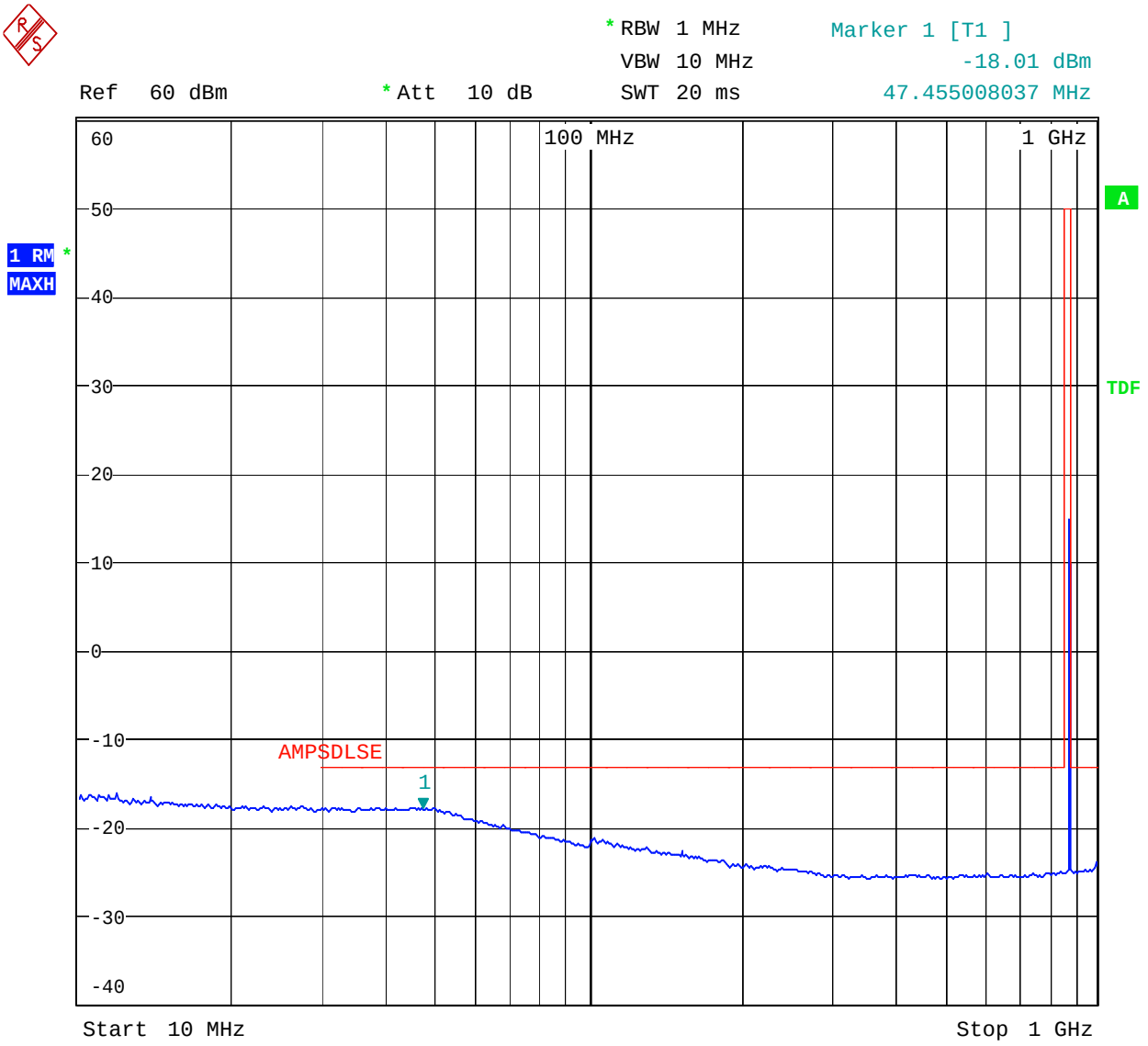
Date: 27.FEB.2007 22:50:39

Figure 26 Antenna Conducted Spurious - GMSK - 881.6 MHz – Combined Carrier Mode



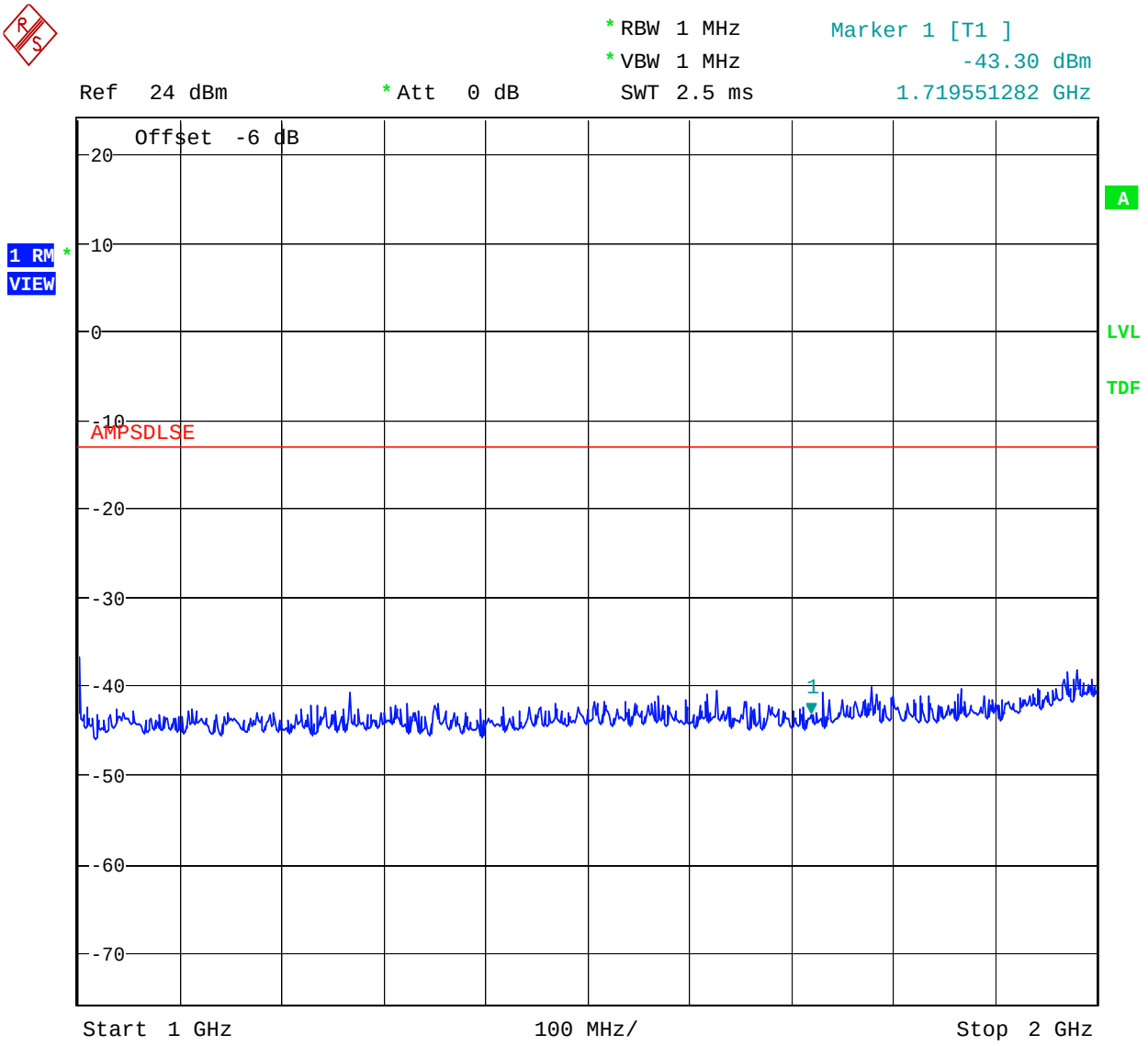
Date: 27.FEB.2007 22:29:19

Figure 27 Antenna Conducted Spurious - GMSK – 893.8 MHz – Combined Carrier Mode



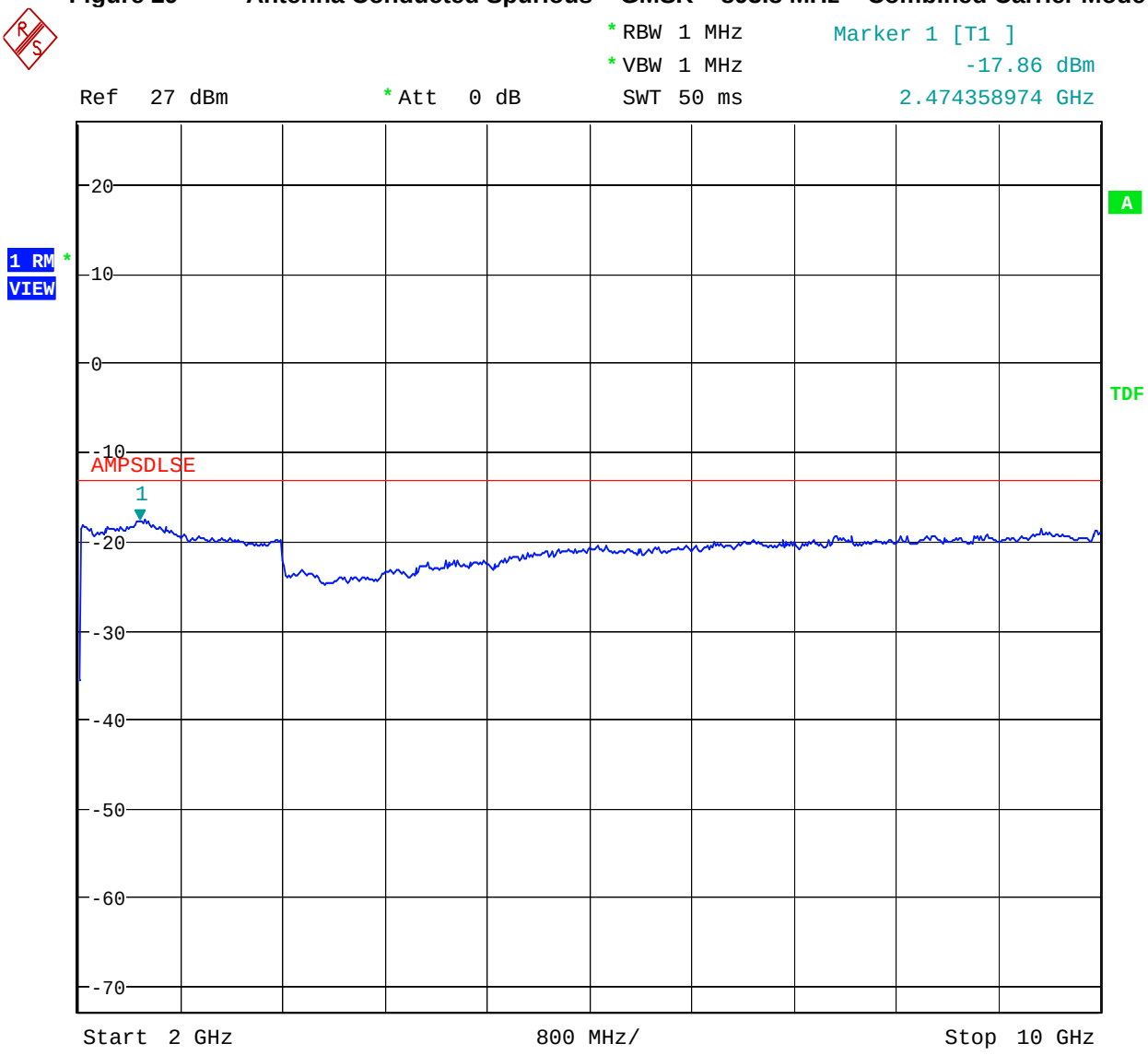
Date: 27.FEB.2007 21:33:06

Figure 28 Antenna Conducted Spurious - GMSK – 893.8 MHz – Combined Carrier Mode



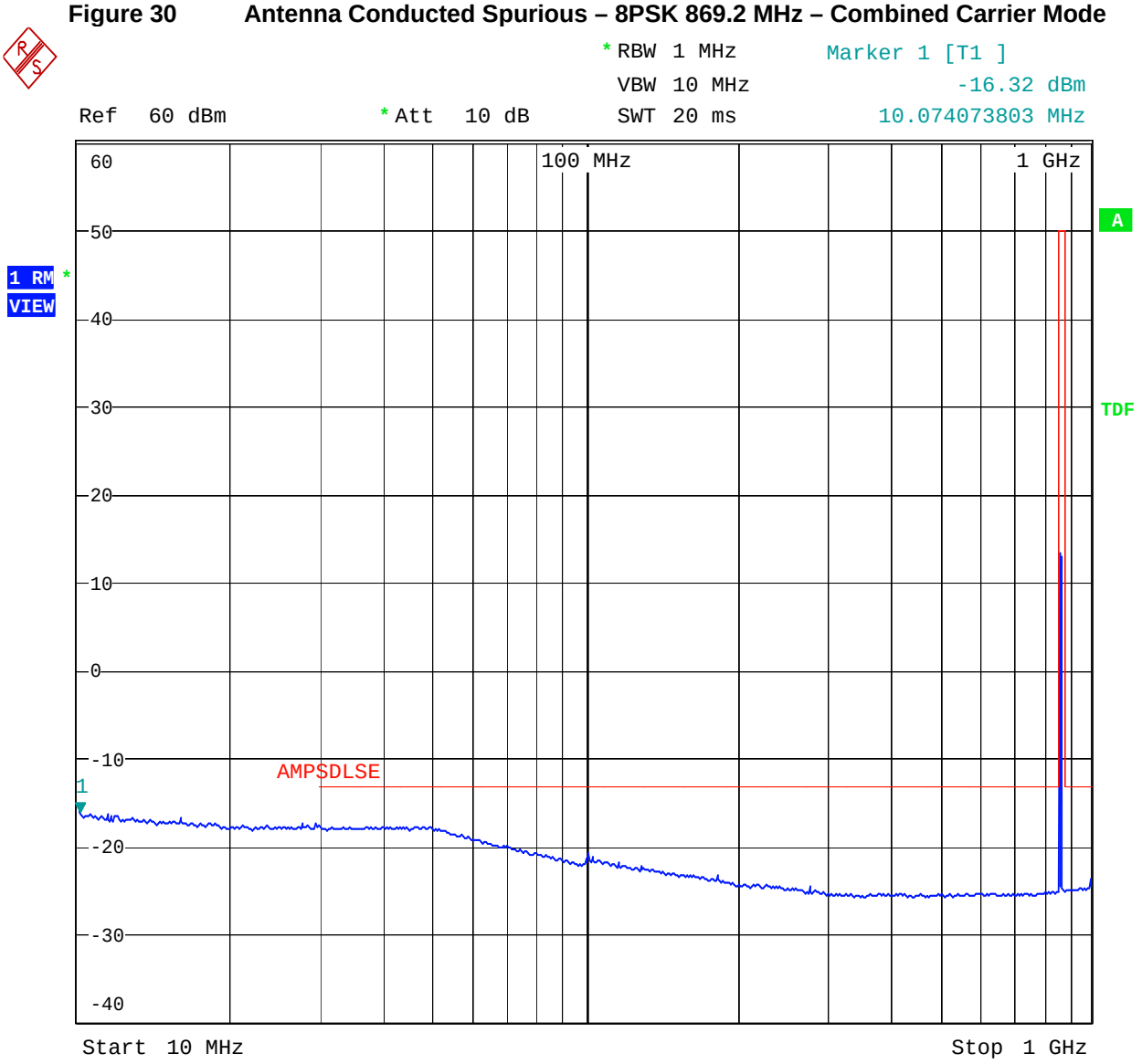
Date: 27.FEB.2007 22:49:45

Figure 29 Antenna Conducted Spurious – GMSK – 893.8 MHz – Combined Carrier Mode



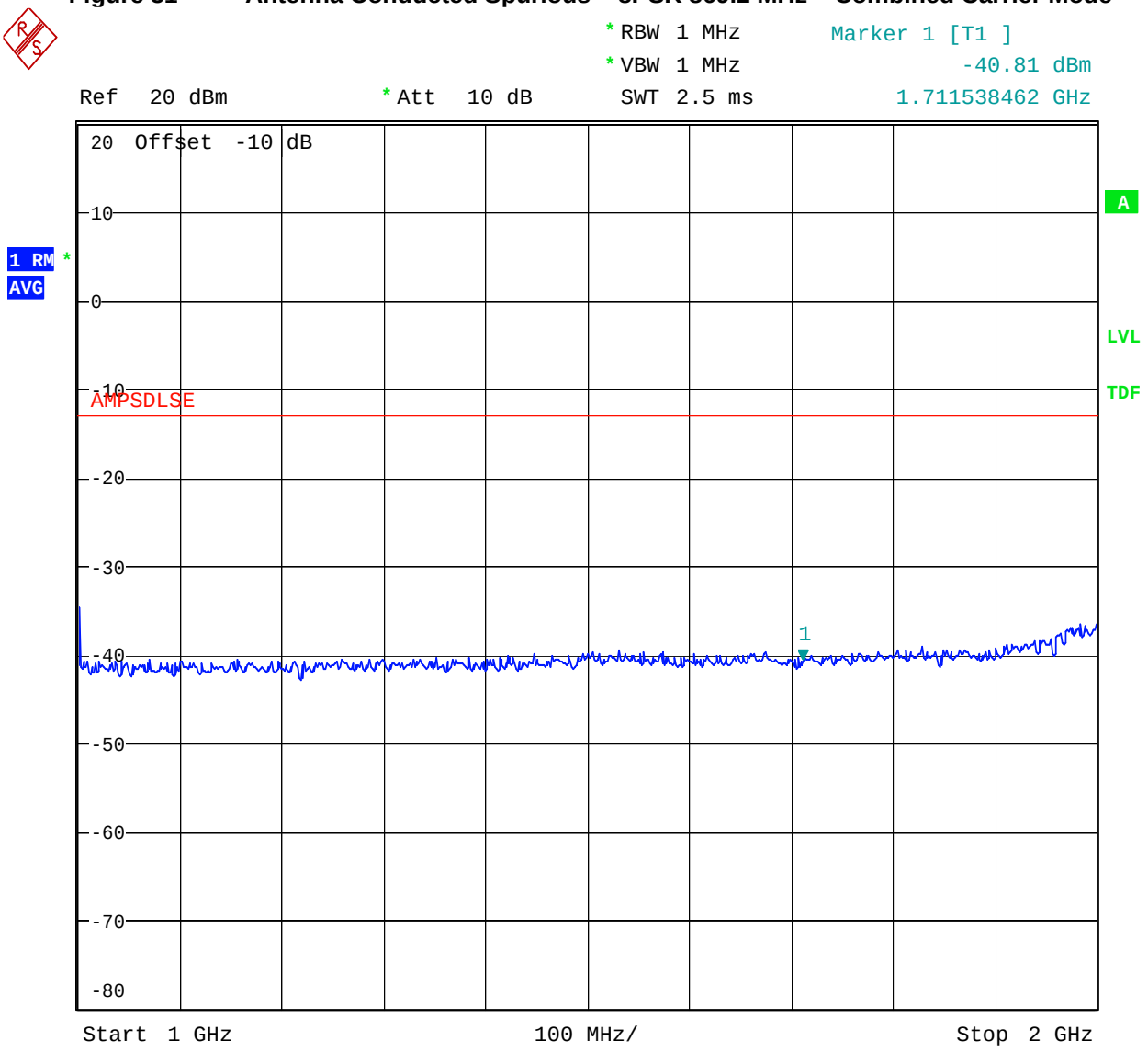
Date: 27.FEB.2007 22:34:57

Figure 30 Antenna Conducted Spurious – 8PSK 869.2 MHz – Combined Carrier Mode



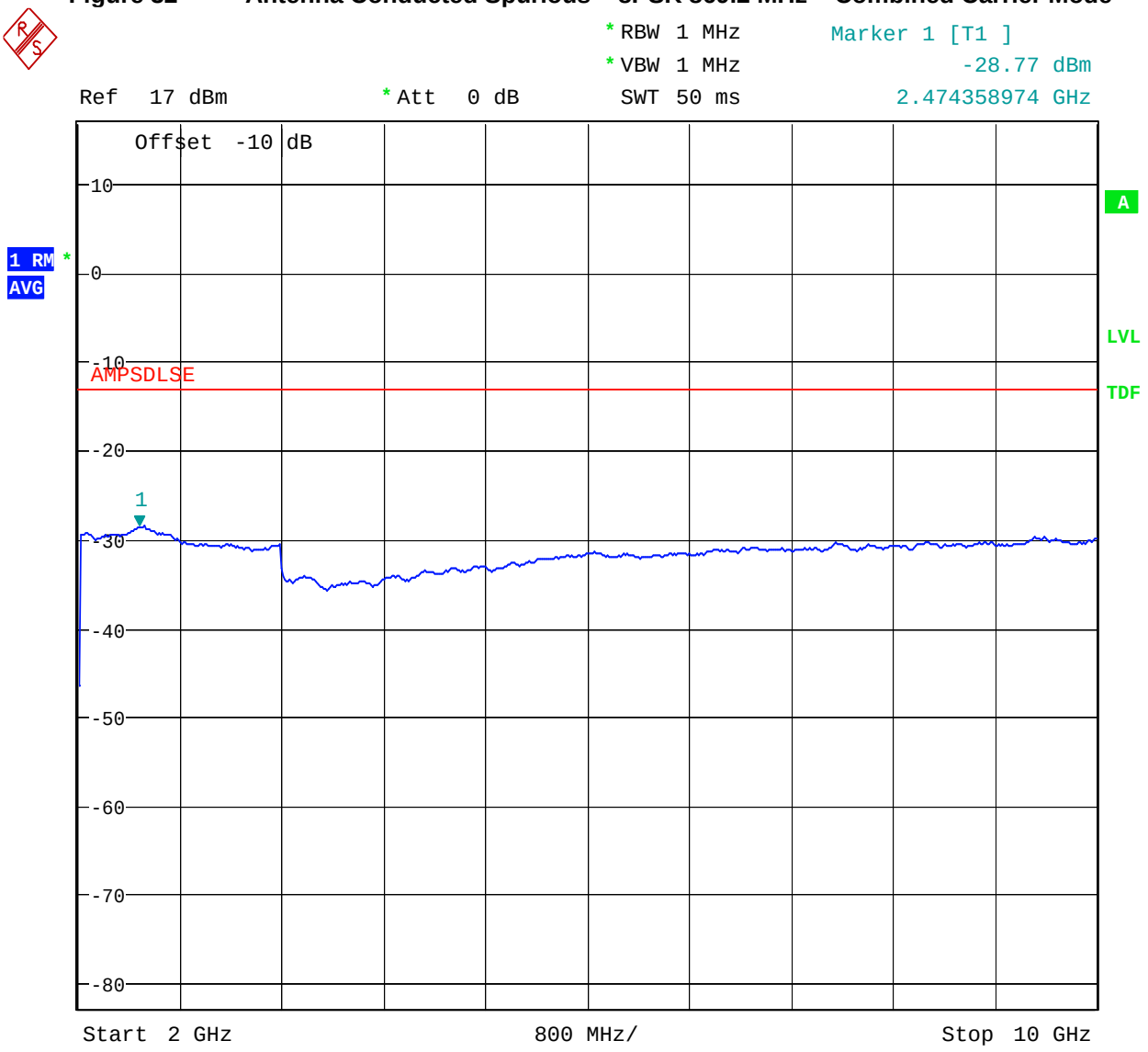
Date: 28.FEB.2007 00:27:32

Figure 31 Antenna Conducted Spurious – 8PSK 869.2 MHz – Combined Carrier Mode



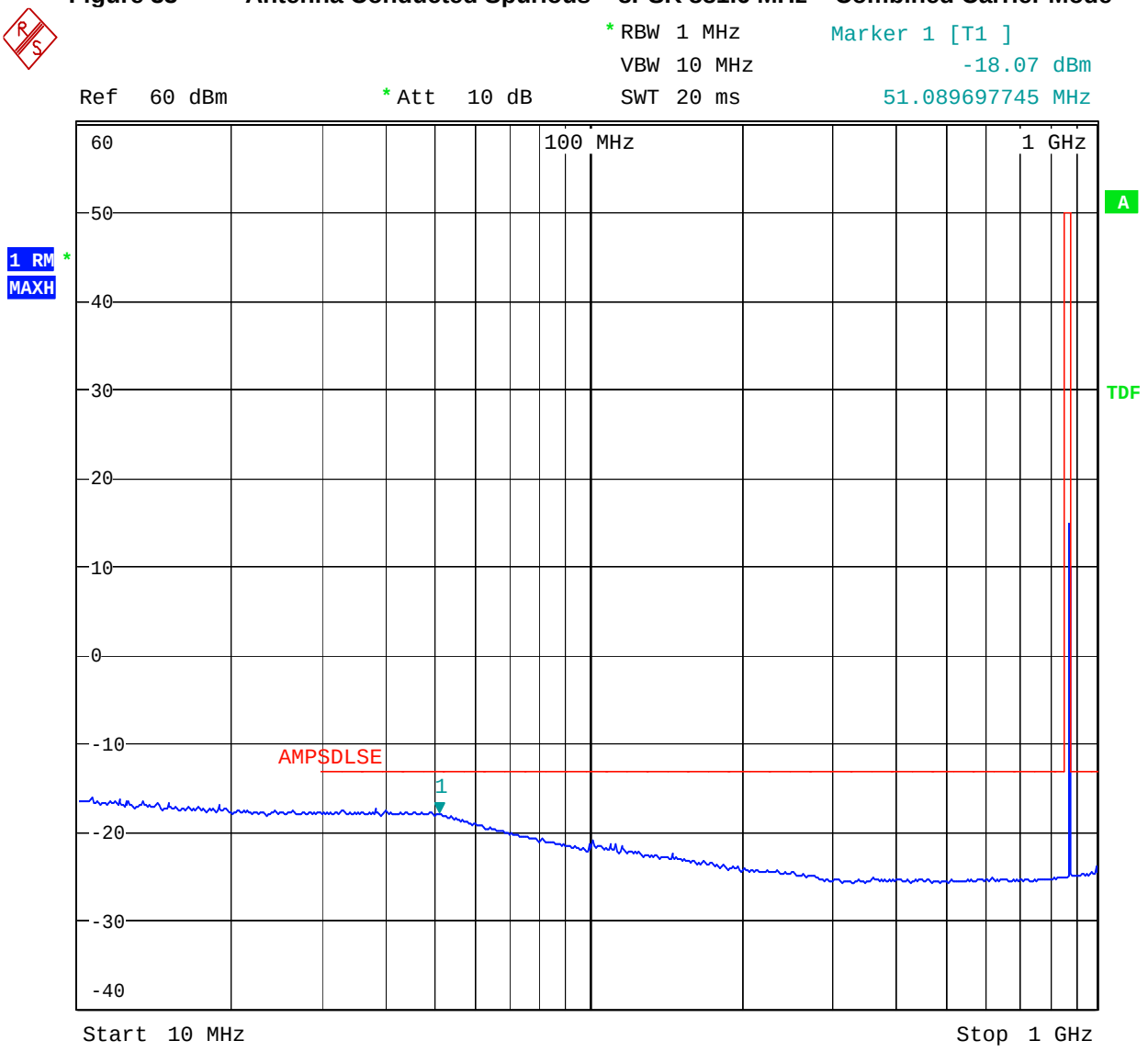
Date: 28.FEB.2007 15:57:54

Figure 32 Antenna Conducted Spurious – 8PSK 869.2 MHz – Combined Carrier Mode



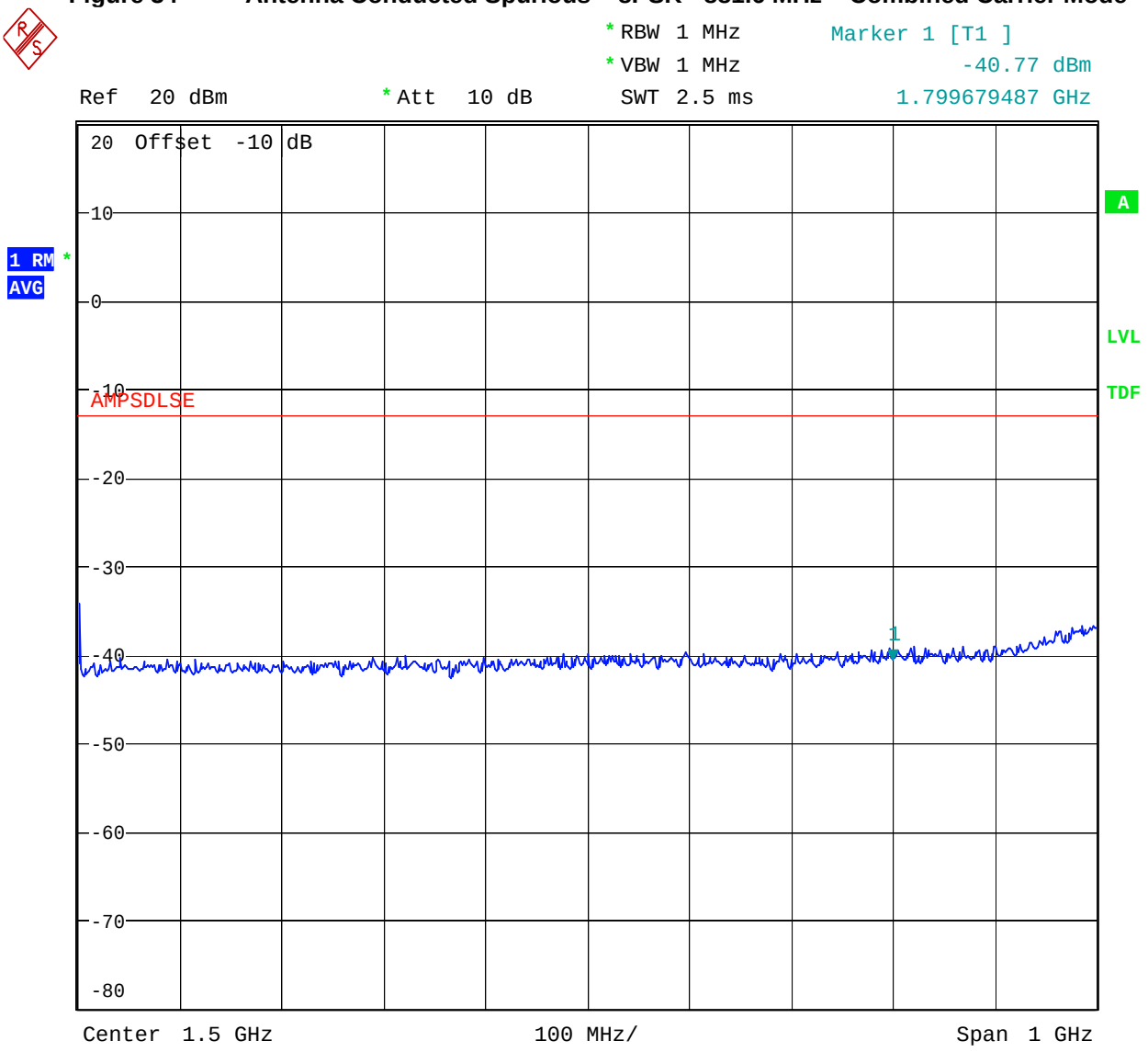
Date: 28.FEB.2007 15:59:55

Figure 33 Antenna Conducted Spurious – 8PSK 881.6 MHz – Combined Carrier Mode



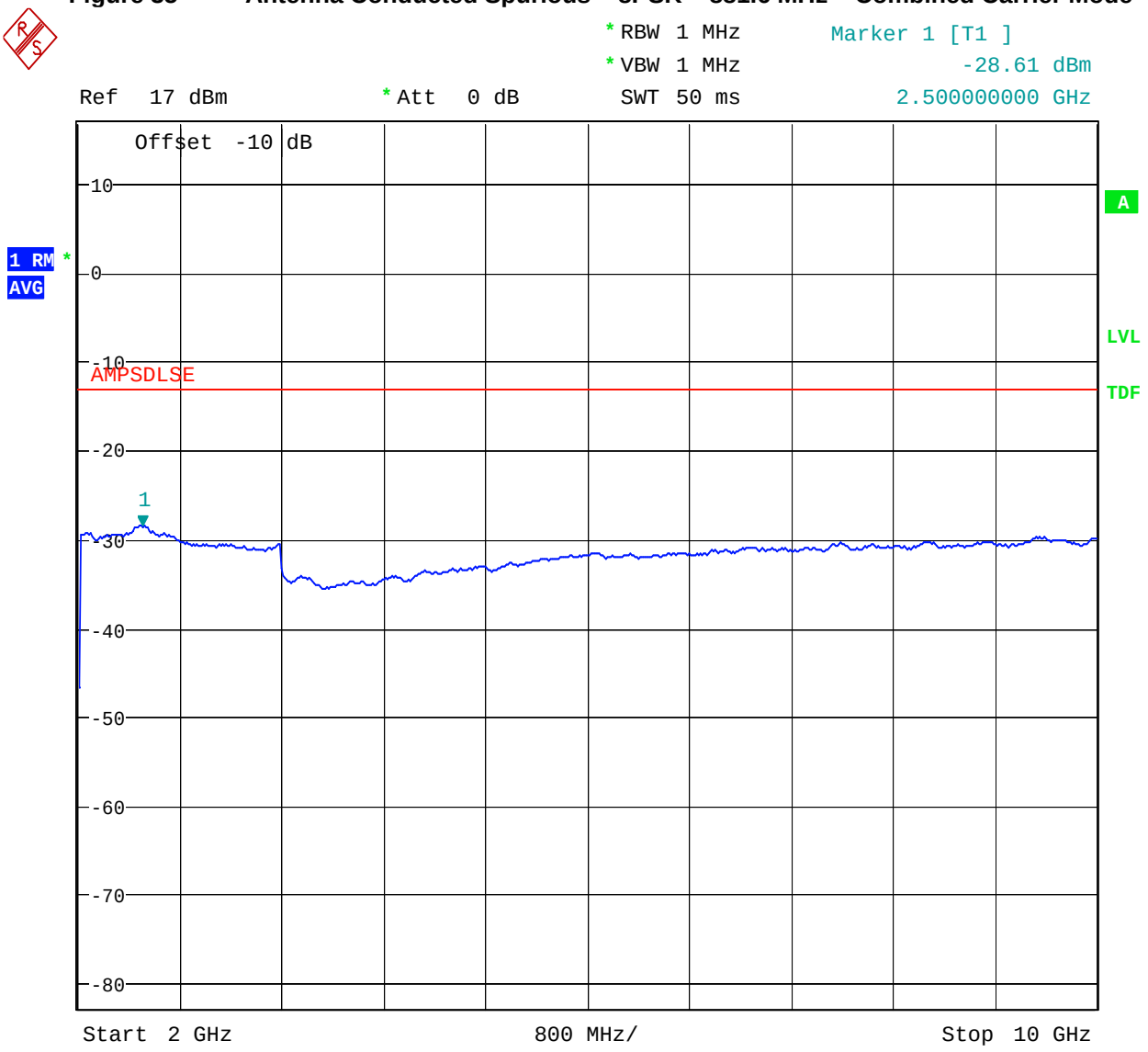
Date: 28.FEB.2007 00:24:06

Figure 34 Antenna Conducted Spurious – 8PSK - 881.6 MHz – Combined Carrier Mode



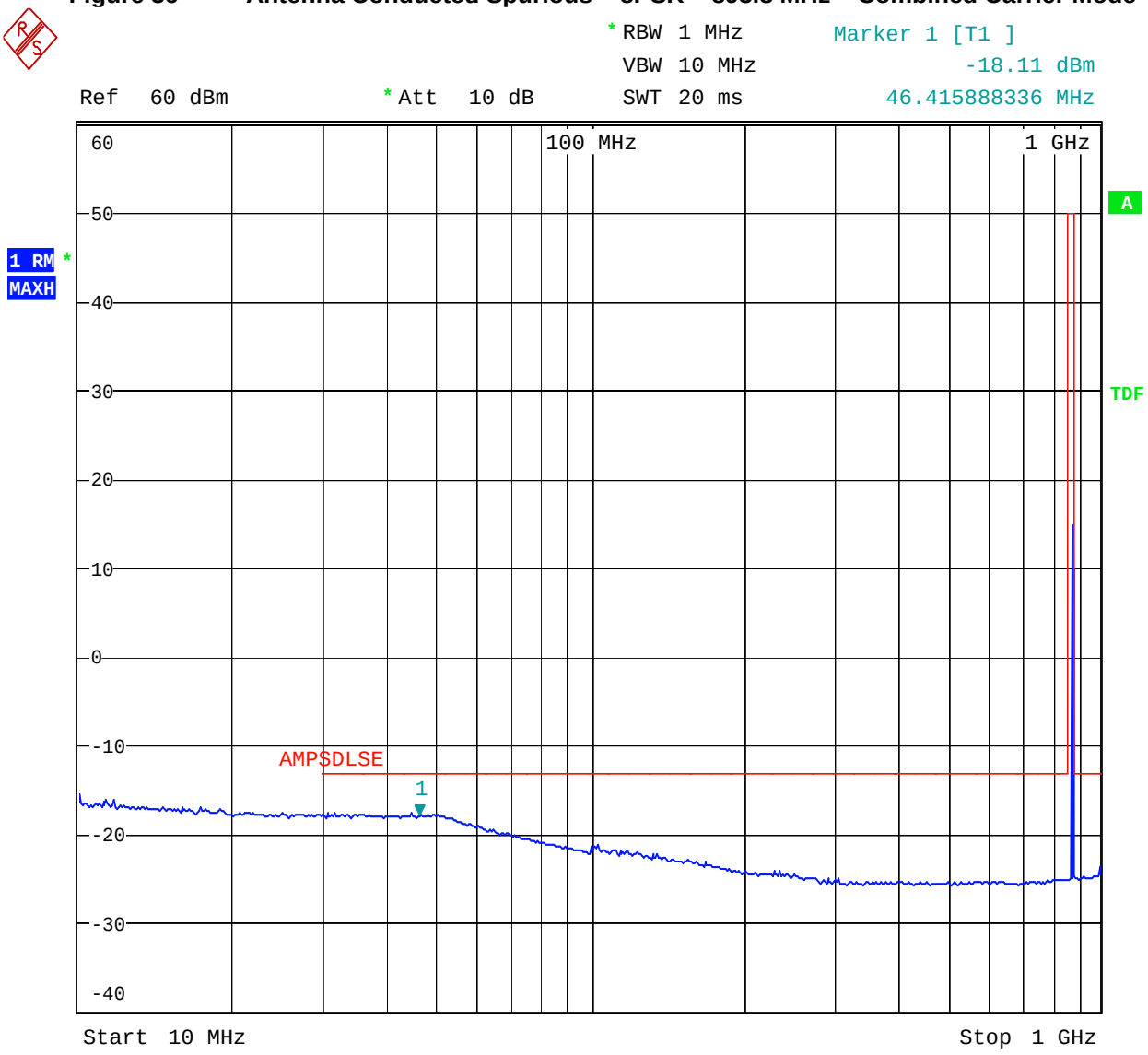
Date: 28.FEB.2007 16:09:39

Figure 35 Antenna Conducted Spurious – 8PSK – 881.6 MHz – Combined Carrier Mode



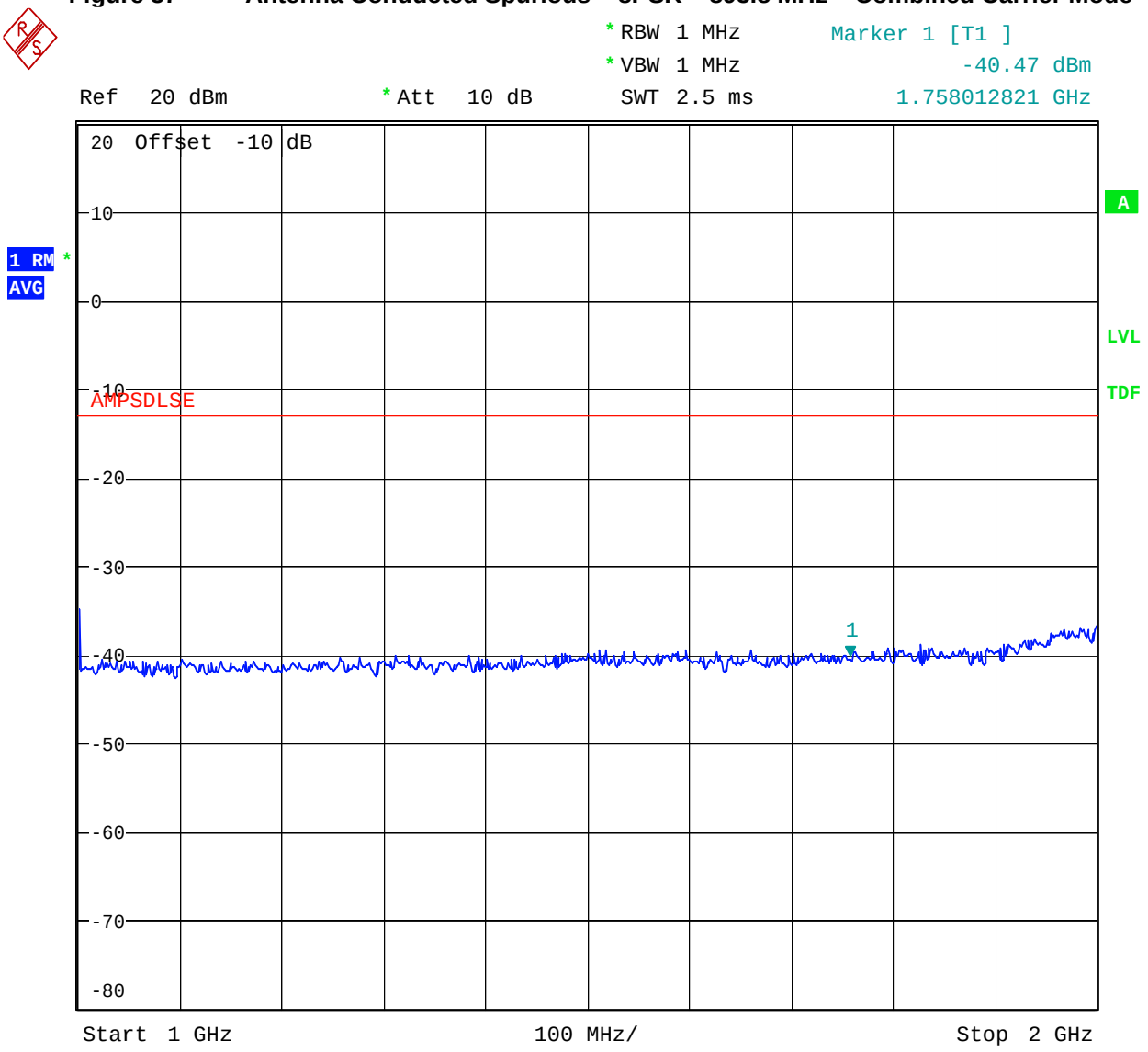
Date: 28.FEB.2007 16:06:01

Figure 36 Antenna Conducted Spurious – 8PSK – 893.8 MHz – Combined Carrier Mode



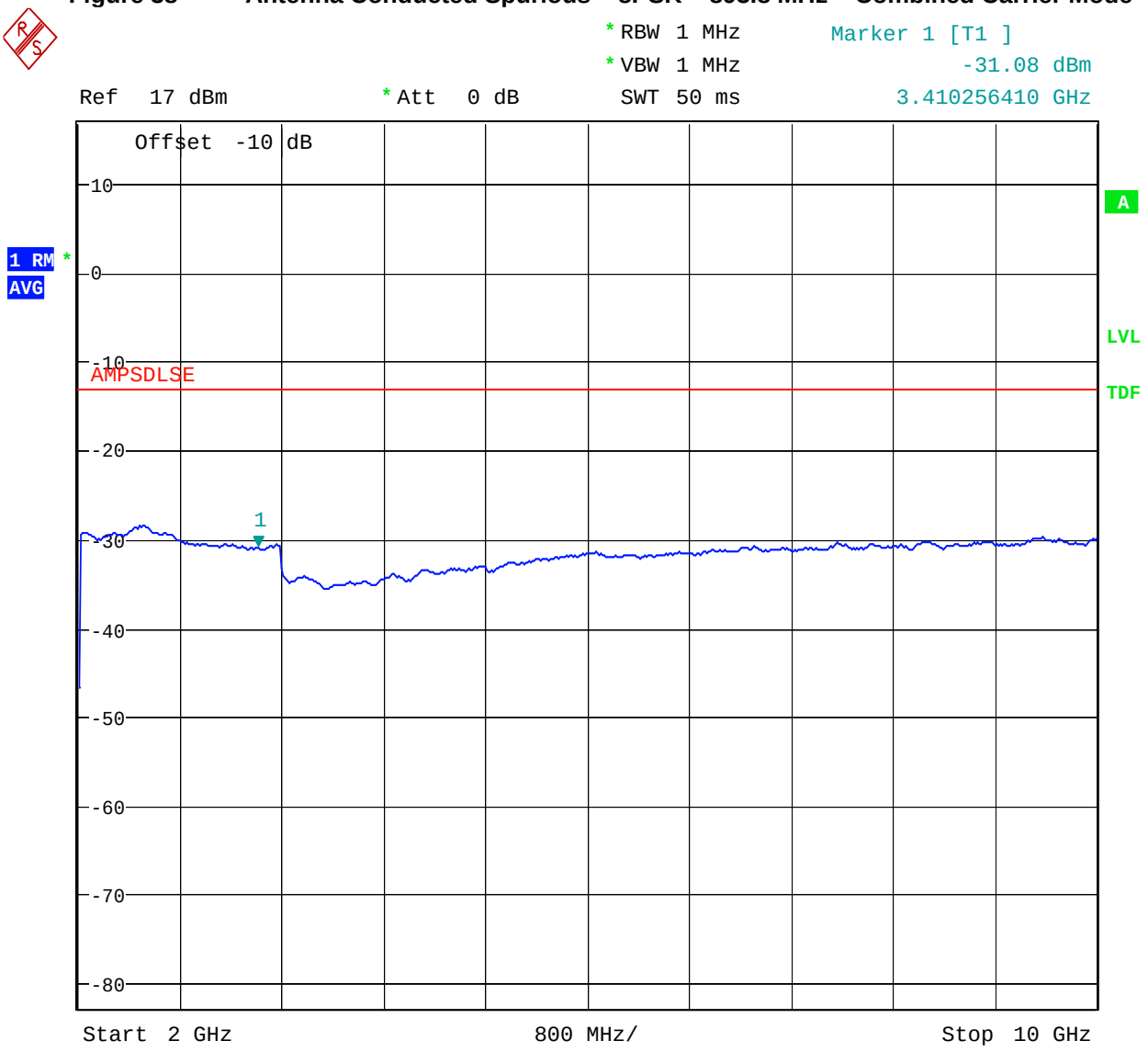
Date: 28.FEB.2007 00:23:24

Figure 37 Antenna Conducted Spurious – 8PSK – 893.8 MHz – Combined Carrier Mode



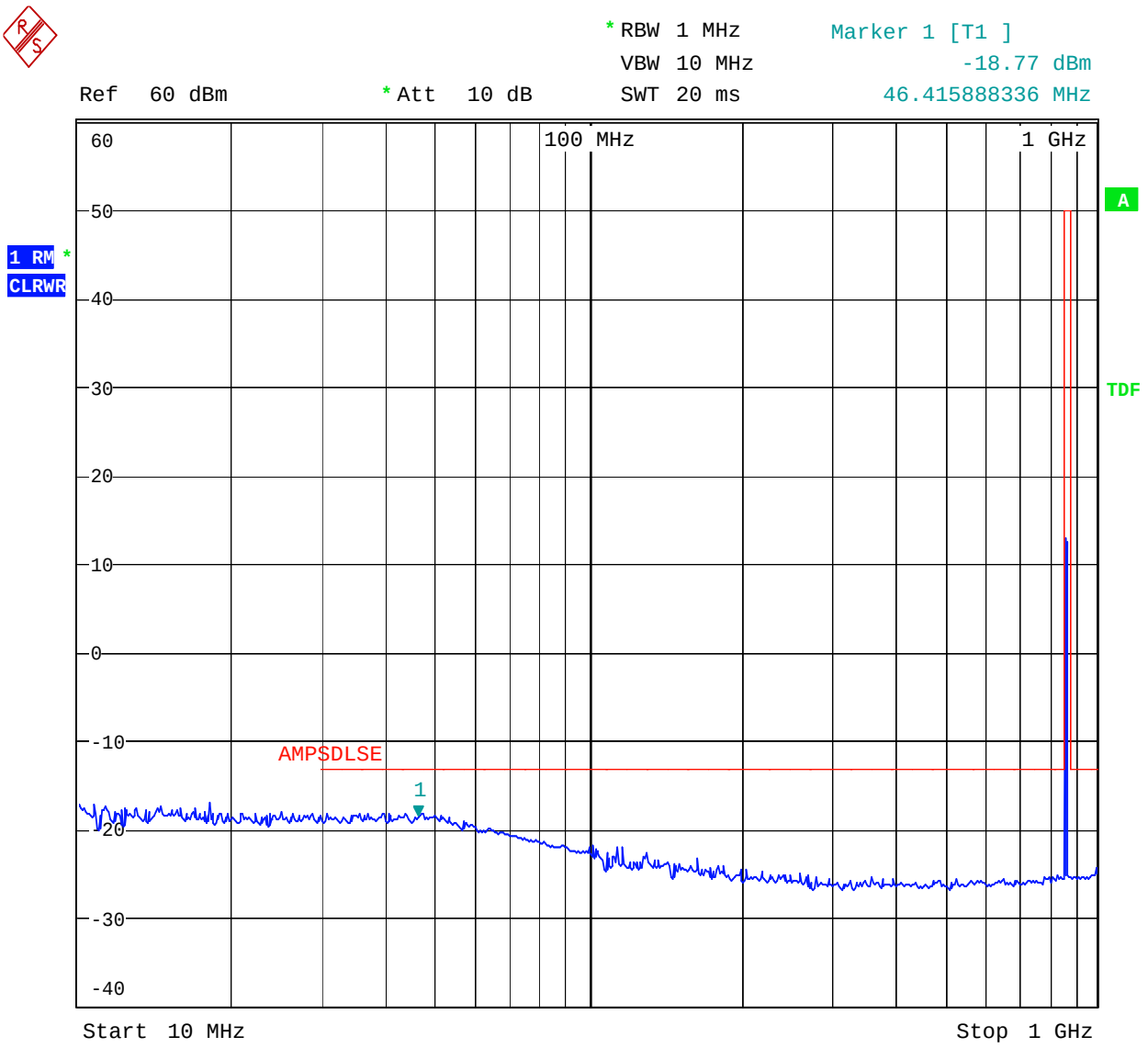
Date: 28.FEB.2007 16:13:02

Figure 38 Antenna Conducted Spurious – 8PSK – 893.8 MHz – Combined Carrier Mode



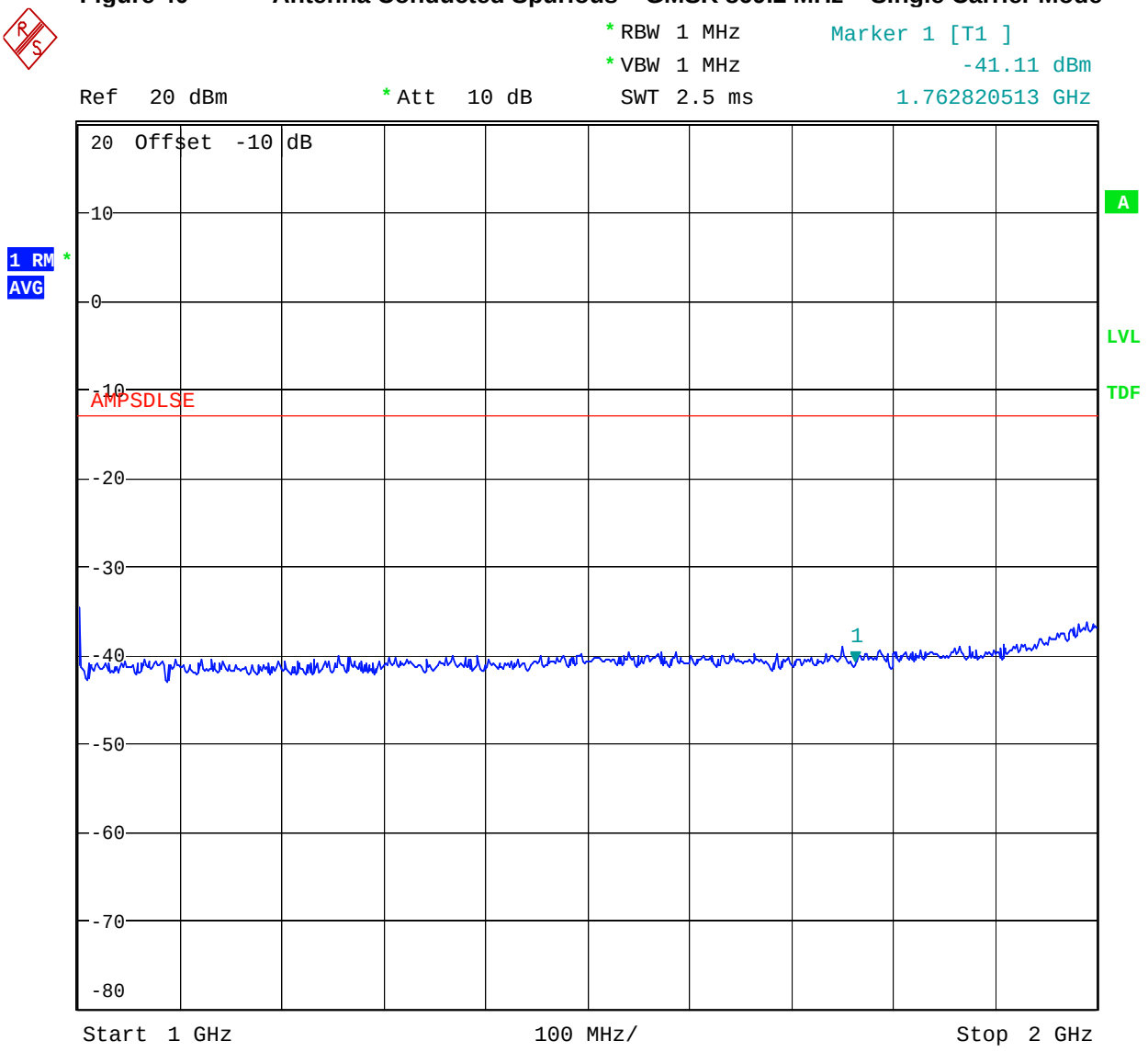
Date: 28.FEB.2007 16:23:40

Figure 39 Antenna Conducted Spurious – GMSK 869.2 MHz – Single Carrier Mode



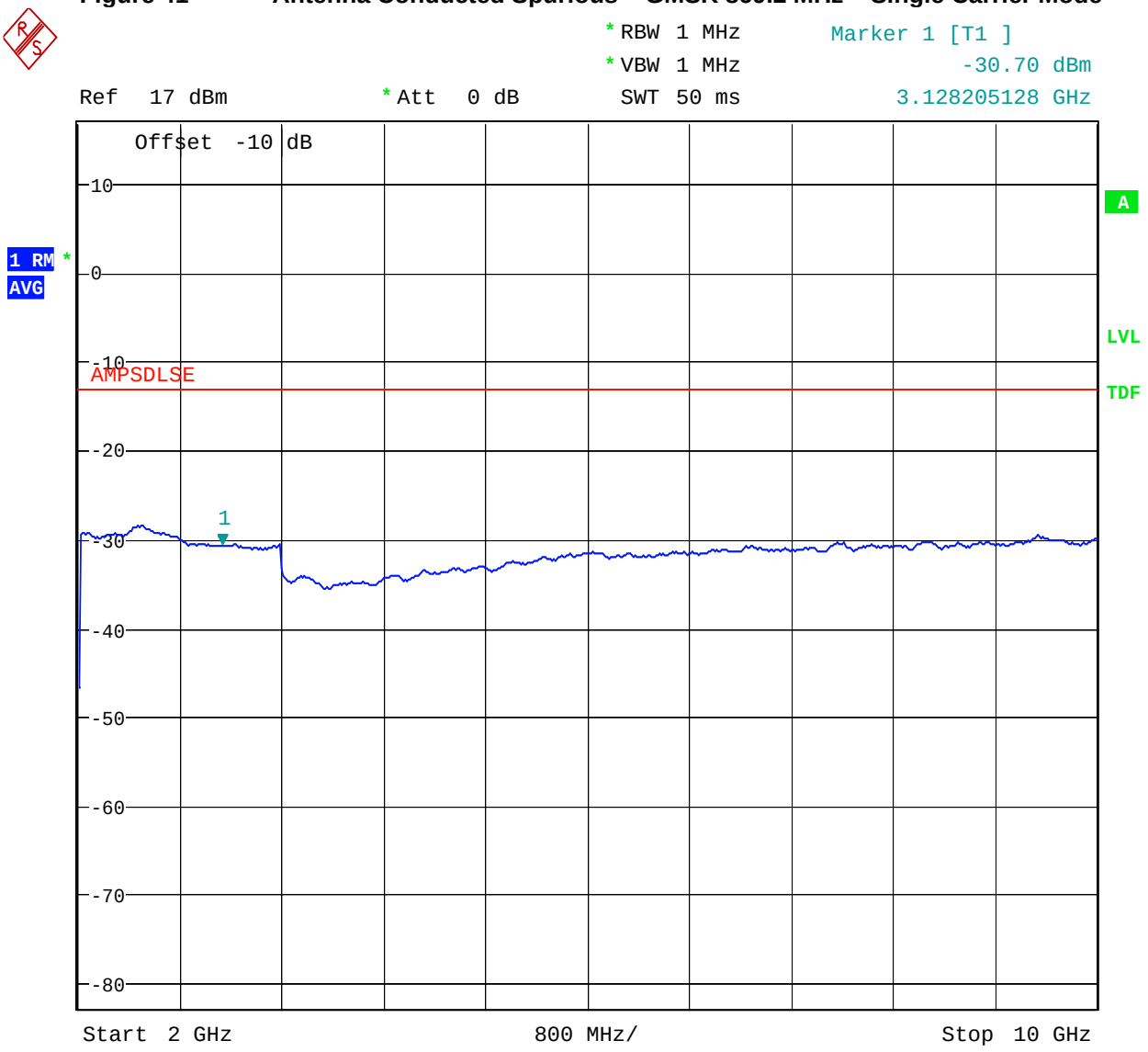
Date: 28.FEB.2007 17:08:19

Figure 40 Antenna Conducted Spurious – GMSK 869.2 MHz – Single Carrier Mode



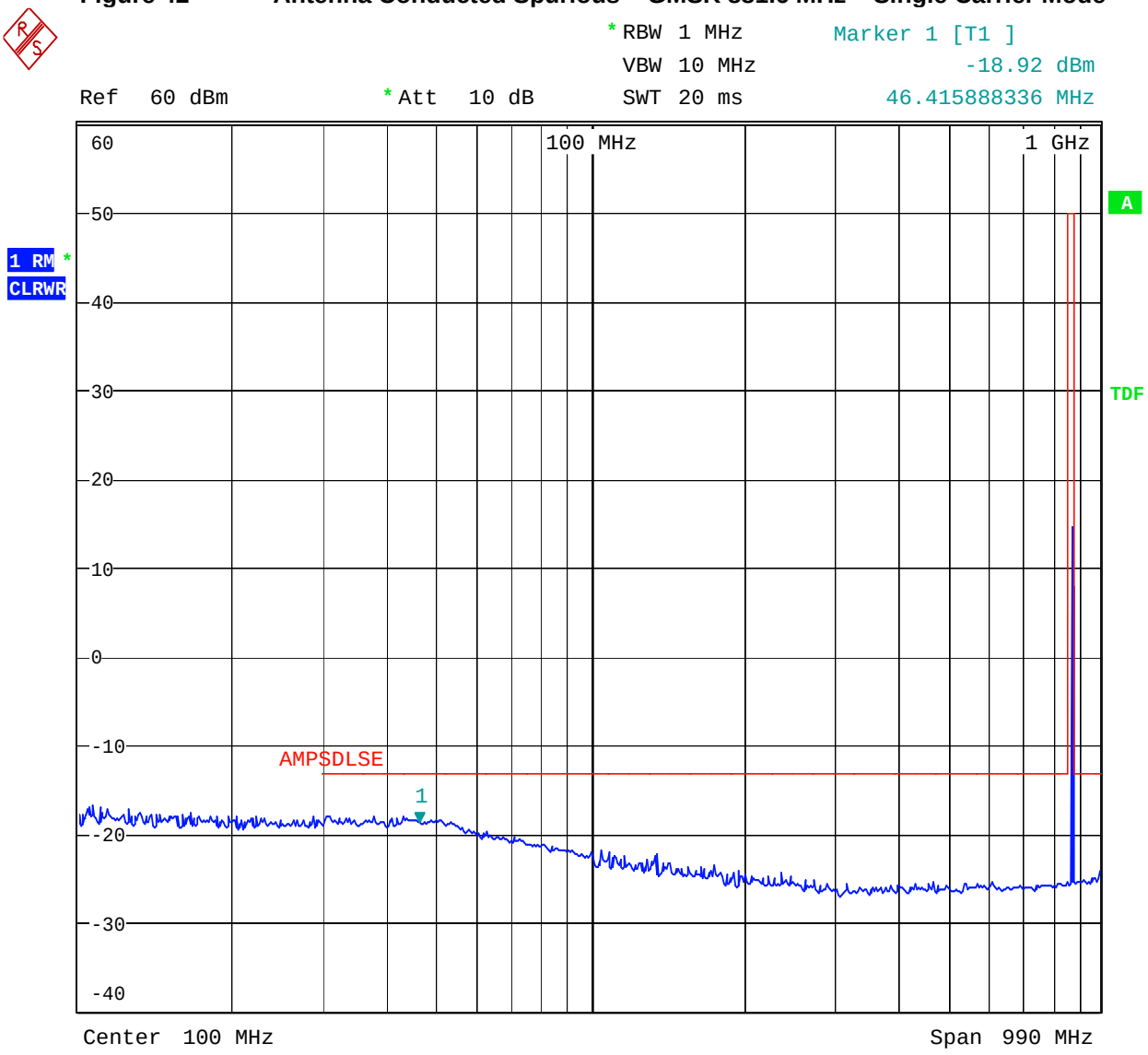
Date: 28.FEB.2007 17:13:11

Figure 41 Antenna Conducted Spurious – GMSK 869.2 MHz – Single Carrier Mode



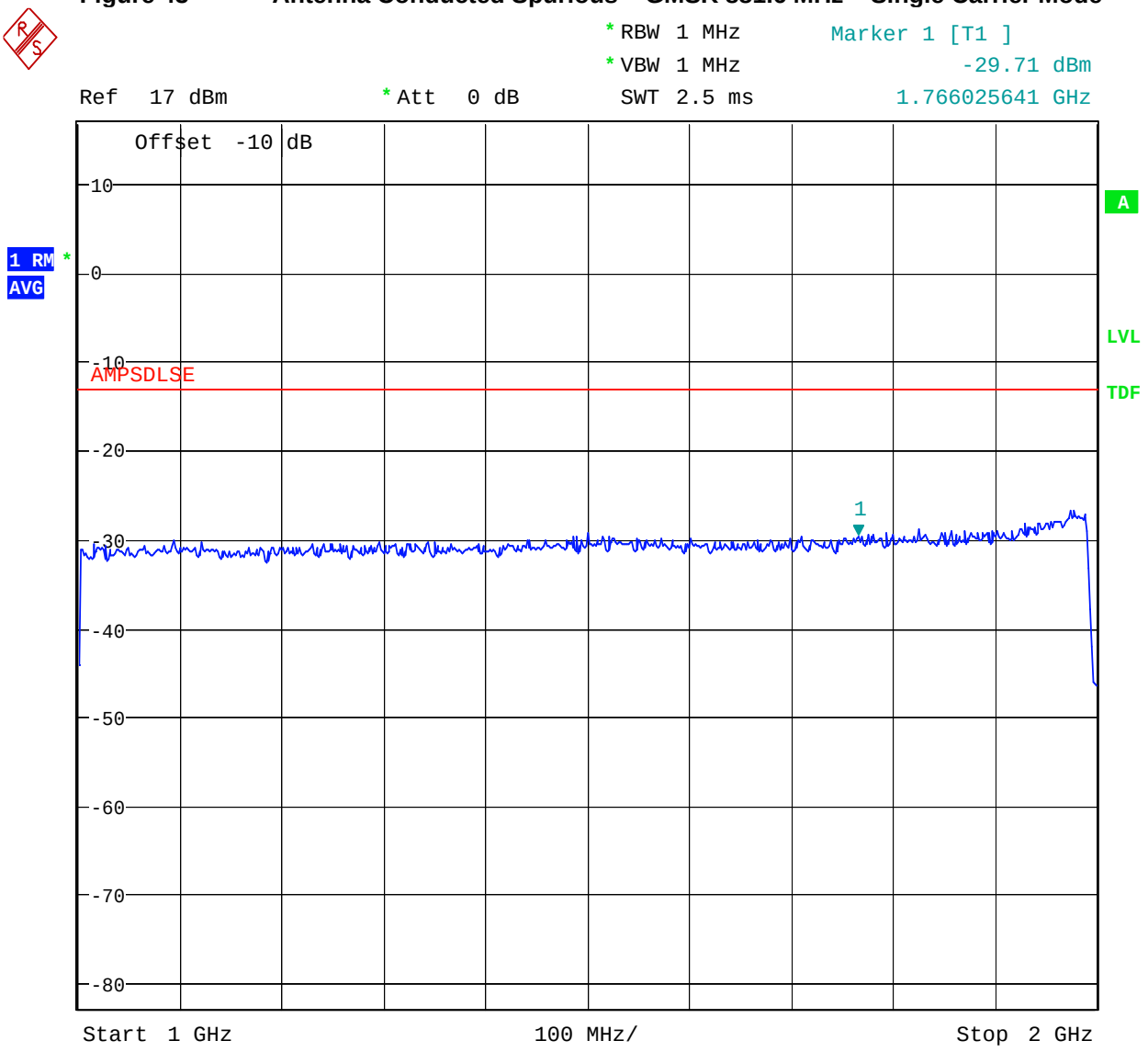
Date: 28.FEB.2007 17:14:56

Figure 42 Antenna Conducted Spurious – GMSK 881.6 MHz – Single Carrier Mode



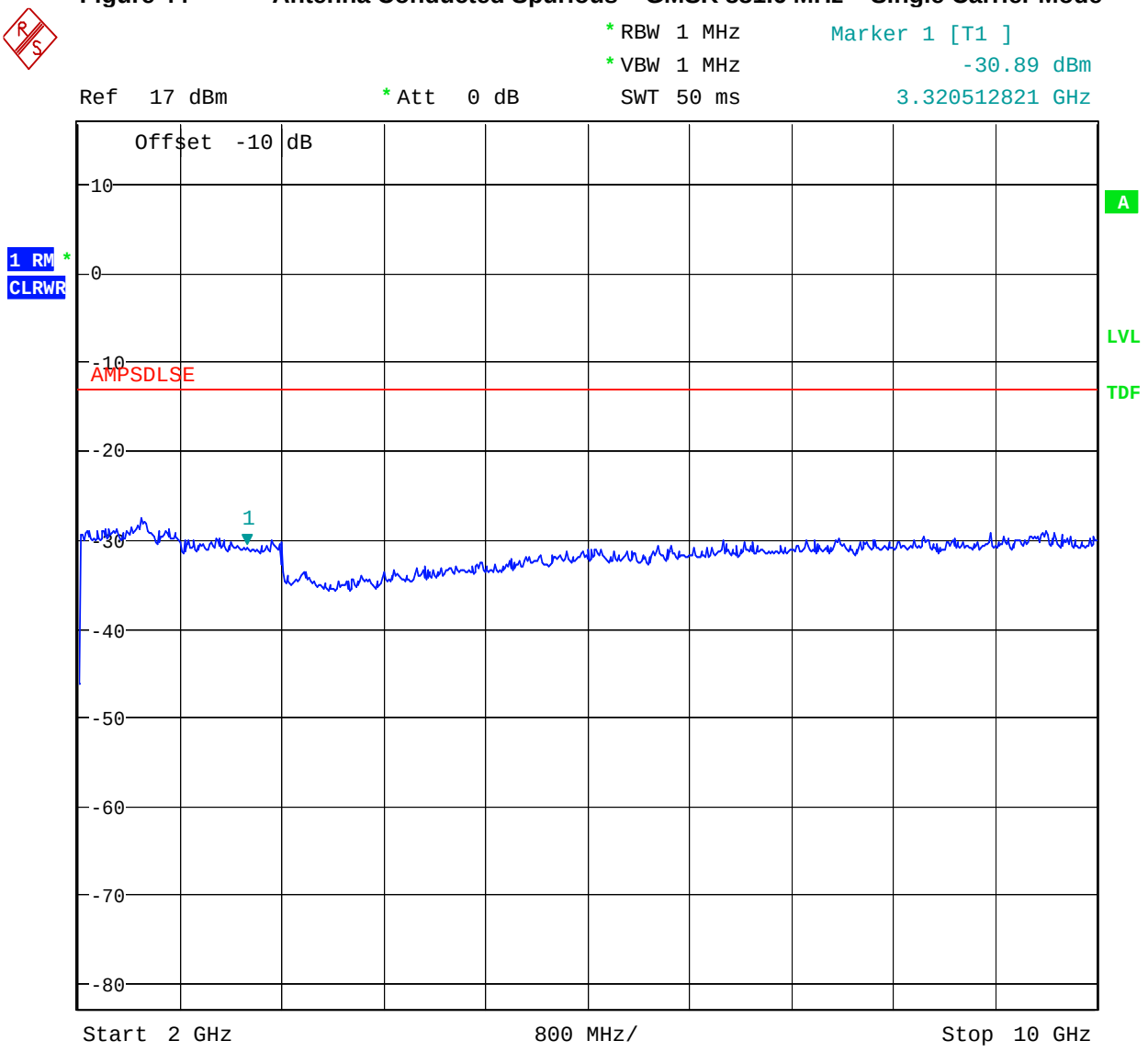
Date: 28.FEB.2007 17:22:31

Figure 43 Antenna Conducted Spurious – GMSK 881.6 MHz – Single Carrier Mode



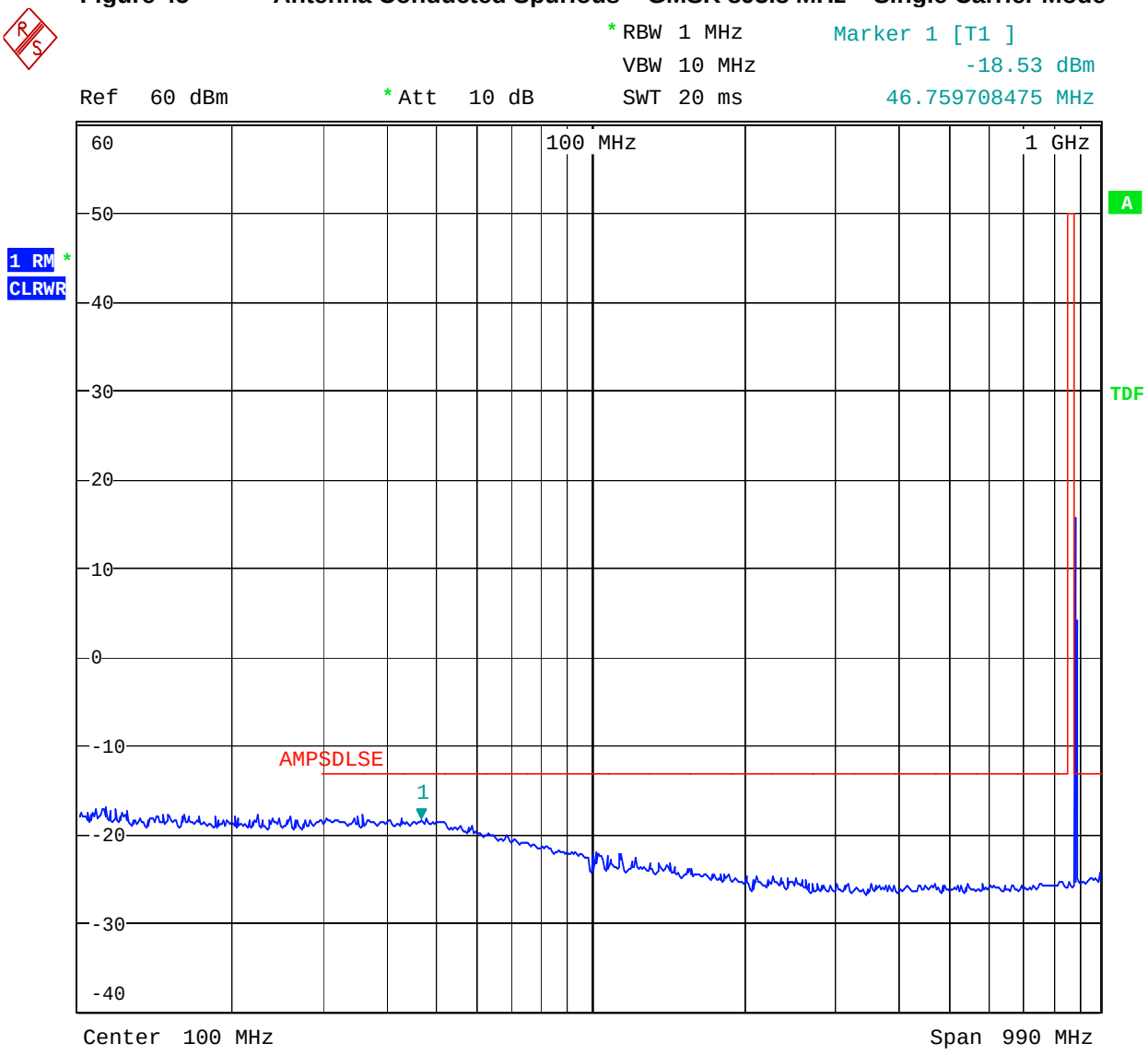
Date: 28.FEB.2007 17:27:15

Figure 44 Antenna Conducted Spurious – GMSK 881.6 MHz – Single Carrier Mode



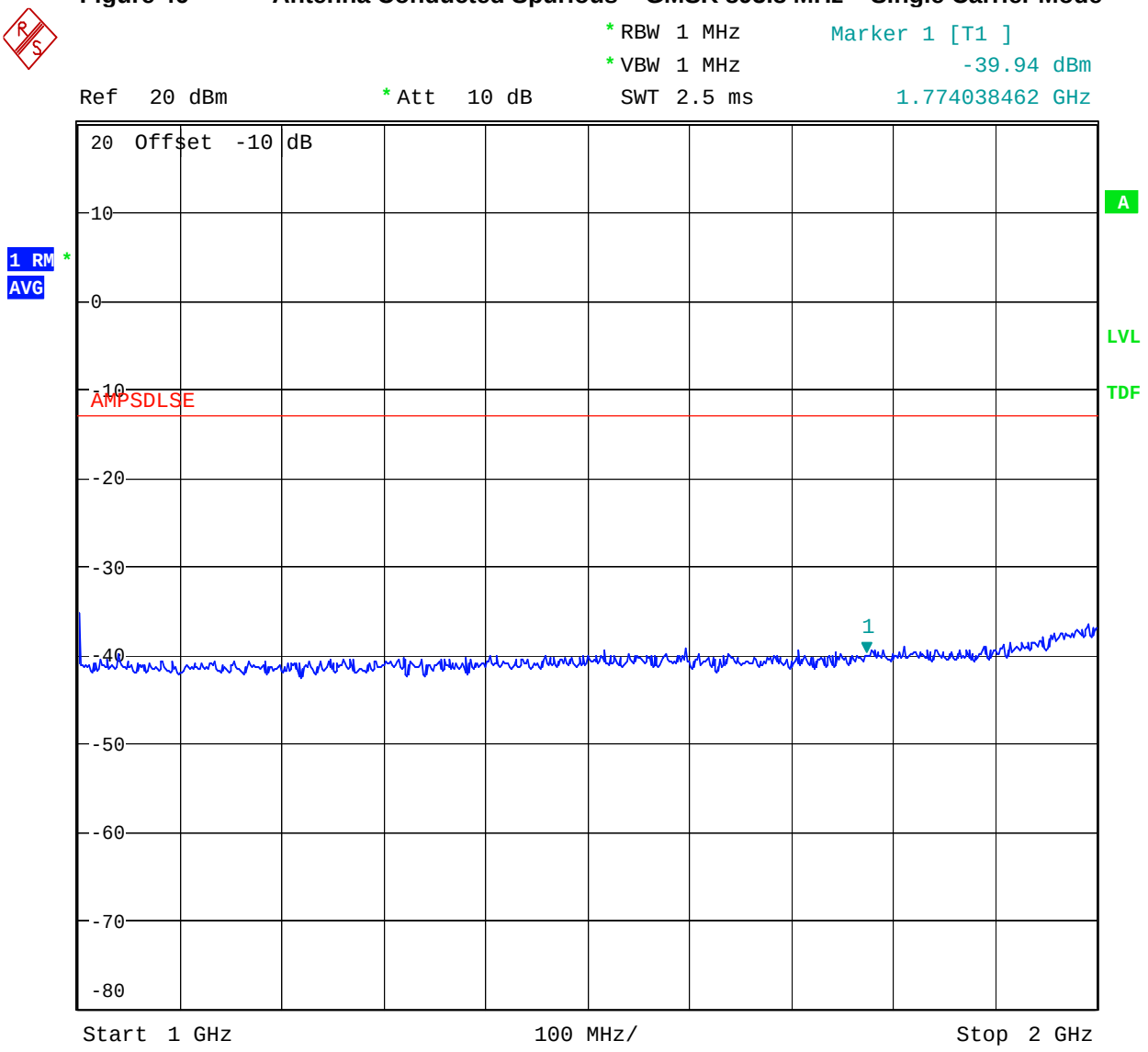
Date: 28.FEB.2007 17:25:08

Figure 45 Antenna Conducted Spurious – GMSK 893.8 MHz – Single Carrier Mode



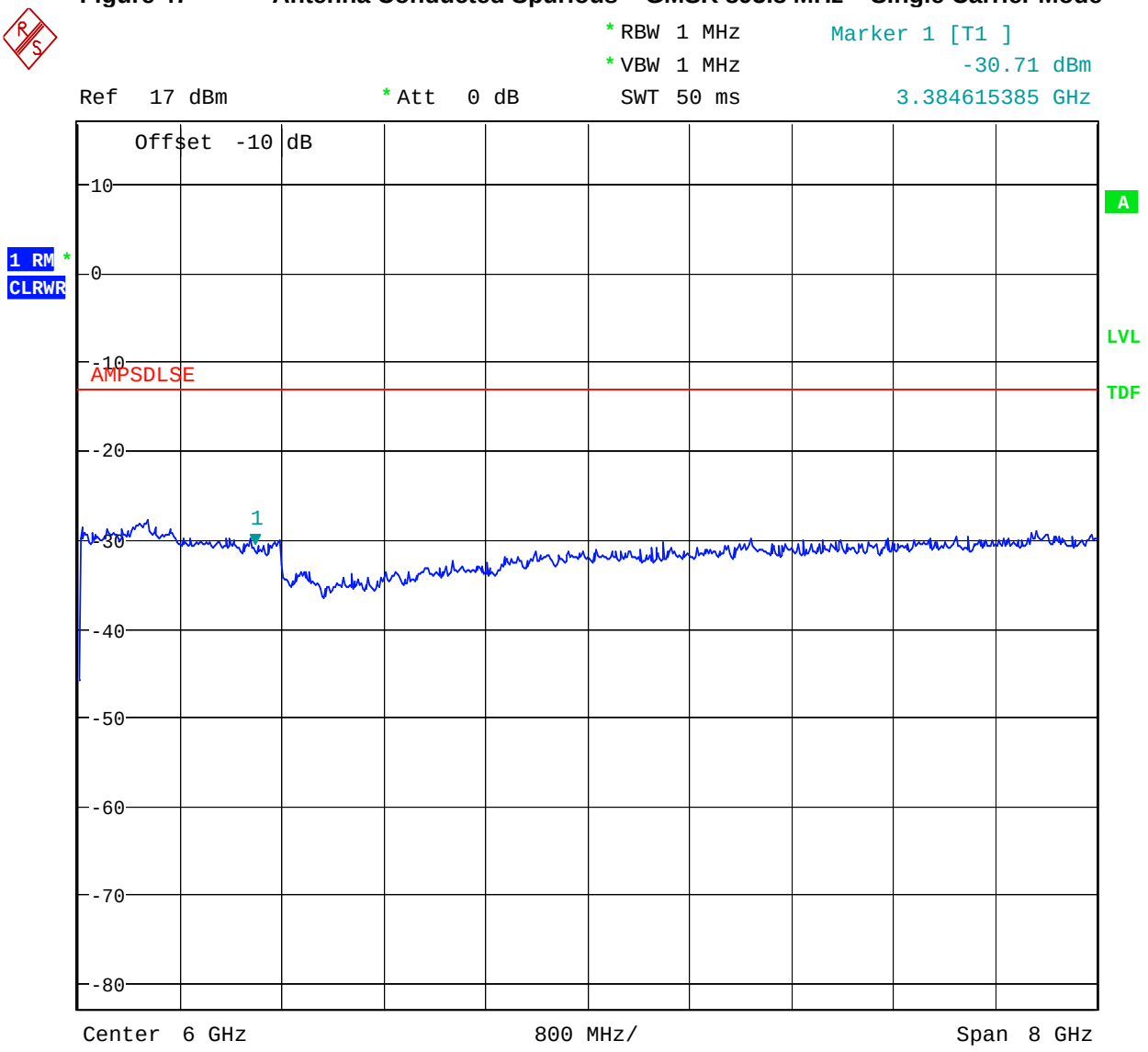
Date: 28.FEB.2007 17:38:57

Figure 46 Antenna Conducted Spurious – GMSK 893.8 MHz – Single Carrier Mode



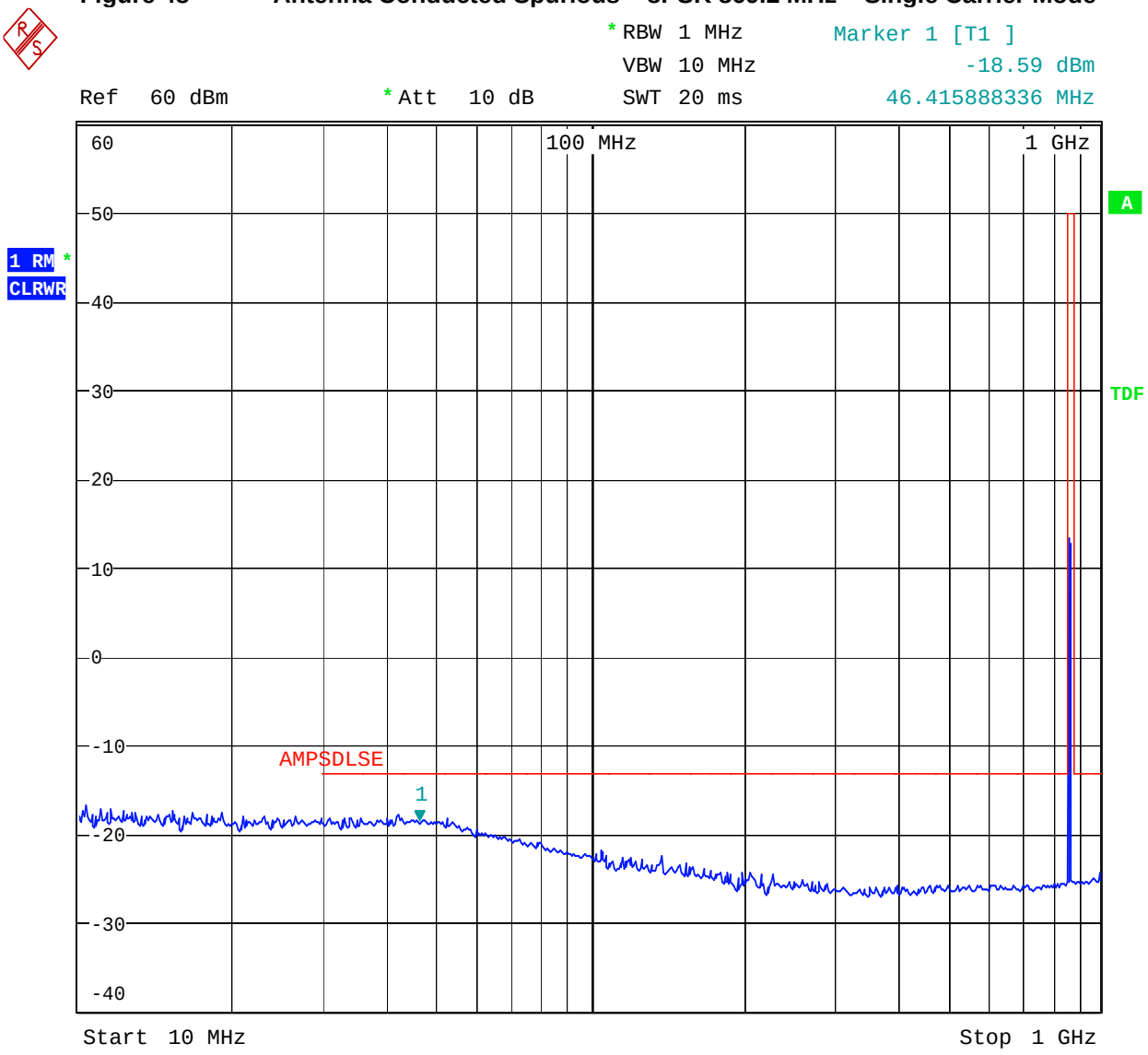
Date: 28.FEB.2007 17:41:45

Figure 47 Antenna Conducted Spurious – GMSK 893.8 MHz – Single Carrier Mode



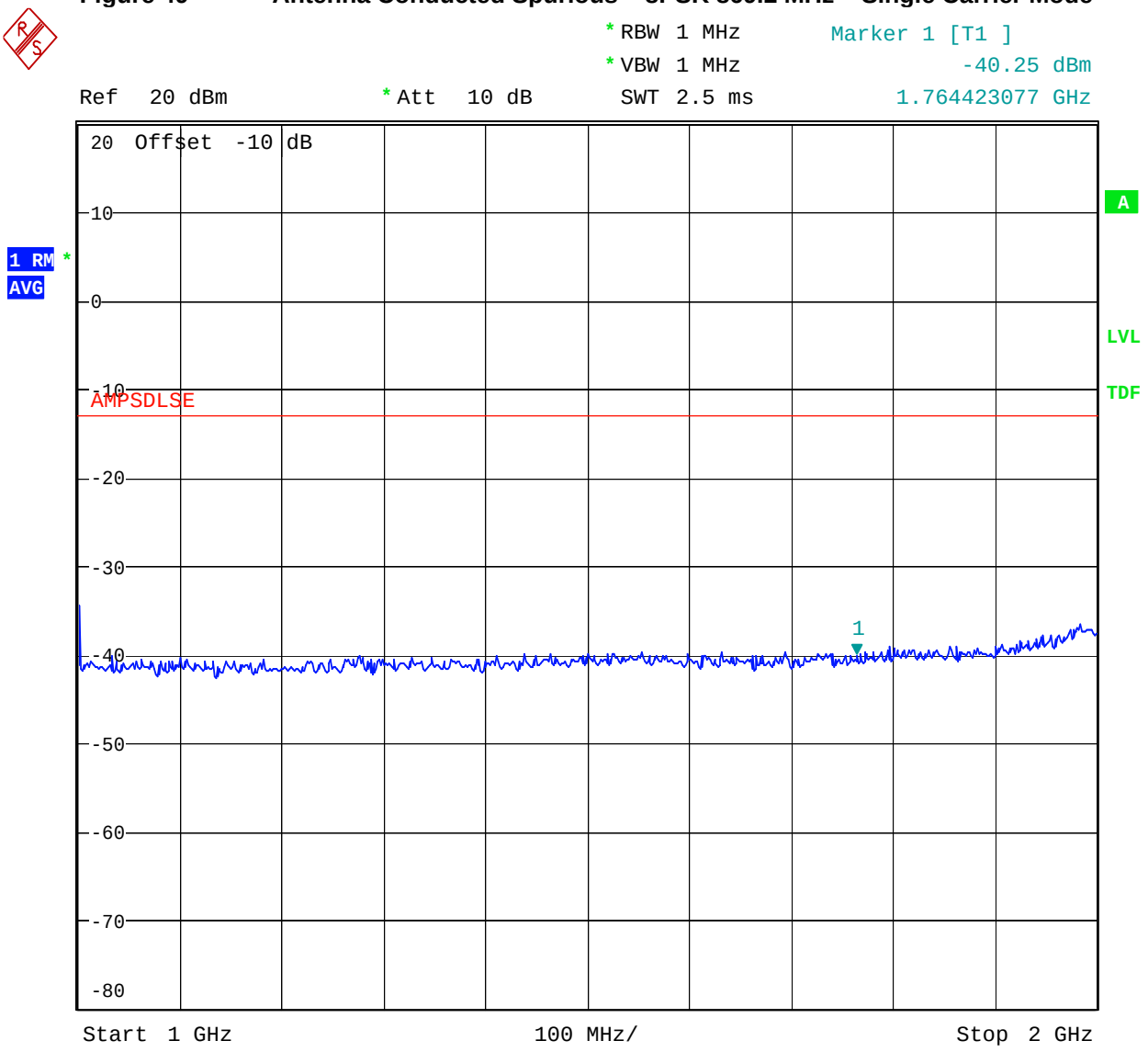
Date: 28.FEB.2007 17:42:44

Figure 48 Antenna Conducted Spurious – 8PSK 869.2 MHz – Single Carrier Mode



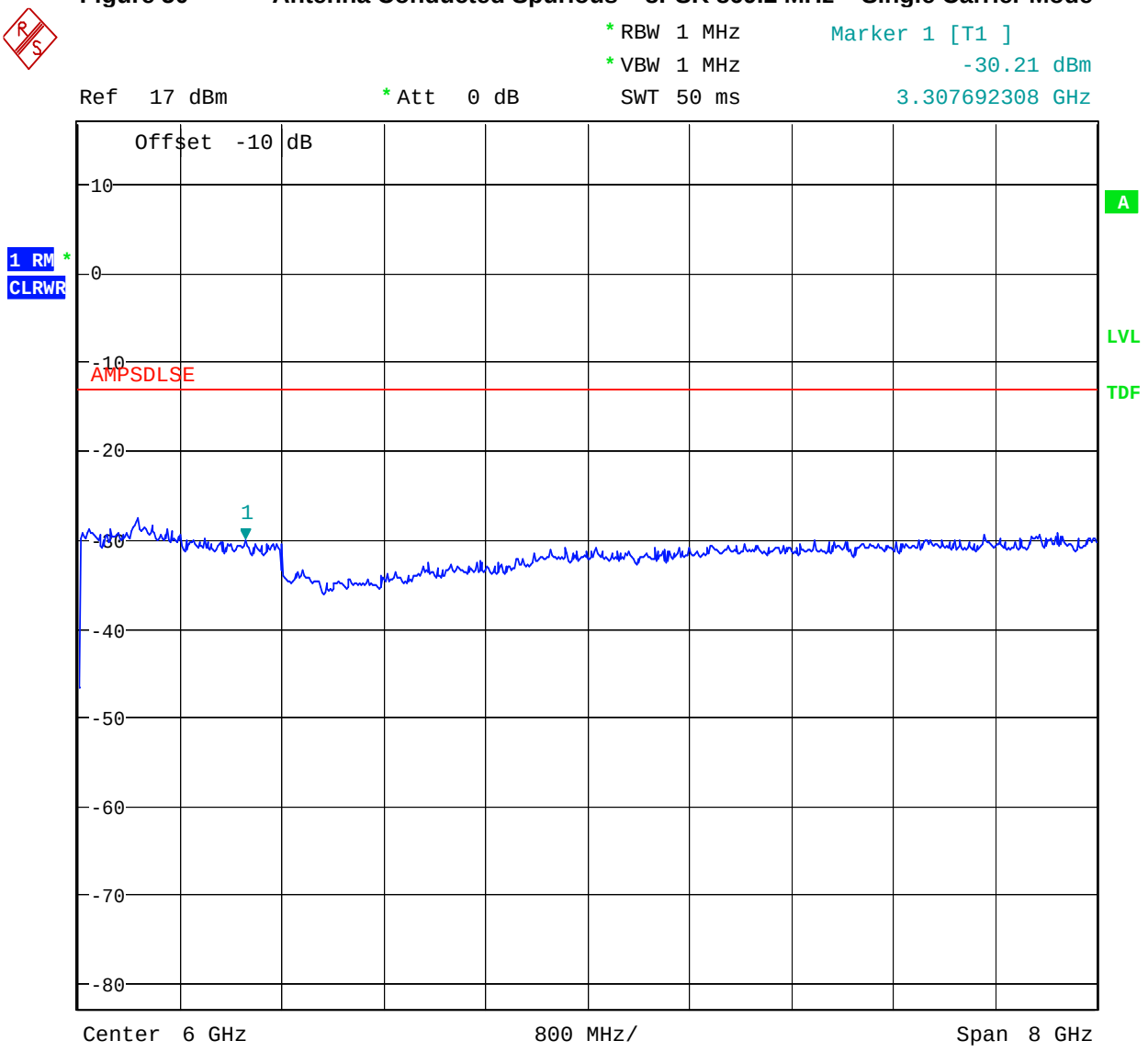
Date: 28.FEB.2007 18:08:51

Figure 49 Antenna Conducted Spurious – 8PSK 869.2 MHz – Single Carrier Mode



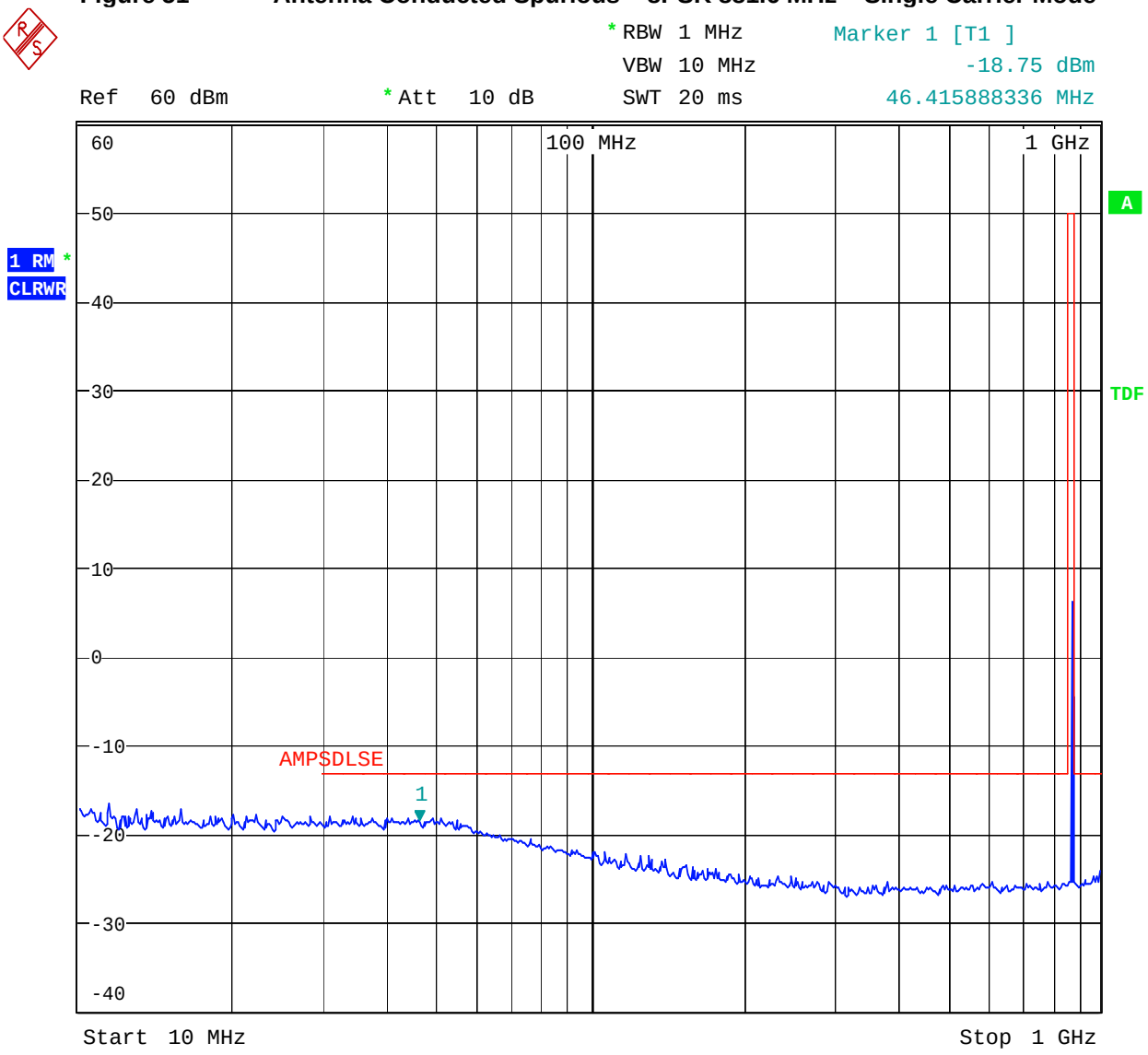
Date: 28.FEB.2007 18:10:41

Figure 50 Antenna Conducted Spurious – 8PSK 869.2 MHz – Single Carrier Mode



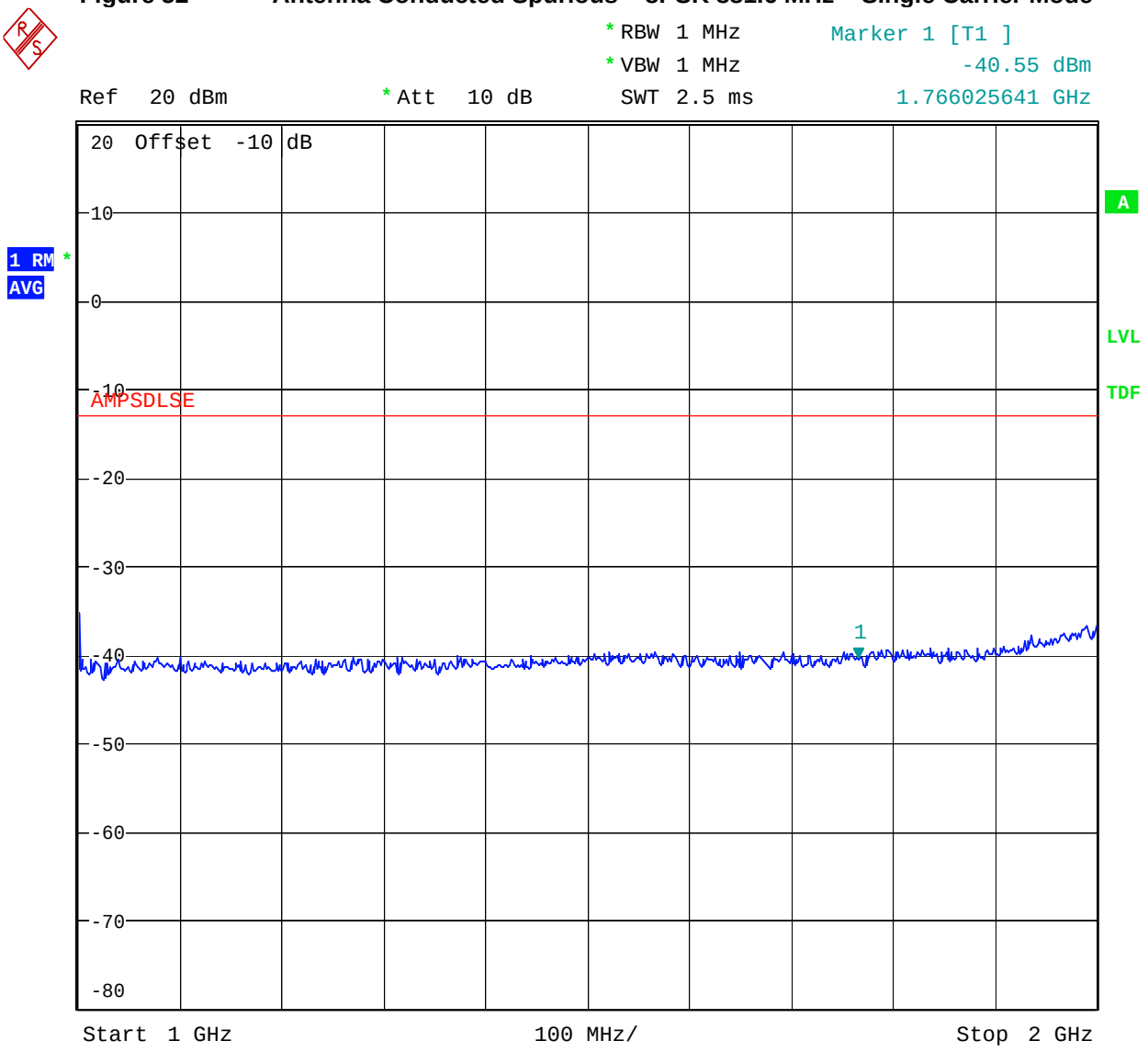
Date: 28.FEB.2007 18:11:41

Figure 51 Antenna Conducted Spurious – 8PSK 881.6 MHz – Single Carrier Mode



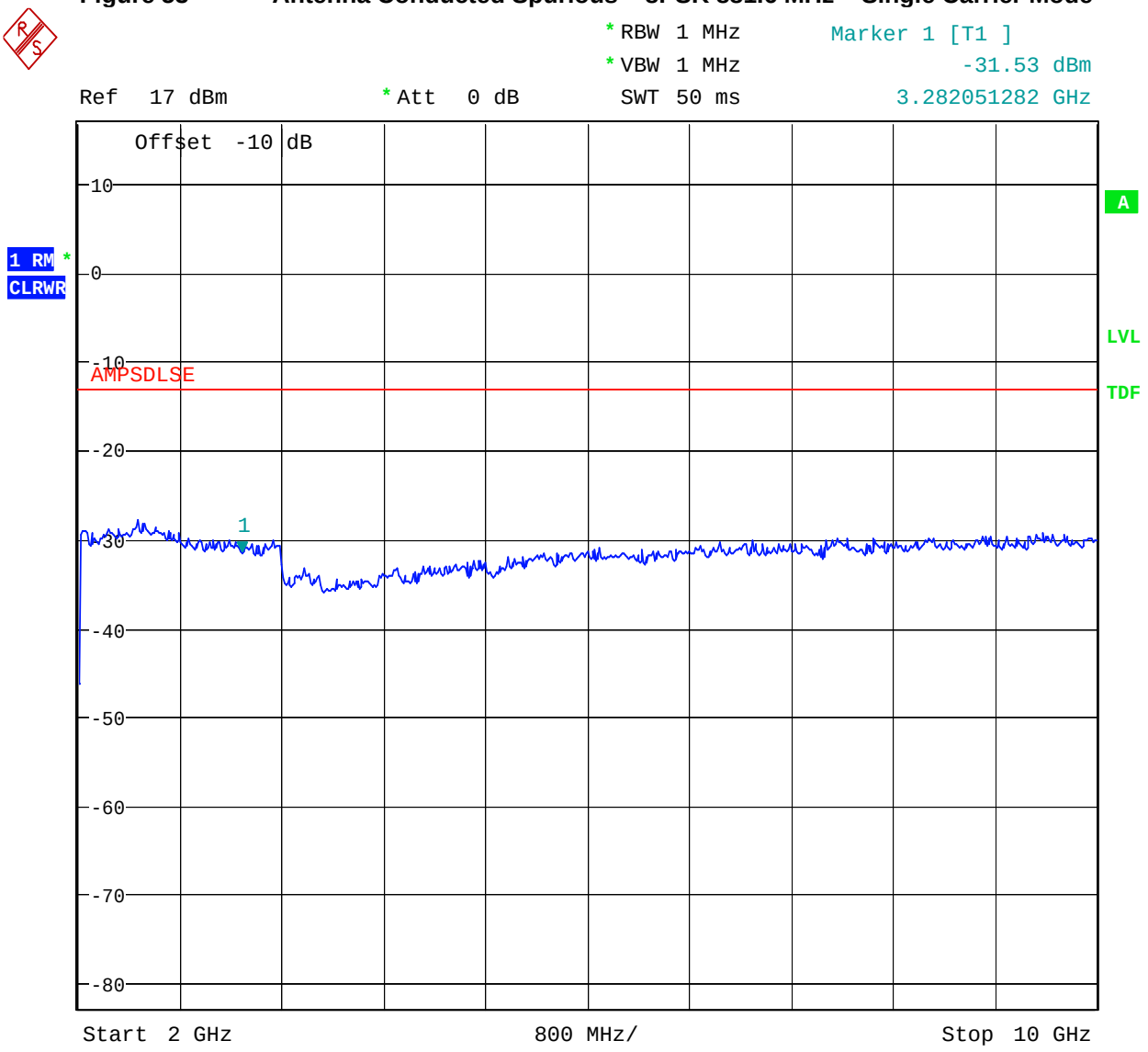
Date: 28.FEB.2007 19:24:00

Figure 52 Antenna Conducted Spurious – 8PSK 881.6 MHz – Single Carrier Mode



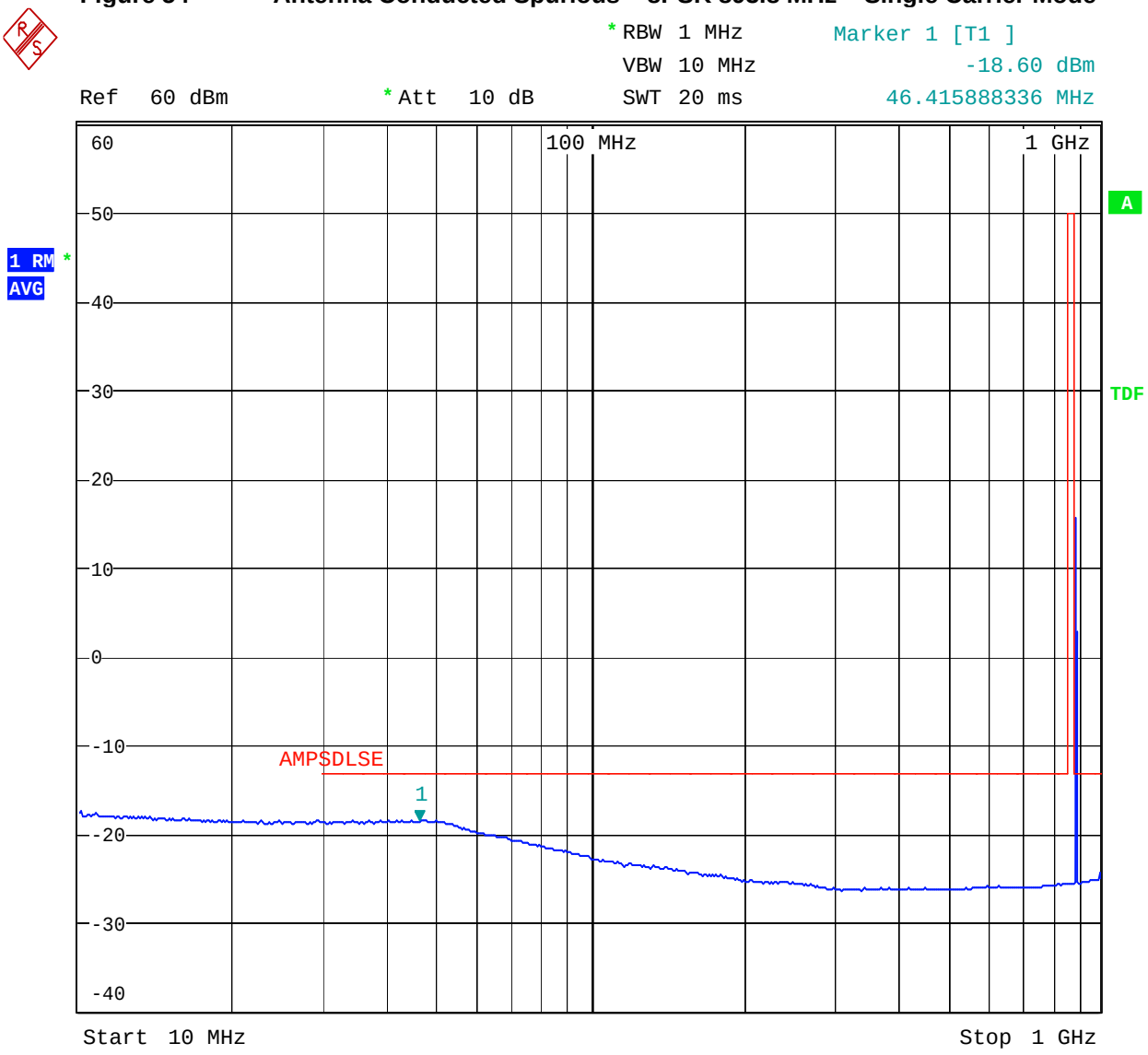
Date: 28.FEB.2007 19:22:48

Figure 53 Antenna Conducted Spurious – 8PSK 881.6 MHz – Single Carrier Mode



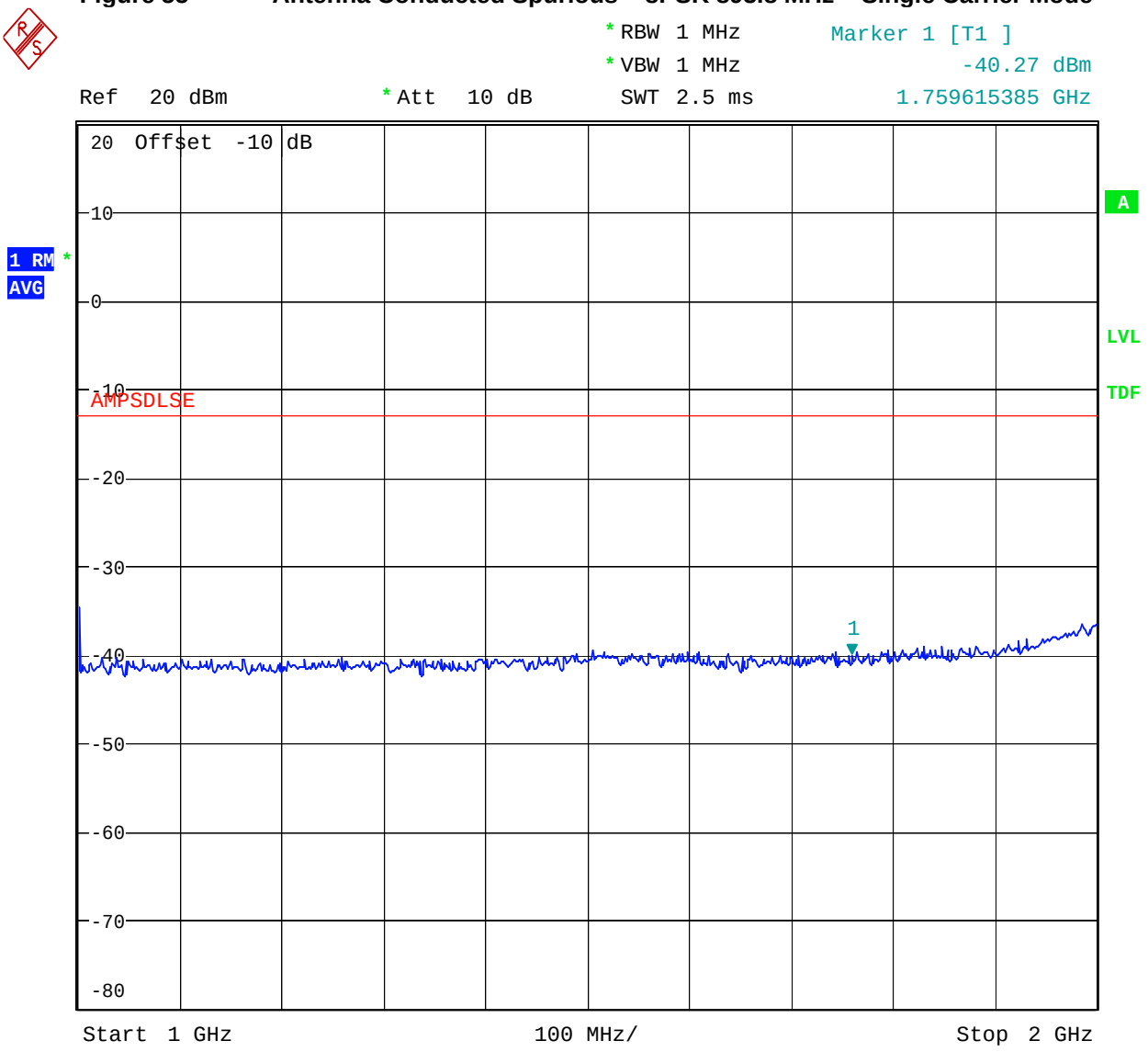
Date: 28.FEB.2007 19:20:49

Figure 54 Antenna Conducted Spurious – 8PSK 893.8 MHz – Single Carrier Mode



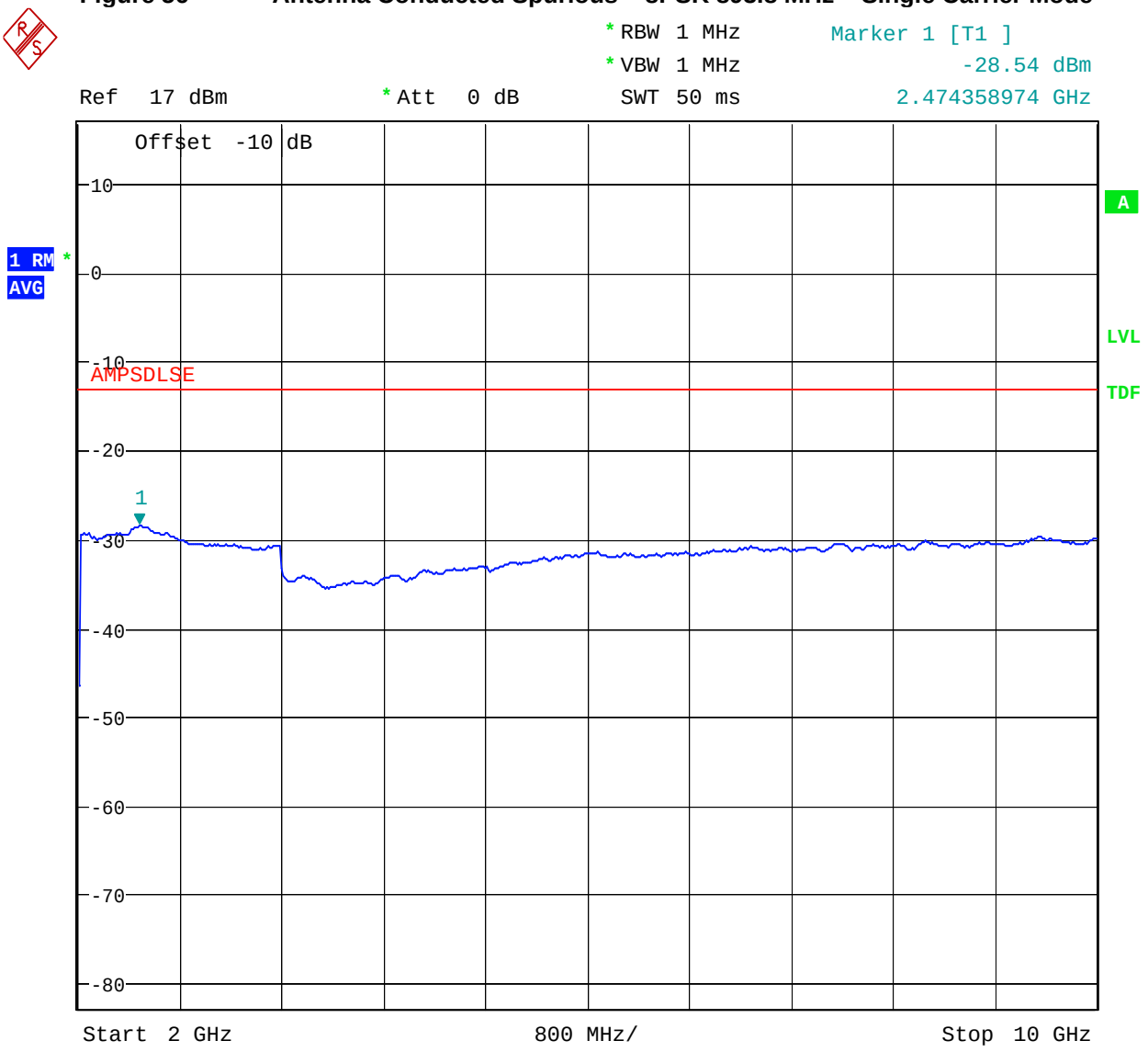
Date: 28.FEB.2007 19:42:32

Figure 55 Antenna Conducted Spurious – 8PSK 893.8 MHz – Single Carrier Mode



Date: 28.FEB.2007 19:43:56

Figure 56 Antenna Conducted Spurious – 8PSK 893.8 MHz – Single Carrier Mode



Date: 28.FEB.2007 19:45:01

D.8. Tested By

Name: Tom Tidwell,
Function: Manager of Wireless Services

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

22.917
(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 -34.1 dBm at 8816 MHz. The spectrum was searched up to 10 GHz with the device operating on three channels.

E.4. Deviations from Normal Operating Mode During Test

None.

E.5. Sample Calculation

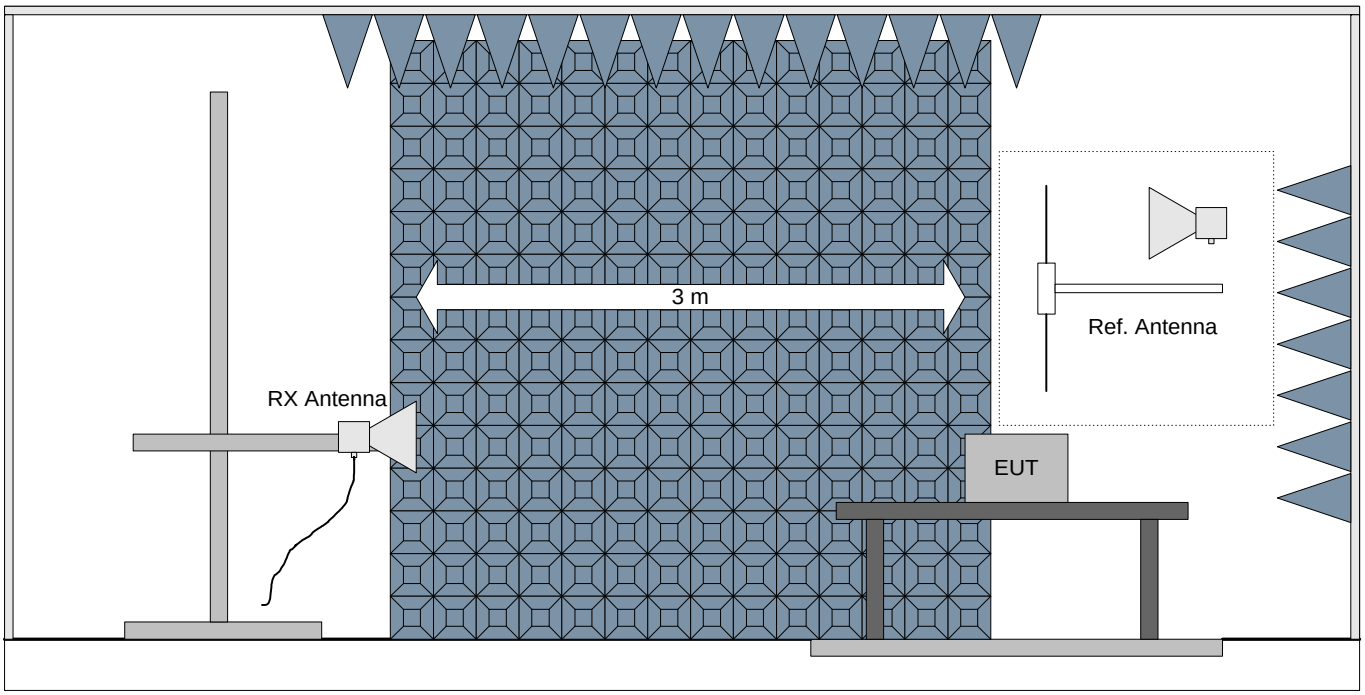
Final measured value (dBm) = Substitution level (dBm) + Antenna Gain (dBd)

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

Min. Atten. Limit dB) = 43 + 10 * log(72 watts)
= 61.6 dB

+48.6 dBm – 61.6 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.

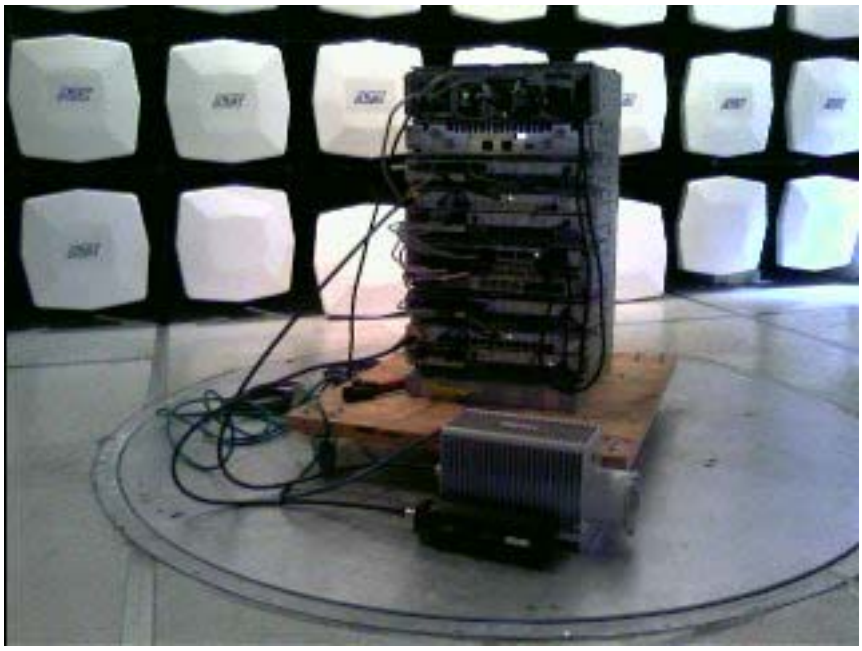
E.7. Test Data

Project No:	W7058-1
Model:	EXTA-01
Comments:	Operated in combined carrier mode (maximum power) at low mid and high channels

Distance:	3 m	Standard:	CFR 47, Part 2	RBW: (unless noted) <1GHz = 120kHz >1GHz = 1MHz	VBW: (unless noted) Peak = RBW Avg. = 10 Hz

Notes	Polarization	Frequency	Measured	Substitution Level	Substitution Antenna Gain	Final Measured Value		Peak Carrier Power		Limit	Margin
	(V/H)	(MHz)	(dBm)	(dBm)	(dBd)	(dBm)	(watts)	(dBm)	(watts)	(dBm)	(dB)
	H	2644.8	-91.8	-52.4	7.0	-45.4	2.88403E-08	48.57	72	-13	32.40
	V	2644.8	-105	-63.7	7.0	-56.7	2.13796E-09	48.57	72	-13	43.70
	H	2607.6	-88.4	-48.9	7.0	-41.9	6.45654E-08	48.57	72	-13	28.90
	V	2607.6	-103.5	-64.1	7.0	-57.1	1.94984E-09	48.57	72	-13	44.10
	H	2681.4	-99.6	-65.4	7.0	-58.4	1.44544E-09	48.57	72	-13	45.40
	V	2681.4	-104.2	-64.6	7.0	-57.6	1.7378E-09	48.57	72	-13	44.60
Noise Floor	H	4408	-100.8	-47.5	8.4	-39.1	1.23027E-07	48.57	72	-13	26.10
Noise Floor	V	4408	-103.7	-47.5	8.4	-39.1	1.23027E-07	48.57	72	-13	26.10
Noise Floor	H	5289.6	-98.6	-48.7	8.3	-40.4	9.12011E-08	48.57	72	-13	27.40
Noise Floor	V	5289.6	-103.3	-48.7	8.3	-40.4	9.12011E-08	48.57	72	-13	27.40
Noise Floor	H	6171.2	-100.8	-46	8.7	-37.3	1.86209E-07	48.57	72	-13	24.30
Noise Floor	V	6171.2	-101.3	-46	8.7	-37.3	1.86209E-07	48.57	72	-13	24.30
Noise Floor	H	8816	-95.1	-43	8.9	-34.1	3.89045E-07	48.57	72	-13	21.10
Noise Floor	V	8816	-95.4	-43	8.9	-34.1	3.89045E-07	48.57	72	-13	21.10

E.8. Test Photo



E.9. Tested By

Name: Tom Tidwell,
Function: Manager of Wireless Services

APPENDIX F: 2.1055 FREQUENCY STABILITY

F.1. Base Standard & Test Basis

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

Specifications

22.355 Except as otherwise provided in this part, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table C–1 of this section.

Frequency range (MHz)	Base, fixed (ppm)	Mobile > 3 watts (ppm)	Mobile < 3 watts (ppm)
25 to 50.....	20.0	20.0	50.0
50 to 450.....	5.0	5.0	50.0
450 to 512.....	2.5	5.0	5.0
821 to 896.....	1.5	2.5	2.5
928 to 929.....	5.0	n/a	n/a
929 to 960.....	1.5	n/a	n/a
2110 to 2220.....	10.0	n/a	n/a

F.2. Deviations

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

F.3. Test Results

Compliant.

The maximum frequency drift was 0.1338 ppm. The limit from 22.355 is 1.5 ppm.

F.4. Observations

None

F.5. Deviations from Normal Operating Mode During Test

None.

F.6. Sample Calculation

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

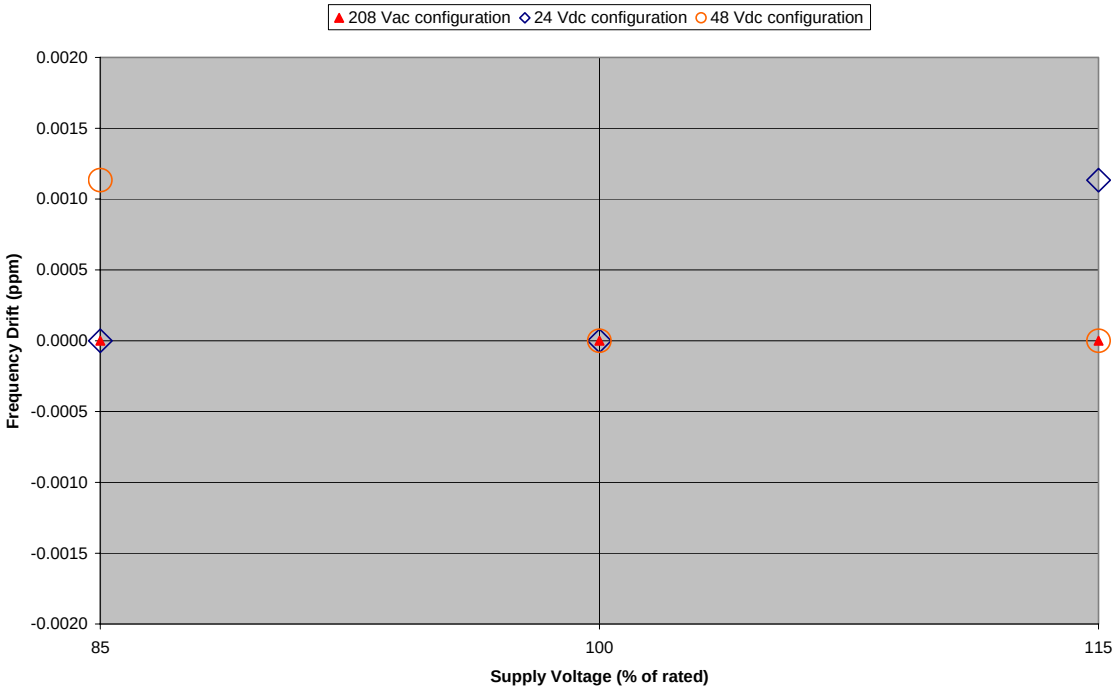
F.7. Test Data

GSM850 Band

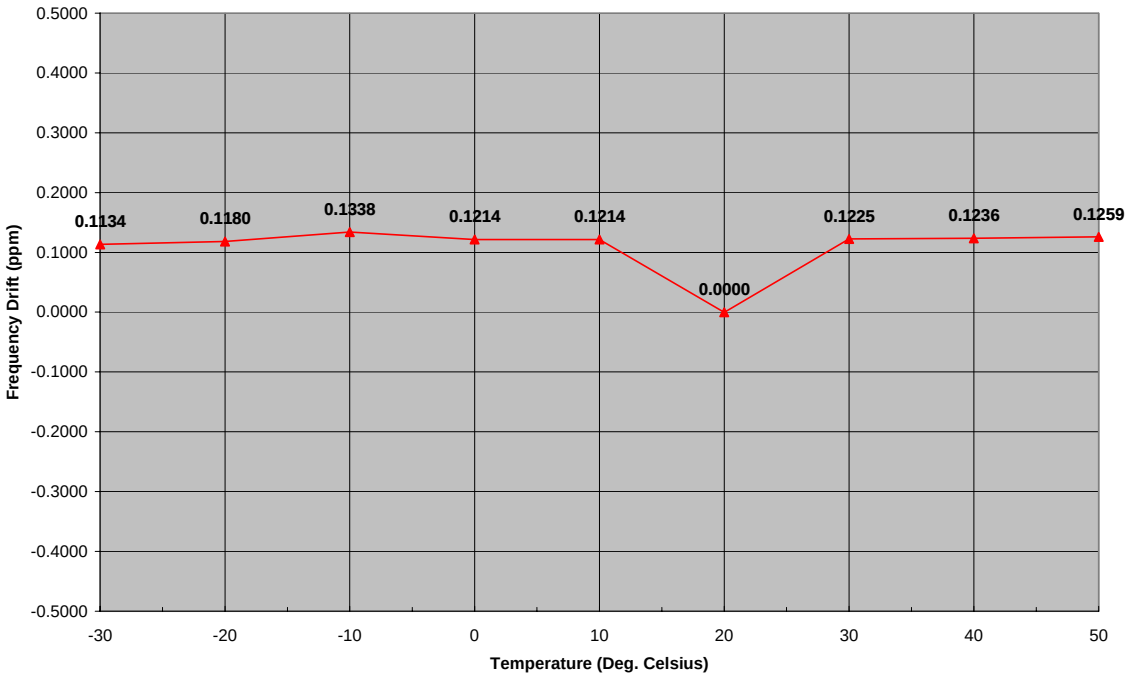
Supply Voltage % of rated	Ambient temperature Deg. Celsius	Reference Transmit Frequency MHz	Measured Frequency MHz	Frequency Drift (Hz)	Frequency Drift (ppm)
100	-30	881.667507	881.667607	100	0.1134
100	-20	881.667507	881.667611	104	0.1180
100	-10	881.667507	881.667625	118	0.1338
100	0	881.667507	881.667614	107	0.1214
100	10	881.667507	881.667614	107	0.1214
100	20	881.667507	881.667507	0	0.0000
100	30	881.667507	881.667615	108	0.1225
100	40	881.667507	881.667616	109	0.1236
100	50	881.667507	881.667618	111	0.1259

Supply Voltage	Ambient temperature Deg. Celsius	Reference Transmit Frequency MHz	Measured Frequency MHz	Frequency Drift Hz	Frequency Drift PPM
176.8 Vac	20	881.667627	881.667627	0	0.0000
208 Vac	20	881.667627	881.667627	0	0.0000
239.2 Vac	20	881.667627	881.667627	0	0.0000
20.4 Vdc	20	881.667625	881.667625	0	0.0000
24.0 Vdc	20	881.667625	881.667625	0	0.0000
27.6 Vdc	20	881.667625	881.667626	1	0.0011
40.8 Vdc	20	881.667627	881.667628	1	0.0011
48.0 Vdc	20	881.667627	881.667627	0	0.0000
55.2 Vdc	20	881.667627	881.667627	0	0.0000

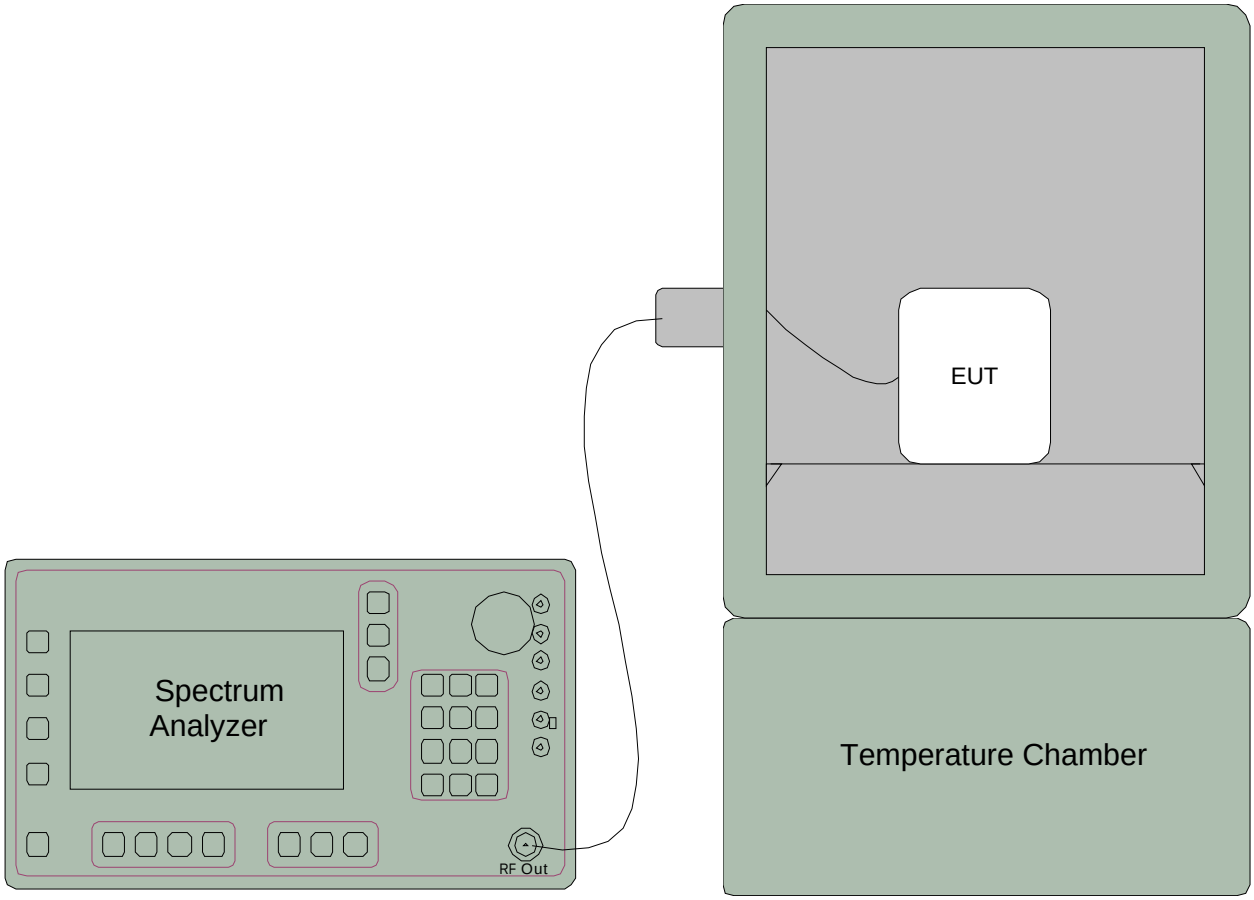
Frequency Drift with Supply Voltage Variation



Frequency Drift with Temperature Variation



F.8. Test Diagram



F.9. Tested By

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Name: Tom Tidwell,
Function: Manager of Wireless Services

APPENDIX G: TEST EQUIPMENT LIST

G.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	11/14/07	E1022P
High Frequency - Cable 1	MegaPhase	TM26-3135-144	12 Months	8/23/07	W1010P
Reference Antenna	ETS	3121 Dipole Set	12 months	8/8/07	S/N. 274
CONTROL ROOM					
Signal Analyzer	Rohde & Schwarz	FSQ26	12 Months	10/23/07	W1020P
High Frequency - Cable 2	MegaPhase	NA	12 Months	8/23/07	W1011P
Amplifier	HP	8449B	12 Months	5/4/07	E1010P

G.2. Antenna Conducted Measurement Equipment

Instrument	Manufacturer	Model	Calibration Frequency	Calibration Due	NTS Control No.
Spectrum Analyzer	Rohde & Schwarz	FSQ26	12 Months	10/23/07	W1020P
Power Meter	Boonton	4531	12 Months	9/1/07	W1001P
Peak Power Sensor	Boonton	57340		9/1/07	W1002P
High Frequency - Cable 1	MegaPhase	TM26-3135-144	12 Months	8/23/07	W1011P
Directional Coupler (10-1000MHz)	Narda	3020A	12 Months	8/28/07	W1006P
Directional Coupler (1-2GHz)	Narda	4242-10	12 Months	2/1/07	W1053P
Directional Coupler (2-26.5GHz)	Narda	27443	12 Months	2/1/07	W1052P
Tunable Notch Filter (500-1000MHz)	K&L Microwave	3TNF-500/1000-N/N	N/A	N/A*	W1043P
Tunable Notch Filter (1000-2000MHz)	K&L Microwave	3TNF-1000/2000-N/N	N/A	N/A*	W1044P
50 ohm load	Bird	8201	-	N/A*	E1193P
50 ohm load	Narda	368BNF	-	N/A*	W1054P
Environmental Chamber #9	RTP	HB-64-705-705-PP	12 Months	10/4/07	ENV-1006-P
Temperature Sensor	Watlow	-	12 Months	10/4/07	ENV-1001-P

* This device was not used for calibrated measurements.

END OF DOCUMENT