KTL Test Report:	9L0298RUS
Applicant:	Allen Telecom 140 Vista Centre Drive Forest, VA 24551
Equipment Under Test: **(E.U.T.)**	MOR801
FCC ID:	BCR-RPT-MOR801
In Accordance With:	**FCC Part 22, Subpart H** Cellular Band Repeaters
Tested By:	KTL Dallas Inc. 802 N. Kealy Lewisville, TX 75057-3136
Authorized By:	
	Tom Tidwell, RF Group Manager
Date:	September, 1999
Total Number of Pages:	100

Table of Contents

Section 1. Summary of Test Results

Manufacturer: Allen Telecom

Model No.: MOR801B

Serial No.: NONE

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 22, Subpart H.

☒ New Submission ☒ Production Unit

☐ Class II Permissive Change ☐ Pre-Production Unit

A	M	P

Equipment Code

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.
See " Summary of Test Data".

NVLAP LAB CODE: 100351-0

TESTED BY: _____ DATE: _____
Ron Gaytan, RF Technician

Summary Of Test Data (20 Watt Amplifier ID # 148630)

TDMA Modules:

NAME OF TEST	PARA. NO.	SPEC.	MEAS.	RESULT
RF Power Output	22.913(a)	500W ERP	20 W	Complies
Occupied Bandwidth (Voice & SAT)	22.917(c)	Mask C	Plot	Complies
Occupies Bandwidth (Wideband Data)	22.917(d)	Mask D	Plot	Complies
Occupied Bandwidth (ST)	22.917(d)	Mask D	Plot	Complies
Occupied Bandwidth (Digital)	None	Input vs. Output	Plot	Complies
Spurious Emissions at Antenna Terminals	22.917	-13 dBm	-16.2 dBm	Complies
Field Strength of Spurious Emissions	22.917	-13 dBm E.I.R.P.	-40.2 dBm	Complies
Frequency Stability	22.355	1.5 ppm	N/A	N/A

CDMA Modules:

NAME OF TEST	PARA. NO.	SPEC.	MEAS.	RESULT
RF Power Output	22.913(a)	500W ERP	20.4 W	Complies
Occupied Bandwidth (Voice & SAT)	22.917(c)	Mask C	Plot	Complies
Occupies Bandwidth (Wideband Data)	22.917(d)	Mask D	Plot	Complies
Occupied Bandwidth (ST)	22.917(d)	Mask D	Plot	Complies
Occupied Bandwidth (Digital)	None	Input vs. Output	Plot	Complies
Spurious Emissions at Antenna Terminals	22.917	-13 dBm	-18.38 dBm	Complies
Field Strength of Spurious Emissions	22.917	-13 dBm E.I.R.P.	-40 dBm	Complies
Frequency Stability	22.355	1.5 ppm	N/A	N/A

Variable Bandwidth Modules:

NAME OF TEST	PARA. NO.	SPEC.	MEAS.	RESULT
RF Power Output	22.913(a)	500W ERP	17.8 W	Complies
Occupied Bandwidth (Voice & SAT)	22.917(c)	Mask C	Plot	Complies
Occupies Bandwidth (Wideband Data)	22.917(d)	Mask D	Plot	Complies
Occupied Bandwidth (ST)	22.917(d)	Mask D	Plot	Complies
Occupied Bandwidth (Digital)	None	Input vs. Output	Plot	Complies
Spurious Emissions at Antenna Terminals	22.917	-13 dBm	-21.5 dBm	Complies
Field Strength of Spurious Emissions	22.917	-13 dBm E.I.R.P.	-40 dBm	Complies
Frequency Stability	22.355	1.5 ppm	N/A	N/A

Summary Of Test Data (8 Watt Amplifier ID # 148698)

TDMA Modules:

NAME OF TEST	PARA. NO.	SPEC.	MEAS.	RESULT
RF Power Output	22.913(a)	500W ERP	2.8 W	Complies
Occupied Bandwidth (Voice & SAT)	22.917(c)	Mask C	Plot	Complies
Occupies Bandwidth (Wideband Data)	22.917(d)	Mask D	Plot	Complies
Occupied Bandwidth (ST)	22.917(d)	Mask D	Plot	Complies
Occupied Bandwidth (Digital)	None	Input vs. Output	Plot	Complies
Spurious Emissions at Antenna Terminals	22.917	-13 dBm	-15.1 dBm	Complies
Field Strength of Spurious Emissions	22.917	-13 dBm E.I.R.P.	-40 dBm	Complies
Frequency Stability	22.355	1.5 ppm	N/A	N/A

CDMA Modules:

NAME OF TEST	PARA. NO.	SPEC.	MEAS.	RESULT
RF Power Output	22.913(a)	500W ERP	2.6 W	Complies
Occupied Bandwidth (Voice & SAT)	22.917(c)	Mask C	Plot	Complies
Occupies Bandwidth (Wideband Data)	22.917(d)	Mask D	Plot	Complies
Occupied Bandwidth (ST)	22.917(d)	Mask D	Plot	Complies
Occupied Bandwidth (Digital)	None	Input vs. Output	Plot	Complies
Spurious Emissions at Antenna Terminals	22.917	-13 dBm	-14.6 dBm	Complies
Field Strength of Spurious Emissions	22.917	-13 dBm E.I.R.P.	-40 dBm	Complies
Frequency Stability	22.355	1.5 ppm	N/A	N/A

Variable Bandwidth Modules:

NAME OF TEST	PARA. NO.	SPEC.	MEAS.	RESULT
RF Power Output	22.913(a)	500W ERP	2.8 W	Complies
Occupied Bandwidth (Voice & SAT)	22.917(c)	Mask C	Plot	Complies
Occupies Bandwidth (Wideband Data)	22.917(d)	Mask D	Plot	Complies
Occupied Bandwidth (ST)	22.917(d)	Mask D	Plot	Complies
Occupied Bandwidth (Digital)	None	Input vs. Output	Plot	Complies
Spurious Emissions at Antenna Terminals	22.917	-13 dBm	-13.8 dBm	Complies
Field Strength of Spurious Emissions	22.917	-13 dBm E.I.R.P.	-40 dBm	Complies
Frequency Stability	22.355	1.5 ppm	N/A	N/A

Footnotes: Frequency stability testing was not performed since the E.U.T. uses a common oscillator circuit for all IF modules. The frequency conversion from RF to IF and back up to RF is controlled with this common oscillator.

Test Conditions:

Indoor	Temperature:	22°C
	Humidity:	25 %
Outdoor	Temperature:	28°C
	Humidity:	30%

.

Section 2. General Equipment Specification

Supply Voltage Input: 120 Vac

Frequency Range: **Downlink:** 869 – 894 MHz

Frequency Range: **Uplink:** 824 849 MHz (Connected to base station via coaxial cable and optic fiber.

Type of Modulation and Designator:	**CDMA (F9W)**	**GSM (GXW)**	**NADC (DXW)**	**CDPD (F9W)**	**AMPS (F8W, F1D)**
	☒	☐	☒	☐	☒

AGC Threshold: Adjusted via setup software

Output Impedance: 50 ohms

Gain: Adjusted via setup software (RF attenuation is adjusted)

Max Input Power: 0 dBm

RF Output (Rated):	**Single:**	**CDMA**	**TDMA**	**AMPS**
	8 W Amp	1 W	2.5 W	5 W
	20 W Amp	5 W	10 W	10 W
	Composite:			
	8 W Amp	.316	1.1 W	2.5 W
	20 W Amp	2.5 W	5 W	10 W

Frequency Translation:	**F1-F1**	**F1-F2**	**N/A**
	☒	☐	☐

Band Selection:	**Software**	**Duplexer Change**	**Fullband Coverage**
	☒	☐	☒

Description of Modifications For Class II Permissive Change

Not Applicable

Modifications Made During Testing

Not Applicable

Theory of Operation

The EUT is a cellular band repeater used for enhancing signal coverage in areas where signal propagation is difficult. The MOR801 interfaces a base station transmitter through a local fiber interface unit. This unit takes an rf input signal from the base station and converts the signal to an optical signal. The signal is then sent to the MOR801 repeater via fiber optic cables. In the uplink direction (mobile tx to base), the rf signal transmitted by the mobile is received by the MOR801, converted to IF, filtered, and converted back to rf. The rf signal is then converted to an optical signal and transmitted via fiber to the local fiber interface unit where it is converted back to rf and sent to the base station RX port via coaxial cable.

The MOR801 is a modular system which allows the user to configure the repeater for multiple signal types. The unit can also be configured as low power or high power by using different amplifier modules. These modules are described below:

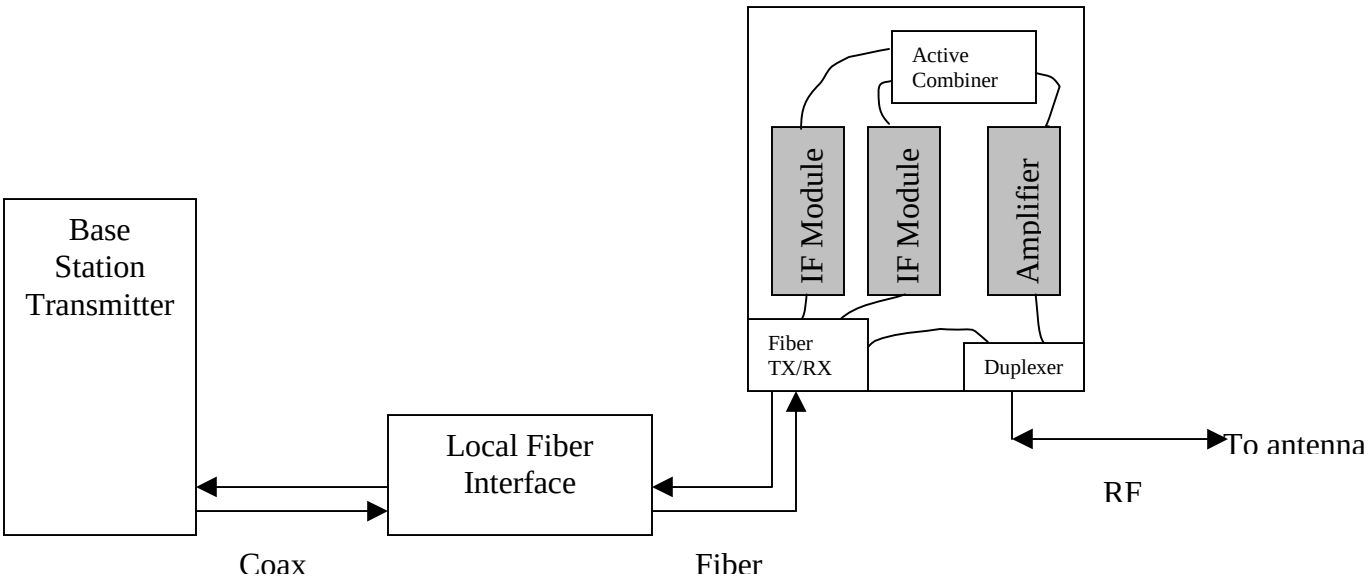
TDMA IF module: This module is intended to operate in an NADC (IS-136) system. The IF filtering is 40kHz wide for these signals.

CDMA IF module: This module is intended to operate in an IS-95 CDMA system. The IF filtering is 1.25 MHz wide for these signals.

Variable Bandwidth module: The bandwidth of this module is adjustable up to 15 MHz wide. These modules could be used to pass multiple analogue and digital rf signals.

Amplifier modules: The MOR801 can be configured with a low power or high power amplifier.

System Diagram



Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 2.985
TESTED BY: Ron Gaytan	DATE: 3 – 14 Sept.

Test Results: Complies.

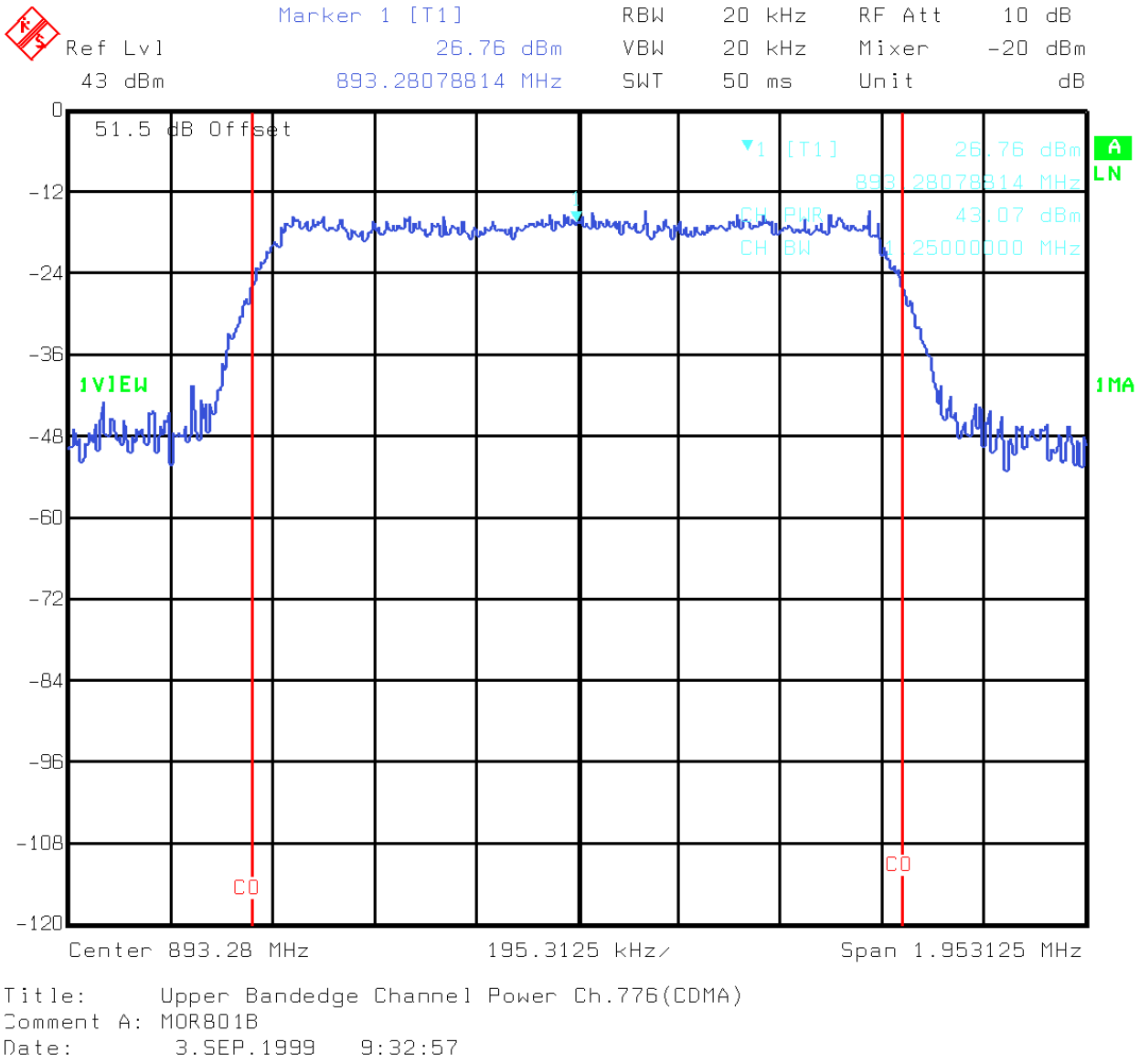
Measurement Data:

20 Watt Amplifier ID # 148630

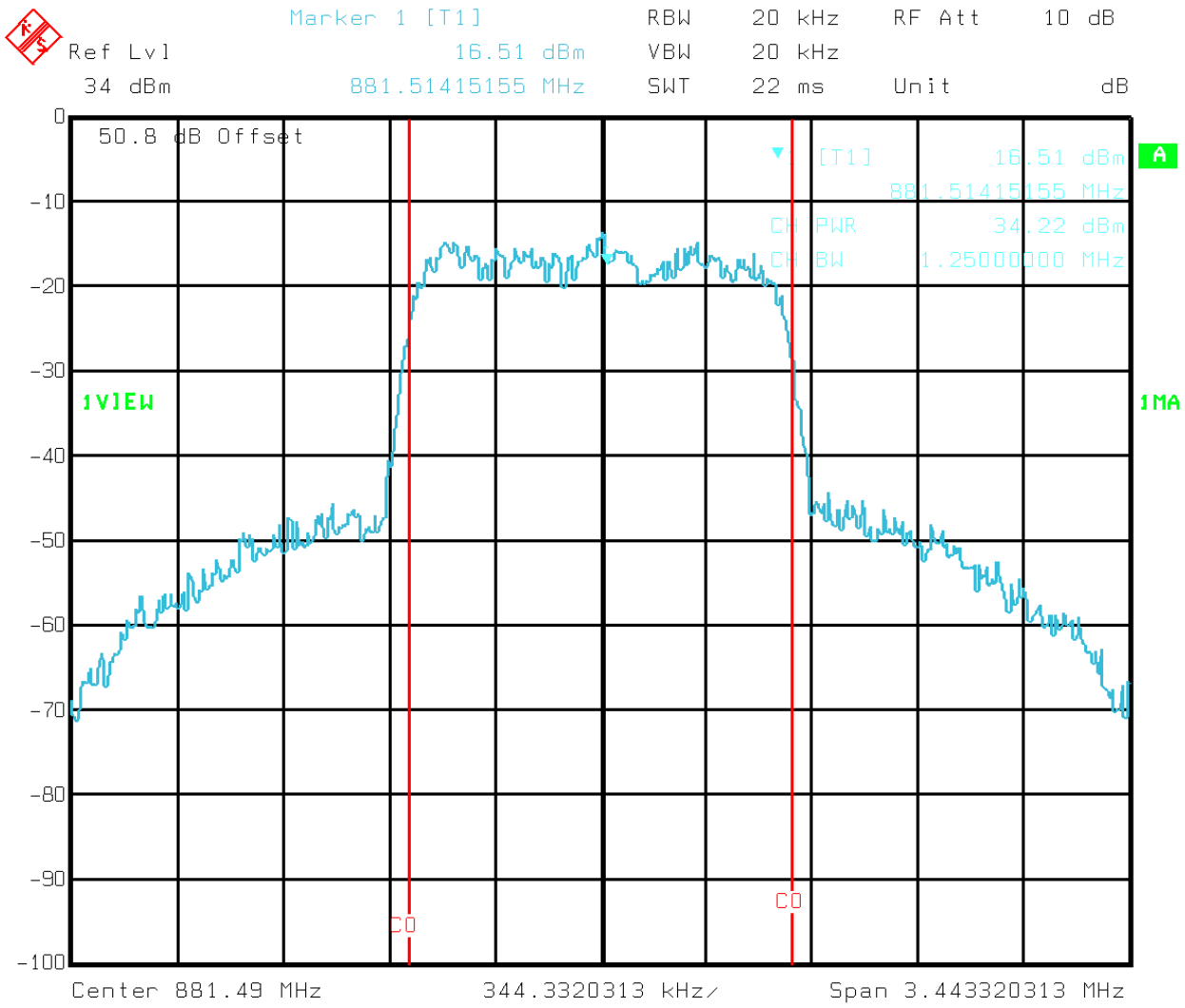
	Modulation Type	Per Channel Power Output (dBm)	Composite Power Output (dBm)
Uplink	AMPS	N/A	N/A
Downlink	AMPS	N/A	N/A
Uplink	CDMA	N/A	N/A
Downlink	CDMA	+43.1	+40.0
Uplink	GSM	N/A	N/A
Downlink	GSM	N/A	N/A
Uplink	NADC	N/A	N/A
Downlink	NADC	+43.0	+40.0
Uplink	CDPD	N/A	N/A
Downlink	CDPD	N/A	N/A

8 Watt Amplifier ID # 148630

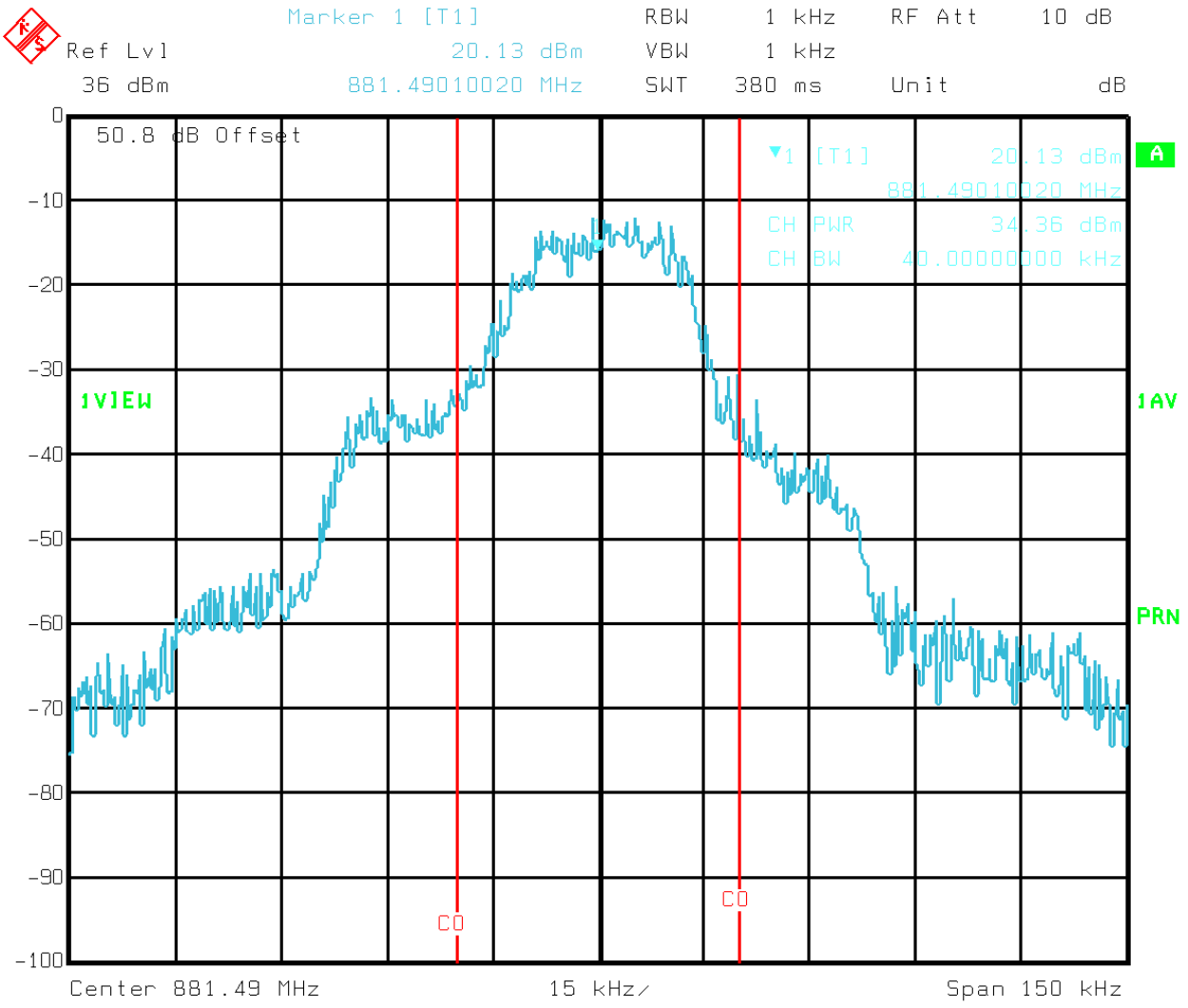
	Modulation Type	Per Channel Power Output (dBm)	Composite Power Output (dBm)
Uplink	AMPS	N/A	N/A
Downlink	AMPS	N/A	N/A
Uplink	CDMA	N/A	N/A
Downlink	CDMA	34.2	30.0
Uplink	GSM	N/A	N/A
Downlink	GSM	N/A	N/A
Uplink	NADC	N/A	N/A
Downlink	NADC	34.4	30.0
Uplink	CDPD	N/A	N/A
Downlink	CDPD	N/A	N/A


Marker 1 [T1]
Ref Lvl
43 dBm
26.76 dBm
893.28078814 MHz
RBW 20 kHz
VBW 20 kHz
SWT 50 ms
RF Att 10 dB
Mixer -20 dBm
Unit dB
51.5 dB Offset
1 [T1]
26.76 dBm
893.28078814 MHz
CH PWR
43.07 dBm
CH BW
1.25000000 MHz
A
LN
1MA
1VIEW
0
-12
-24
-36
-48
-60
-72
-84
-96
-108
-120
CO
CO
Center 893.28 MHz
195.3125 kHz/
Span 1.953125 MHz
Title: Upper Bandedge Channel Power Ch.776(CDMA)
Comment A: MOR801B
Date: 3.SEP.1999 9:32:57

Plot 1


Marker 1 [T1]
RBW 20 kHz
RF Att 10 dB
Ref Lvl
16.51 dBm
VBW 20 kHz
34 dBm
881.51415155 MHz
SWT 22 ms
Unit dB
50.8 dB Offset
[T1]
16.51 dBm
881.51415155 MHz
CH PWR
34.22 dBm
CH BW
1.25000000 MHz
A
1VIEW
1MA
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
CO
CO
Center 881.49 MHz
344.3320313 kHz/
Span 3.443320313 MHz
Title: Channel Power CDMA 8 Watt Amplifier ID#148698
Comment A: MOR801B (Channel 383)
Date: 14.SEP.1999 15:12:16

Plot 2


Marker 1 [T1]
RBW 1 kHz
RF Att 10 dB
Ref Lvl
20.13 dBm
VBW 1 kHz
36 dBm
881.49010020 MHz
SWT 380 ms
Unit dB
50.8 dB Offset
1 [T1] 20.13 dBm
881.49010020 MHz
CH PWR 34.36 dBm
CH BW 40.00000000 kHz
A
1VIEW
1AV
PRN
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
CO
CO
Center 881.49 MHz
15 kHz/
Span 150 kHz
Title: Channel Power TDMA 8 Watt Amplifier ID#148698
Comment A: MOR801B
Date: 14.SEP.1999 13:26:19

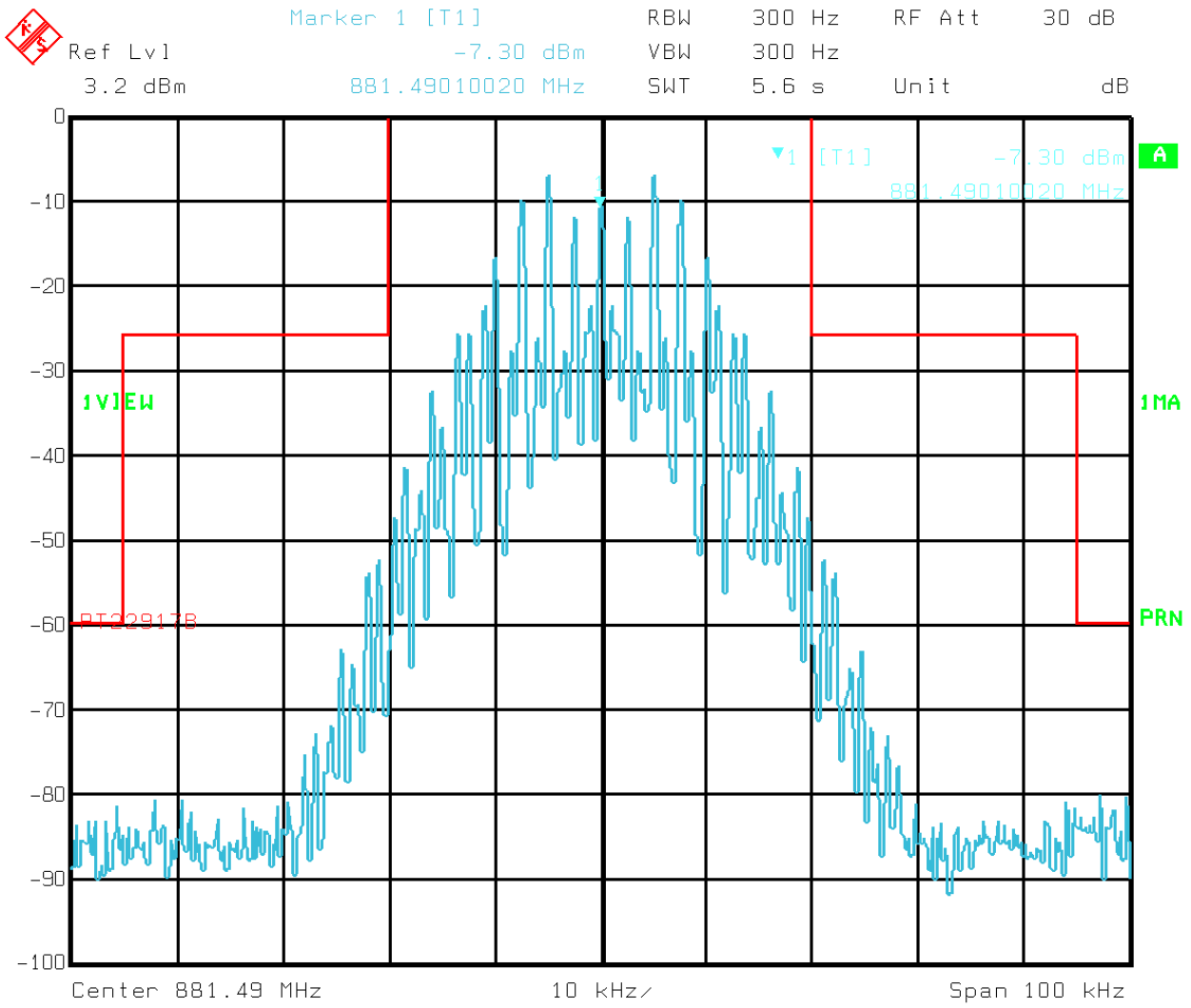
Plot 3

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth (Voice + SAT)	PARA. NO.: 2.917(c)
TESTED BY: Ron Gaytan	DATE: 20 – 21 Sept.

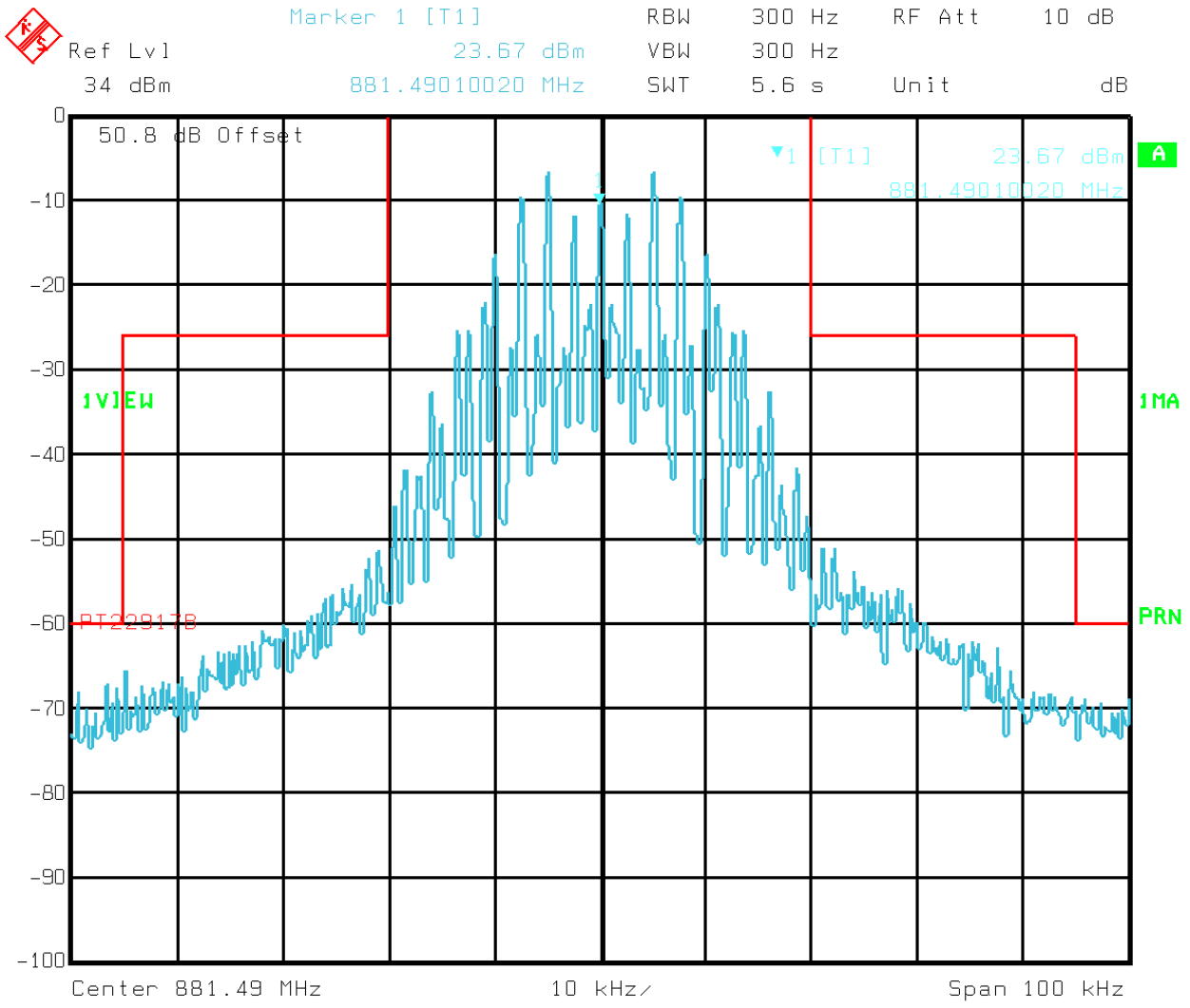
Test Results: Complies.

Test Data: See attached graph(s).

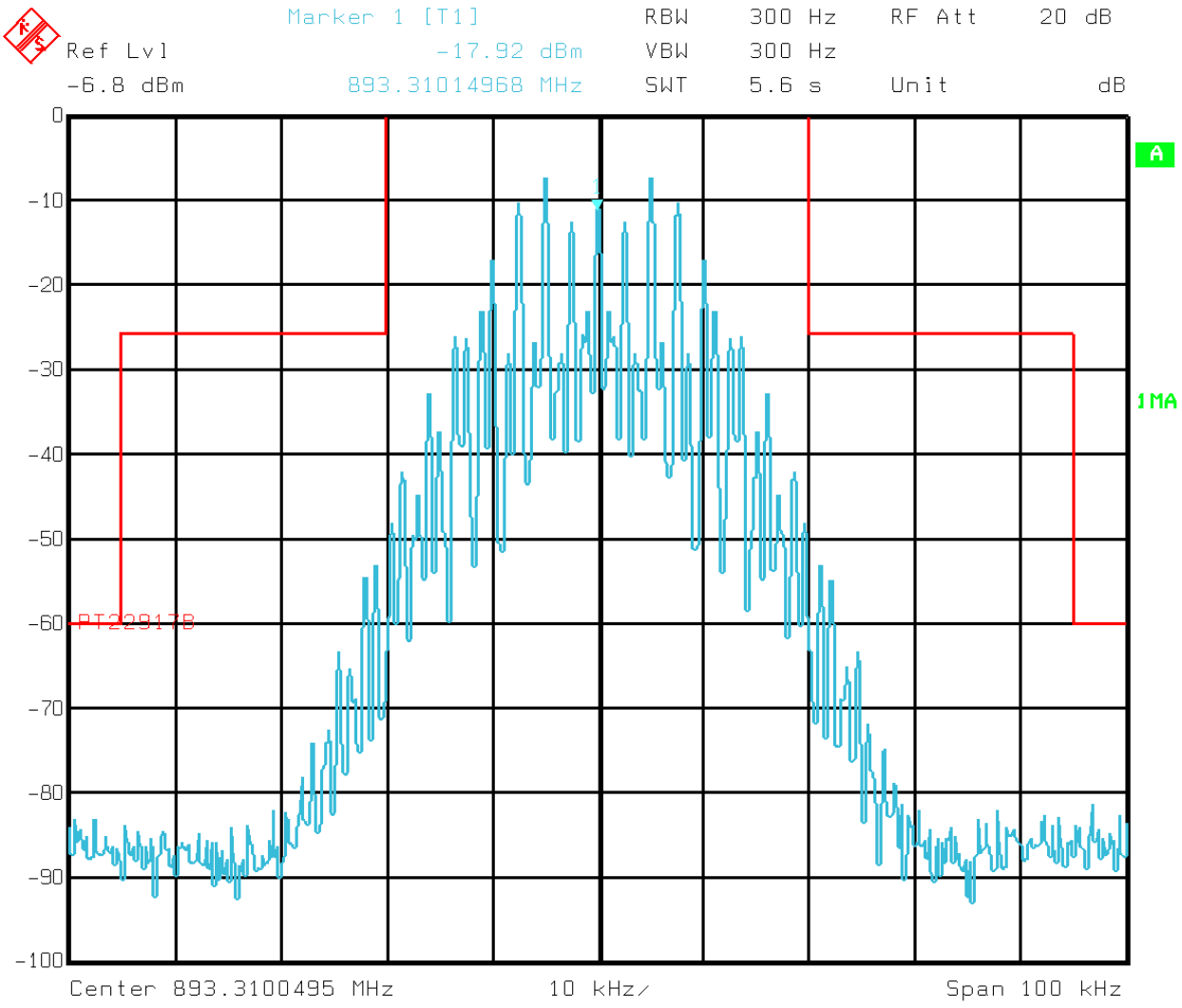


Title: Voice/SAT Input TDMA Modules 8 Watt Amplifier
Comment A: MOR801B (Channel 383)
Date: 20.SEP.1999 14:09:55

Plot 4

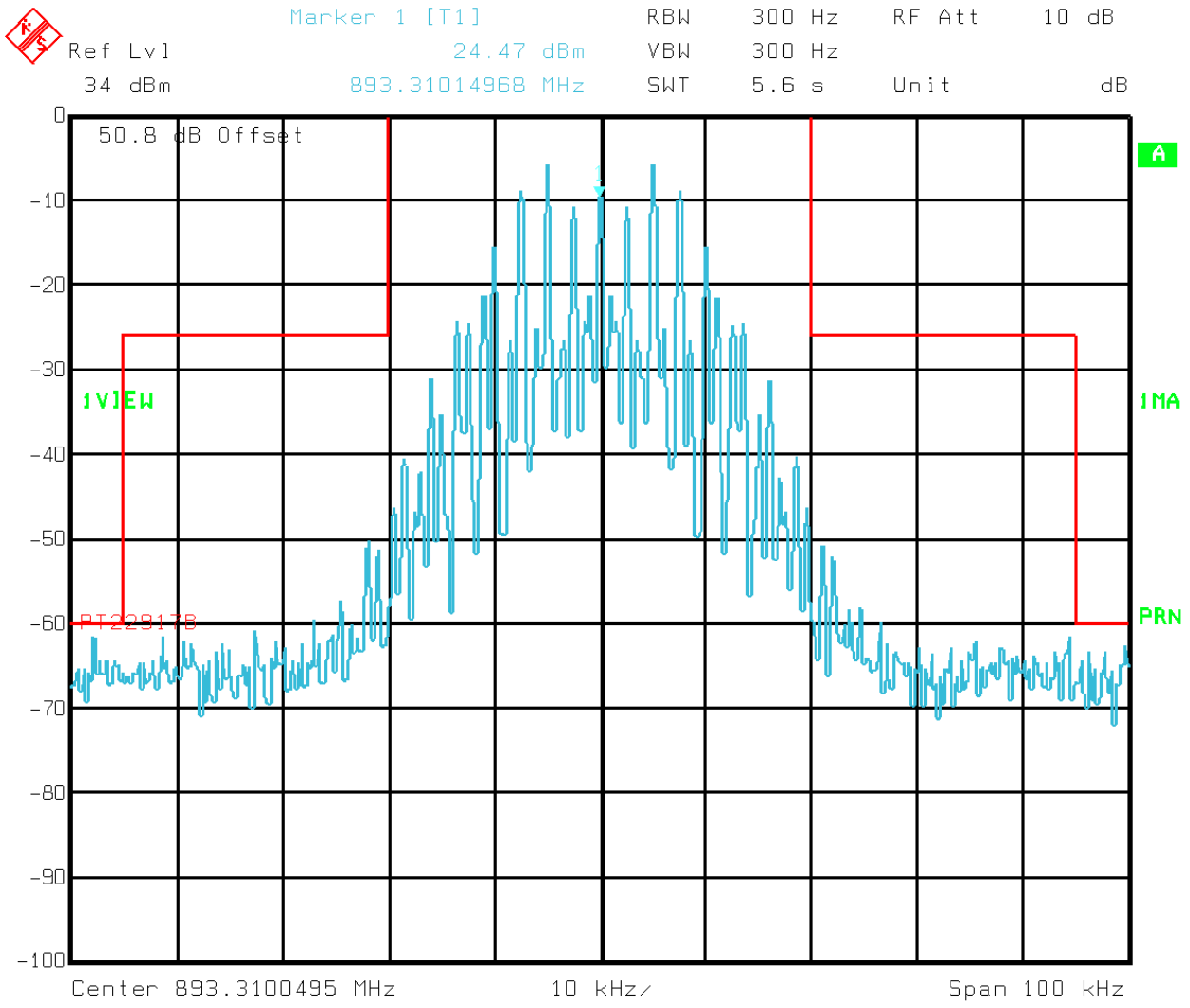

Marker 1 [T1]
RBW 300 Hz
RF Att 10 dB
Ref Lvl
23.67 dBm
VBW 300 Hz
34 dBm
881.49010020 MHz
SWT 5.6 s
Unit dB
50.8 dB Offset
1 [T1]
23.67 dBm
881.49010020 MHz
A
1VIEW
1MA
PRN
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 881.49 MHz
10 kHz/
Span 100 kHz
Title: Voice/SAT TDMA Modules 8 Watt Amplifier
Comment A: MOR801B (Channel 383)
Date: 20.SEP.1999 14:14:55

Plot 5

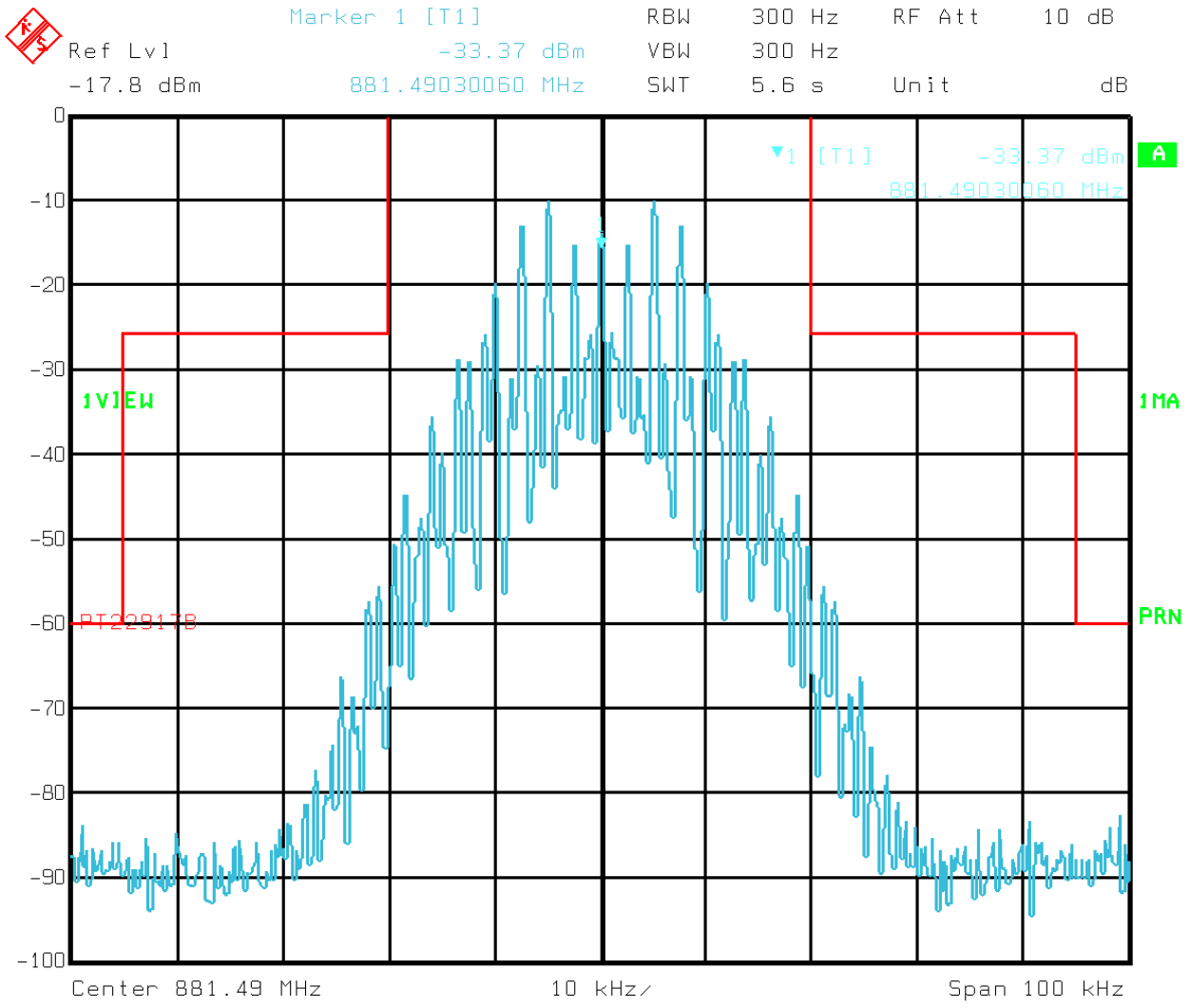


Title: Voice/SAT Input CDMA Modules 8 Watt Amplifier
Comment A: MOR801B (Channel 777)
Date: 20.SEP.1999 11:34:07

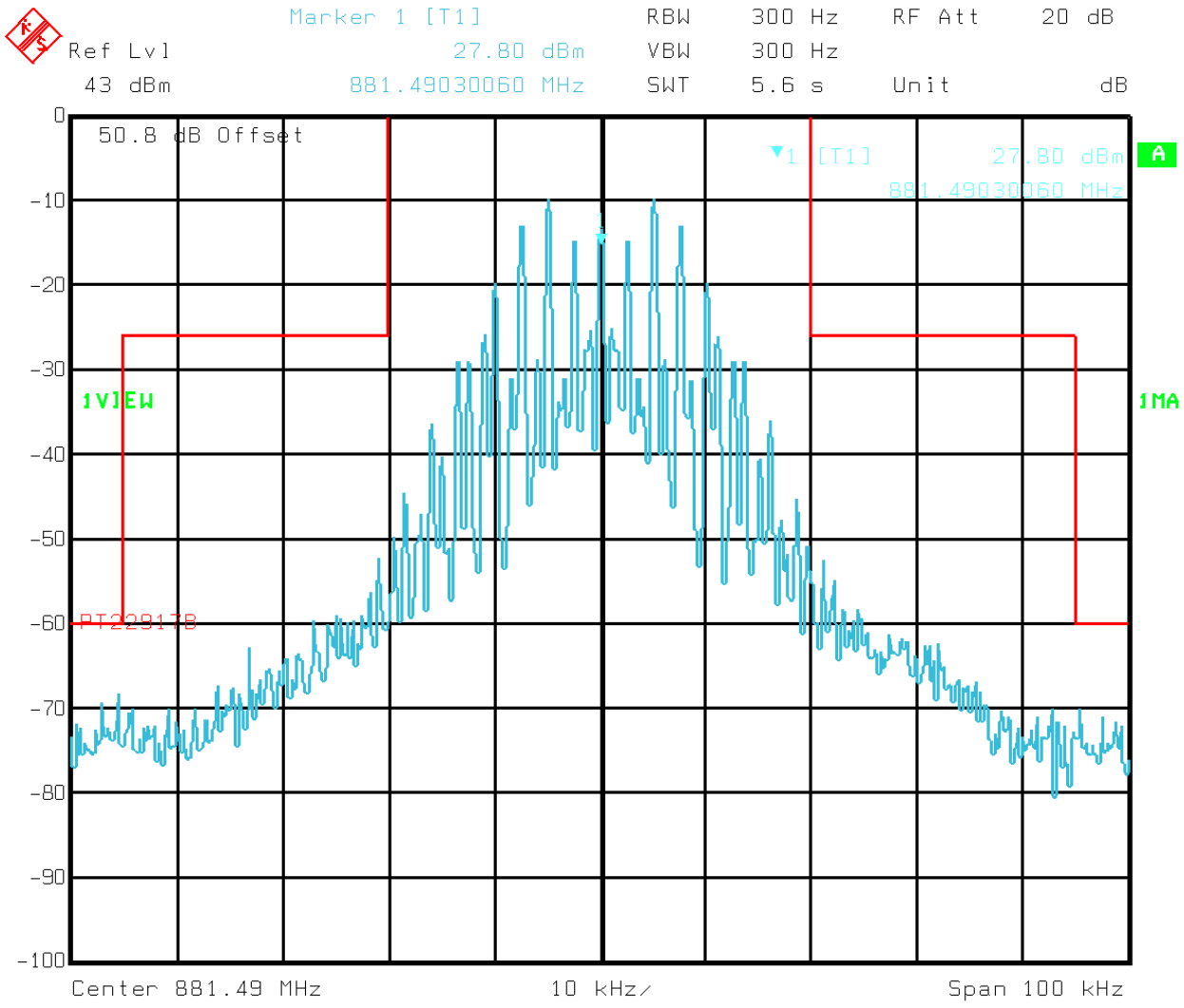
Plot 6


Marker 1 [T1]
RBW 300 Hz
RF Att 10 dB
Ref Lvl
24.47 dBm
VBW 300 Hz
34 dBm
893.31014968 MHz
SWT 5.6 s
Unit dB
50.8 dB Offset
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
A
1VIEW
1MA
PRN
PI22817B
Center 893.3100495 MHz
10 kHz/
Span 100 kHz
Title: Voice/SAT CDMA Modules 8 Watt Amplifier
Comment A: MOR801B (Channel 777)
Date: 20.SEP.1999 11:15:59

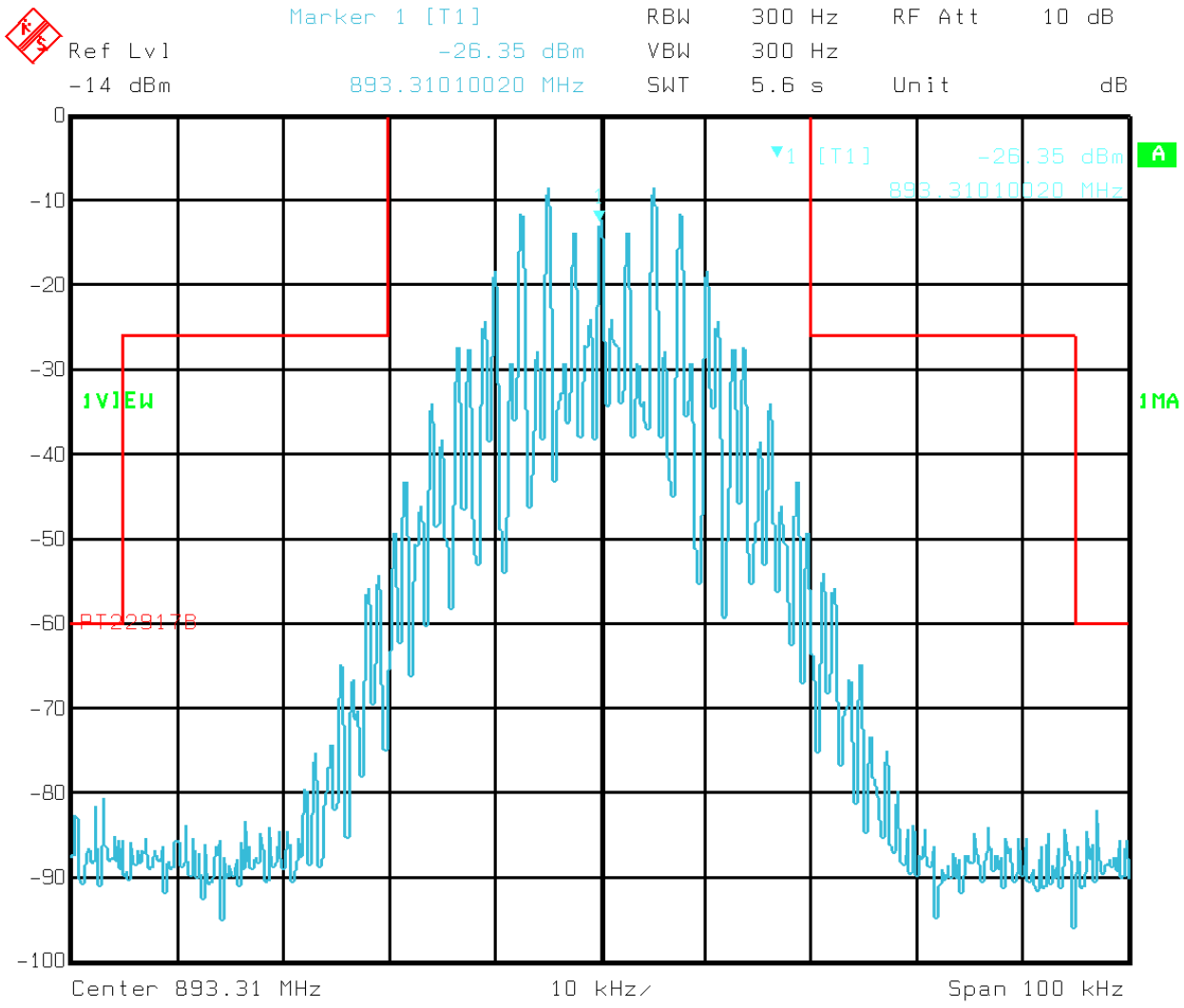
Plot 7


Marker 1 [T1]
RBW 300 Hz
RF Att 10 dB
Ref Lvl
-33.37 dBm
VBW 300 Hz
-17.8 dBm
881.49030060 MHz
SWT 5.6 s
Unit dB
1 [T1] -33.37 dBm
881.49030060 MHz
A
1VIEW
1MA
PRN
PT22817B
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 881.49 MHz
10 kHz/
Span 100 kHz
Title: Voice/SAT Input TDMA Modules
Comment A: MOR801B (Channel 383)
Date: 21.SEP.1999 8:46:27

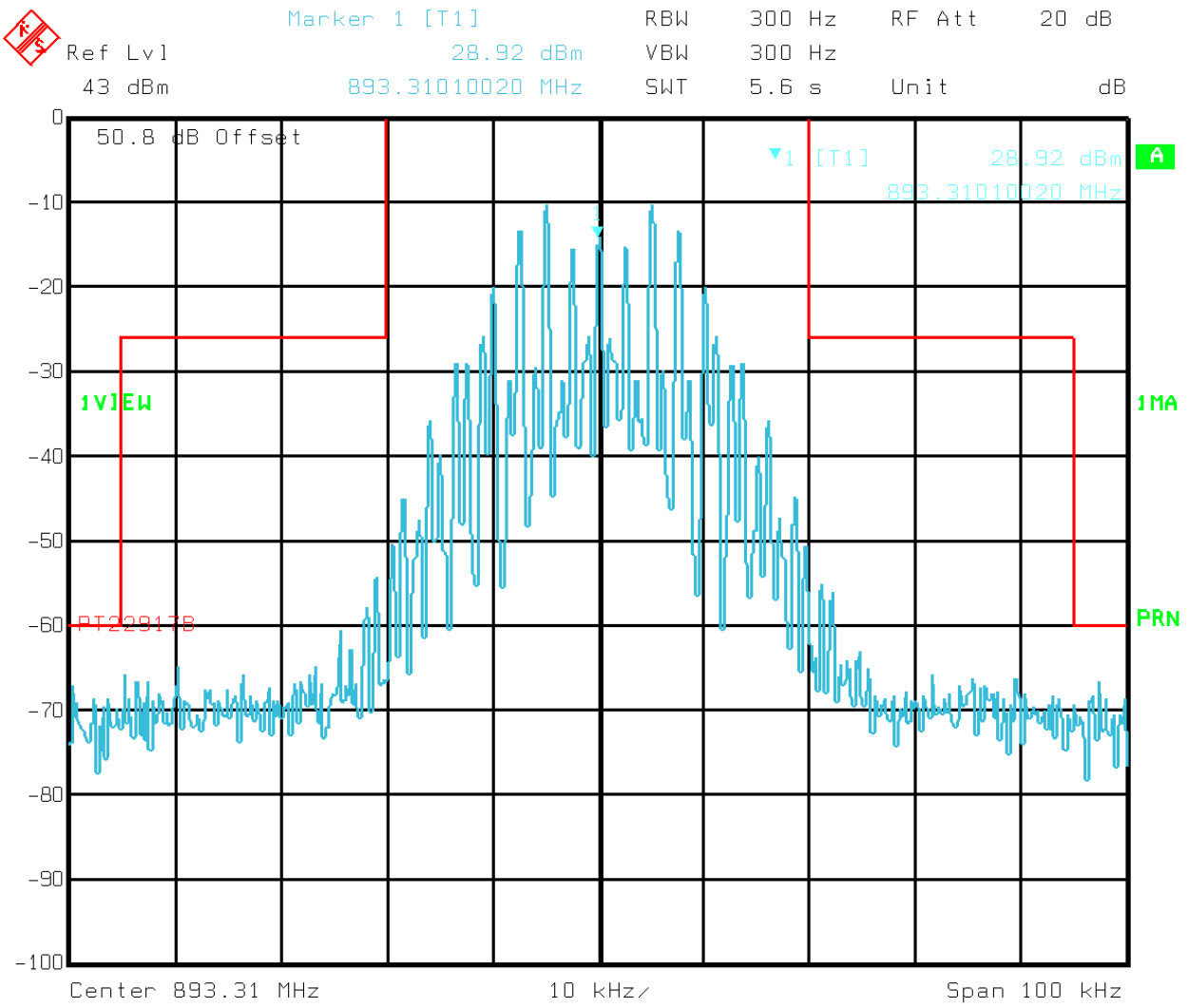
Plot 8


Marker 1 [T1]
RBW 300 Hz
RF Att 20 dB
Ref Lvl
27.80 dBm
VBW 300 Hz
43 dBm
881.49030060 MHz
SWT 5.6 s
Unit dB
50.8 dB Offset
1 [T1]
27.80 dBm
881.49030060 MHz
A
1VIEW
1MA
PT22817B
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 881.49 MHz
10 kHz/
Span 100 kHz
Title: Voice/SAT TDMA Modules
Comment A: MOR801B (Channel 383)
Date: 21.SEP.1999 8:49:24

Plot 9


Marker 1 [T1]
RBW 300 Hz
RF Att 10 dB
Ref Lvl
-26.35 dBm
VBW 300 Hz
-14 dBm
893.31010020 MHz
SWT 5.6 s
Unit dB
1 [T1]
-26.35 dBm
893.31010020 MHz
A
1VIEW
1MA
PT22817B
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 893.31 MHz
10 kHz/
Span 100 kHz
Title: Voice/SAT Input CDMA Modules
Comment A: MOR801B (Channel 777)
Date: 21.SEP.1999 9:36:20

Plot 10



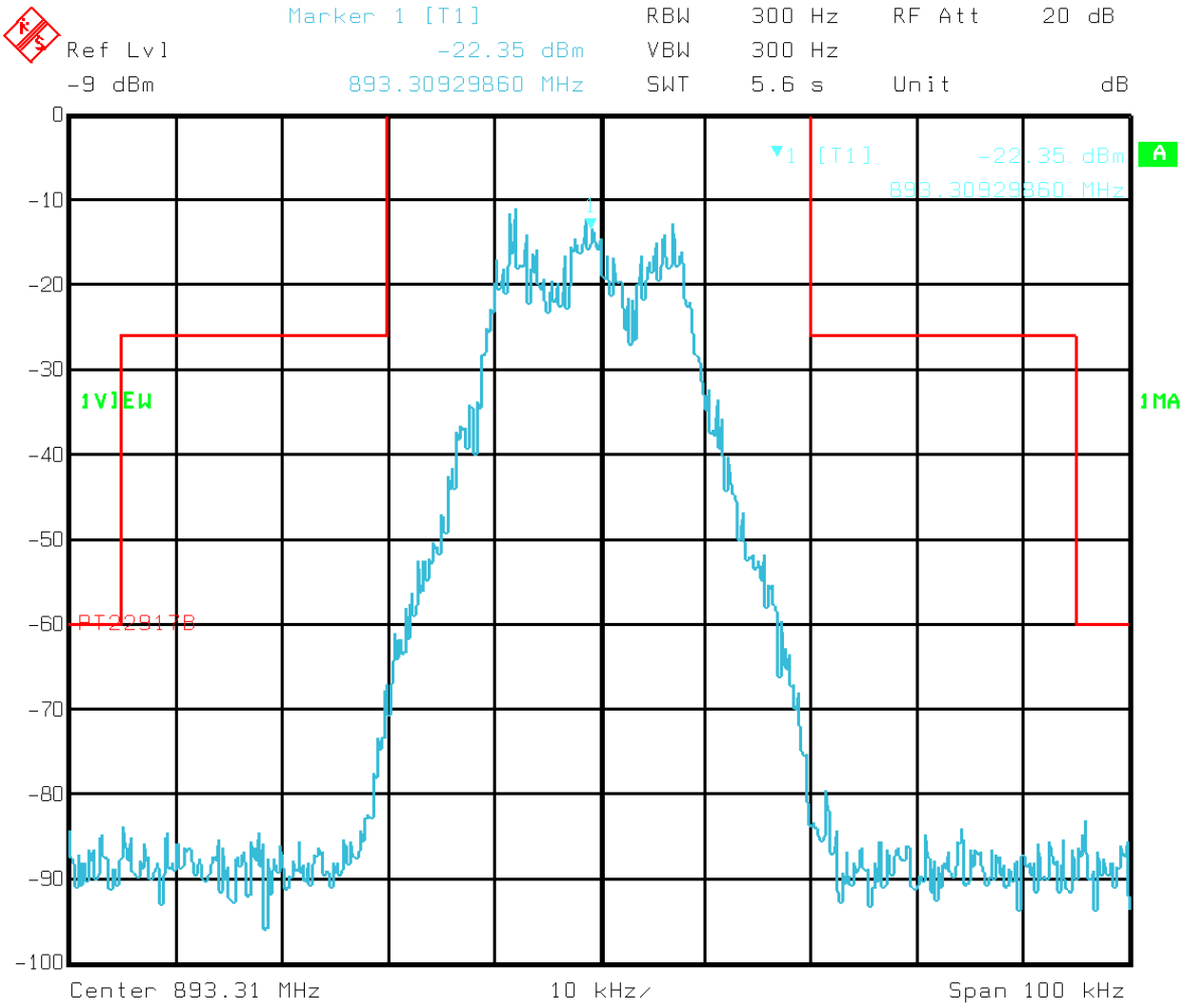
Title: Voice/SAT CDMA Modules
Comment A: MOR801B (Channel 777)
Date: 21.SEP.1999 9:39:36

Plot 11

NAME OF TEST: Occupied Bandwidth (WB Data)	PARA. NO.: 2.917 (d)
TESTED BY: Ron Gaytan	DATE: 21 Sept.

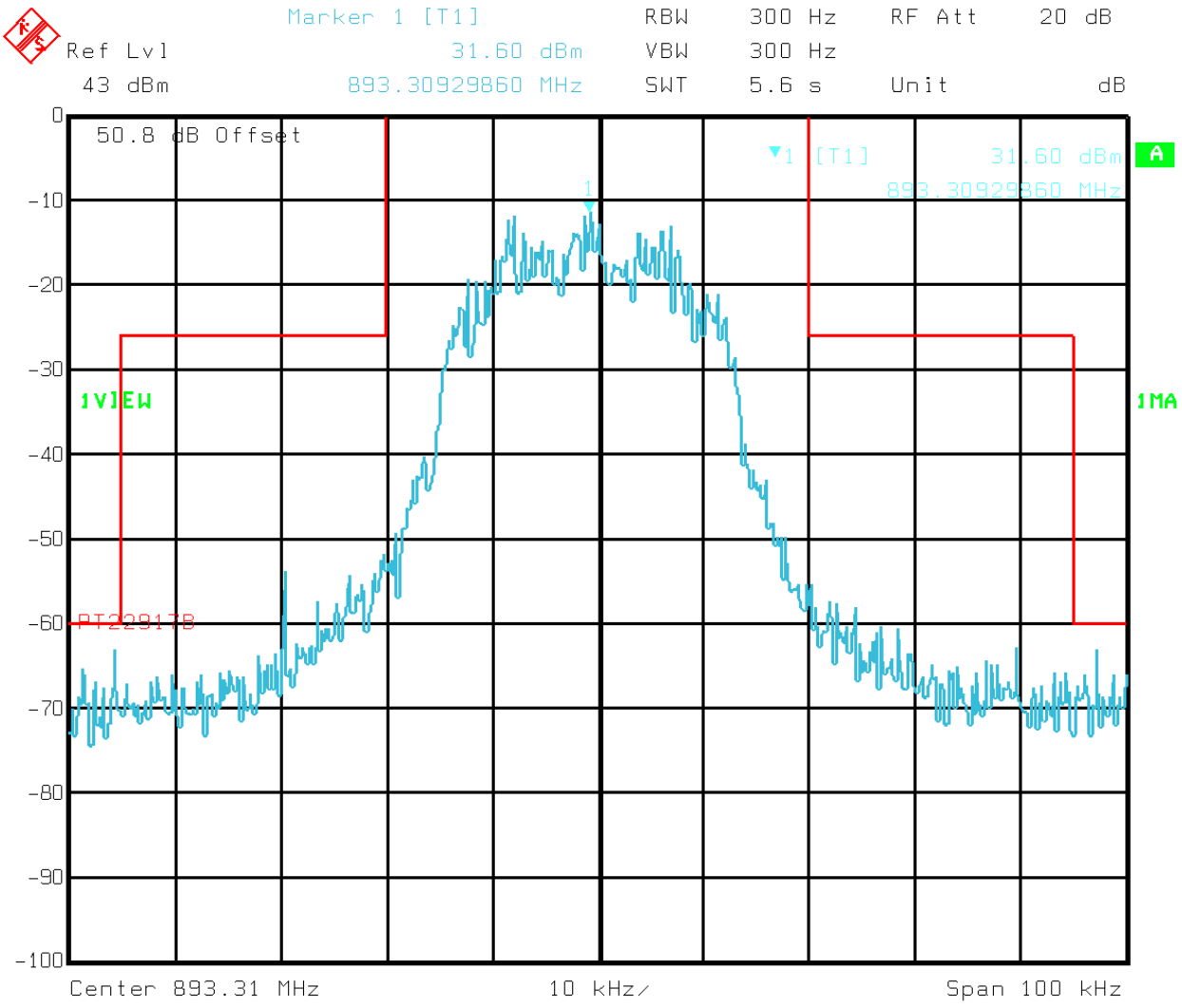
Test Results: Complies.

Test Data: See attached graph(s).



Title: Wideband Data Input CDMA Modules
Comment A: MOR801B (Channel 777)
Date: 21.SEP.1999 10:35:23

Plot 12

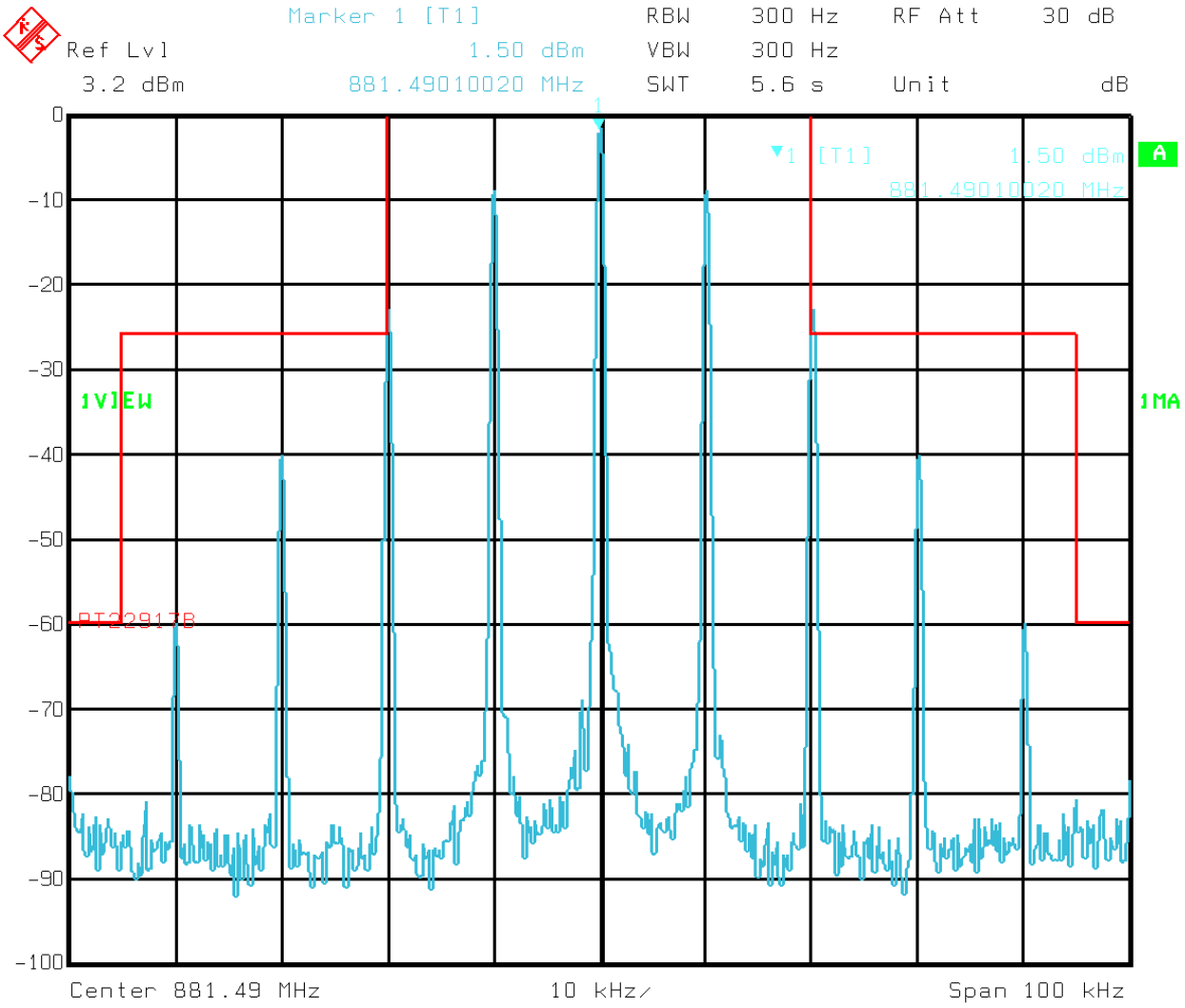

Marker 1 [T1]
RBW 300 Hz
RF Att 20 dB
Ref Lvl
31.60 dBm
VBW 300 Hz
43 dBm
893.30929860 MHz
SWT 5.6 s
Unit dB
50.8 dB Offset
1 [T1]
31.60 dBm
893.30929860 MHz
A
1VIEW
1MA
PT22817B
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 893.31 MHz
10 kHz/
Span 100 kHz
Title: Wideband Data CDMA Modules
Comment A: MOR801B (Channel 777)
Date: 21.SEP.1999 10:13:16

Plot 13

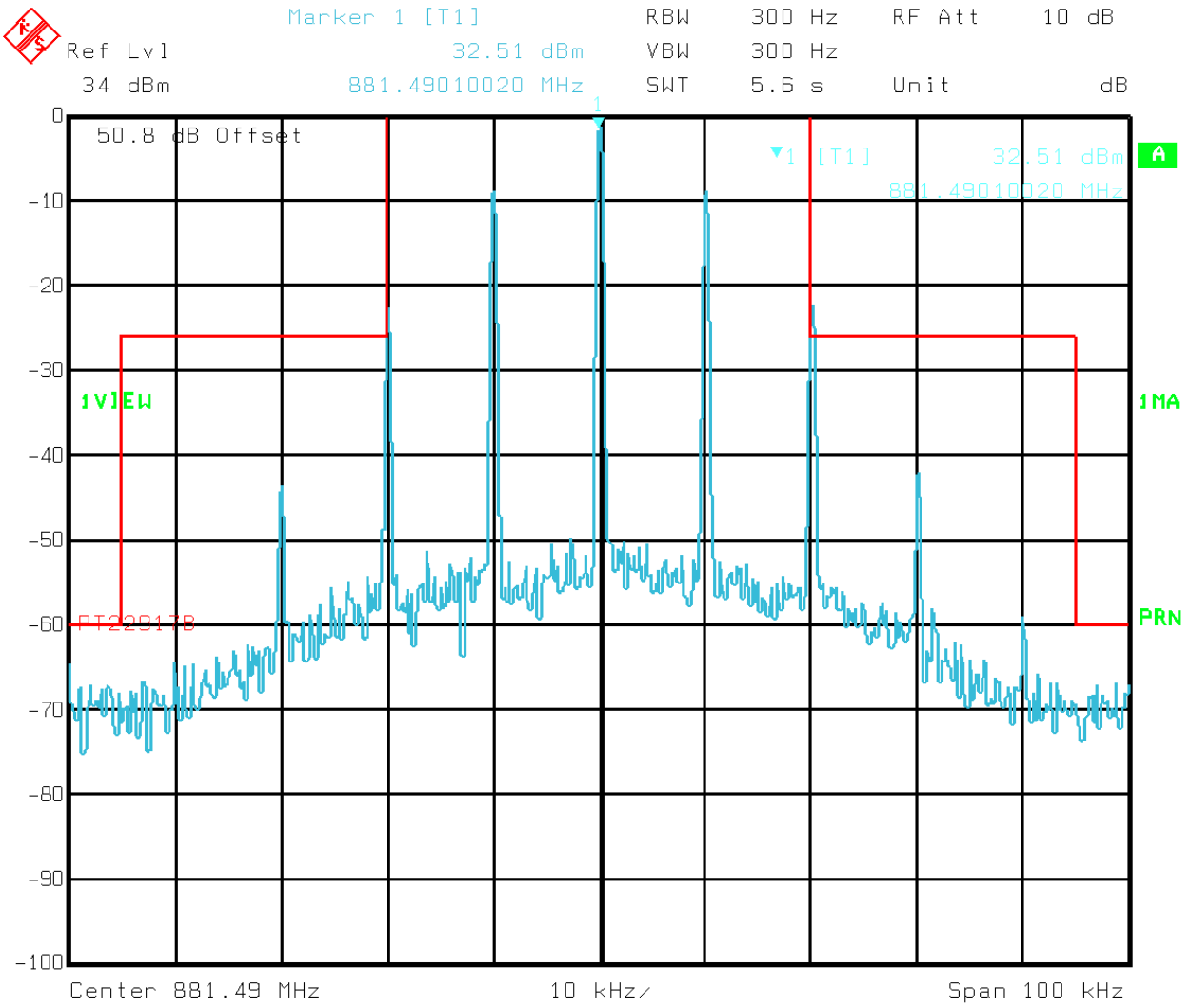
NAME OF TEST: Occupied Bandwidth (ST)	PARA. NO.: 2.917(d)
TESTED BY: Ron Gaytan	DATE: 21 Sept.

Test Results: Complies.

Test Data: See attached graph(s).

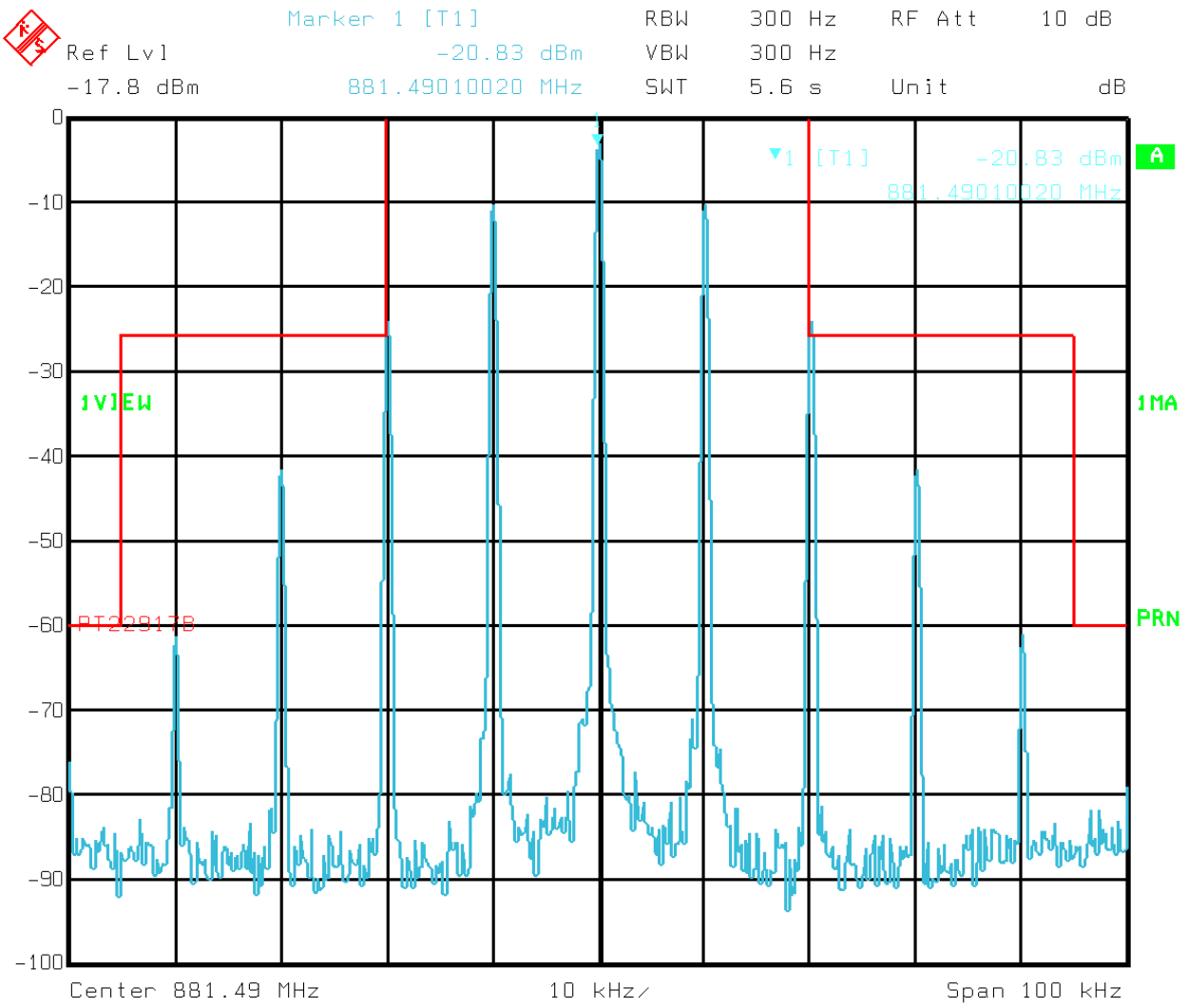

Marker 1 [T1]
RBW 300 Hz
RF Att 30 dB
Ref Lvl
1.50 dBm
VBW 300 Hz
3.2 dBm
881.49010020 MHz
SWT 5.6 s
Unit dB
1 [T1]
1.50 dBm
881.49010020 MHz
A
VIEW
1MA
PT229178
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 881.49 MHz
10 kHz/
Span 100 kHz
Title: Signal Tone Input TDMA Modules 8 Watt Amplifier
Comment A: MOR801B (Channel 383)
Date: 20.SEP.1999 14:02:36

Plot 14

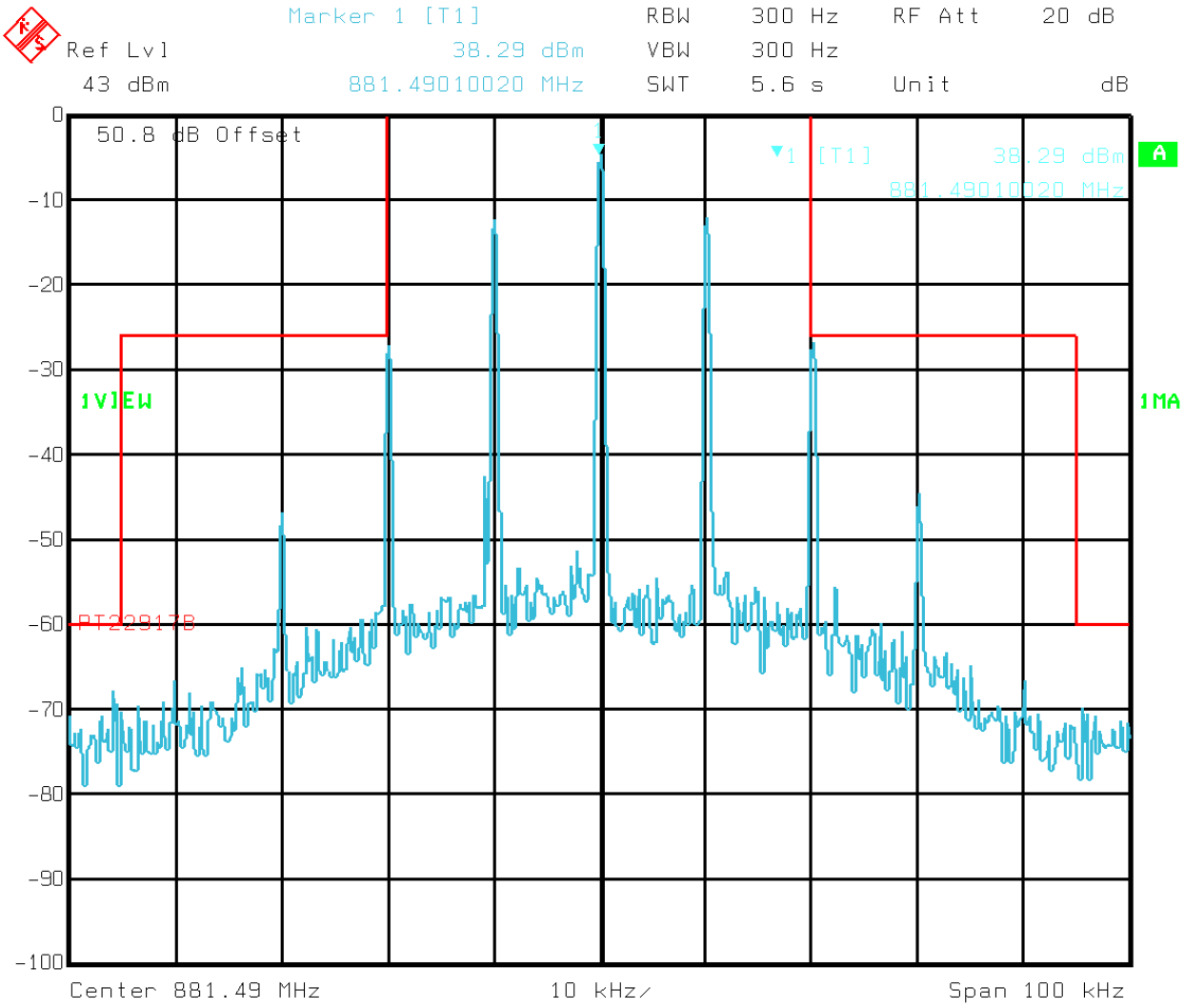


Title: Signal Tone TDMA Modules 8 Watt Amplifier
Comment A: MOR801B (Channel 383)
Date: 20.SEP.1999 13:59:33

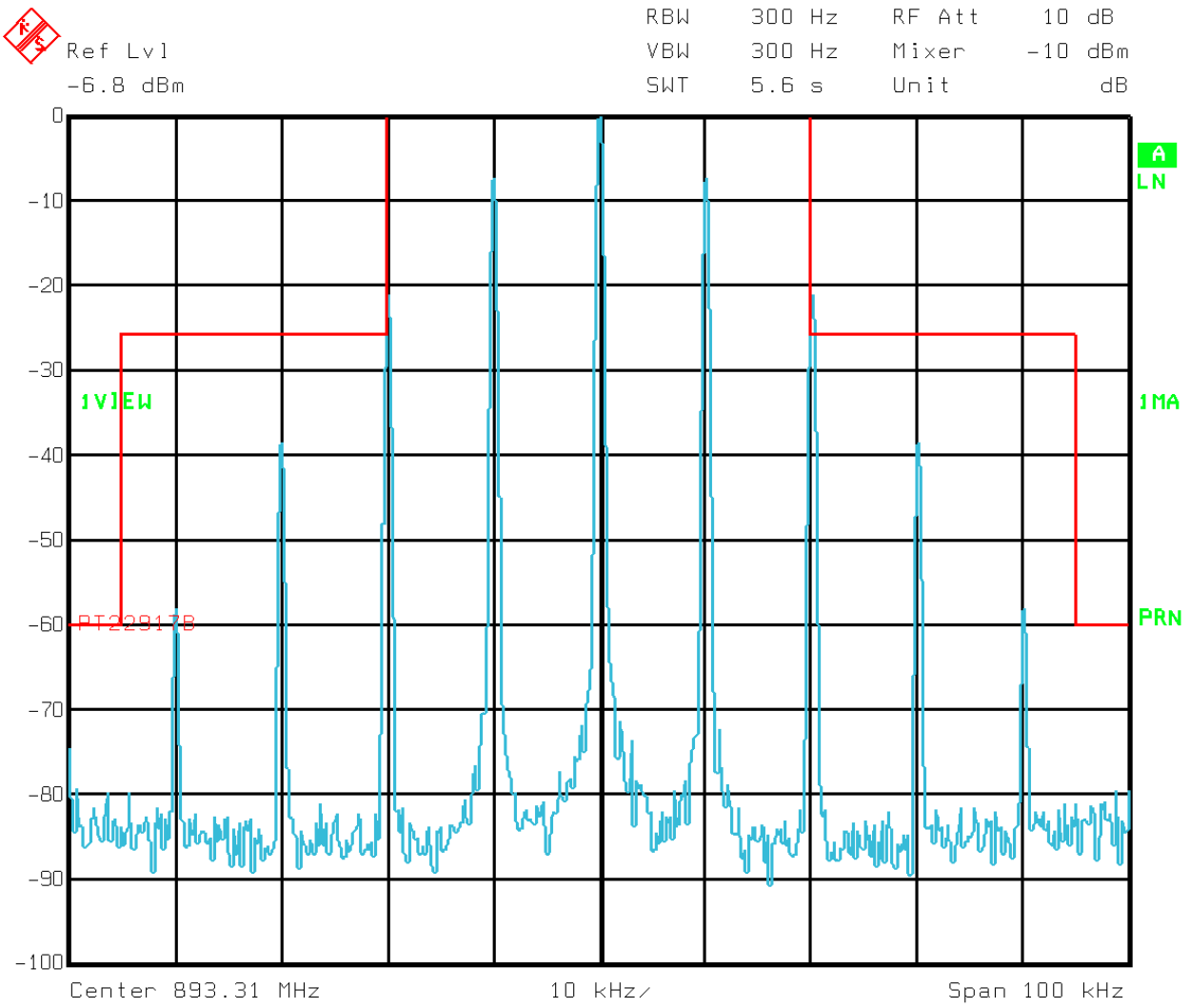
Plot 15


Marker 1 [T1]
RBW 300 Hz
RF Att 10 dB
Ref Lvl
-20.83 dBm
VBW 300 Hz
-17.8 dBm
881.49010020 MHz
SWT 5.6 s
Unit dB
1 [T1]
-20.83 dBm
881.49010020 MHz
A
1VIEW
1MA
PRN
PT22817B
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 881.49 MHz
10 kHz/
Span 100 kHz
Title: Signal Tone Input TDMA Modules
Comment A: MOR801B (Channel 383)
Date: 21.SEP.1999 8:58:46

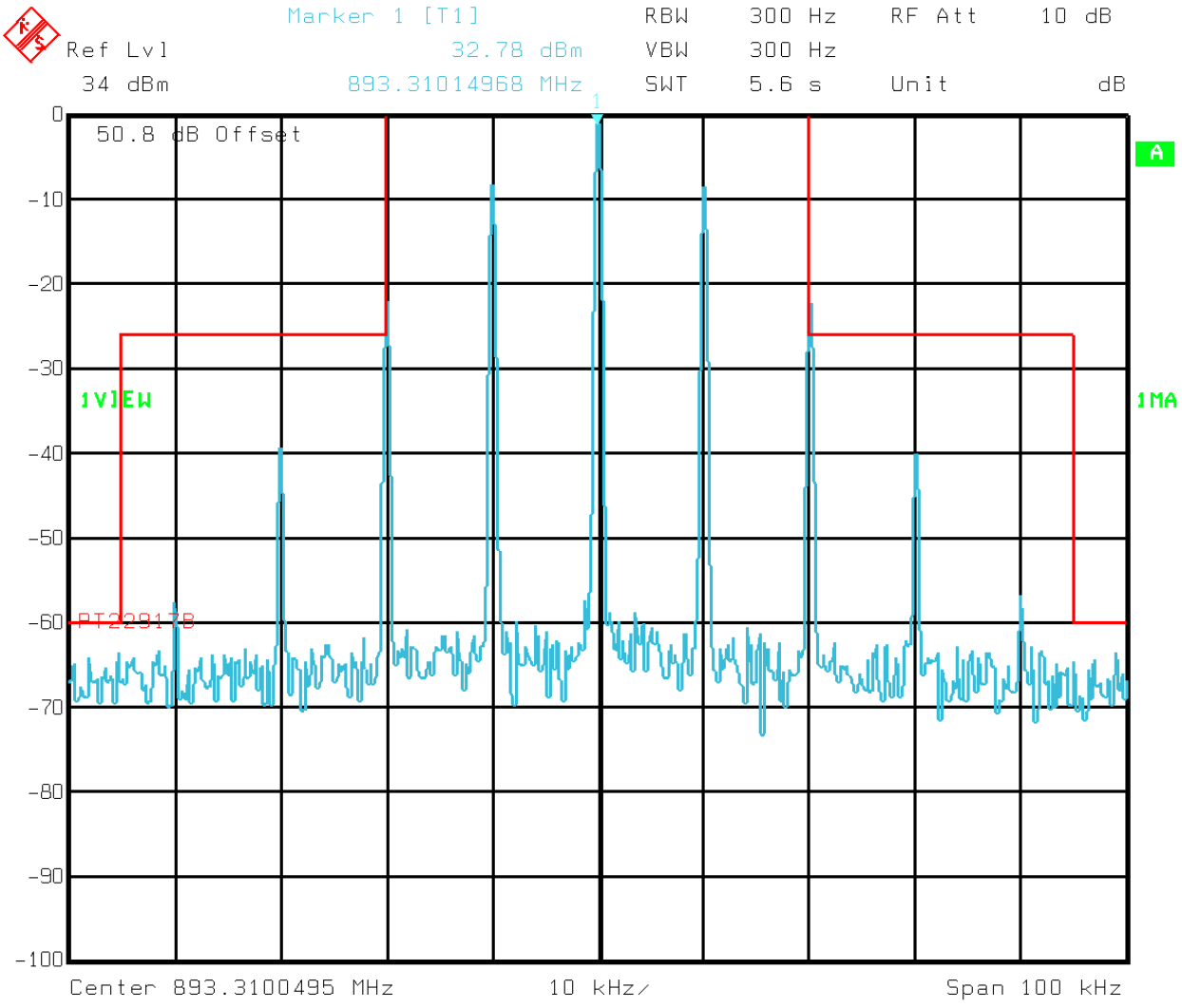
Plot 16


Marker 1 [T1]
RBW 300 Hz
RF Att 20 dB
Ref Lvl
38.29 dBm
VBW 300 Hz
43 dBm
881.49010020 MHz
SWT 5.6 s
Unit dB
50.8 dB Offset
1 [T1]
38.29 dBm
881.49010020 MHz
A
1VIEW
1MA
PT2281TB
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 881.49 MHz
10 kHz/
Span 100 kHz
Title: Signal Tone TDMA Modules
Comment A: MOR801B (Channel 383)
Date: 21.SEP.1999 8:55:51

Plot 17

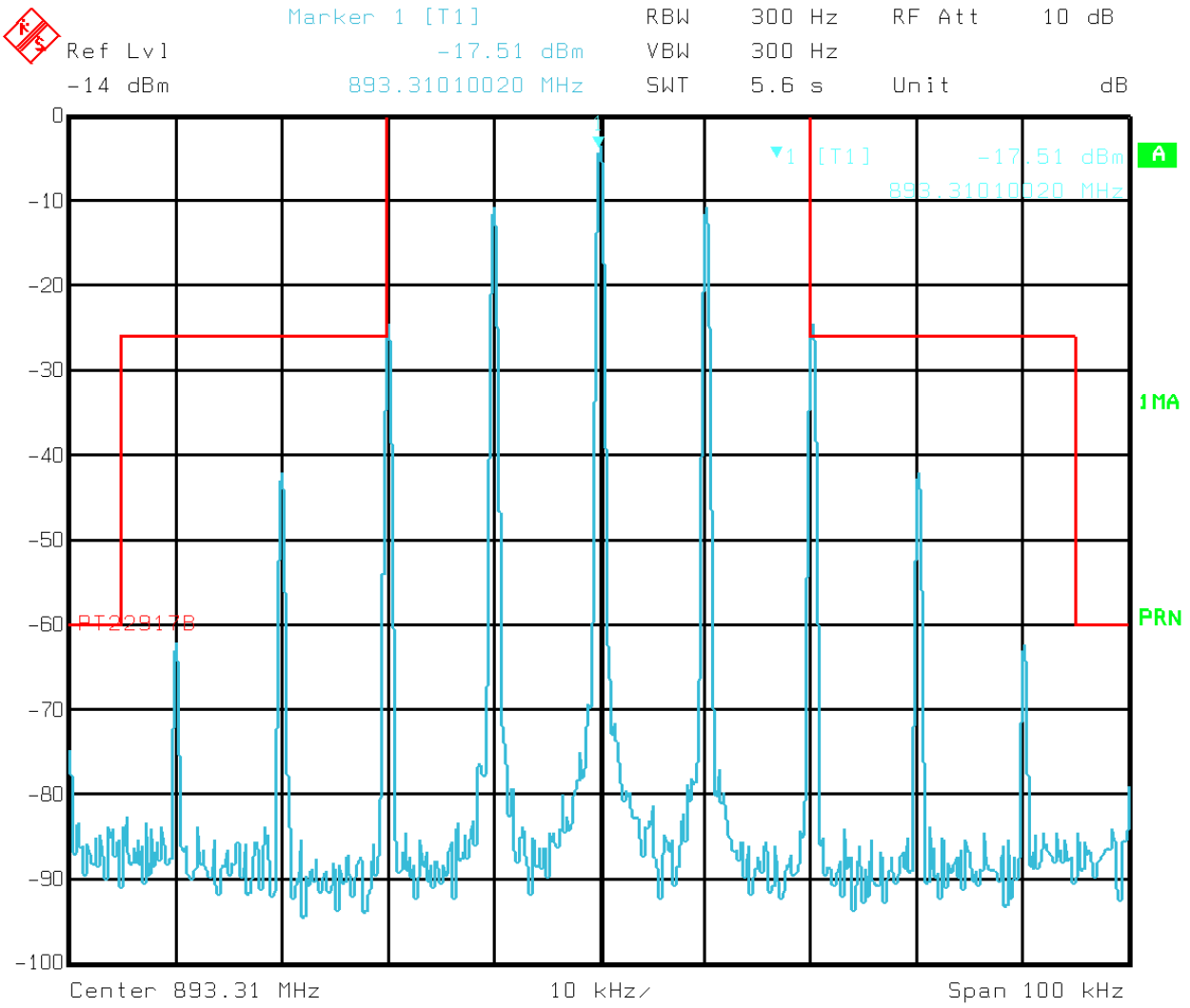

RBW 300 Hz
VBW 300 Hz
SWT 5.6 s
RF Att 10 dB
Mixer -10 dBm
Unit dB
Ref Lvl
-6.8 dBm
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
A
LN
1MA
PRN
1VIEW
PT22917B
Center 893.31 MHz
10 kHz/
Span 100 kHz
Title: Signal Tone Input CDMA Modules 8 Watt Amplifier
Comment A: MOR801B (Channel 777)
Date: 30.SEP.1999 15:31:10

Plot 18



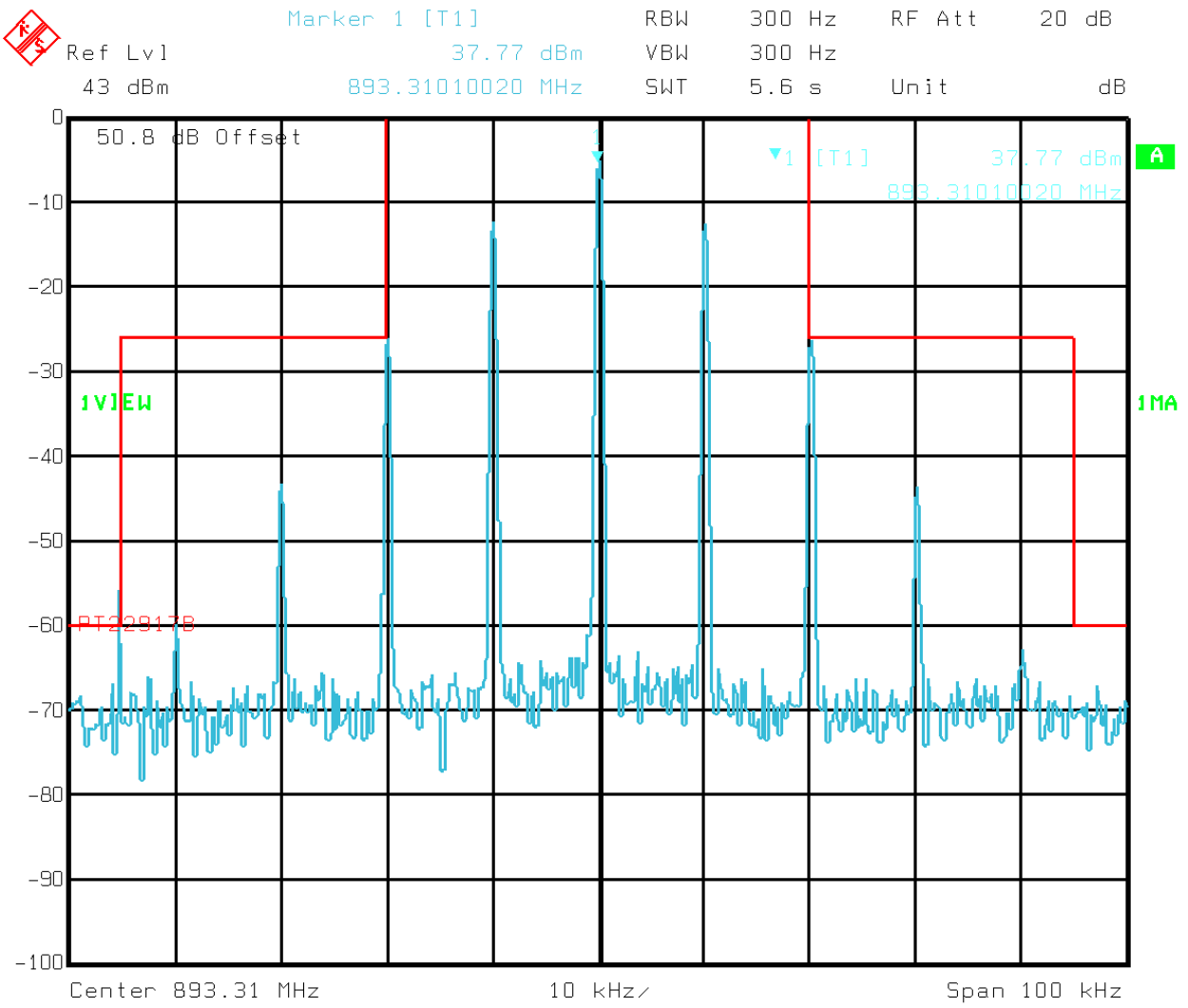
Title: Signal Tone CDMA Modules 8 Watt Amplifier
Comment A: MOR801B (Channel 777)
Date: 20.SEP.1999 11:43:29

Plot 19



Title: Signal Tone Input CDMA Modules
Comment A: MOR801B (Channel 777)
Date: 21.SEP.1999 9:25:33

Plot 20



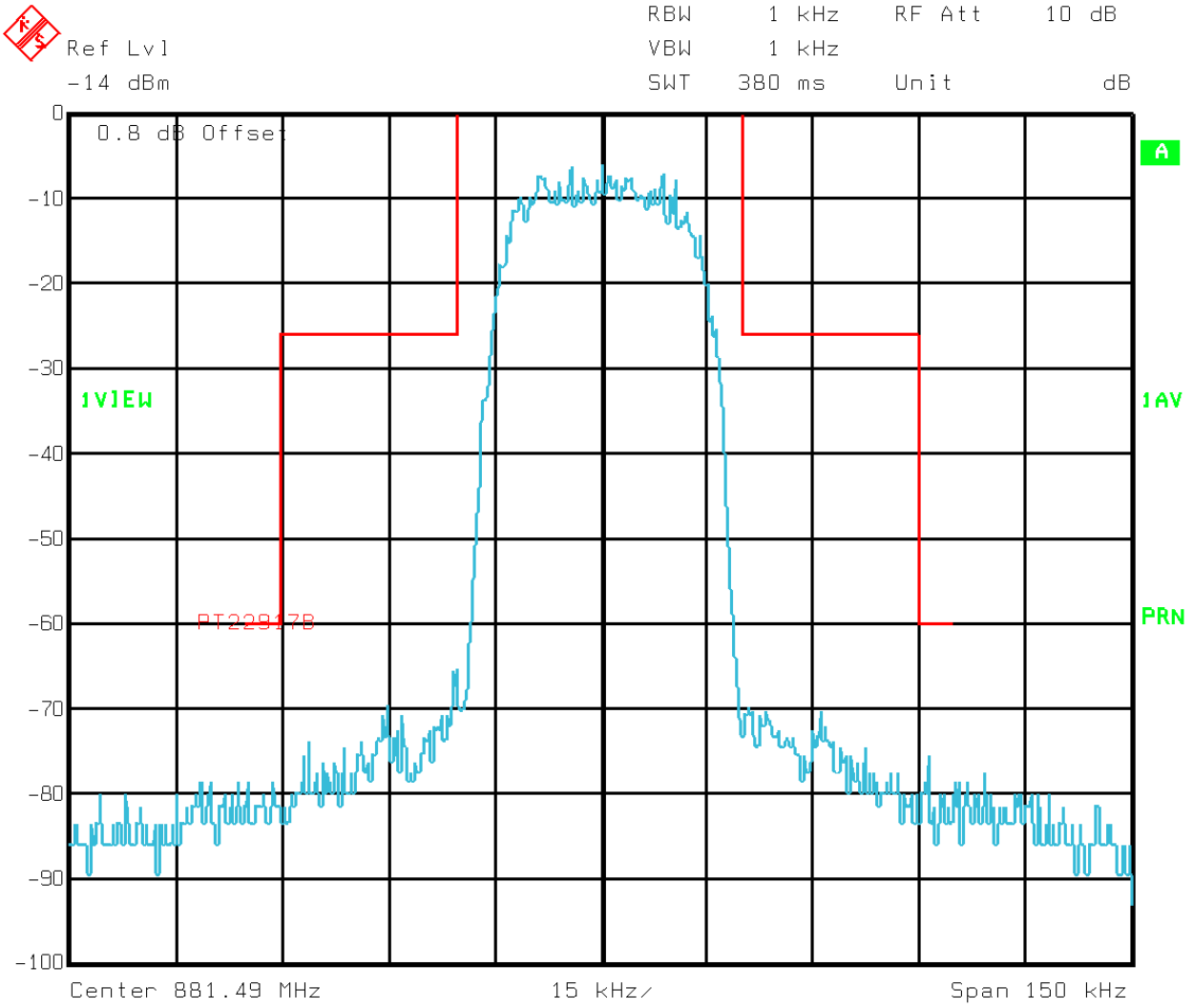
Title: Signal Tone CDMA Modules
Comment A: MOR801B (Channel 777)
Date: 21.SEP.1999 9:21:21

Plot 21

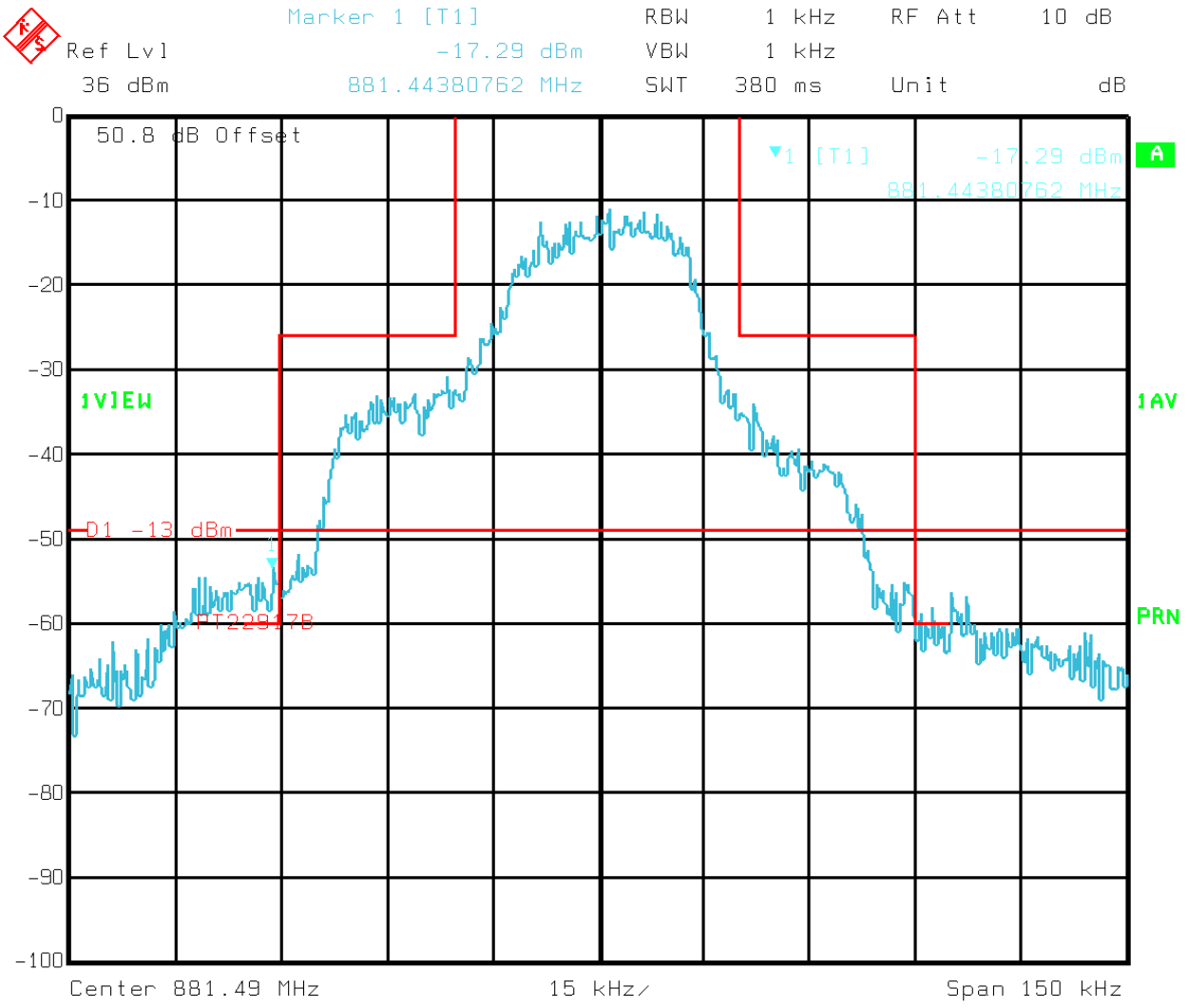
NAME OF TEST: Occupied Bandwidth (Digital Mod.)	PARA. NO.: 2.917(e)
TESTED BY: Ron Gaytan	DATE: 25 Aug. – 14 Sept.

Test Results: Complies.

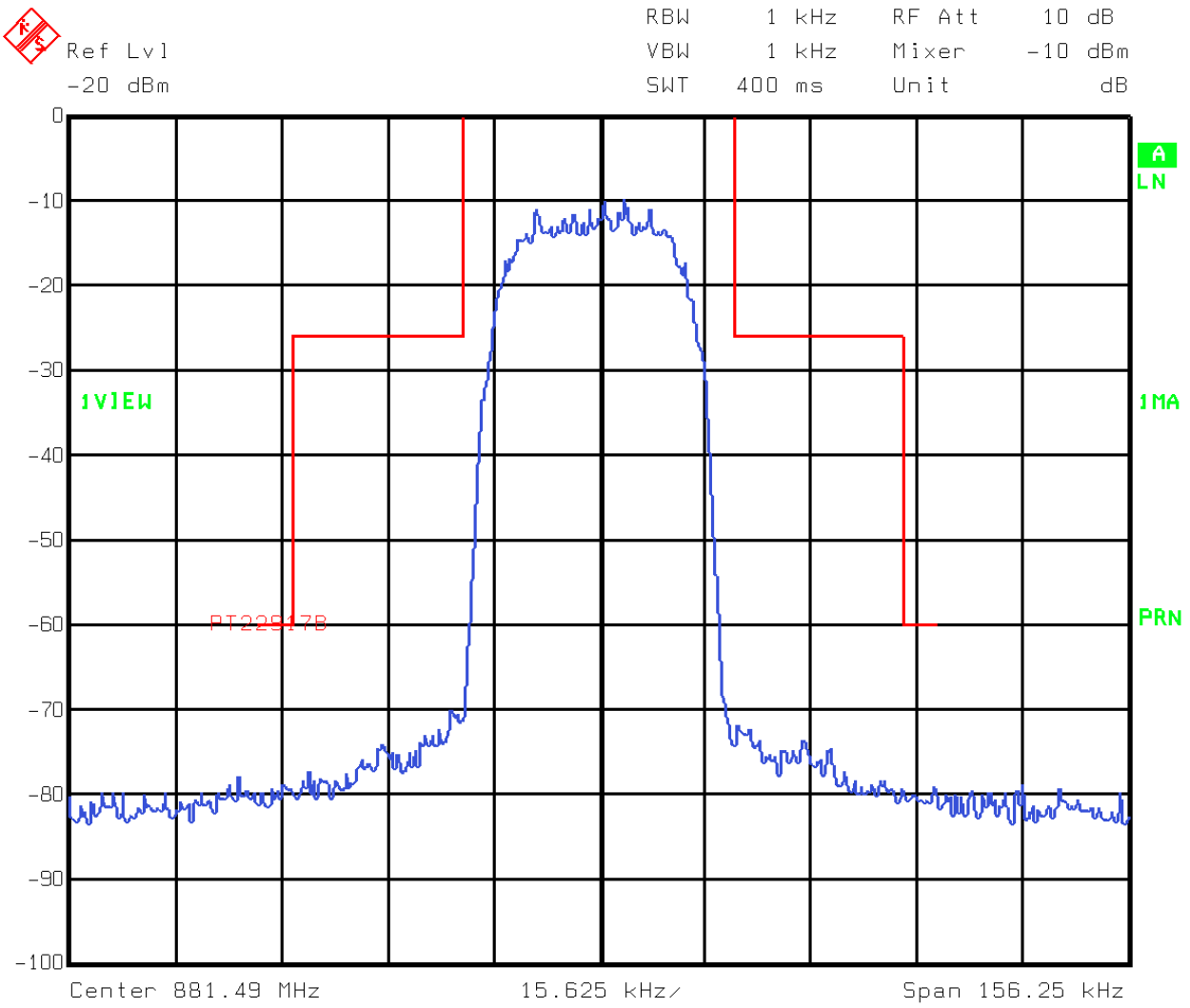
Test Data: See attached graph(s).


Ref Lvl
-14 dBm
RBW 1 kHz
VBW 1 kHz
SWT 380 ms
RF Att 10 dB
Unit dB
0.8 dB Offset
A
1VIEW
1AV
PRN
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 881.49 MHz
15 kHz/
Span 150 kHz
Title: Occupied Bandwidth Input TDMA 8 Watt Amplifier ID#148698
Comment A: MOR801B
Date: 14.SEP.1999 13:39:29

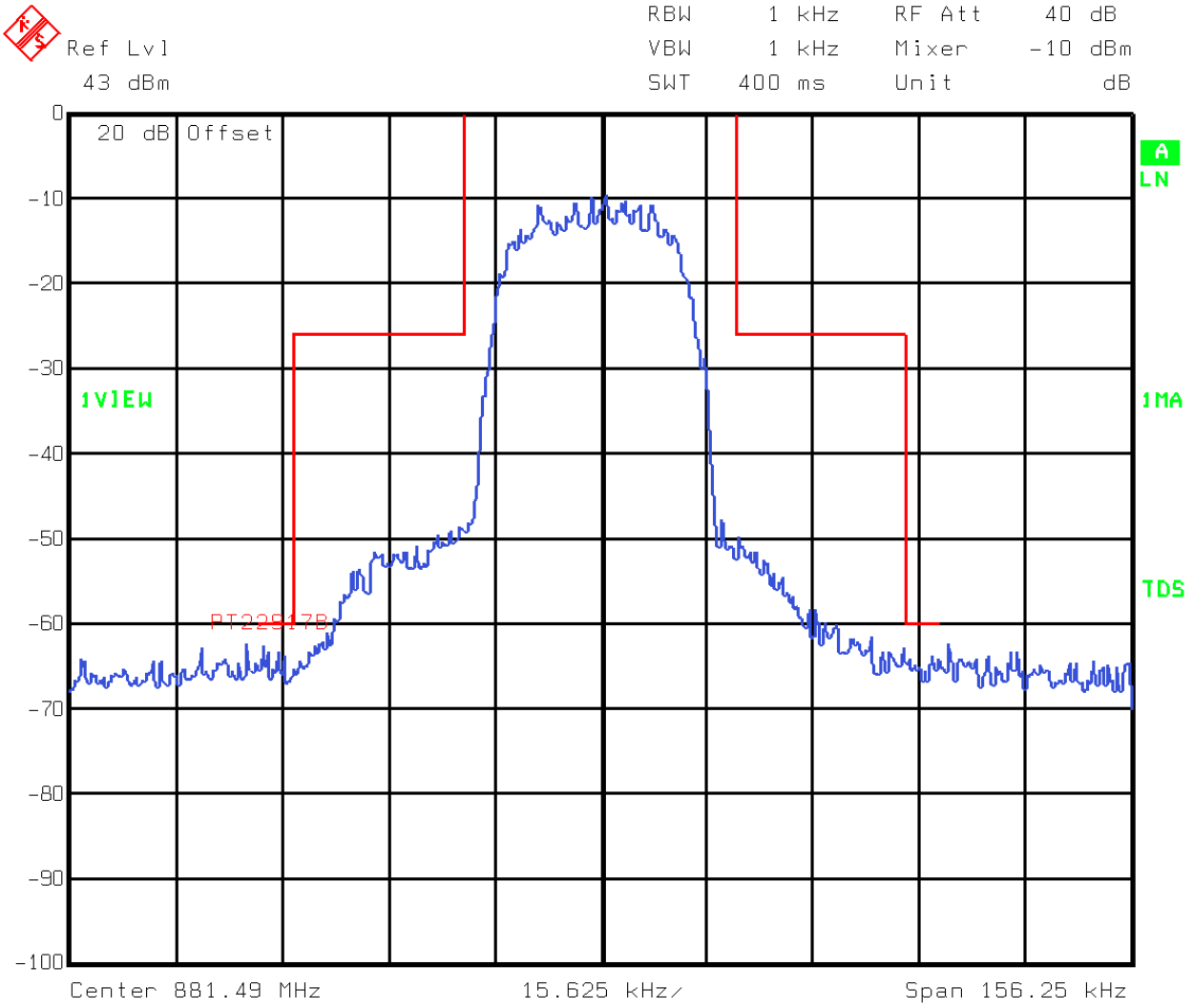
Plot 22


Marker 1 [T1]
RBW 1 kHz
RF Att 10 dB
Ref Lvl
-17.29 dBm
VBW 1 kHz
36 dBm
881.44380762 MHz
SWT 380 ms
Unit dB
50.8 dB Offset
1 [T1] -17.29 dBm
881.44380762 MHz
A
1VIEW
1AV
D1 -13 dBm
PRN
Center 881.49 MHz
15 kHz/
Span 150 kHz
Title: Occupied Bandwidth TDMA 8 Watt Amplifier ID#148698
Comment A: MOR801B
Date: 14.SEP.1999 13:28:49

Plot 23

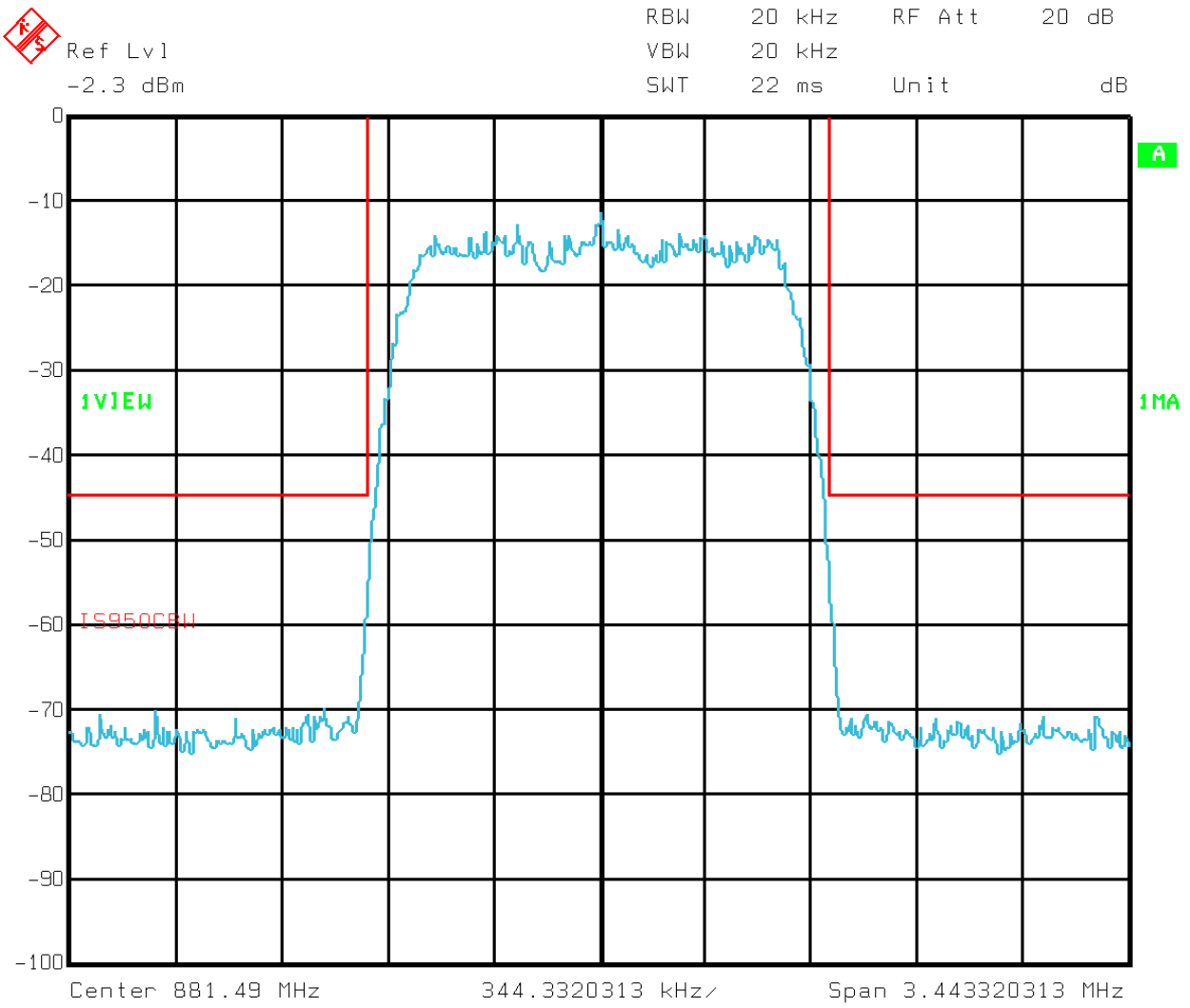

RBW 1 kHz
VBW 1 kHz
SWT 400 ms
RF Att 10 dB
Mixer -10 dBm
Unit dB
Ref Lvl
-20 dBm
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
A
LN
1VIEW
1MA
PRN
PT225178
Center 881.49 MHz
15.625 kHz/
Span 156.25 kHz
Title: Occupied Bandwidth CH 383 Input
Comment A: 9L0298R MOR801B
Date: 25.AUG.1999 9:24:40

Plot 24

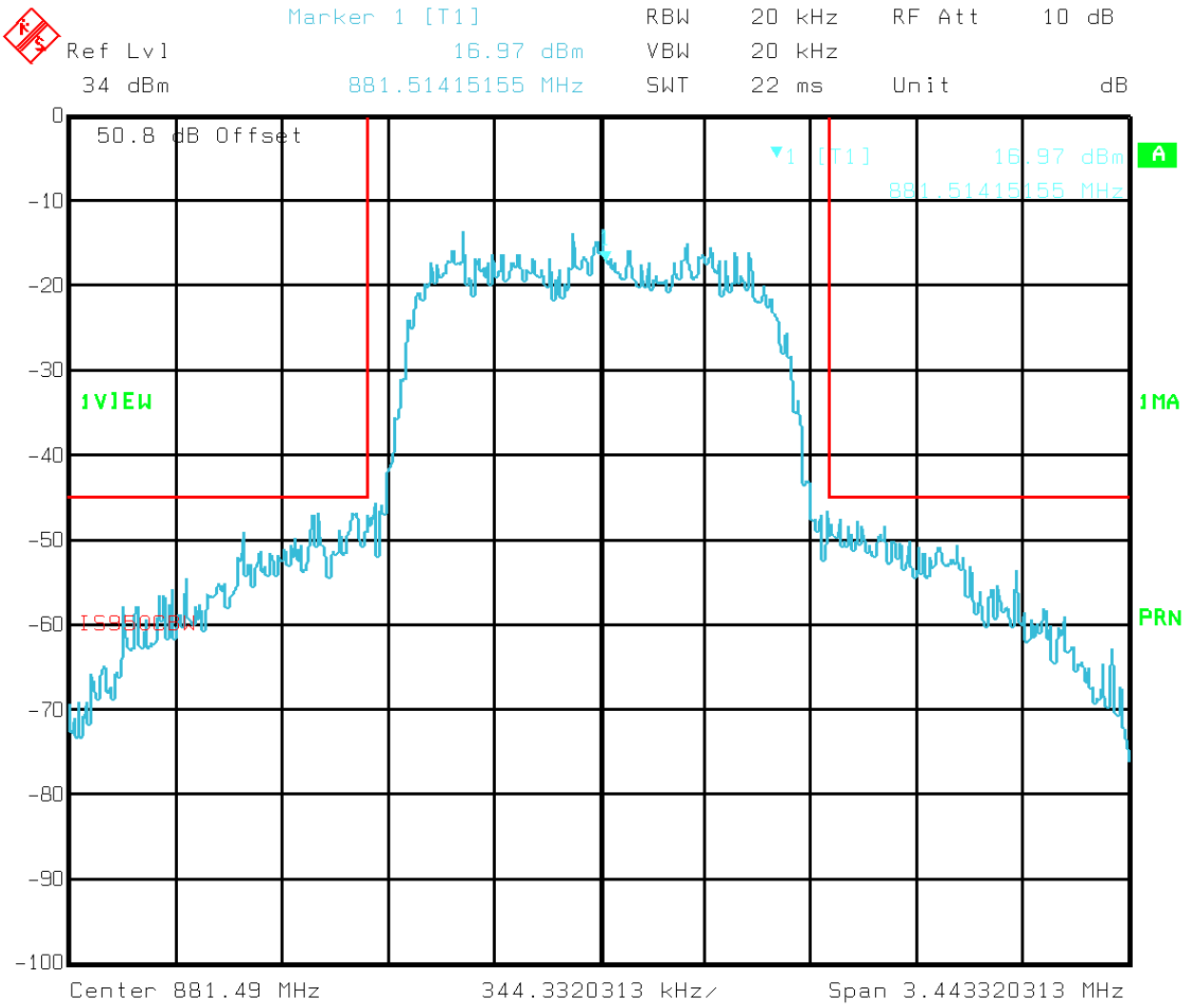


Title: Occupied Bandwidth CH 383
Comment A: 9L0298R MOR801B
Date: 25.AUG.1999 9:13:20

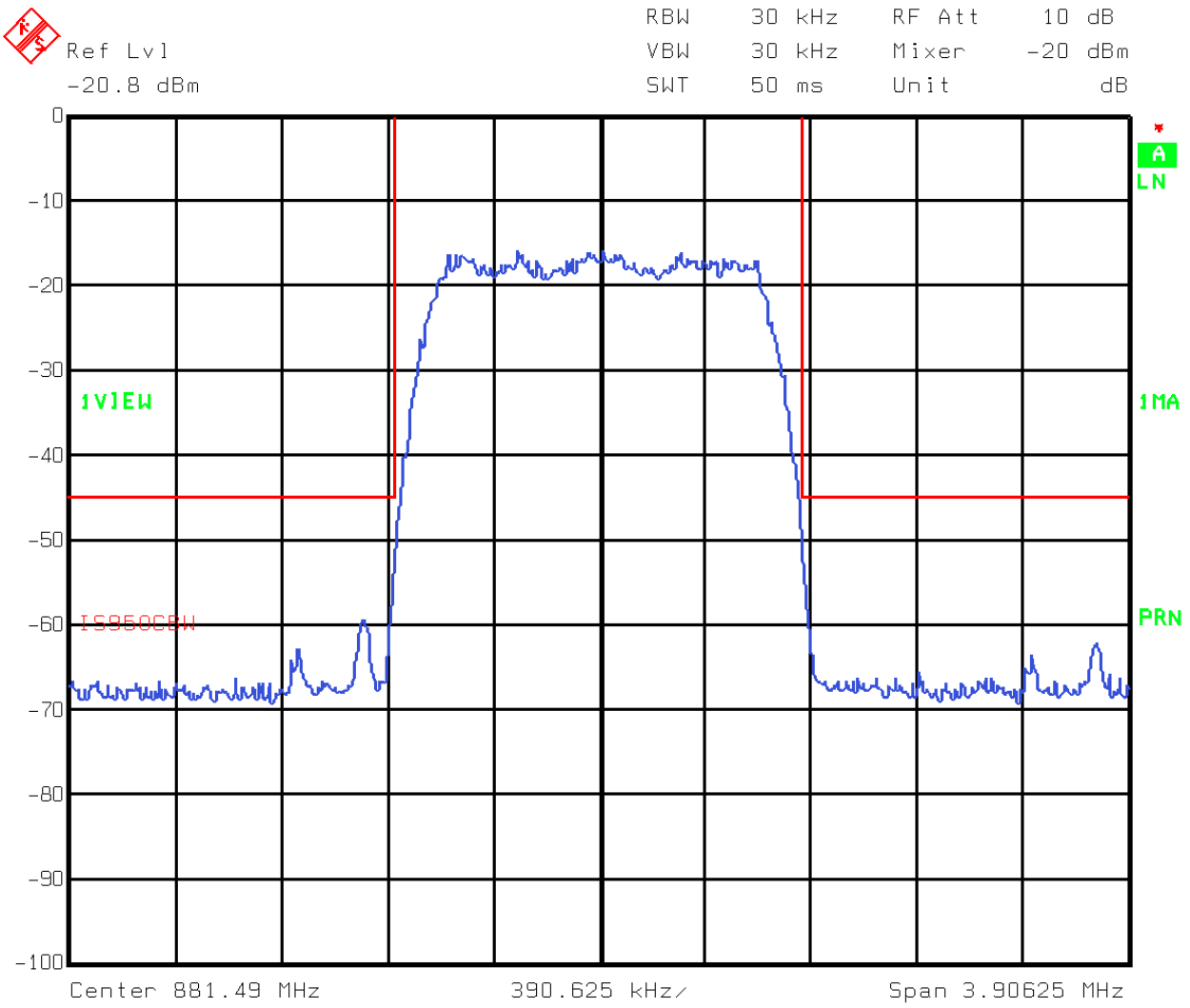
Plot 25


RBW 20 kHz
RF Att 20 dB
VBW 20 kHz
SWT 22 ms
Unit dB
Ref Lvl
-2.3 dBm
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
A
1VIEW
1MA
IS95OCBW
Center 881.49 MHz
344.3320313 kHz/
Span 3.443320313 MHz
Title: Occupied Bandwidth Input CDMA 8 Watt Amplifier ID#148698
Comment A: MOR801B (Channel 383)
Date: 14.SEP.1999 14:58:24

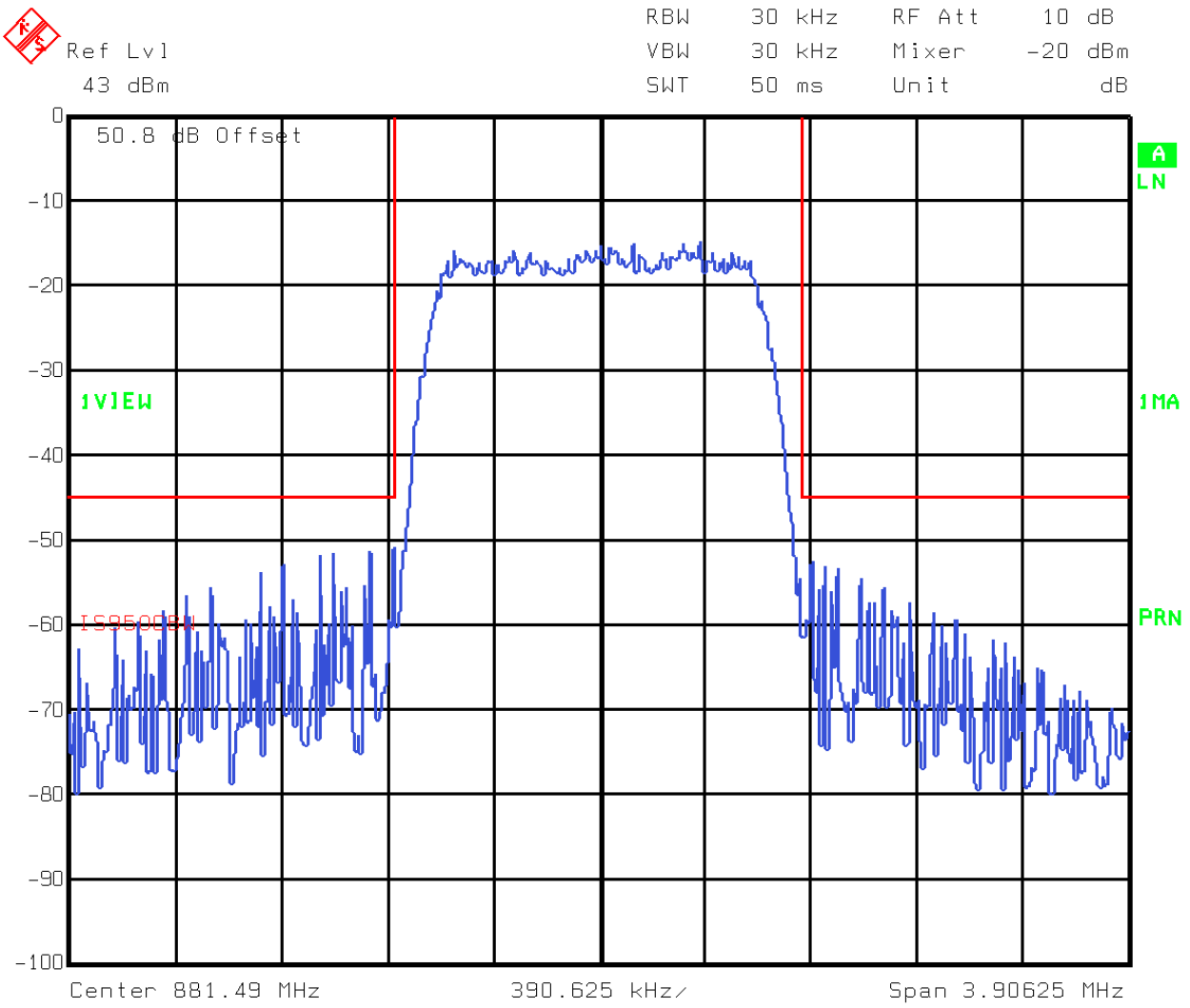
Plot 26


Marker 1 [T1]
RBW 20 kHz
RF Att 10 dB
Ref Lvl
16.97 dBm
VBW 20 kHz
34 dBm
881.51415155 MHz
SWT 22 ms
Unit dB
50.8 dB Offset
1 [T1]
16.97 dBm
881.51415155 MHz
A
1VIEW
1MA
PRN
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 881.49 MHz
344.3320313 kHz/
Span 3.443320313 MHz
Title: Occupied Bandwidth CDMA 8 Watt Amplifier ID#148698
Comment A: MOR801B (Channel 383)
Date: 14.SEP.1999 15:07:12

Plot 27


RBW 30 kHz
VBW 30 kHz
SWT 50 ms
RF Att 10 dB
Mixer -20 dBm
Unit dB
Ref Lvl
-20.8 dBm
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
1VIEW
IS95OCBW
A
LN
1MA
PRN
Center 881.49 MHz
390.625 kHz/
Span 3.90625 MHz
Title: Occupied Band Widthe Ch.383(CDMA)
Comment A: MOR801B (Input Signal)
Date: 3.SEP.1999 11:54:51

Plot 28


RBW 30 kHz
VBW 30 kHz
SWT 50 ms
RF Att 10 dB
Mixer -20 dBm
Unit dB
Ref Lvl
43 dBm
50.8 dB Offset
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
1VIEW
IS95CDMA
A
LN
1MA
PRN
Center 881.49 MHz
390.625 kHz/
Span 3.90625 MHz
Title: Occupied Band Width Ch.383(CDMA)
Comment A: MOR801B
Date: 3.SEP.1999 11:59:23

Plot 29

Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.917(e)
TESTED BY: Ron Gaytan	DATE: 24 – 25 Aug.

Test Results: Complies.

Test Data:

20 Watt Amplifier ID# 148630 CDMA Module

NAME OF TEST	WORST-CASE SPURIOUS LEVEL(dBm)
0 to 10 GHz spurious (Downlink)	-18.4
Intermodulation (Downlink)	-15.2
Lower band edge spurious (Downlink)	-16.4
Upper band edge spurious (Downlink)	-14.3

20 Watt Amplifier ID# 148630 CDMA/Variable Bandwidth Module

NAME OF TEST	WORST-CASE SPURIOUS LEVEL(dBm)
0 to 10 GHz spurious (Downlink)	-21.5
Intermodulation (Downlink)	-13.5
Lower band edge spurious (Downlink)	
Upper band edge spurious (Downlink)	

20 Watt Amplifier ID# 148630 TDMA Module

NAME OF TEST	WORST-CASE SPURIOUS LEVEL(dBm)
0 to 10 GHz spurious (Downlink)	-16.2
Intermodulation (Downlink)	-14.8
Lower band edge spurious (Downlink)	-18.1
Upper band edge spurious (Downlink)	-14.6

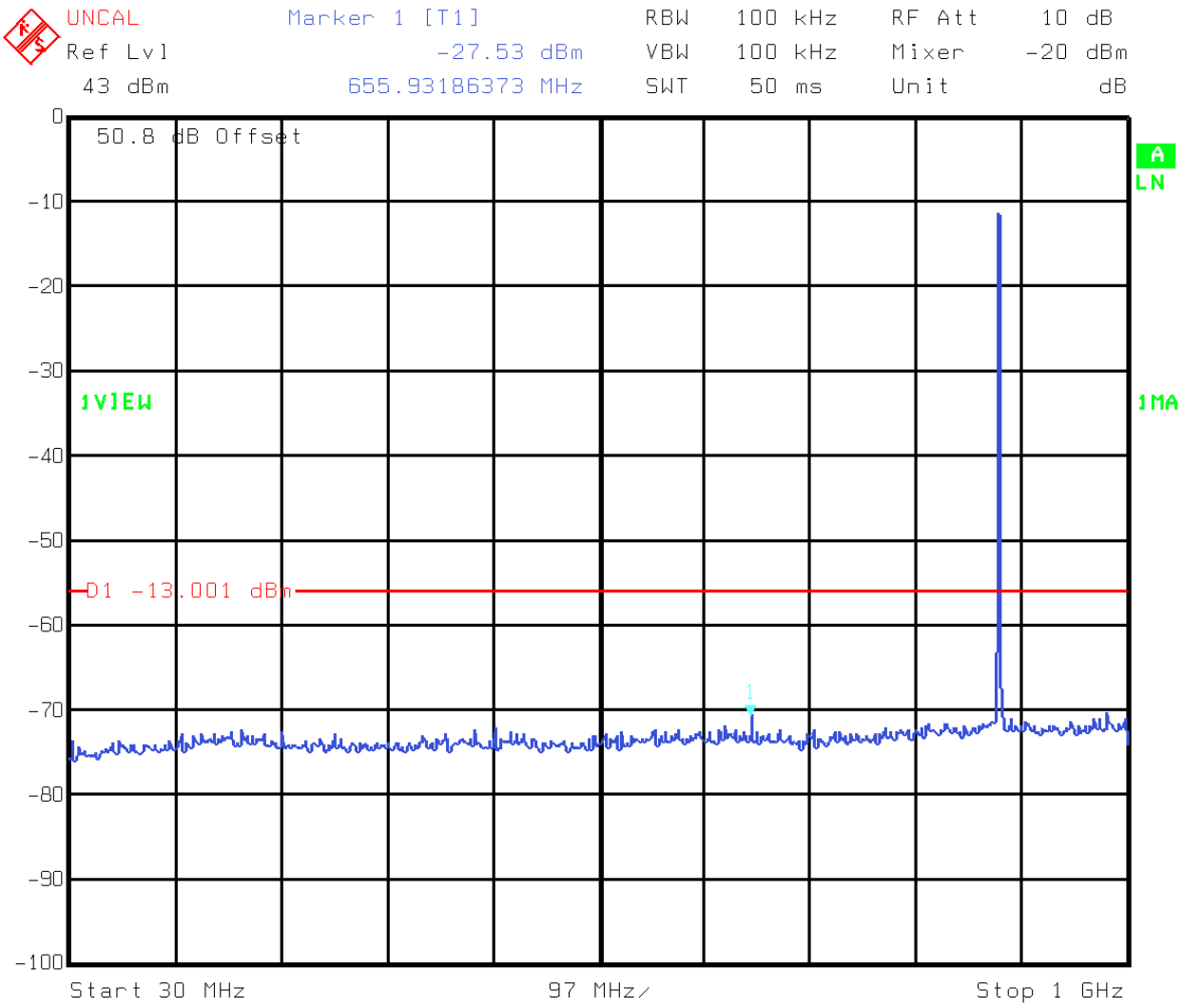
Test Data - (Continued)

8 Watt Amplifier ID# 148698 CDMA Module

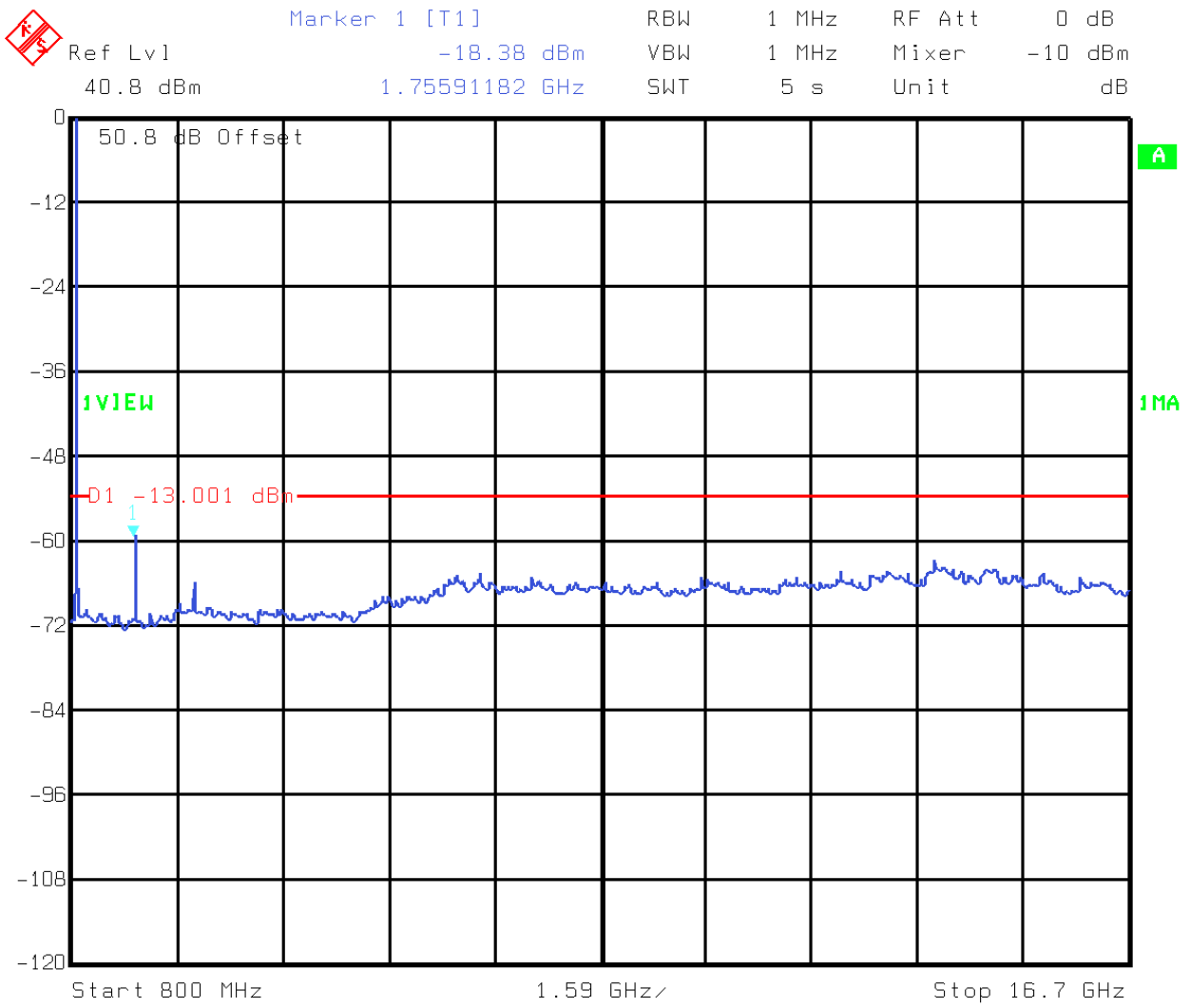
NAME OF TEST	WORST-CASE SPURIOUS LEVEL(dBm)
0 to 10 GHz spurious (Downlink)	-14.6
Lower band edge spurious (Downlink)	-14.2
Upper band edge spurious (Downlink)	-14.0

8 Watt Amplifier ID# 148698 TDMA Module

NAME OF TEST	WORST-CASE SPURIOUS LEVEL(dBm)
0 – 10 GHz spurious (Downlink)	-15.1
Intermodulation (Downlink)	
Lower band edge spurious (Downlink)	--17.6
Upper band edge spurious (Downlink)	-21.4

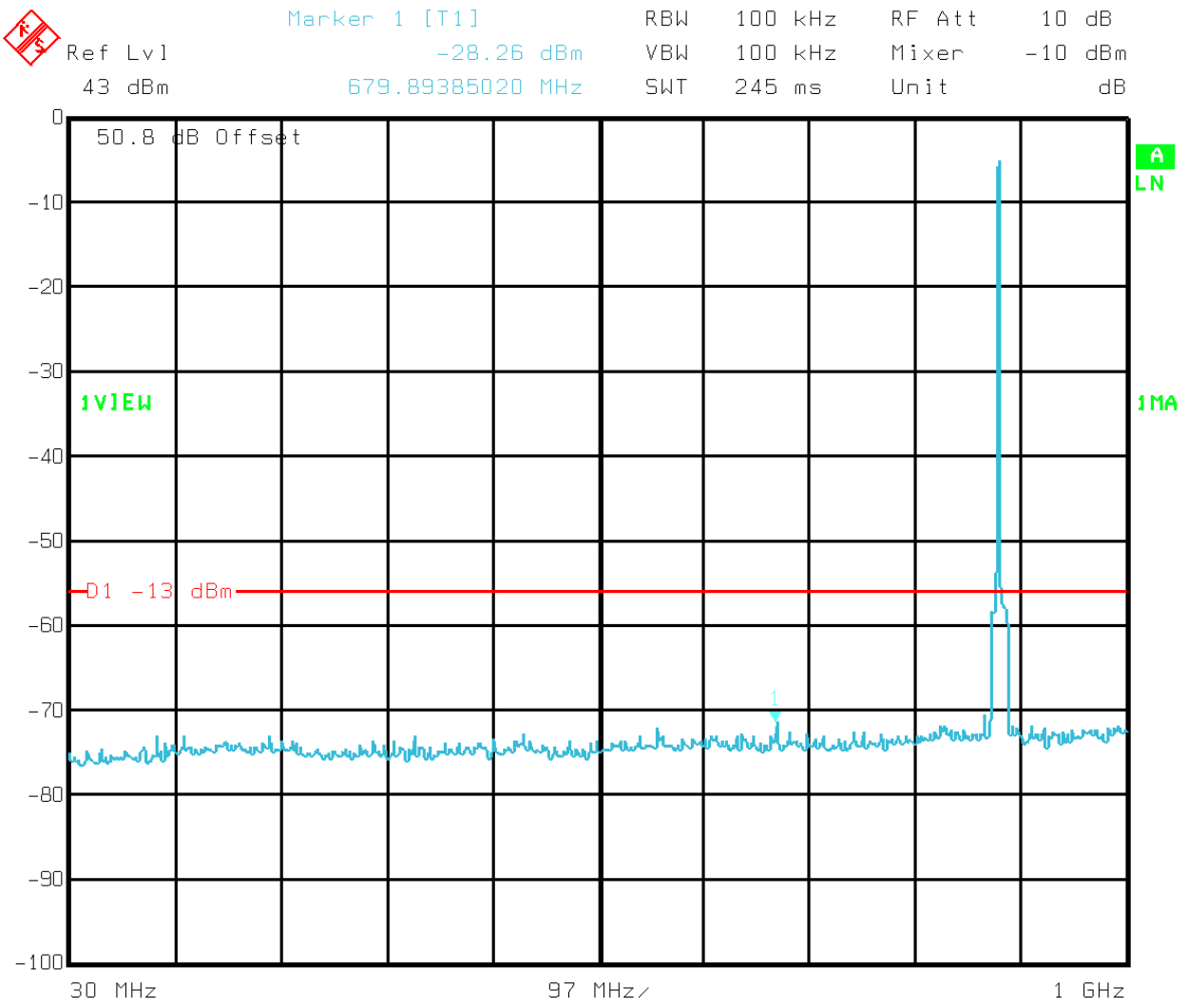

UNCAL
Marker 1 [T1]
RBW 100 kHz
RF Att 10 dB
Ref Lvl
-27.53 dBm
VBW 100 kHz
Mixer -20 dBm
43 dBm
655.93186373 MHz
SWT 50 ms
Unit dB
50.8 dB Offset
A
LN
1VIEW
1MA
D1 -13.001 dBm
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Start 30 MHz
97 MHz/
Stop 1 GHz
Title: Antenna Port Spurious Emissions Ch.383(CDMA)
Comment A: MOR801B
Date: 3.SEP.1999 13:18:17

Plot 30

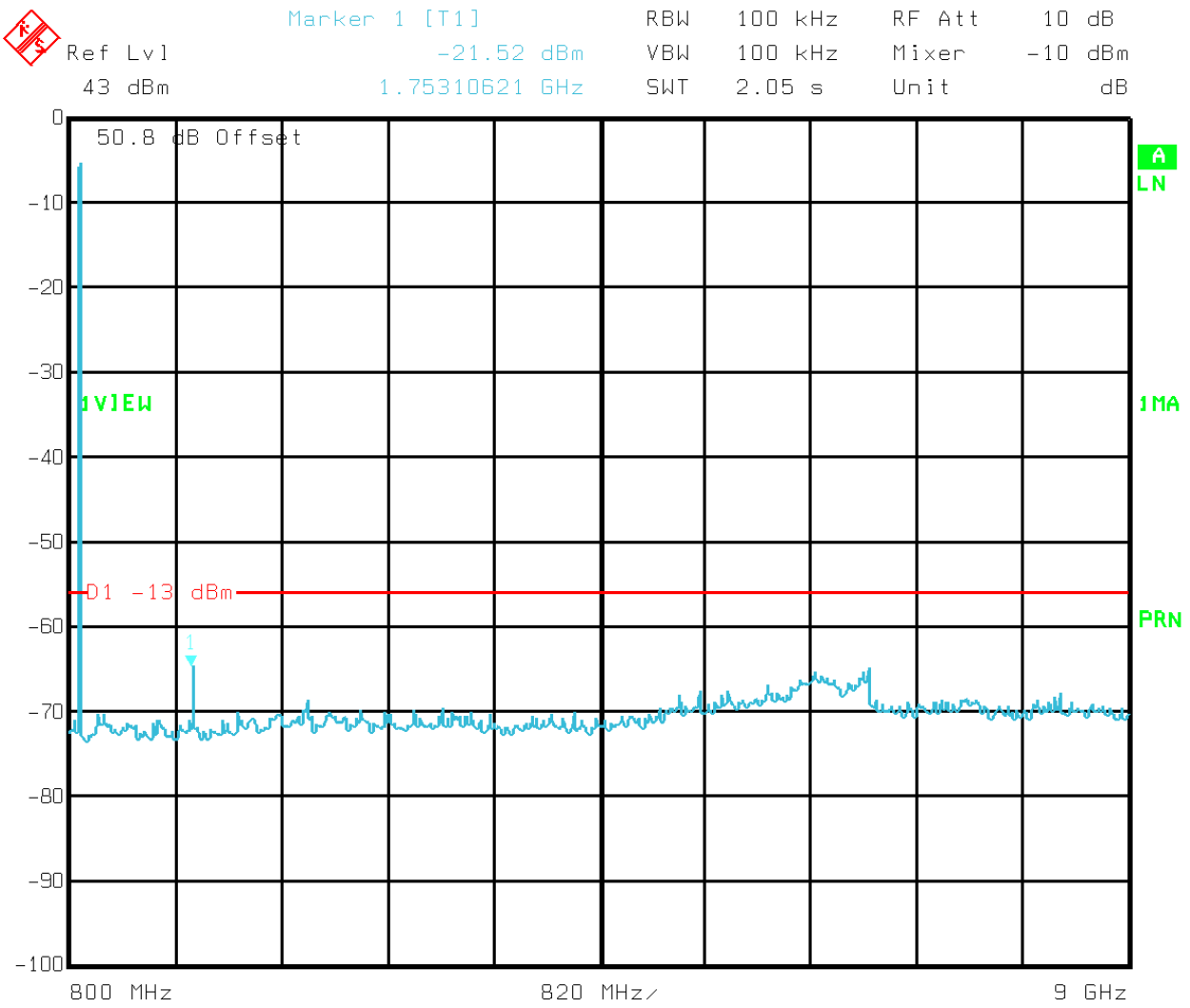


Title: Antenna Port Spurious Emissions Ch.383(CDMA)
Comment A: MOR801B
Date: 3.SEP.1999 13:37:37

Plot 31

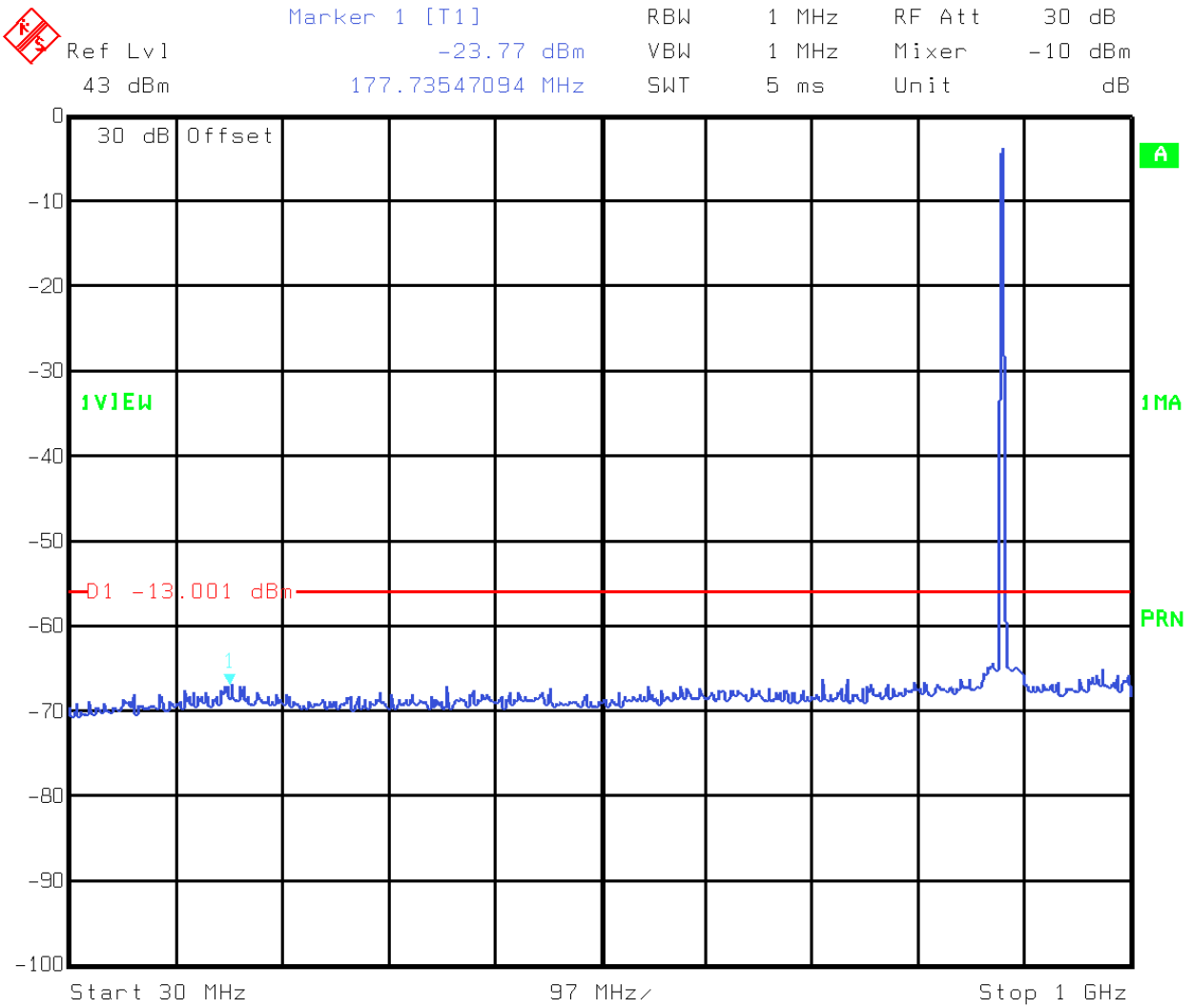

Marker 1 [T1]
-28.26 dBm
679.89385020 MHz
RBW 100 kHz
VBW 100 kHz
SWT 245 ms
RF Att 10 dB
Mixer -10 dBm
Unit dB
Ref Lvl
43 dBm
50.8 dB Offset
A
LN
1VIEW
1MA
D1 -13 dBm
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
30 MHz
97 MHz/
1 GHz
Title: Spurious Emissions CDMA/Variable Bandwidth Modules
Comment A: MOR801B
Date: 23.SEP.1999 10:05:14

Plot 32



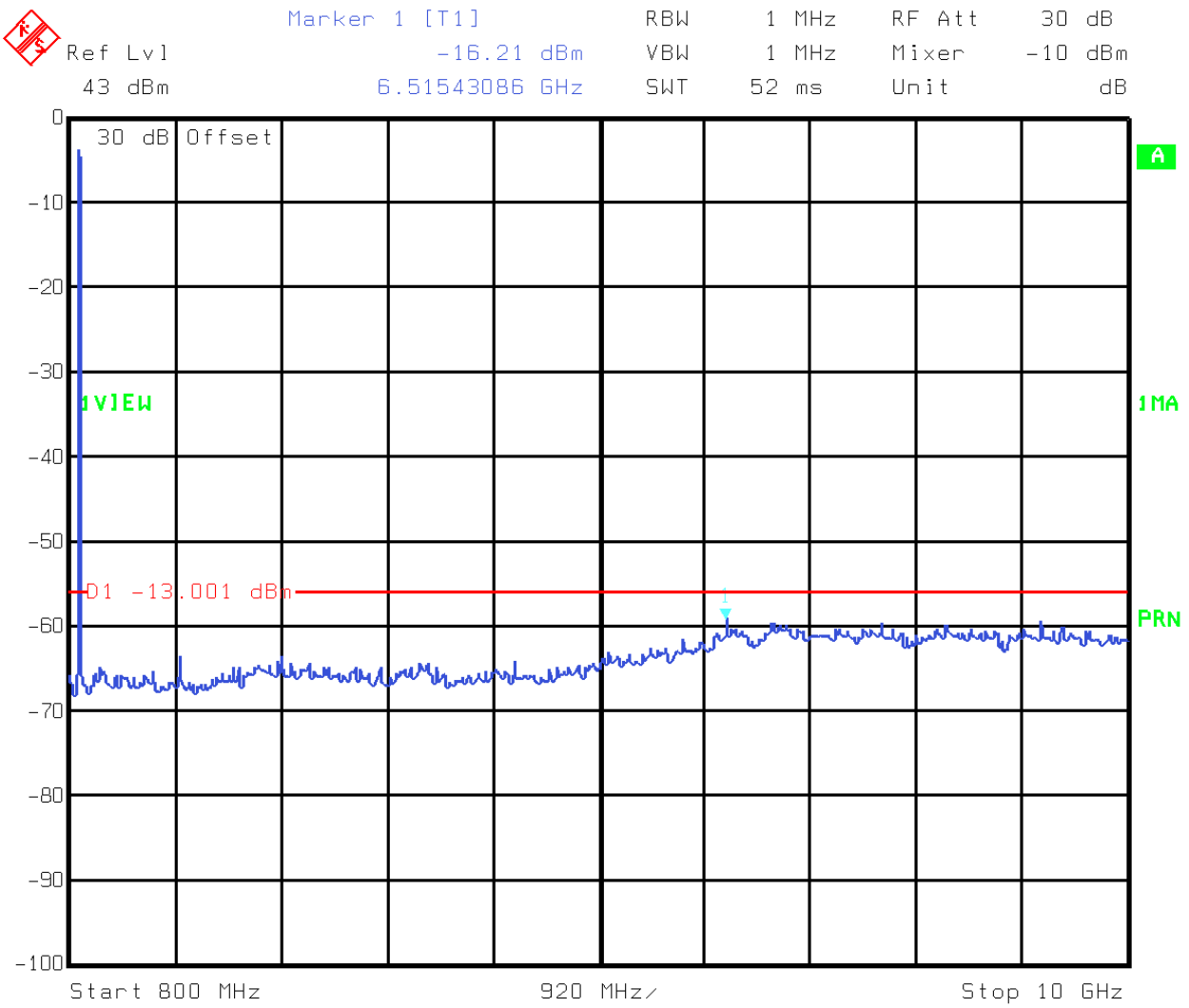
Title: Spurious Emissions CDMA/Variable Bandwidth Modules
Comment A: MOR801B
Date: 23.SEP.1999 10:10:42

Plot 33



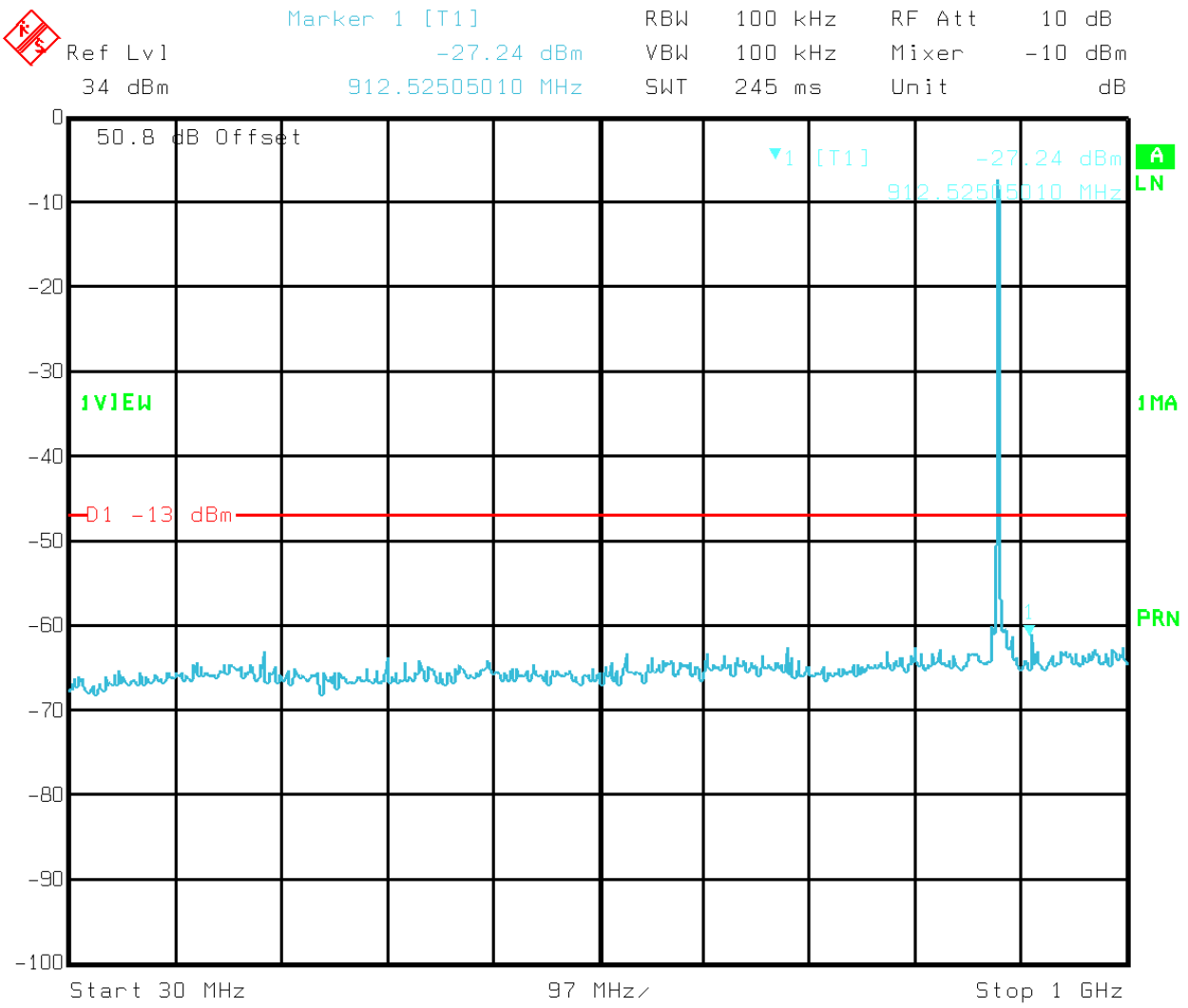
Title: Antenna Port Spurious Emissions CH 383
Comment A: 9L0298R MOR801B
Date: 25.AUG.1999 10:35:56

Plot 34



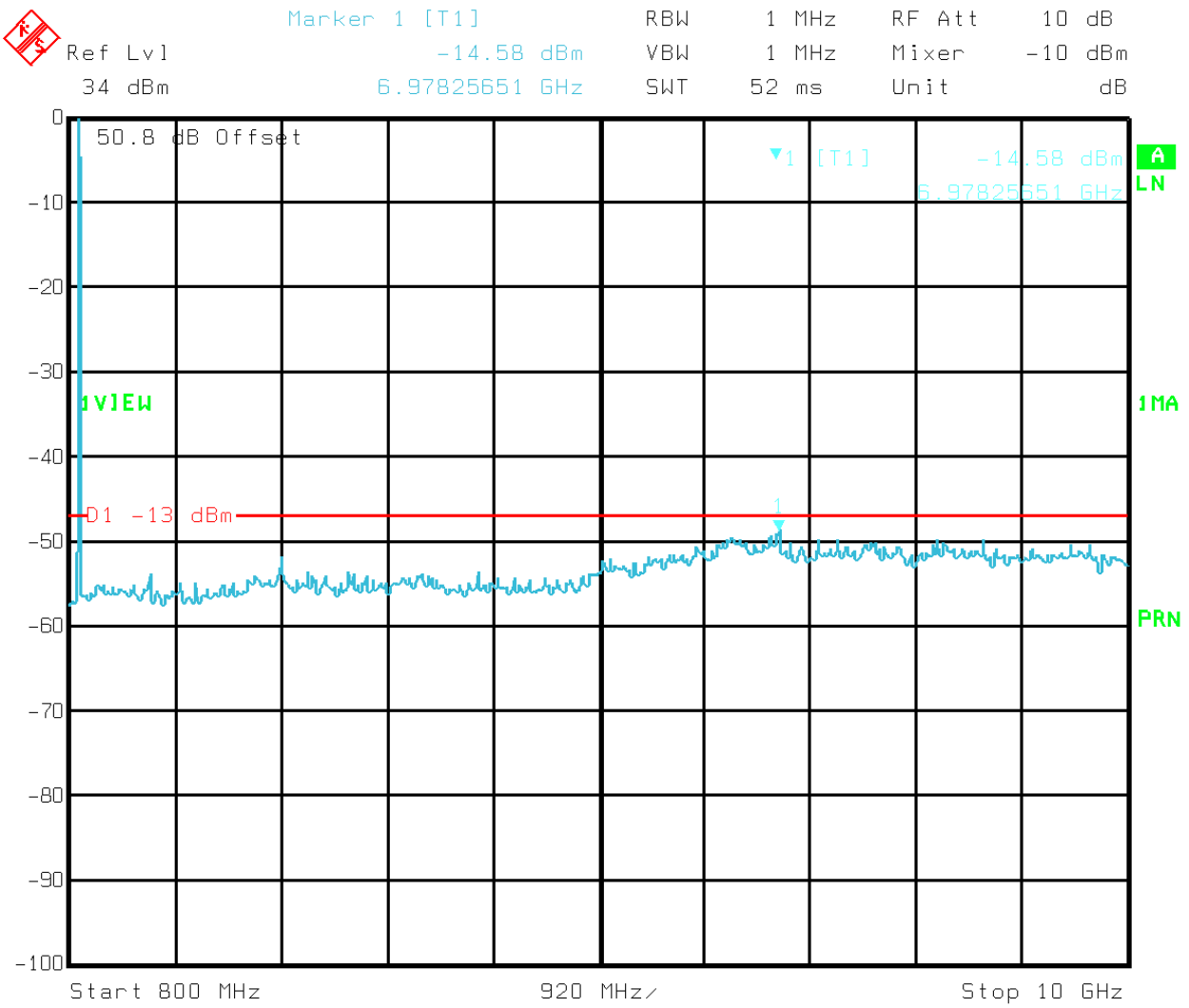
Title: Antenna Port Spurious Emissions CH 383
Comment A: 9L0298R MOR801B
Date: 25.AUG.1999 10:37:43

Plot 35



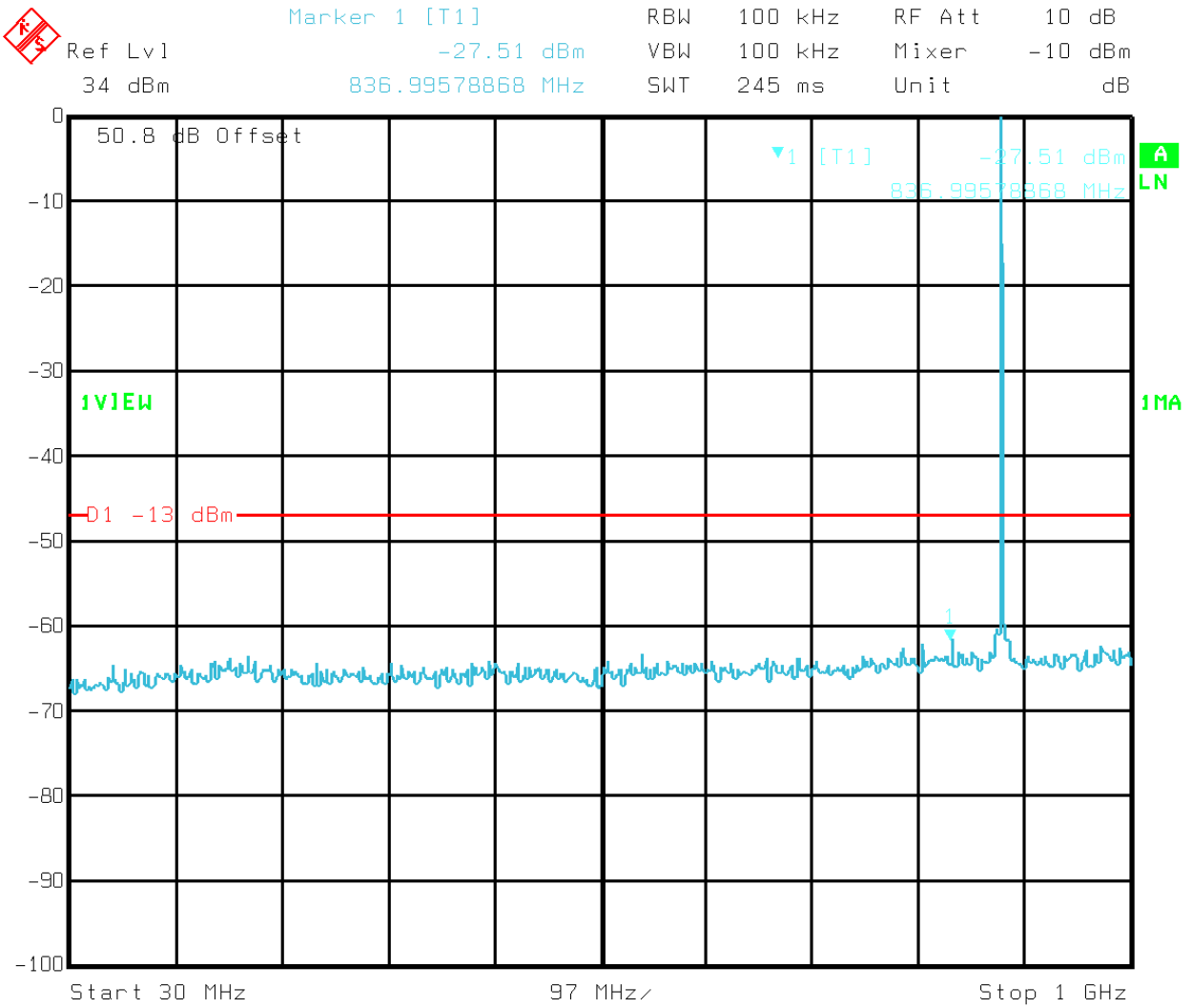
Title: Antenna Port Spurious Emissions 8 Watt Amp. CDMA Signal
Comment A: MOR801B (Channel 383)
Date: 29.SEP.1999 14:04:21

Plot 36



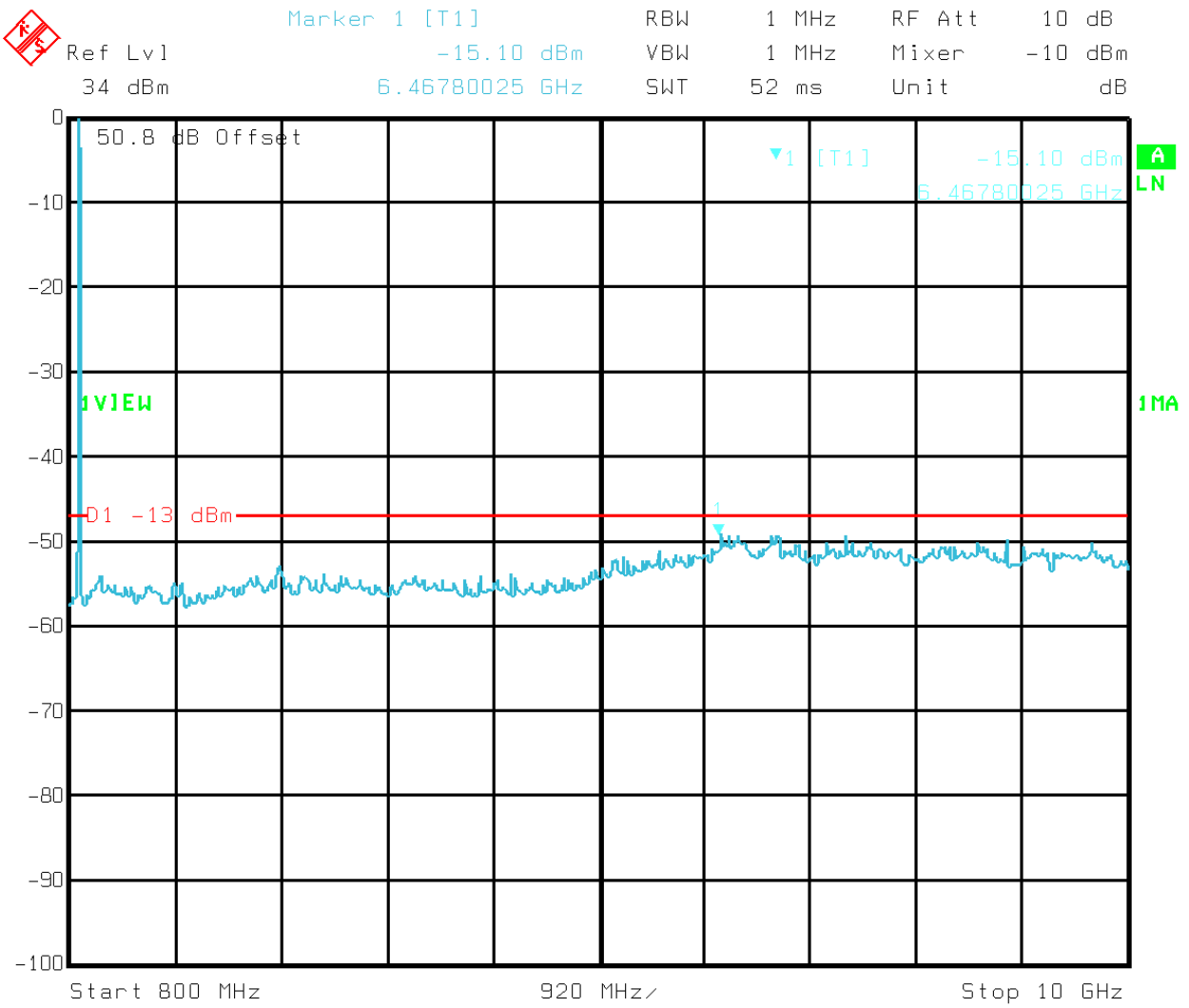
Title: Antenna Port Spurious Emissions 8 Watt Amp. CDMA Signal
Comment A: MOR801B (Channel 383)
Date: 29.SEP.1999 14:05:33

Plot 37



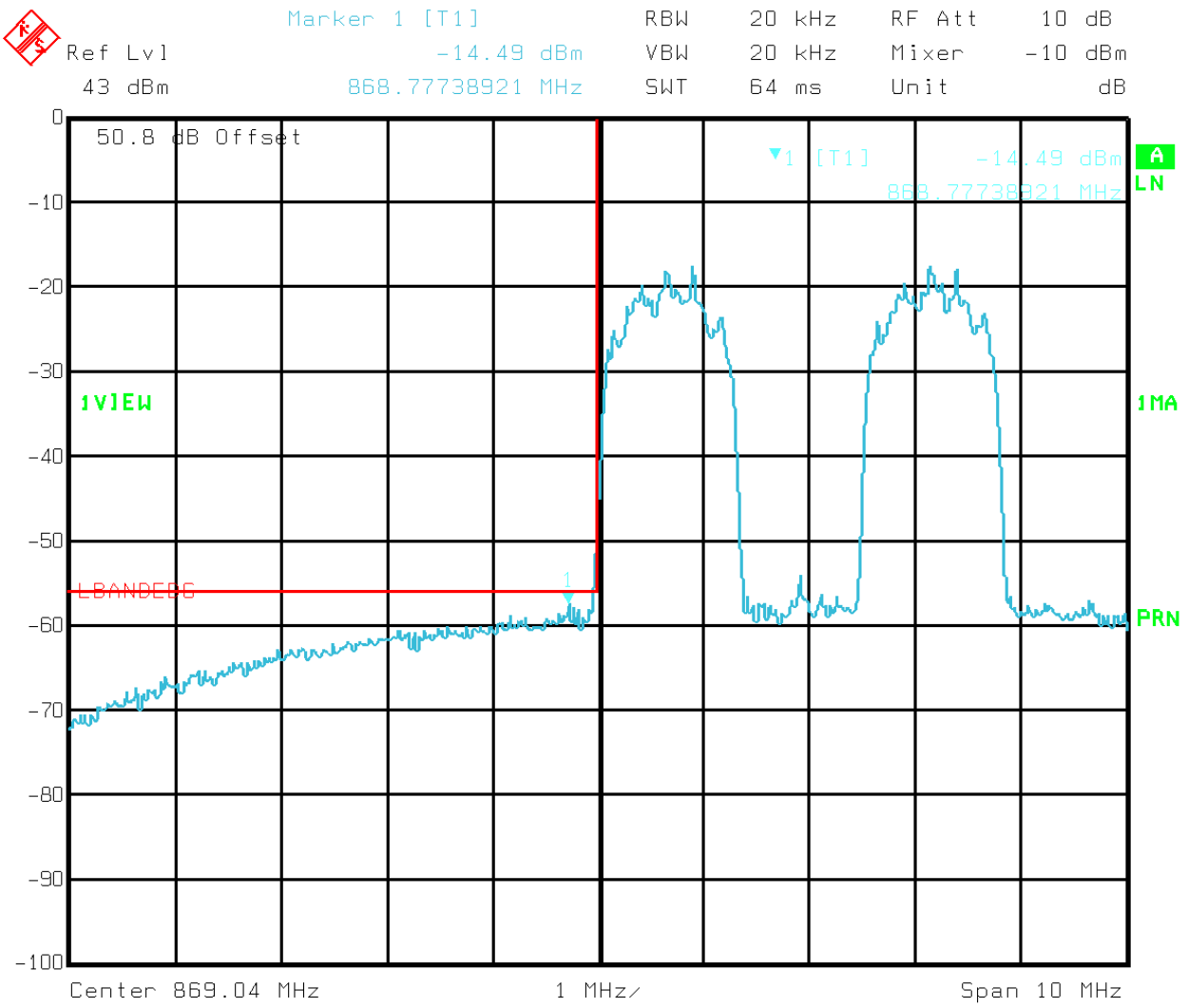
Title: Antenna Port Spurious Emissions 8 Watt Amp. TDMA Signal
Comment A: MOR801B (Channel 383)
Date: 29.SEP.1999 14:30:07

Plot 38



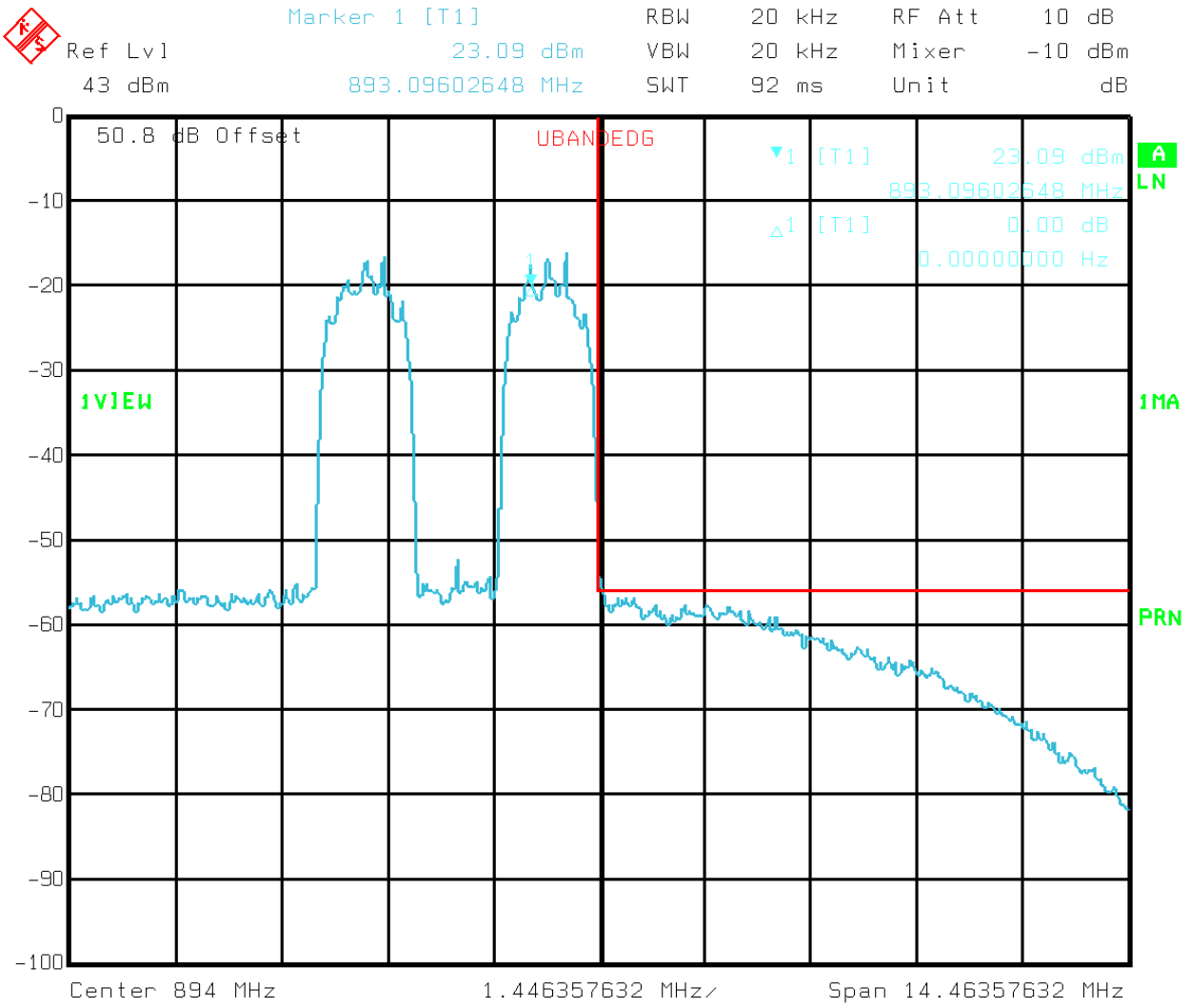
Title: Antenna Port Spurious Emissions 8 Watt Amp. TDMA Signal
Comment A: MOR801B (Channel 383)
Date: 29.SEP.1999 14:34:15

Plot 39



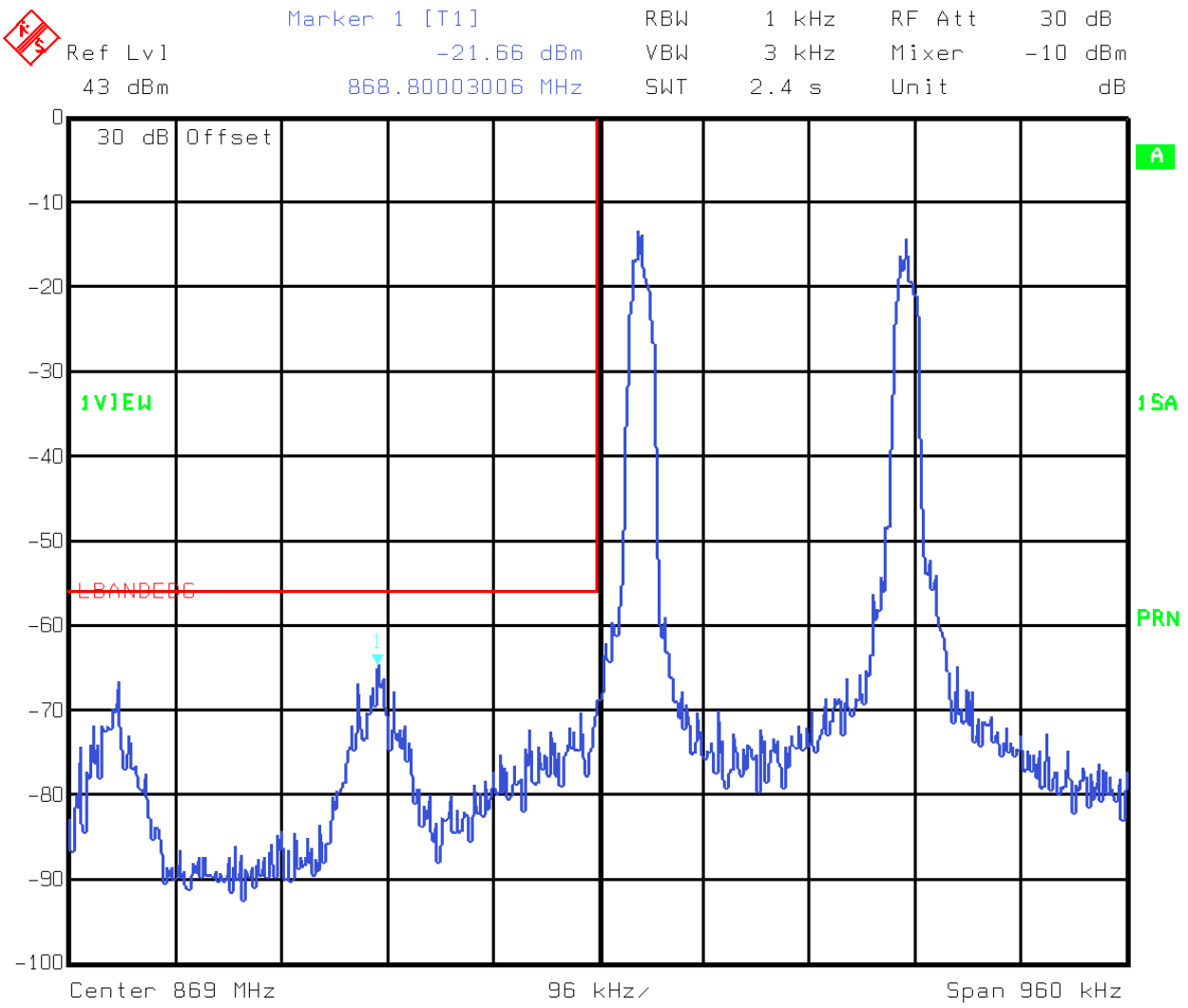
Title: Lower Bandedge CDMA/Variable Bandwidth Modules
Comment A: MOR801B (2 of 2 CDMA Signals)
Date: 23.SEP.1999 15:21:22

Plot 40

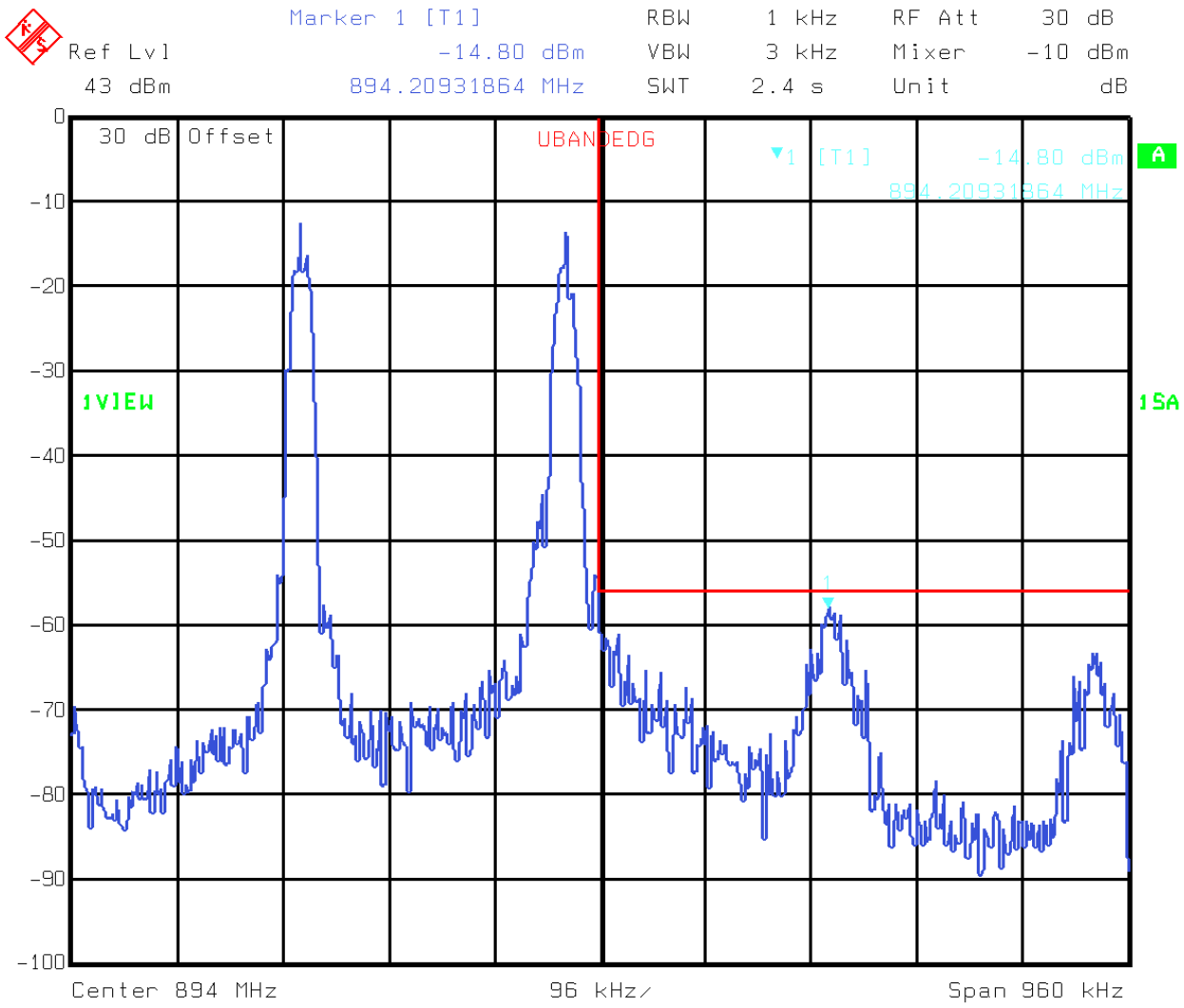


Title: Upper Bandedge CDMA/Variable Bandwidth Modules
Comment A: MOR801B (2 of 2 CDMA Signals)
Date: 23.SEP.1999 15:06:21

Plot 41

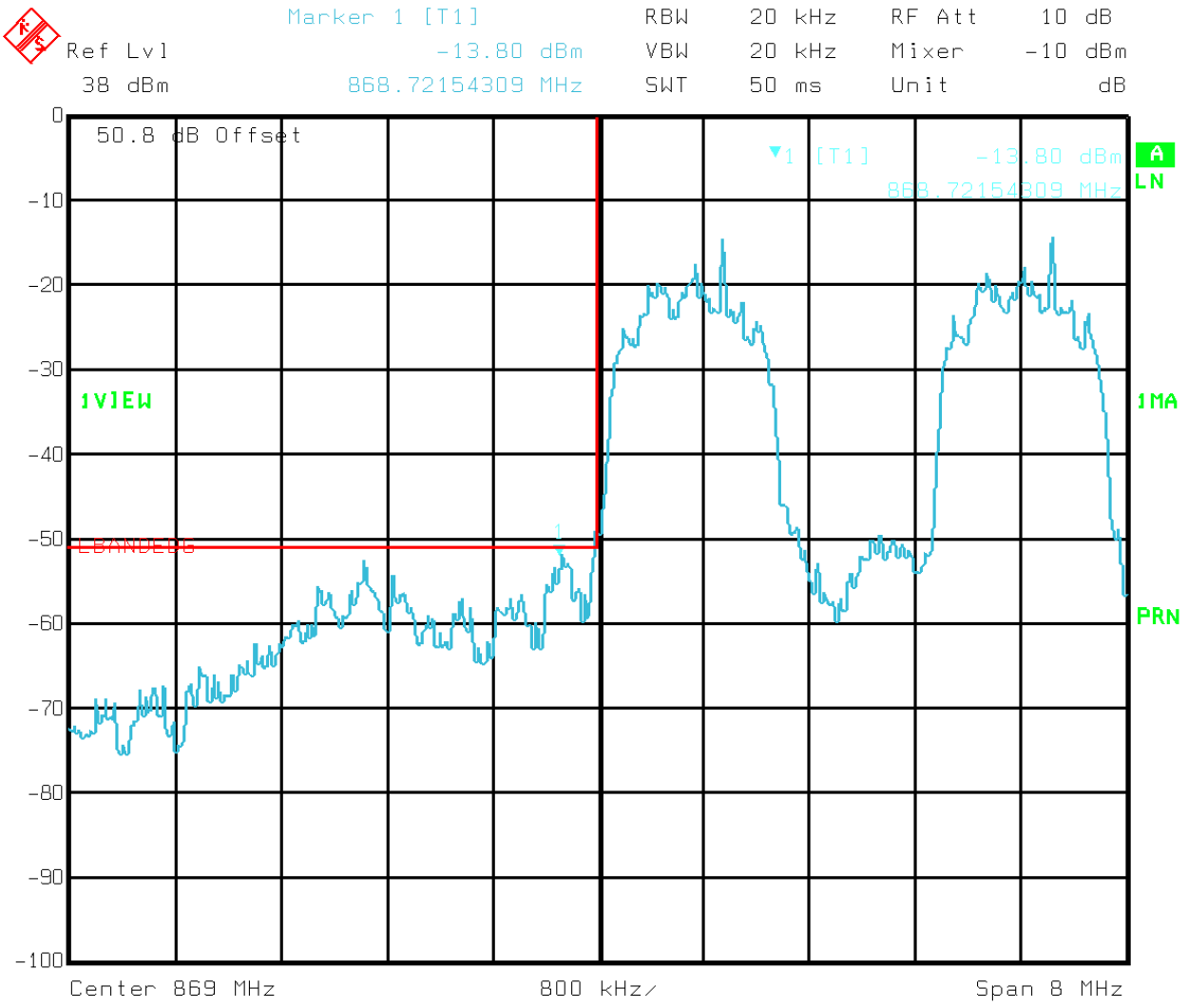

Marker 1 [T1]
Ref Lvl
43 dBm
-21.66 dBm
868.80003006 MHz
RBW 1 kHz
VBW 3 kHz
SWT 2.4 s
RF Att 30 dB
Mixer -10 dBm
Unit dB
30 dB Offset
1VIEW
LBANDEDG
1SA
PRN
Center 869 MHz
96 kHz/
Span 960 kHz
Title: Lower Bandedge NADC (Dual Carrier)
Comment A: 1 of 2 NADC Signals
Date: 25.AUG.1999 14:26:09

Plot 42



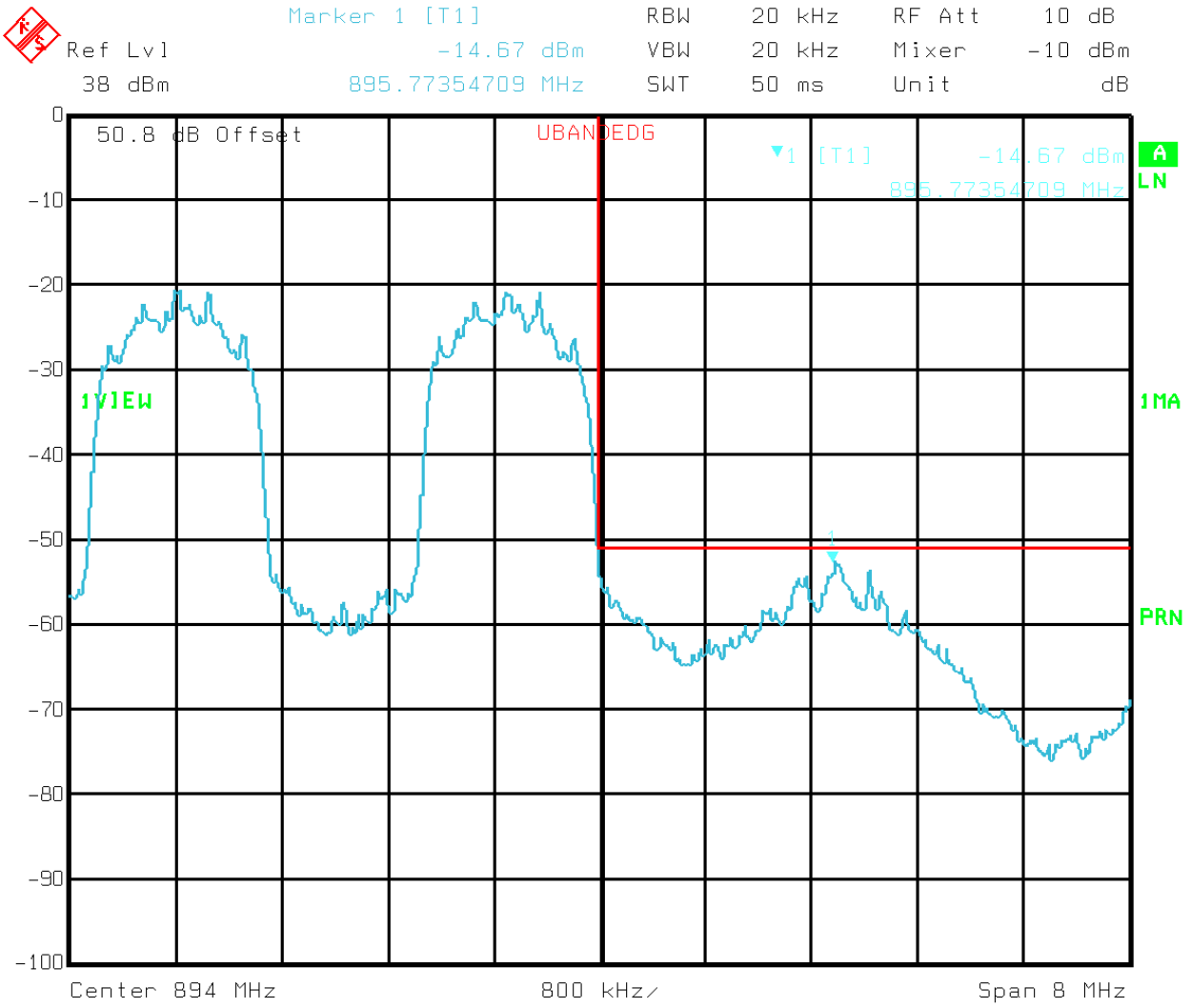
Title: Upper Bandedge NADC (Dual Carrier)
Comment A: 1 of 2 NADC Signals
Date: 25.AUG.1999 15:21:44

Plot 43



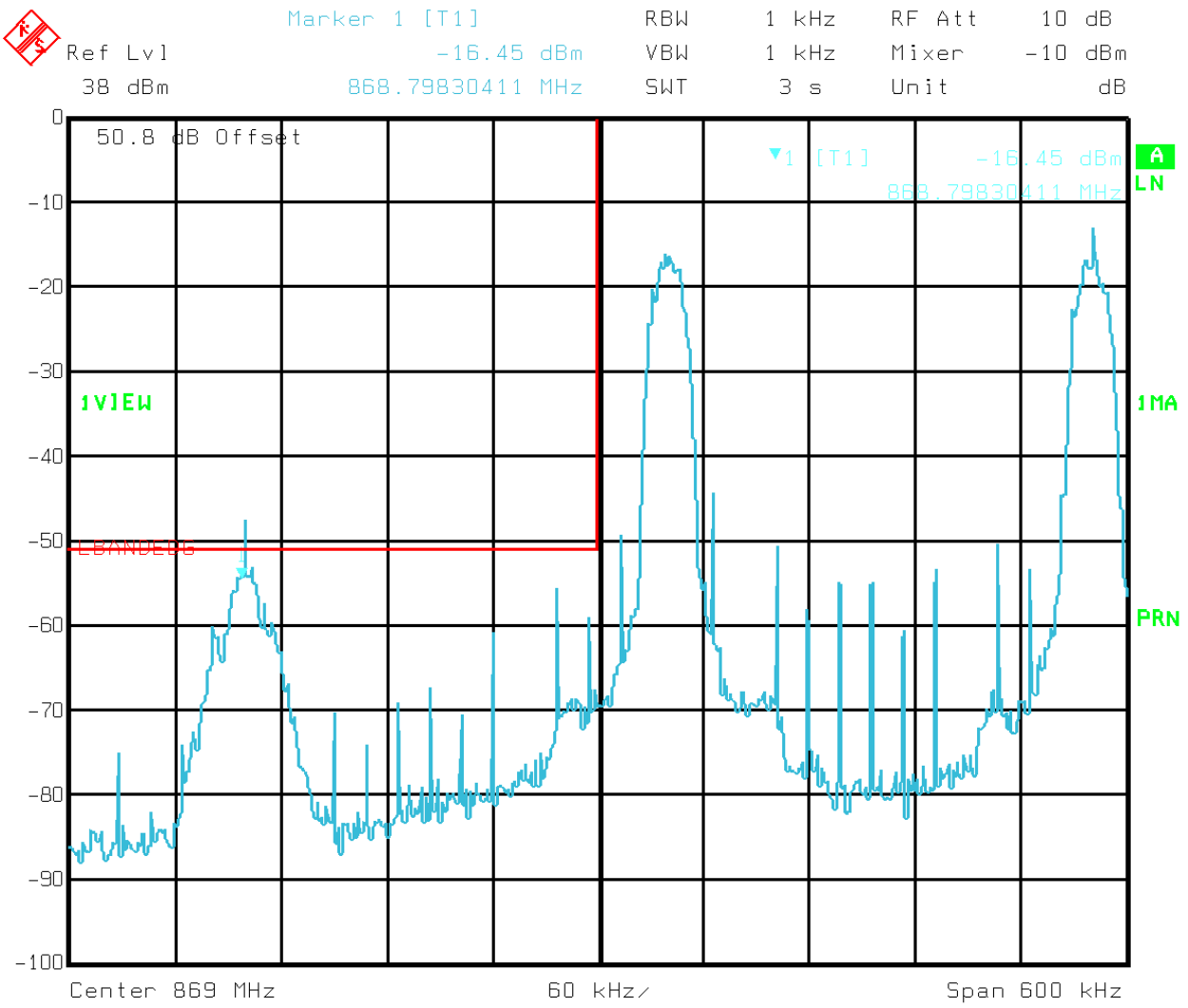
Title: Lower Bandedge Intermodulation 8 Watt Amp. CDMA Signal
Comment A: MOR801B (2 of 2 CDMA Signals)
Date: 29.SEP.1999 16:22:04

Plot 44



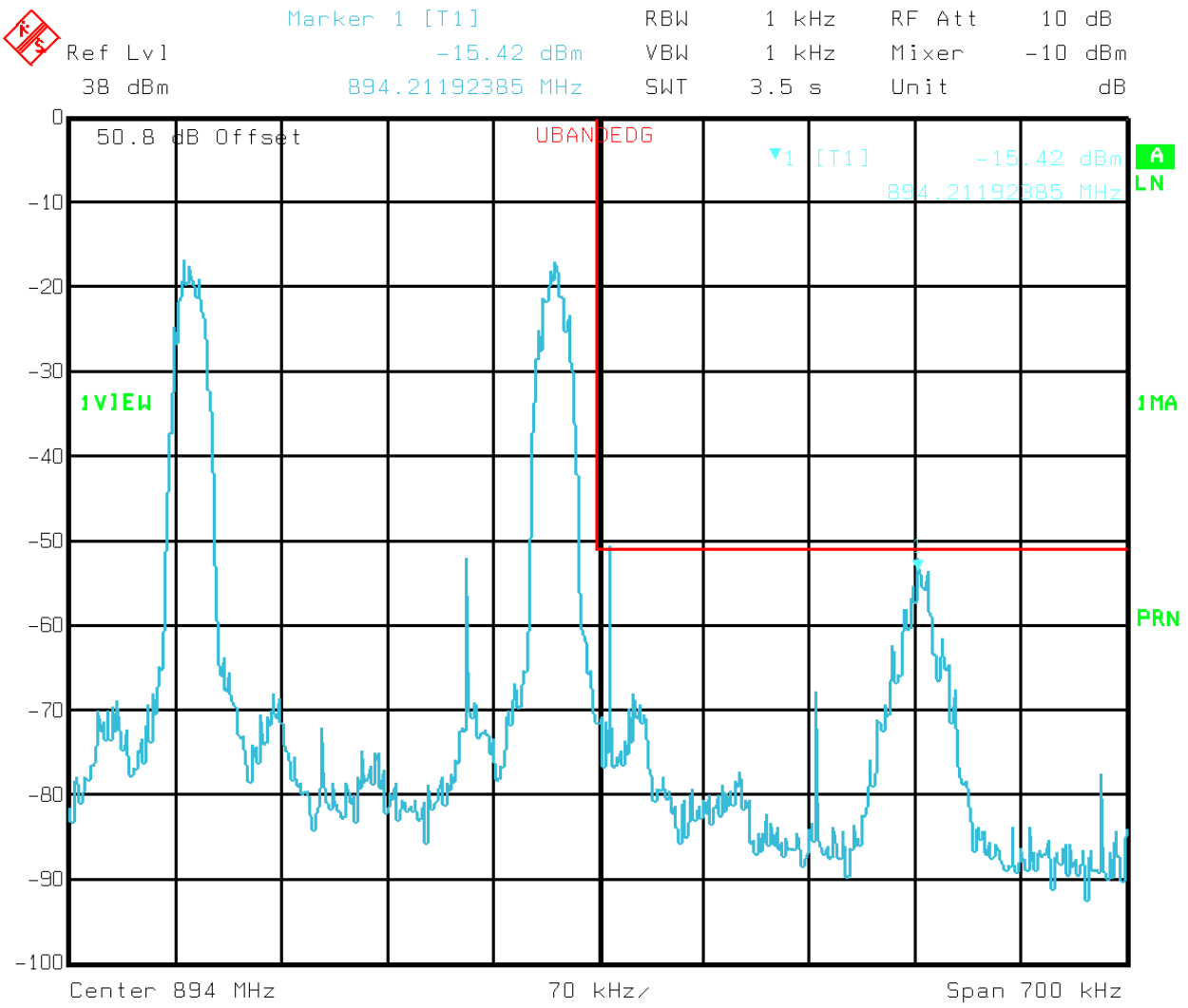
Title: Upper Bandedge Intermodulation 8 Watt Amp. CDMA Signal
Comment A: MOR801B (2 of 2 CDMA Signals)
Date: 29.SEP.1999 16:41:27

Plot 45



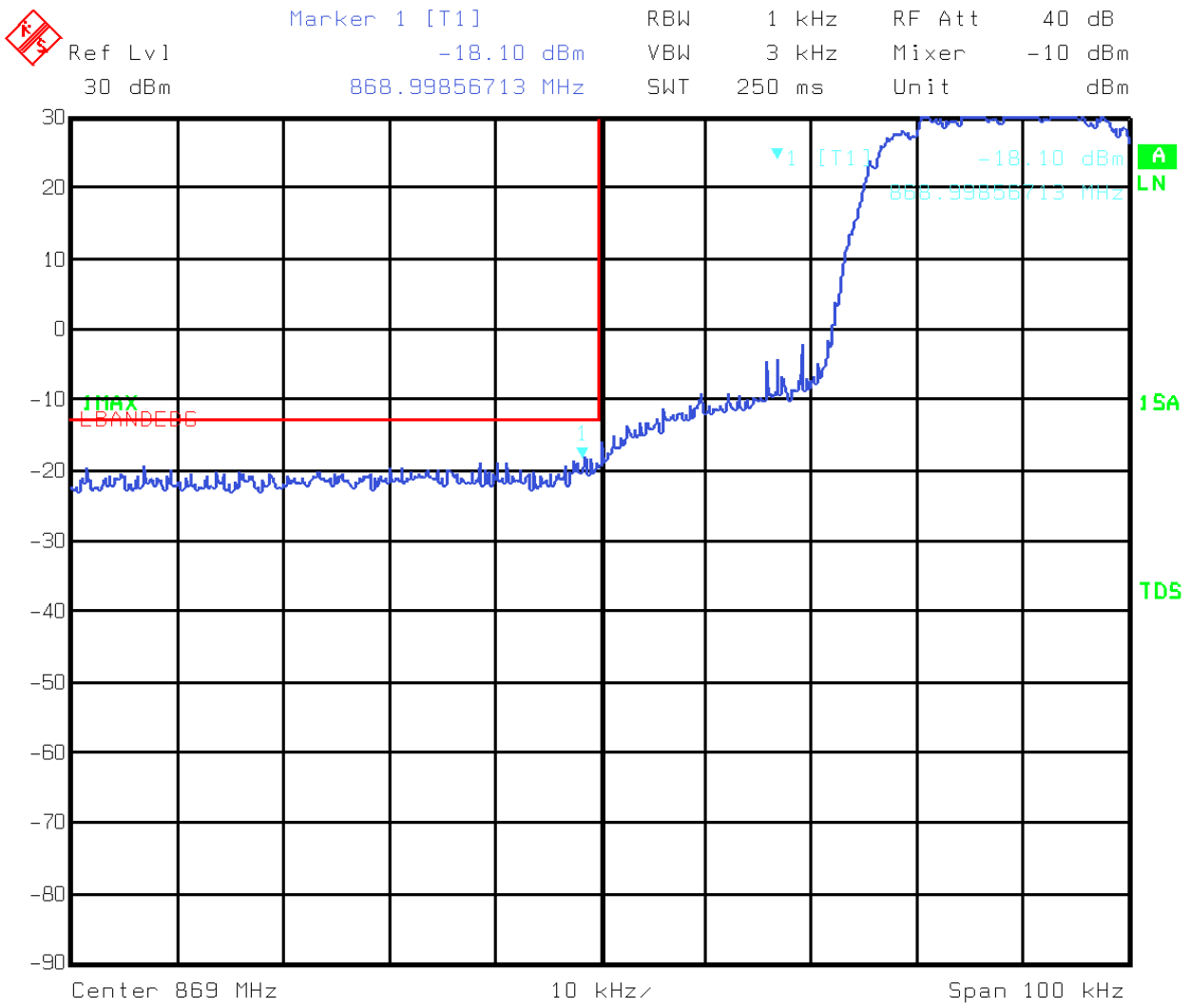
Title: Lower Bandedge Intermodulation 8 Watt Amp. TDMA Signal
Comment A: MOR801B (2 of 2 CDMA Signals)
Date: 30.SEP.1999 8:52:44

Plot 46



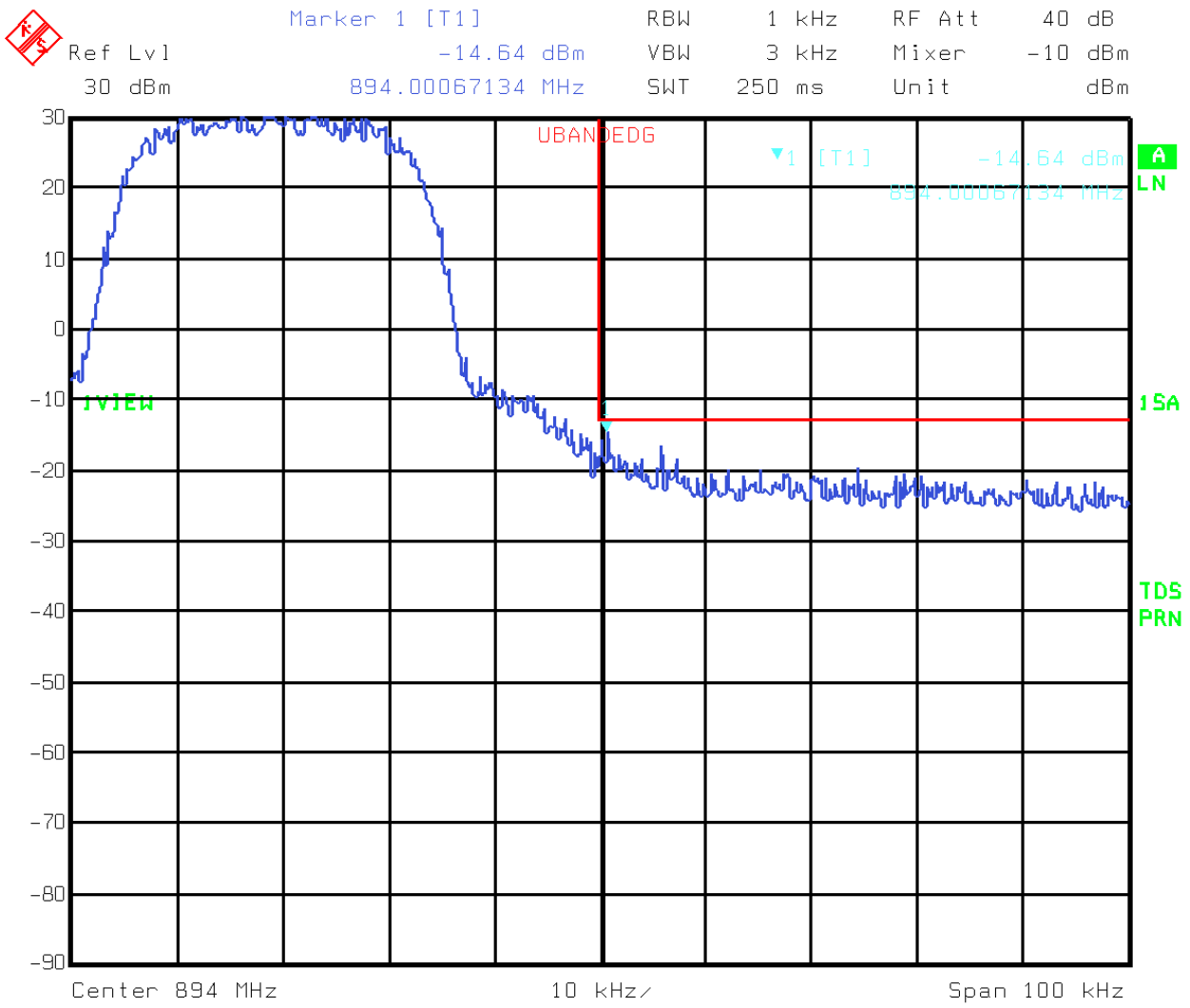
Title: Upper Bandedge Intermodulation 8 Watt Amp. TDMA Signal
Comment A: MOR801B (2 of 2 CDMA Signals)
Date: 30.SEP.1999 9:15:46

Plot 47



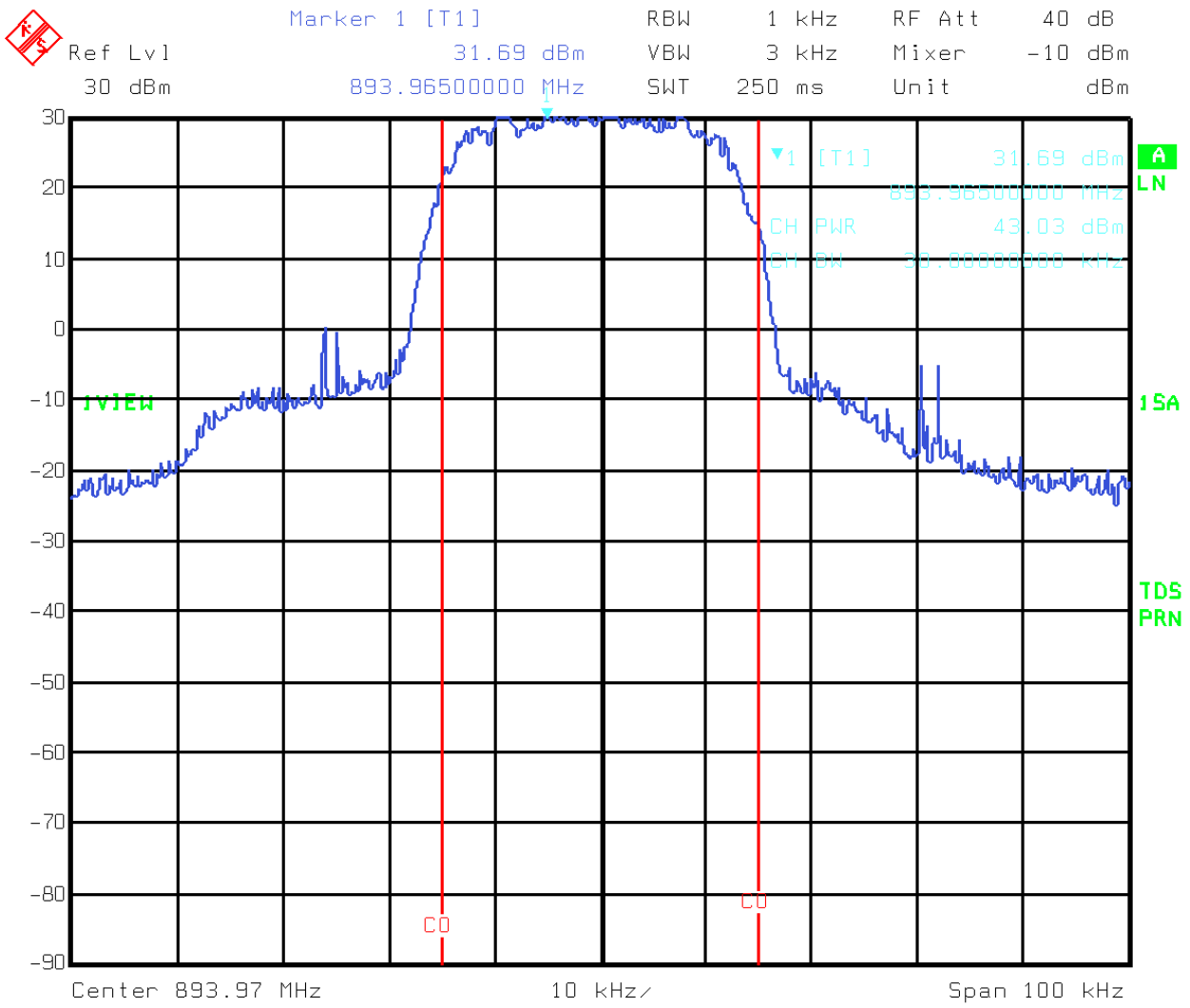
Title: Lower Bandedge NADC (Single carrier)
Comment A: 9L0268R MOR801B
Date: 24.AUG.1999 15:31:00

Plot 48



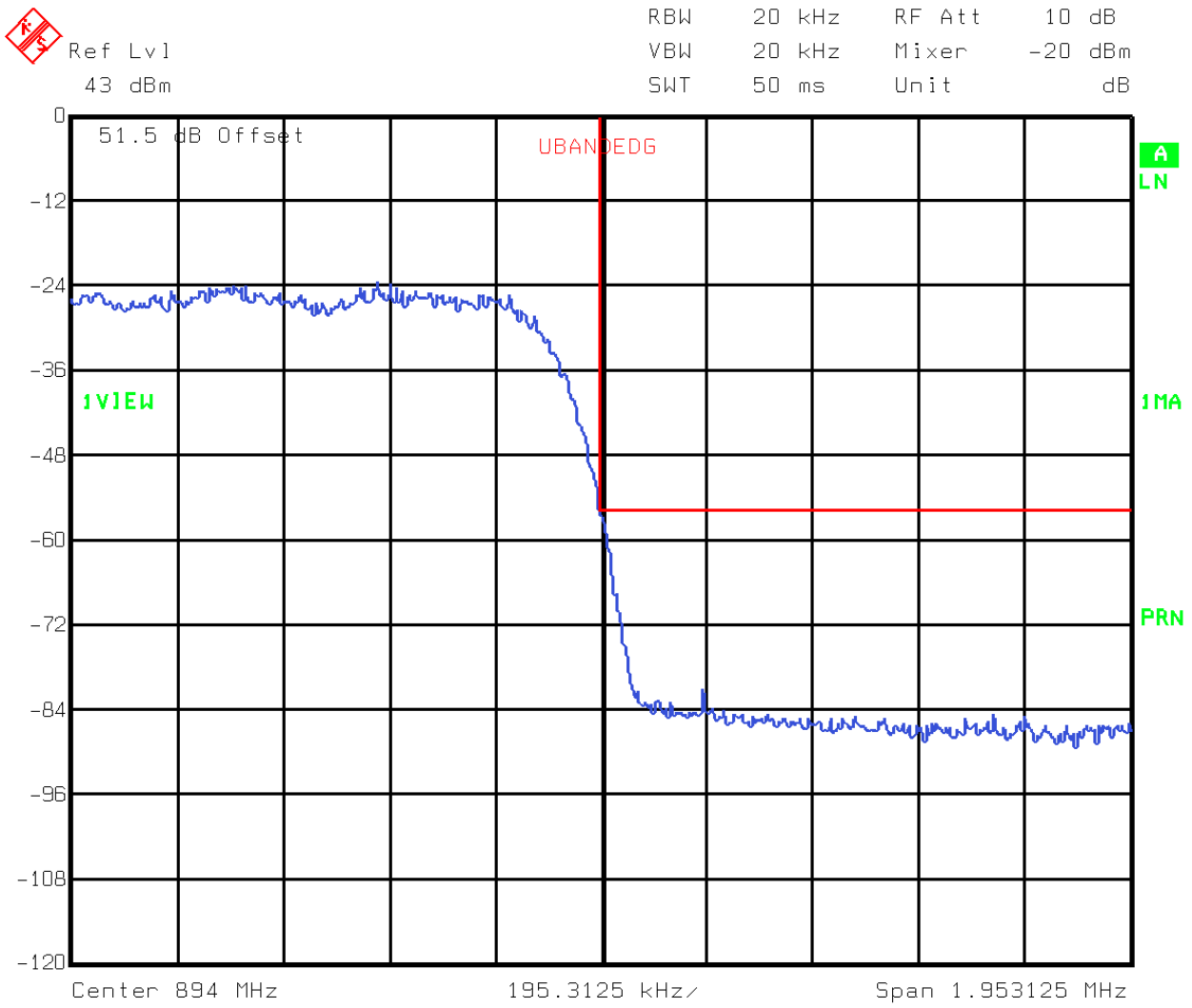
Title: Channel Power NADC CH 799 (Single carrier)
Comment A: 9L0268R MOR801B
Date: 24.AUG.1999 16:36:49

Plot 49

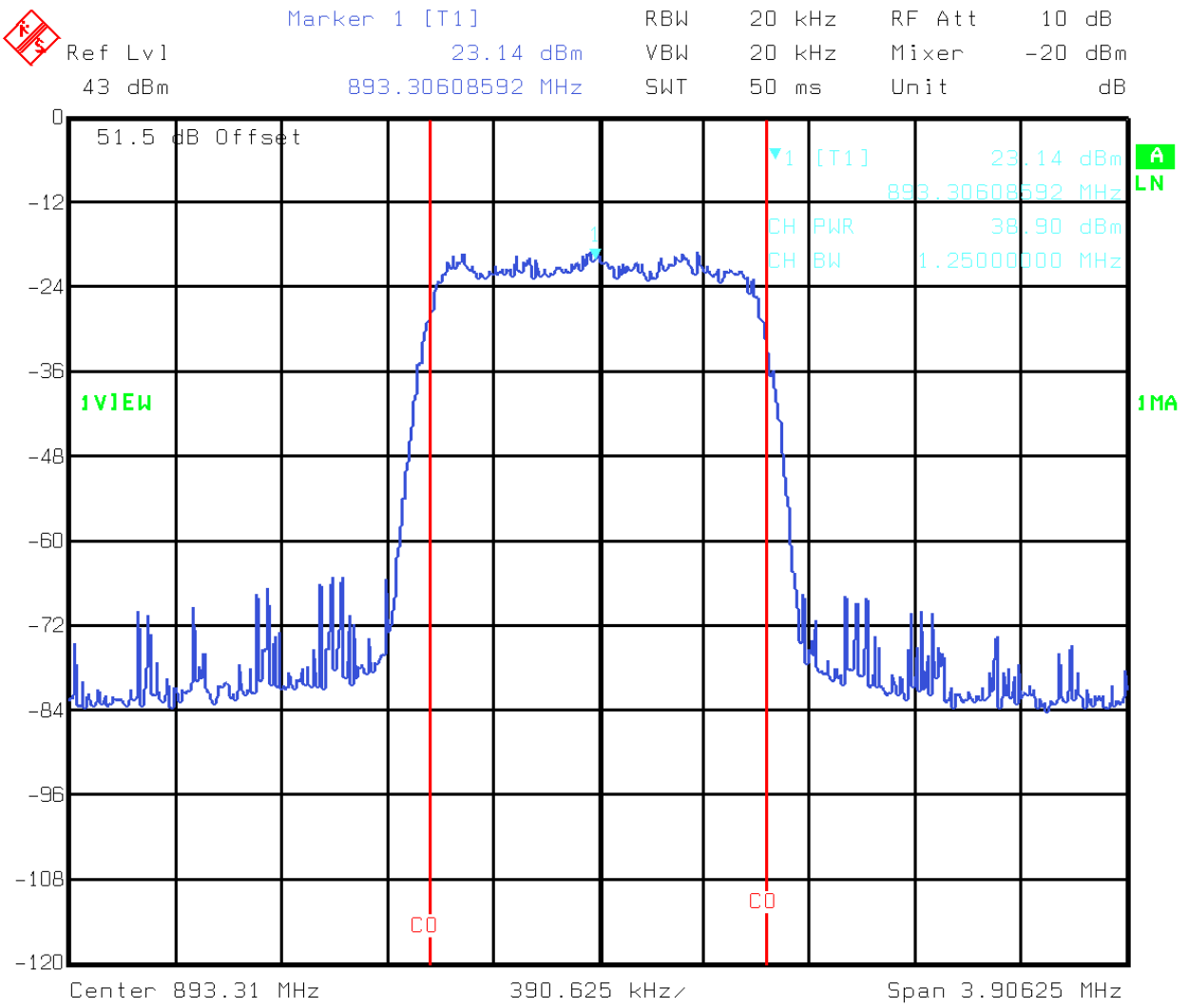


Title: Channel Power NADC CH 799 (Single carrier)
Comment A: 9L0268R MOR801B
Date: 24.AUG.1999 16:34:53

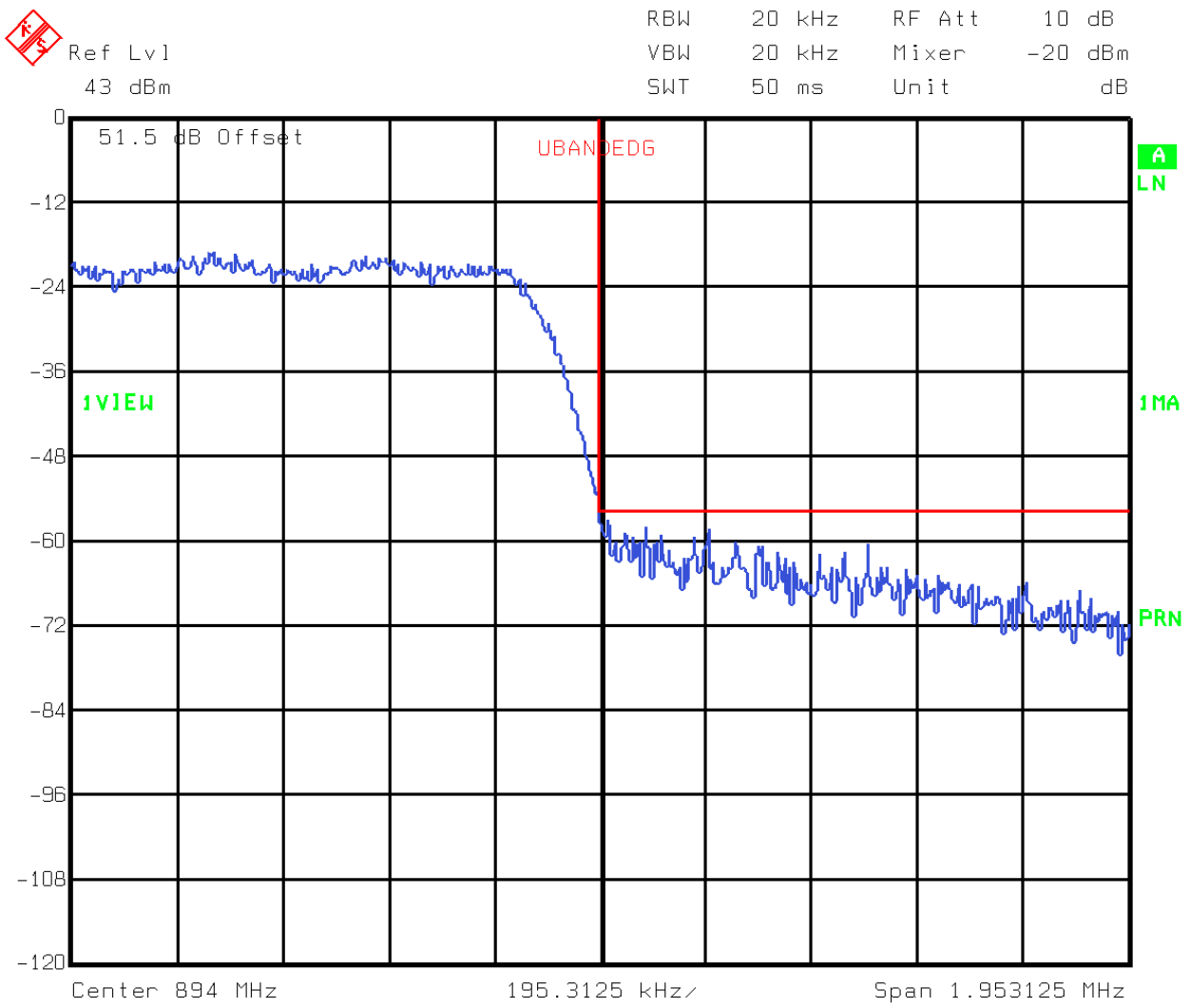
Plot 50


RBW 20 kHz
VBW 20 kHz
SWT 50 ms
RF Att 10 dB
Mixer -20 dBm
Unit dB
Ref Lvl
43 dBm
51.5 dB Offset
UBANDEDG
A
LN
1MA
PRN
1VIEW
0
-12
-24
-36
-48
-60
-72
-84
-96
-108
-120
Center 894 MHz
195.3125 kHz/
Span 1.953125 MHz
Title: Upper Bandedge Ch.777(CDMA)
Comment A: MOR801B
Date: 3.SEP.1999 10:00:47

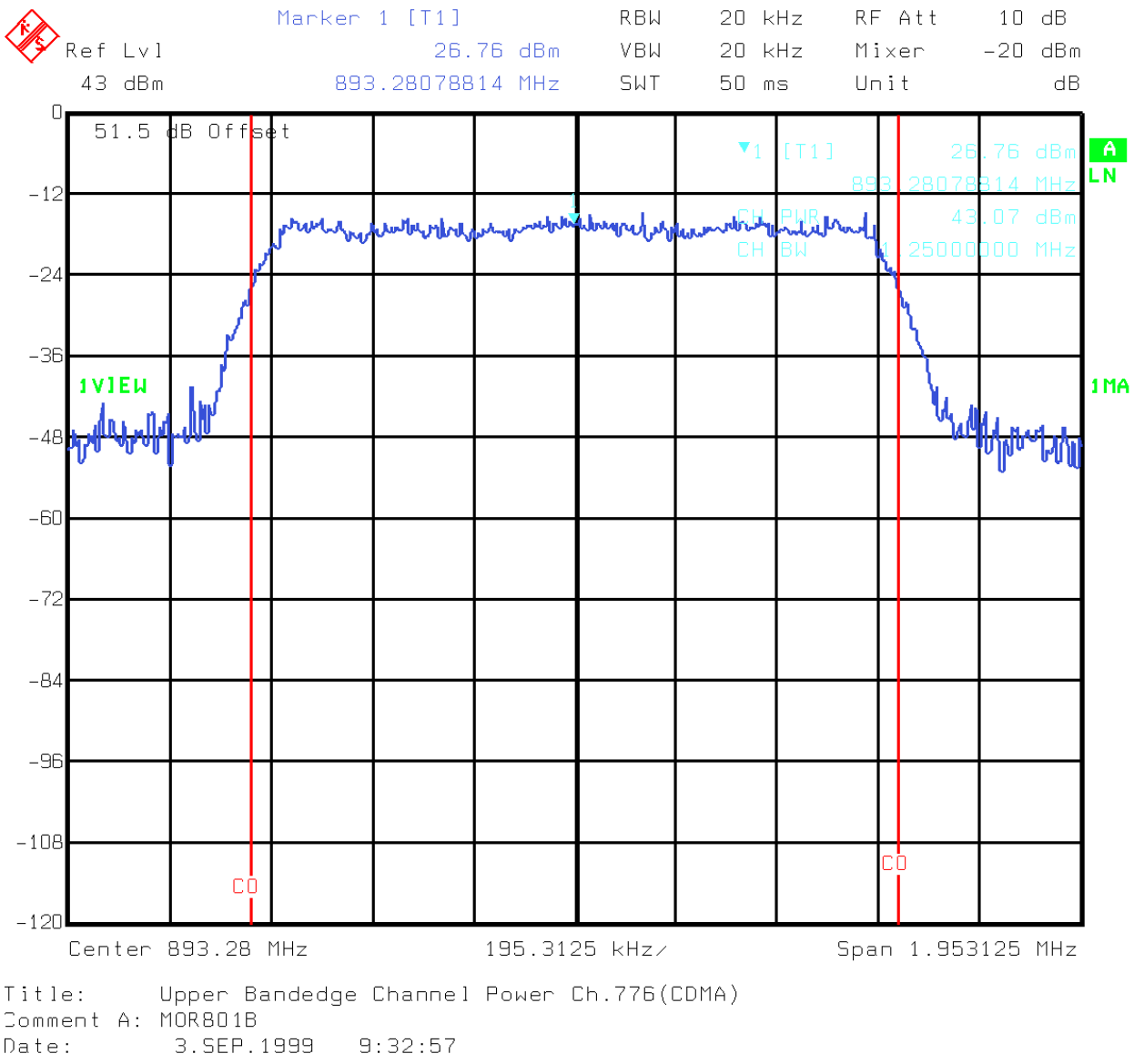
Plot 51


Marker 1 [T1]
RBW 20 kHz
RF Att 10 dB
Ref Lvl
23.14 dBm
VBW 20 kHz
Mixer -20 dBm
43 dBm
893.30608592 MHz
SWT 50 ms
Unit dB
51.5 dB Offset
1 [T1] 23.14 dBm
893.30608592 MHz
CH PWR 38.90 dBm
CH BW 1.25000000 MHz
A
LN
1VIEW
1MA
0
-12
-24
-36
-48
-60
-72
-84
-96
-108
-120
CO
CO
Center 893.31 MHz
390.625 kHz/
Span 3.90625 MHz
Title: Channel Power Upper Bandedge Ch.777(CDMA)
Comment A: MOR801B
Date: 3.SEP.1999 9:58:10

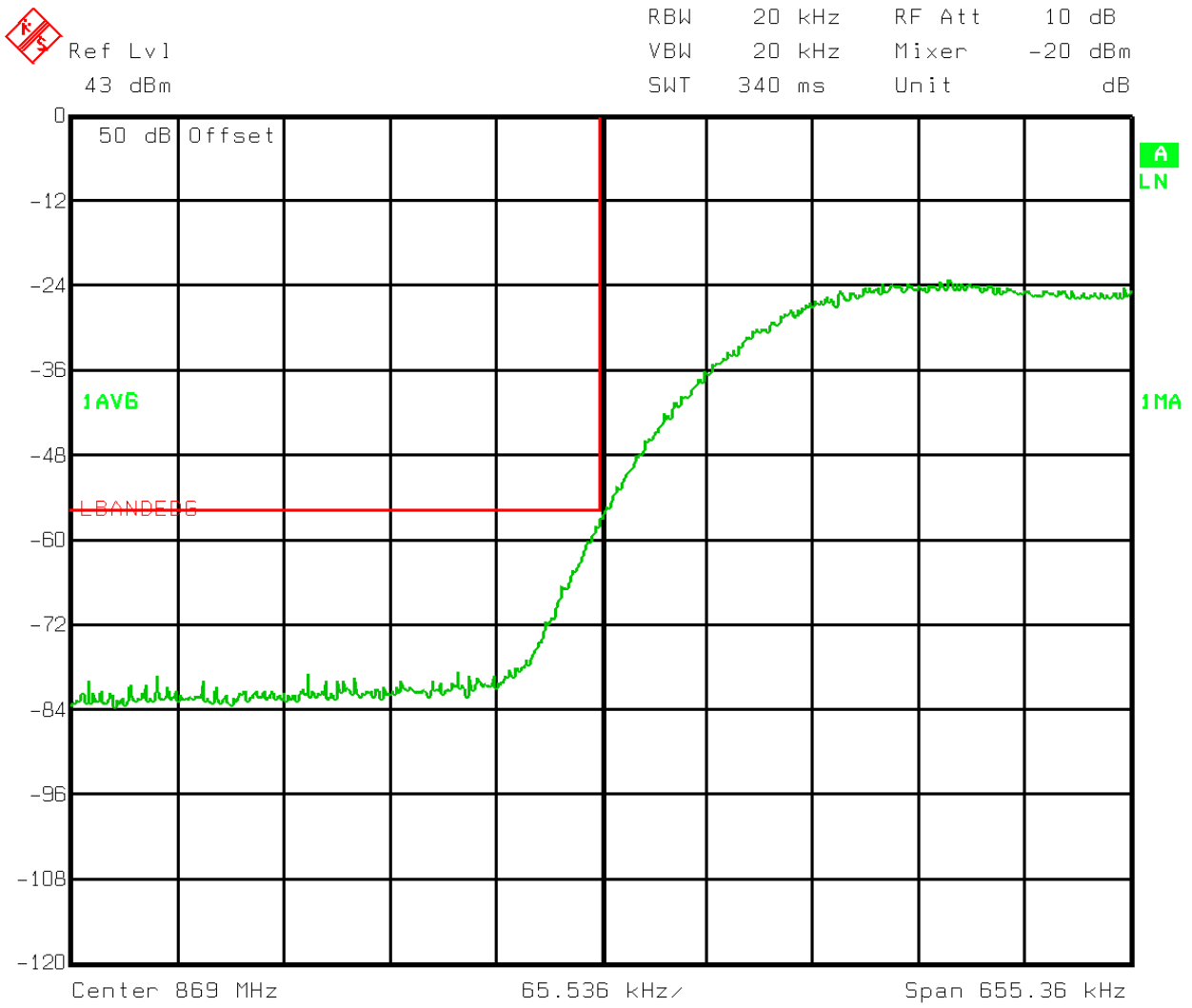
Plot 52


RBW 20 kHz
VBW 20 kHz
SWT 50 ms
RF Att 10 dB
Mixer -20 dBm
Unit dB
Ref Lvl
43 dBm
51.5 dB Offset
UBANDEDG
A
LN
1VIEW
1MA
PRN
0
-12
-24
-36
-48
-60
-72
-84
-96
-108
-120
Center 894 MHz
195.3125 kHz/
Span 1.953125 MHz
Title: Upper Bandedge Ch.776(CDMA)
Comment A: MOR801B
Date: 3.SEP.1999 9:36:11

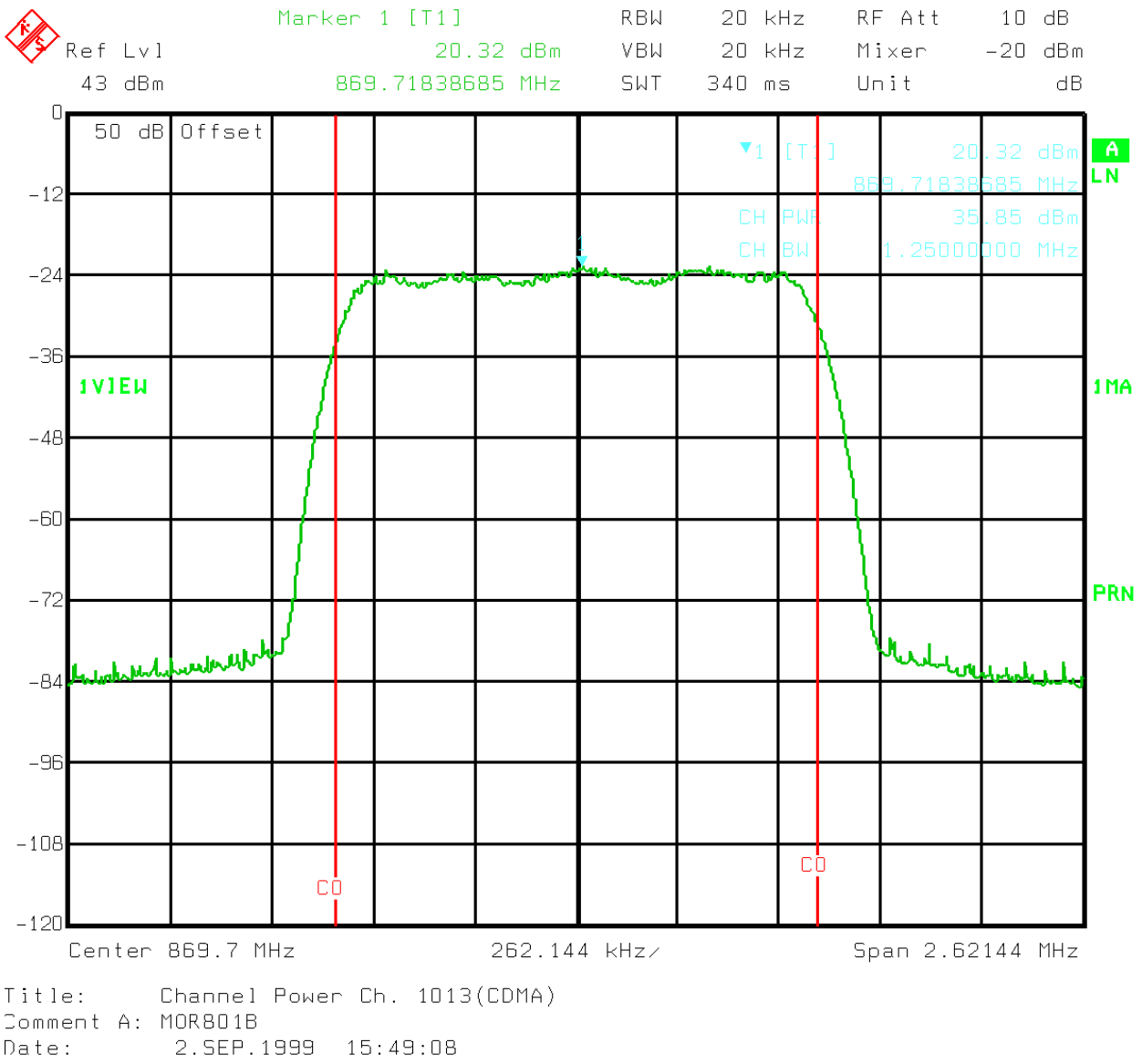
Plot 53


Marker 1 [T1]
RBW 20 kHz
RF Att 10 dB
Ref Lvl
26.76 dBm
VBW 20 kHz
Mixer -20 dBm
43 dBm
893.28078814 MHz
SWT 50 ms
Unit dB
0
51.5 dB Offset
▼1 [T1]
26.76 dBm
893.28078814 MHz
CH PWR
43.07 dBm
CH BW
1.25000000 MHz
A
LN
-12
-24
-36
1VIEW
1MA
-48
-60
-72
-84
-96
-108
-120
CO
CO
Center 893.28 MHz
195.3125 kHz/
Span 1.953125 MHz
Title: Upper Bandedge Channel Power Ch.776(CDMA)
Comment A: MOR801B
Date: 3.SEP.1999 9:32:57

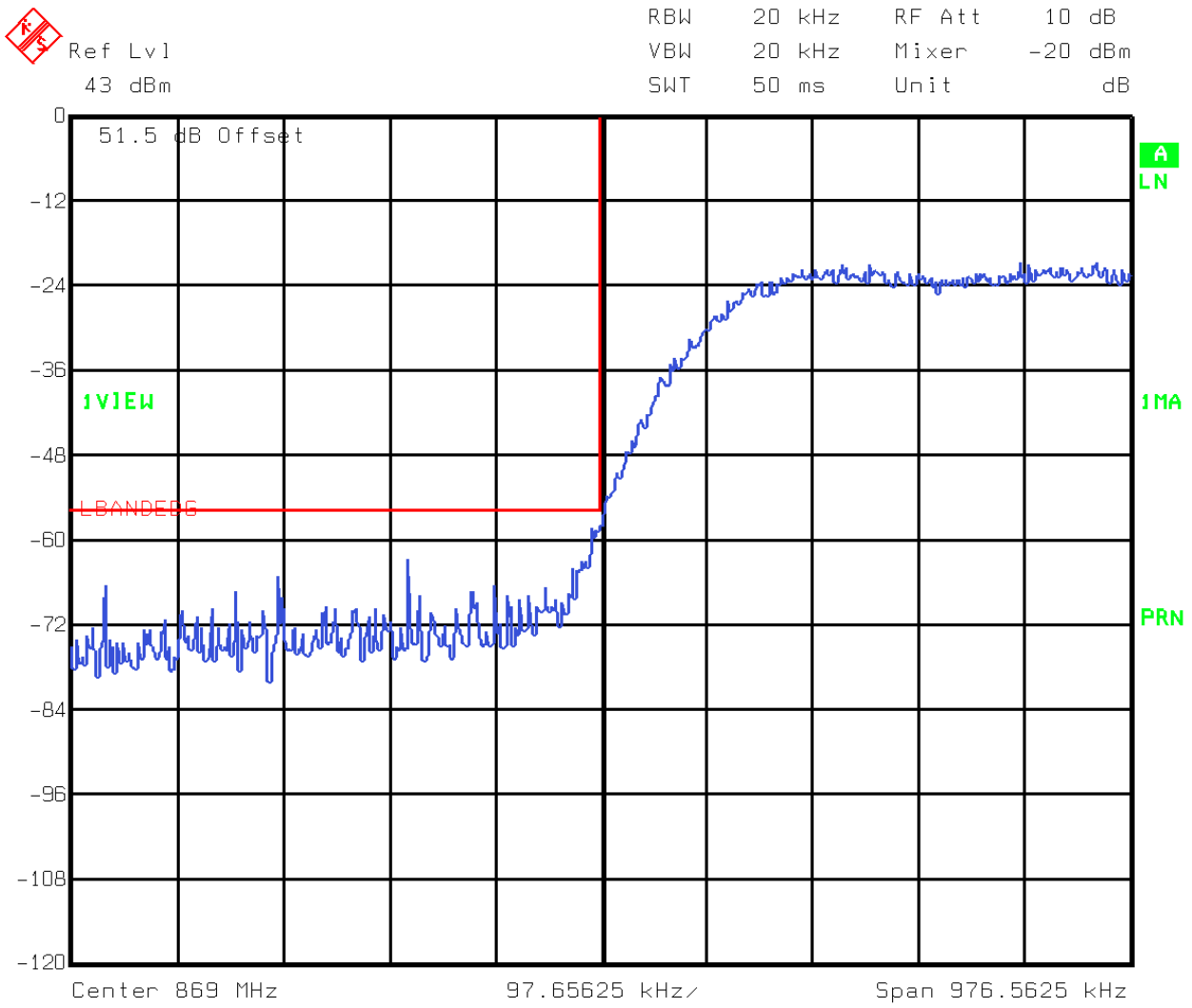
Plot 54


RBW 20 kHz
RF Att 10 dB
VBW 20 kHz
Mixer -20 dBm
SWT 340 ms
Unit dB
Ref Lvl
43 dBm
50 dB Offset
0
-12
-24
-36
-48
-60
-72
-84
-96
-108
-120
1AVG
LBANDEDG
A
LN
1MA
Center 869 MHz
65.536 kHz/
Span 655.36 kHz
Title: Lower Bandedge Ch. 1013(CDMA)
Comment A: MOR801B
Date: 2.SEP.1999 16:00:14

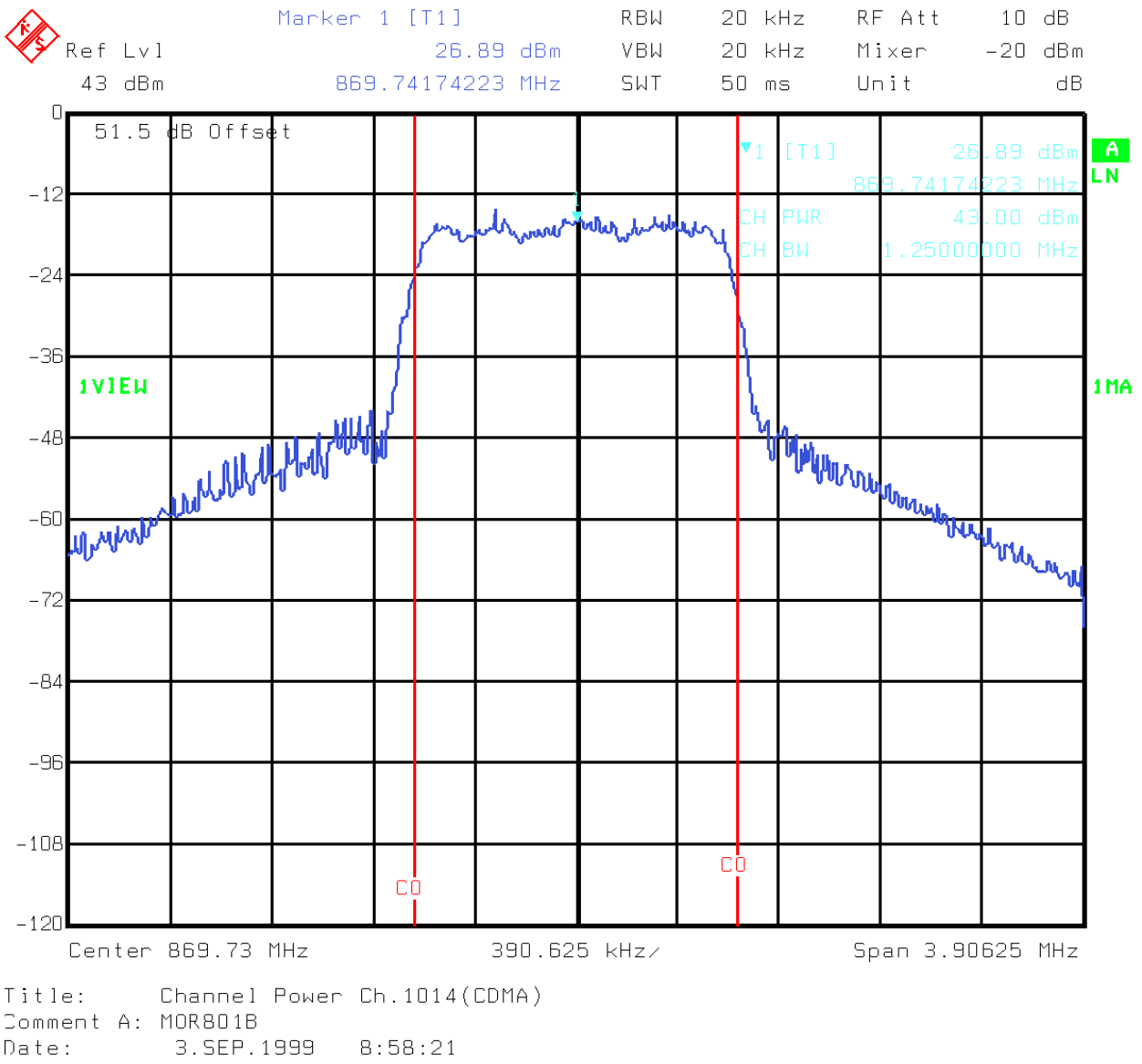
Plot 55


Marker 1 [T1]
Ref Lvl
43 dBm
20.32 dBm
869.71838685 MHz
RBW 20 kHz
VBW 20 kHz
SWT 340 ms
RF Att 10 dB
Mixer -20 dBm
Unit dB
50 dB Offset
1 [T1] 20.32 dBm
869.71838685 MHz
CH PWR 35.85 dBm
CH BW 1.25000000 MHz
1VIEW
1MA
PRN
LN
0
-12
-24
-36
-48
-60
-72
-84
-96
-108
-120
Center 869.7 MHz
262.144 kHz/
Span 2.62144 MHz
Title: Channel Power Ch. 1013(CDMA)
Comment A: MOR801B
Date: 2.SEP.1999 15:49:08

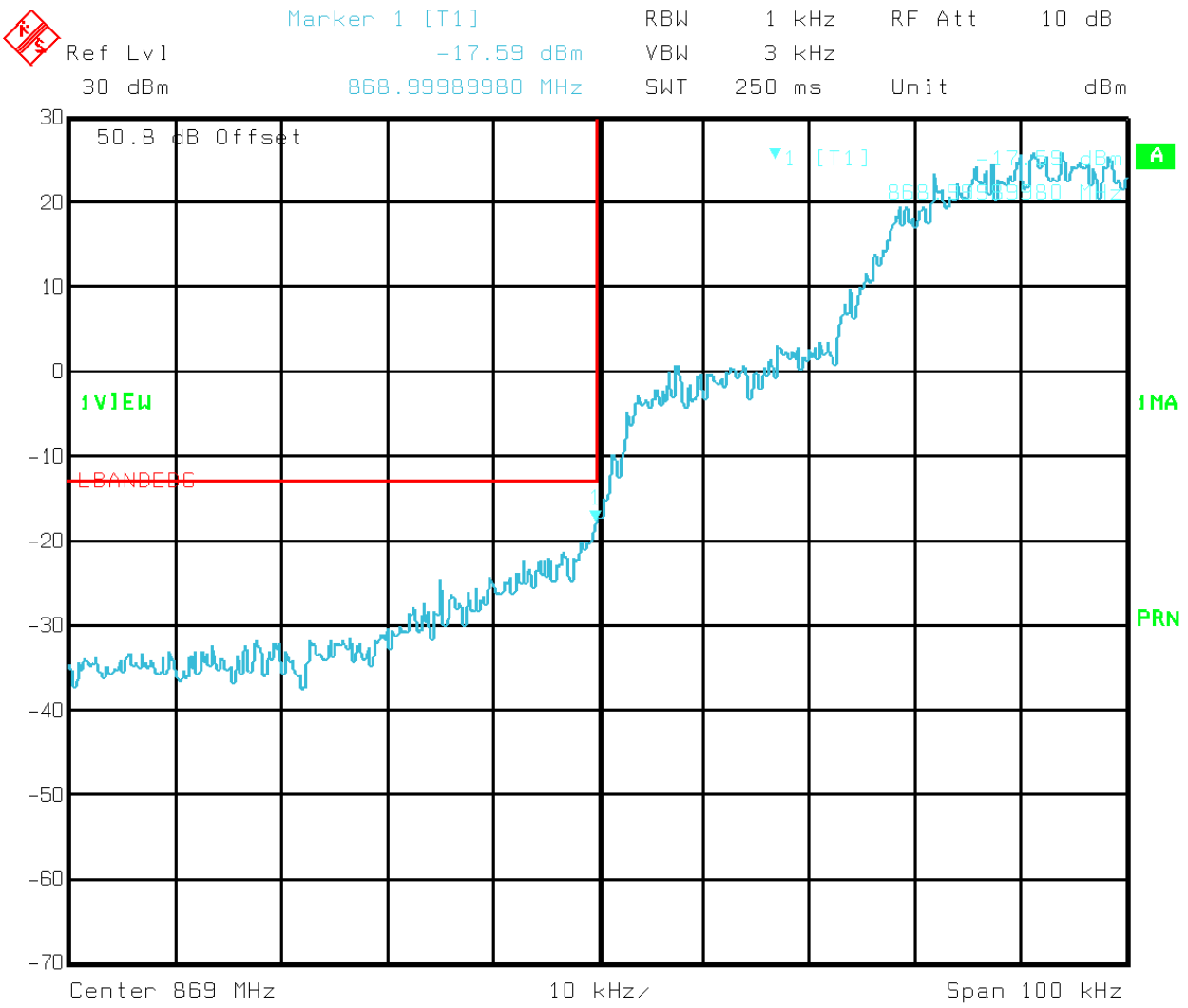
Plot 56


RBW 20 kHz
VBW 20 kHz
SWT 50 ms
RF Att 10 dB
Mixer -20 dBm
Unit dB
Ref Lvl
43 dBm
51.5 dB Offset
0
-12
-24
-36
-48
-60
-72
-84
-96
-108
-120
VIEW
LBANDEDG
A
LN
MA
PRN
Center 869 MHz
97.65625 kHz/
Span 976.5625 kHz
Title: Lower Bandedge Ch.1014(CDMA)
Comment A: MOR801B
Date: 3.SEP.1999 8:39:11

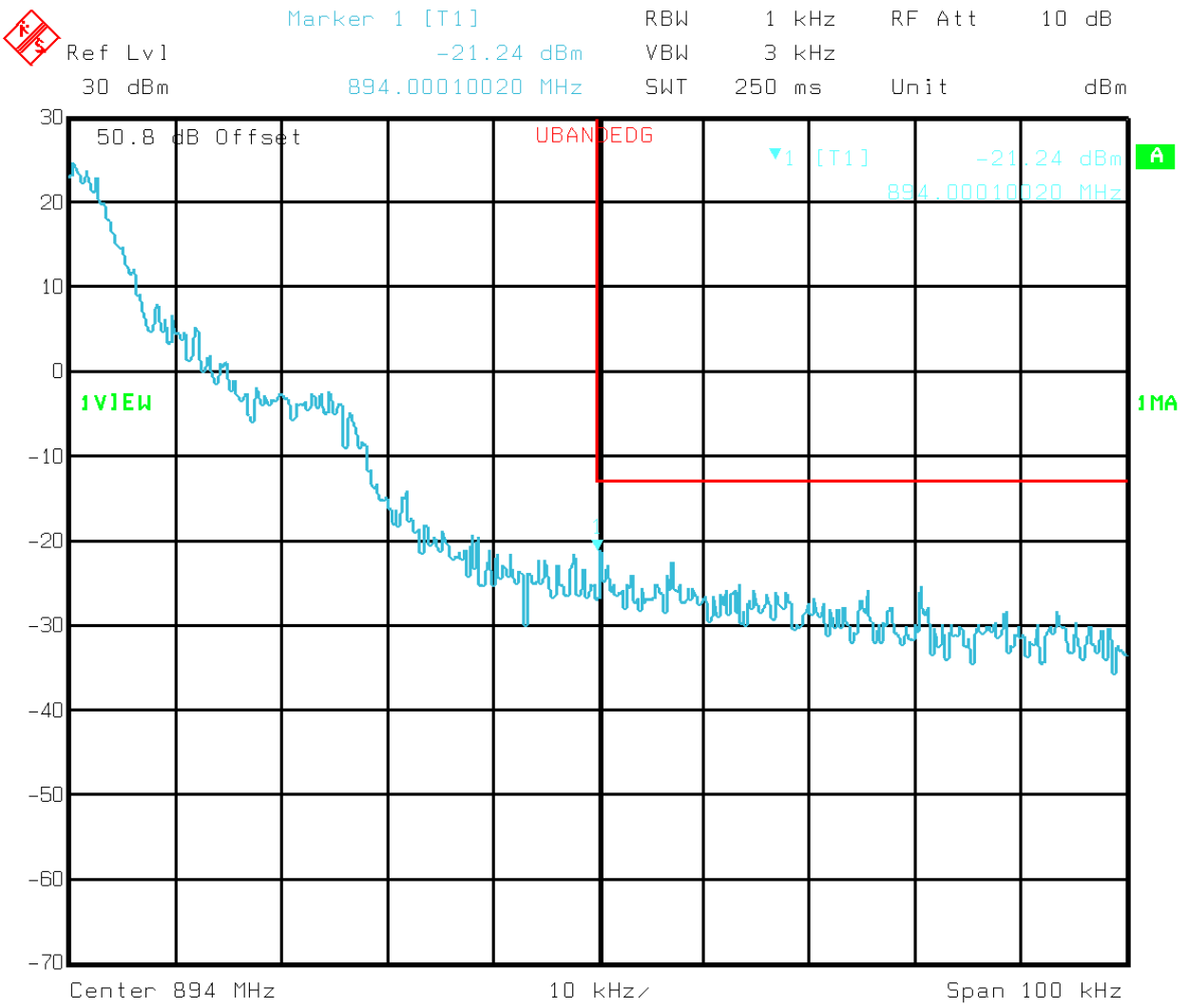
Plot 57


Marker 1 [T1]
Ref Lvl
43 dBm
26.89 dBm
869.74174223 MHz
RBW 20 kHz
VBW 20 kHz
SWT 50 ms
RF Att 10 dB
Mixer -20 dBm
Unit dB
51.5 dB Offset
1 [T1]
26.89 dBm
869.74174223 MHz
CH PWR 43.00 dBm
CH BW 1.25000000 MHz
A
LN
1MA
1VIEW
0
-12
-24
-36
-48
-60
-72
-84
-96
-108
-120
CO
CO
Center 869.73 MHz
390.625 kHz/
Span 3.90625 MHz
Title: Channel Power Ch.1014(CDMA)
Comment A: MOR801B
Date: 3.SEP.1999 8:58:21

Plot 58

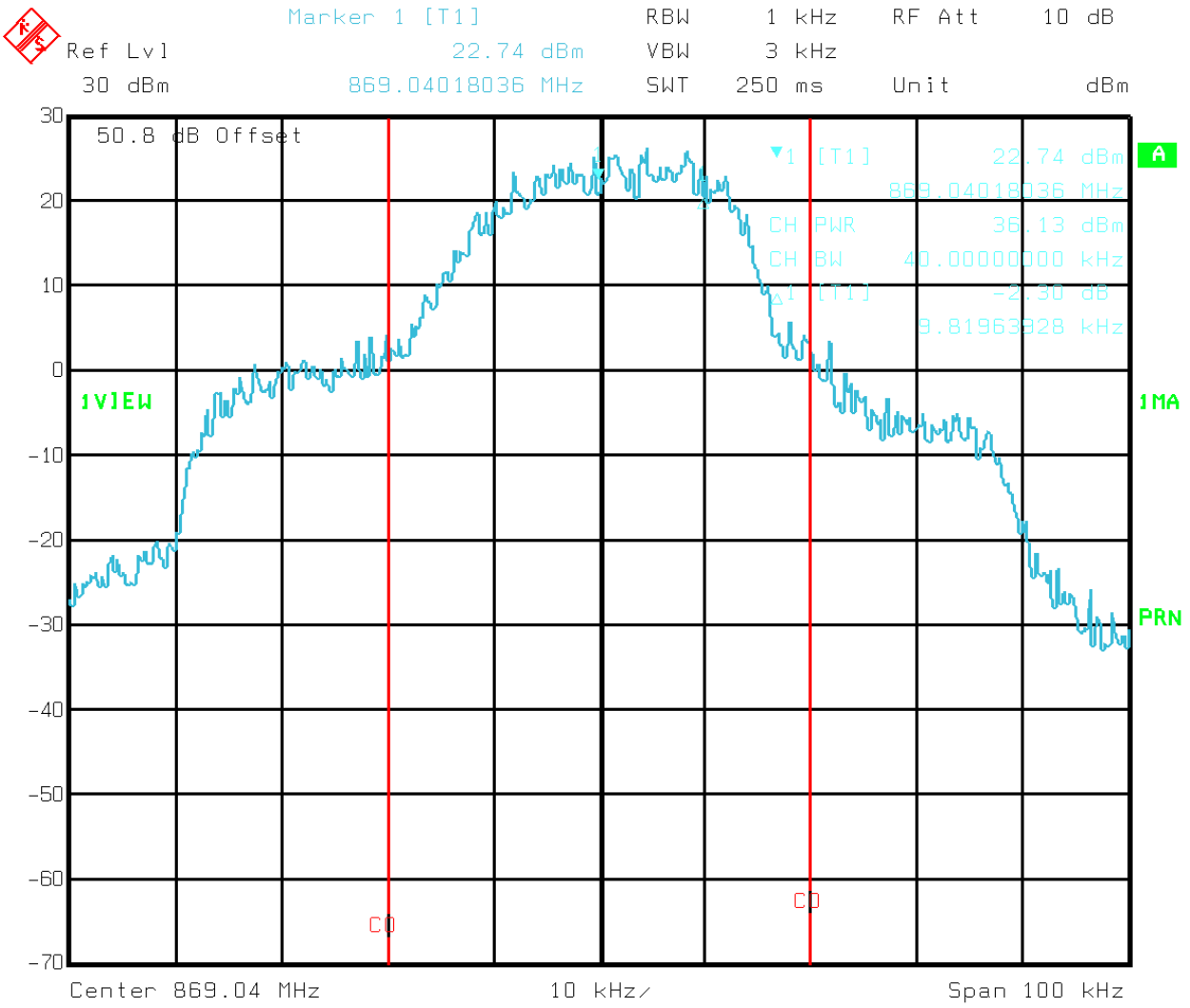

Marker 1 [T1]
RBW 1 kHz
RF Att 10 dB
Ref Lvl
-17.59 dBm
VBW 3 kHz
30 dBm
868.99989980 MHz
SWT 250 ms
Unit dBm
50.8 dB Offset
1VIEW
LBANDEBG
1MA
PRN
Center 869 MHz
10 kHz/
Span 100 kHz
Title: Lower Bandedge TDMA 8 Watt Amplifier ID#148698
Comment A: MOR801B
Date: 14.SEP.1999 11:26:00

Plot 59

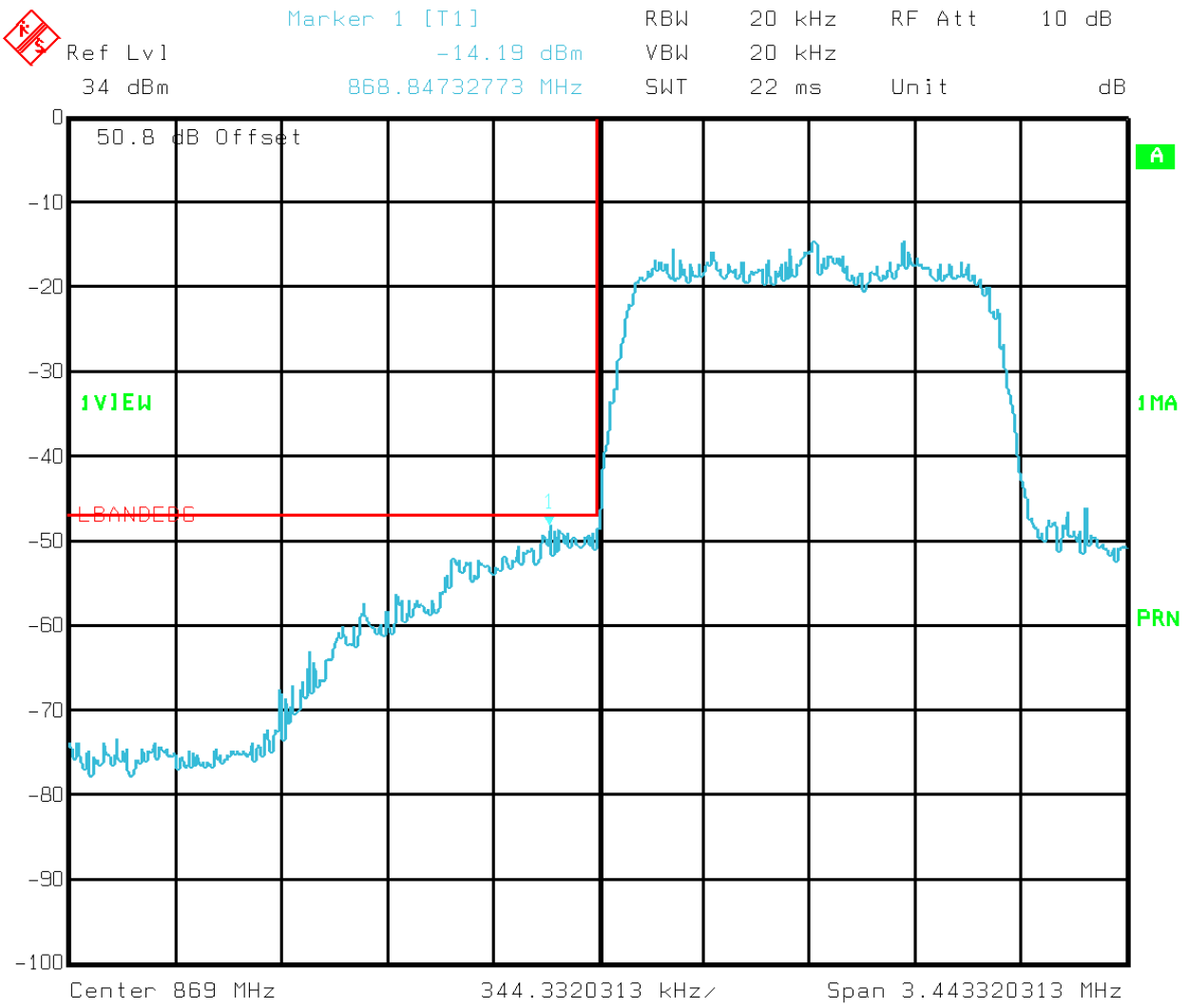


Title: Upper Bandedge Channel 798 TDMA 8 Watt Amplifier ID#148698
Comment A: MOR801B
Date: 14.SEP.1999 12:50:22

Plot 60

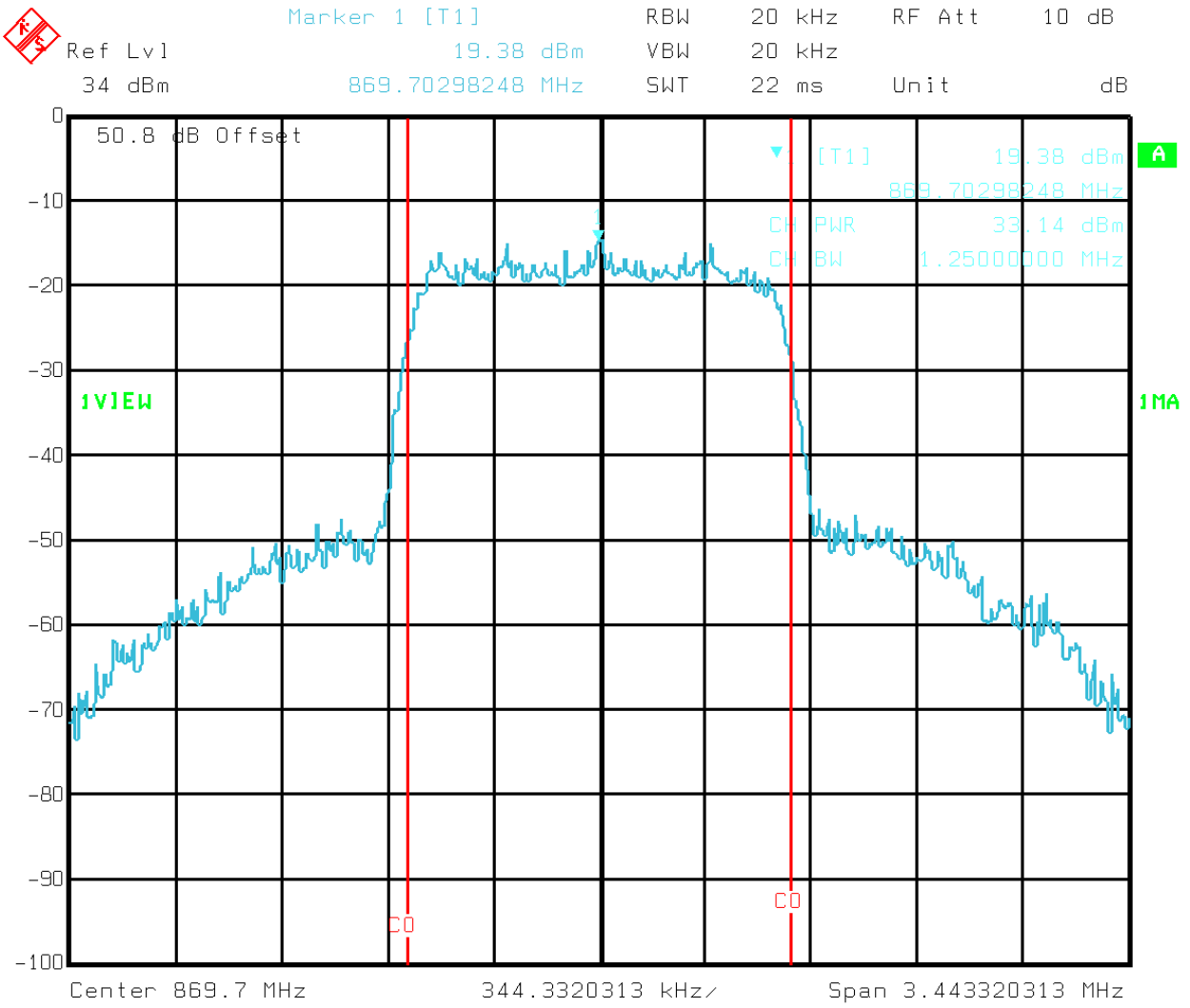

Marker 1 [T1]
RBW 1 kHz
RF Att 10 dB
Ref Lvl
22.74 dBm
VBW 3 kHz
30 dBm
869.04018036 MHz
SWT 250 ms
Unit dBm
50.8 dB Offset
1 [T1]
22.74 dBm
869.04018036 MHz
CH PWR
36.13 dBm
CH BW
40.00000000 kHz
1 [T1]
-2.30 dB
9.81963928 kHz
1VIEW
1MA
PRN
Center 869.04 MHz
10 kHz/
Span 100 kHz
Title: Lower Bandedge Channel Power TDMA 8 Watt Amplifier ID#148698
Comment A: MOR801B
Date: 14.SEP.1999 11:22:48

Plot 61



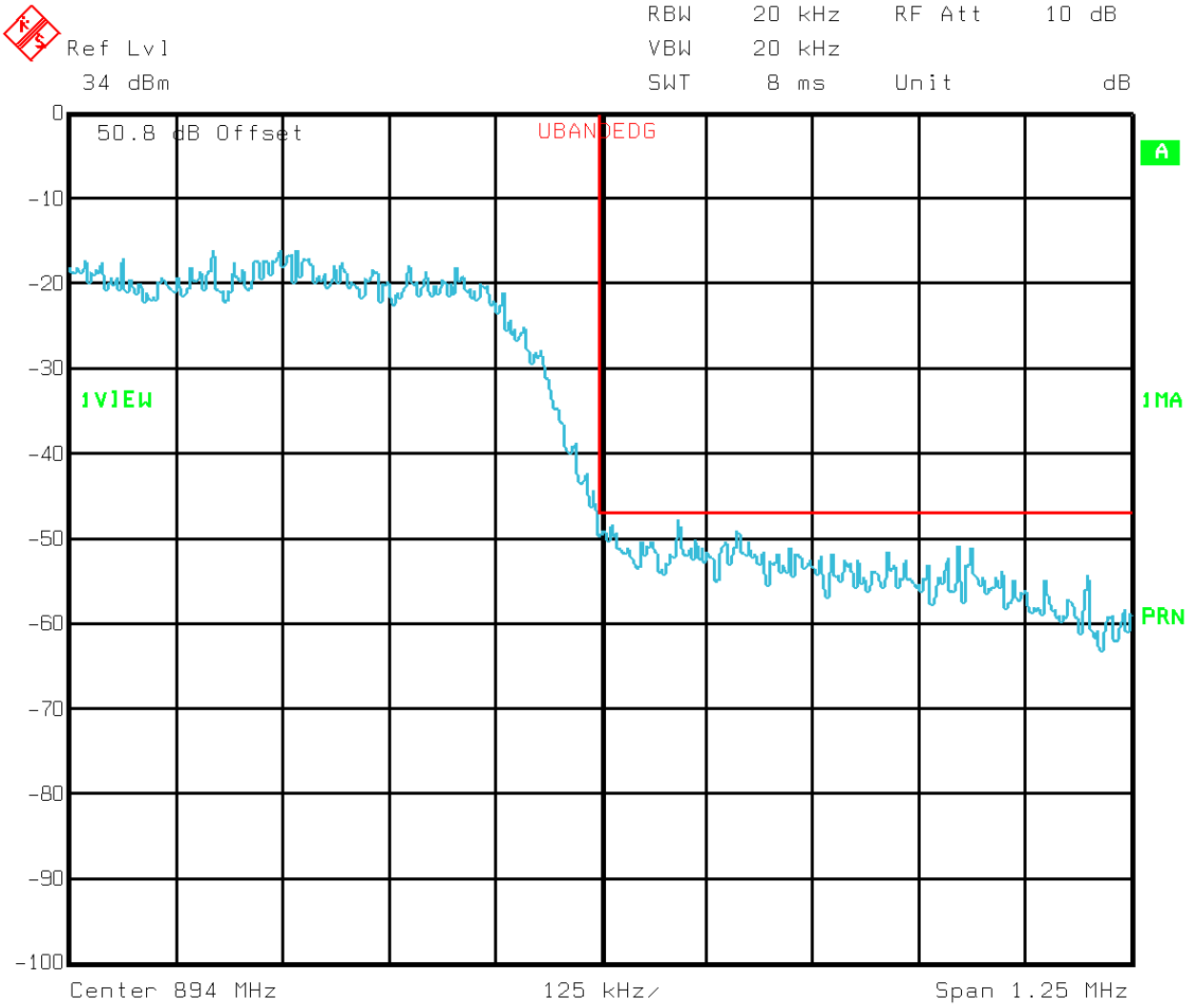
Title: Lower Bandedge CDMA 8 Watt Amplifier ID#148698
Comment A: MOR801B (Channel 1013)
Date: 14.SEP.1999 15:50:48

Plot 62



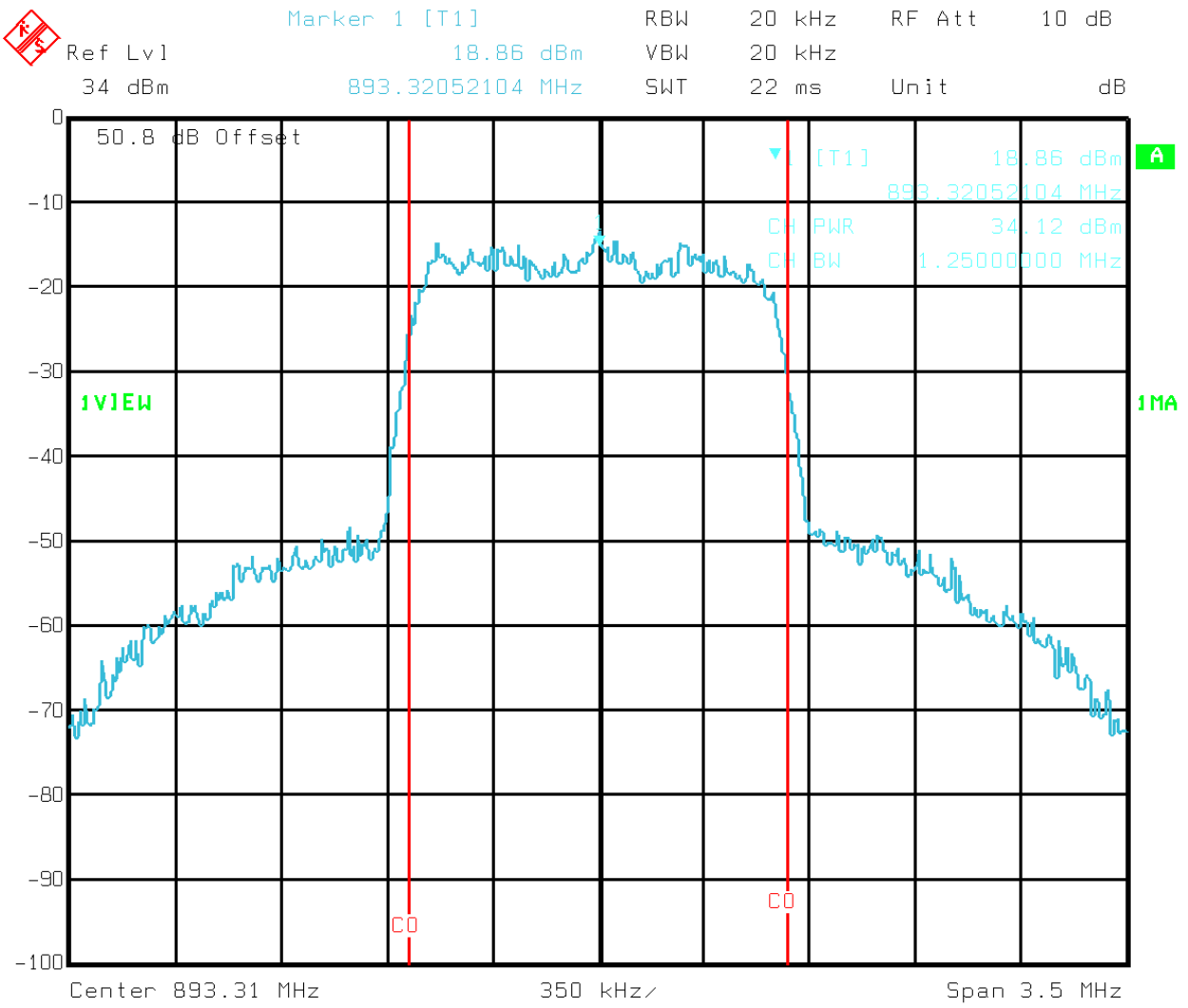
Title: Lower Bandedge Channel Power CDMA 8 Watt Amplifier ID#148698
Comment A: MOR801B (Channel 1013)
Date: 14.SEP.1999 15:54:18

Plot 63



Title: Upper Bandedge CDMA Modules 8 Watt Amplifier ID# 148698
Comment A: MOR801B (Channel 777)
Date: 16.SEP.1999 8:46:44

Plot 64



Title: Upper Bandedge Channel Power CDMA Modules 8 Watt Amplifier
Comment A: MOR801B (Channel 777)
Date: 16.SEP.1999 8:52:57

Plot 65

Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious	PARA. NO.: 2.917(e)
TESTED BY: Ron Gaytan	DATE: 21 Sept.

Test Results: Complies.
The maximum field strength is 57.1 dBμV/m @ 2644 MHz @ 3m.

Test Data: See attached table.

Test Data - Radiated Emissions - Downlink

KTL Dallas, Inc.

Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Microwave Radiated Emissions Data

Complete X Preliminary ___ Page 1 of 1

Client: AllenTelecom Test #: MW-1 W.O.#: 9L0298R

EUT: MOR801B S/N: None Photo ID: 9L0298R MW-1

Technician: Ron Gaytan Specification: CFR 47 Part 2.1053 Lab: A OATS Date: 9/21/99

Equipment Used 667-G2023-CF31

Configuration: Tx at max power into 50 ohm load.

Bandwidth: 1MHz Video Bandwidth: 1MHz Antenna Distance 3 m Detector:

Climatic Conditions:
Temperature: 20 C
Relative Humidity: 42 %
Atmospheric Pressure: 998 mbar

EUT Power: X 115 V.A.C. X 60 Hz X Peak
___ 208 V.A.C. ___ 50 Hz ___ Average
___ 230 V.A.C.
___ Other _____ ___ 1 Phase ___ 3 Phase

Freq. (GHz)	Meter Reading (dBm)	Antenna Factor (dB)	Cable Loss (dB)	RF Gain (dB)	Corrected Reading (dBuV/m)	Spec. Limit (dBuV/m)	Pol.	Comments:
.88149	72.5	24	1.7	0	98.2	N/A	V	Fundamental Frequency
.88149	74	24	1.7	0	99.7	N/A	V	KTL# 667
1.7629	15	26.5	2.8	0	44.3	82.2	V	
2.644	16	28.7	3.4	0	48.1	82.2	V	
3.525	20	31	4.0	0	55	82.2	V	Noise Floor
3.525	6	31	4.0	0	41	82.2	V	Average Detector (N. F.)
4.407	16	32.1	4.4	0	52.5	82.2	V	Noise Floor
4.407	3	32.1	4.4	0	39.5	82.2	V	Average Detector (N. F.)
5.288	16	33.3	4.9	0	54.2	82.2	V	Noise Floor
5.288	3	33.3	4.9	0	41.2	82.2	V	Average Detector (N. F.)
.88149	73	24	1.7	0	98.7	N/A	H	Fundamental Frequency
.88149	74	24	1.7	0	99.7	N/A	H	KTL# 667
1.7629	16	26.5	2.8	0	45.3	82.2	H	
2.644	25	28.7	3.4	0	57.1	82.2	H	
2.644	12	28.7	3.4	0	44.1	82.2	H	Average Detector
3.525	20	31	4.0	0	55	82.2	H	Noise Floor
3.525	6	31	4.0	0	41	82.2	H	Average Detector (N. F.)
4.407	3	32.1	4.4	0	39.5	82.2	H	Average Detector (N. F.)
5.288	3	33.3	4.9	0	41.2	82.2	H	Average Detector (N. F.)

DATACOMMON\FORMS\TESTDATASHEETS\MICRORE REV 030597

Photographs of Test Setup

FRONT VIEW

REAR VIEW

Section 7. Frequency Stability

NAME OF TEST: Frequency Stability	PARA. NO.: 22.355
TESTED BY:	DATE:

Test Results:

Measurement Data: Standard Test Frequency: _____ MHz
Standard Test Voltage: _____ Vdc

Section 8. Test Equipment List

KTL ID	Description	Manufacturer Model Number	Serial Number	Calibration Date
G2632	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	06/14/99
G3728	COMBINER	MINI-CIRCUITS ZA3PD-1	NONE	CBU
G2735	/Q MODULATION GENERATOR	ROHDE & SCHWARZ AMIQ	830848/005	05/26/99
G2736	SIGNAL GENERATOR	ROHDE & SCHWARZ SMIQ 03	DE22081	05/03/99
G1017	ATTENUATOR	NARDA 776B-20	NONE	10/14/98
G1018	ATTENUATOR	NARDA 776B-10	NONE	10/27/98
G2023	ANTENNA,HORN	EMCO 3115	8812-3035	07/16/99
CF31	CABLE, 7.6m	KTL Semi-Flex, Storm	N/A	01/29/99
CF38	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	08/31/99
CF41	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	08/31/99
677	RECEIVER, 1-18 GHz	ELECTRO METRICS EMC 50	185	08/31/99

ANNEX A - TEST METHODOLOGIES

NAME OF TEST: RF Power Output **PARA. NO.: 2.985**

Minimum Standard: Para. No. 22.913(a). The maximum effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 watts.

Method Of Measurement:

Detachable Antenna:
The peak power at antenna terminals is measured using an in-line peak power meter. Power output is measured with the maximum rated input level.

Integral Antenna:
If the antenna is not detachable from the circuit then the Peak Power Output is derived from the peak radiated field strength of the fundamental emission by using the plane wave relation $GP/4\pi R^2 = E^2/120\pi$ and proceeding as follows:

$$P = \frac{E^2 R^2}{30G} = \frac{E^2 3^2}{30G}$$

where,

P = the equivalent isotropic radiated power in watts
E = the maximum measured field strength in V/m
R = the measurement range (3 meters)
G = the numeric gain of the transmit antenna in relation to an isotropic radiator

NAME OF TEST: Occupied Bandwidth (Voice & SAT) PARA. NO.: 2.989

Minimum Standard: 22.917(c) The mean power of any emission removed from the carrier frequency by a displacement frequency (f_d in kHz) must be attenuated below the mean power of the unmodulated carrier (P) as follows:

(i) On any frequency removed from the carrier frequency by more than 12 kHz but not more than 20 kHz:

at least 117 log (f_d/12)

(ii) On any frequency removed from the carrier frequency by more than 20 kHz, up to the first multiple of the carrier frequency:

at least 100 log (f_d/11) dB or 43 + 10 log (P) dB, whichever is the lesser attenuation.

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: 300 Hz
VBW: ≥ RBW
Span: 100 kHz
Sweep: Auto
Mask: CELLF3E

Input Signal Characteristics (F3E/F3D):

RF level: Maximum recommended by manufacturer
AF1 frequency: 6 kHz
AF1 level: sufficient to produce 2 kHz deviation
AF2 frequency: 2.5 kHz
AF2 level: sufficient to produce 12 kHz deviation.

NAME OF TEST: Occupied Bandwidth (WB Data) PARA. NO.: 2.989

Minimum Standard: 22.917(c) The mean power of any emission removed from the carrier frequency by a displacement frequency (f_d in kHz) must be attenuated below the mean power of the unmodulated carrier (P) as follows:

(1) On any frequency removed from the carrier frequency by more than 20 kHz but not more than 45 kHz:

at least 26 dB

(2) On any frequency removed from the carrier frequency by more than 45 kHz but not more than 90 kHz:

at least 45 dB

(3) On any frequency removed from the carrier frequency by more than 90 kHz, up to the first multiple of the carrier frequency:

at least 60 dB or 43 + 10 log (P) dB, whichever is the lesser attenuation.

Method Of Measurement:

Spectrum Analyzer Settings:
RBW: 300 Hz
VBW: ≥ RBW
Span: 200 kHz
Sweep: Auto
Mask: CELLF1D

Input Signal Characteristics:
RF level: Maximum recommended by manufacturer
AF1 frequency: 10 kHz, random bit sequence
AF1 level: sufficient to produce 8 kHz deviation

NAME OF TEST: Occupied Bandwidth (ST) PARA. NO.: 2.989

Minimum Standard: 22.917(c) The mean power of any emission removed from the carrier frequency by a displacement frequency (f_d in kHz) must be attenuated below the mean power of the unmodulated carrier (P) as follows:

(1) On any frequency removed from the carrier frequency by more than 20 kHz but not more than 45 kHz:

at least 26 dB

(2) On any frequency removed from the carrier frequency by more than 45 kHz but not more than 90 kHz:

at least 45 dB

(3) On any frequency removed from the carrier frequency by more than 90 kHz, up to the first multiple of the carrier frequency:

at least 60 dB or 43 + 10 log (P) dB, whichever is the lesser attenuation.

Method Of Measurement:

Spectrum Analyzer Settings:
RBW: 300 Hz
VBW: ≥ RBW
Span: 200 kHz
Sweep: Auto
Mask: CELLF1D

Input Signal Characteristics:
RF level: Maximum recommended by manufacturer
AF1 frequency: 10 kHz tone
AF1 level: sufficient to produce 8 kHz deviation

NAME OF TEST: Occupied Bandwidth (Digital Modulation) PARA. NO.: 2.989

Minimum Standard: Not defined by FCC. Input vs. Output.

Method Of Measurement:

Spectrum Analyzer Settings:
RBW: CDMA (30 kHz), GSM (30 kHz), NADC (1 kHz) and CDPD (1 kHz)
VBW: ≥ RBW
Span: As required
Sweep: Auto
Mask:

Input Signal Characteristics:
RF level: Maximum recommended by manufacturer

NAME OF TEST: Spurious Emission at Antenna Terminals PARA. NO.: 2.991

Minimum Standard: Para. No. 22.917(e). The mean power of emissions must be attenuated below the mean power of the unmodulated carrier on any frequency twice or more than twice the fundamental emission by at least 43 + 10 log P. This is equivalent to -13 dBm absolute power.

Method Of Measurement:

Spectrum Analyzer Settings:
RBW: 30 kHz (AMPS). As required for digital modulations.
VBW: ≥ RBW
Start Frequency: 0 MHz
Stop Frequency: 10 GHz
Sweep: Auto

NAME OF TEST: Field Strength of Spurious Radiation PARA. NO.: 2.993

Minimum Standard: Para. No. 22.917(e). The mean power of emissions must be attenuated below the mean power of the unmodulated carrier on any frequency twice or more than twice the fundamental emission by at least 43 + 10 log P. This is equivalent to -13 dBm absolute power.

Calculation Of Field Strength Limit:

An example of attenuation requirement of 43 + 10 Log P is equivalent to -13 dBm (5×10^{-5} Watts) at the antenna terminal. We determine the field strength limit by using the plane wave relation.

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

For emissions ≤ 1 GHz:

G = 1.64 (Dipole Gain)
P = 10^{-5} Watts (Maximum spurious output power)
R = 3m (Measurement Distance)

$$E = \frac{\sqrt{30GP}}{R}$$

$$\mathrm{E} = \frac{\sqrt{30 \times 1.64 \times 5 \times 10^{-5}}}{3} = 0.016533 \text{ V / m} = 84.4 \text{ dB}\mu\text{V / m}$$

For emissions > 1 GHz:

G = 1 (Isotropic Gain)
P = 1×10^{-5} Watts (Maximum spurious output power)
R = 3m (Measurement Distance)

$$E = 84.4 - 20Log\sqrt{1.64} = 82.3dB\mu V \ / \ m@3m$$

The spectrum is searched to 10 GHz.

NAME OF TEST: Frequency Stability **PARA. NO.: 2.995**

Minimum Standard: Para. No. 22.355. The transmitter carrier frequency shall remain within the tolerances given in Table C-1.

Freq. Range (MHz)	Base, fixed	Mobile > 3 W	Mobile ≤ 3 W
821 to 896	1.5	2.5	2.5

Table C-1

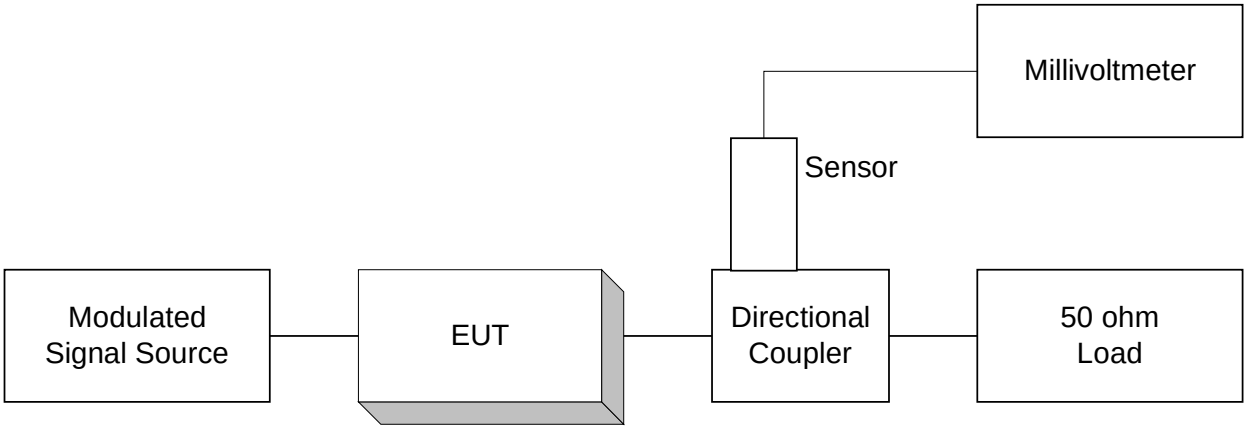
Method Of Measurement:

Frequency Stability With Voltage Variation:
The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. The frequency counter and signal generator are phase locked with the same 10 MHz reference frequency by connecting the 10 MHz ref. out of the counter to the 10 MHz ref, in of the signal generator. With the voltage input to the E.U.T. set to 85% S.T.V., the frequency is measured in 30 second intervals for a period of 5 minutes. This procedure is repeated at 100% S.T.V. and 115% S.T.V.

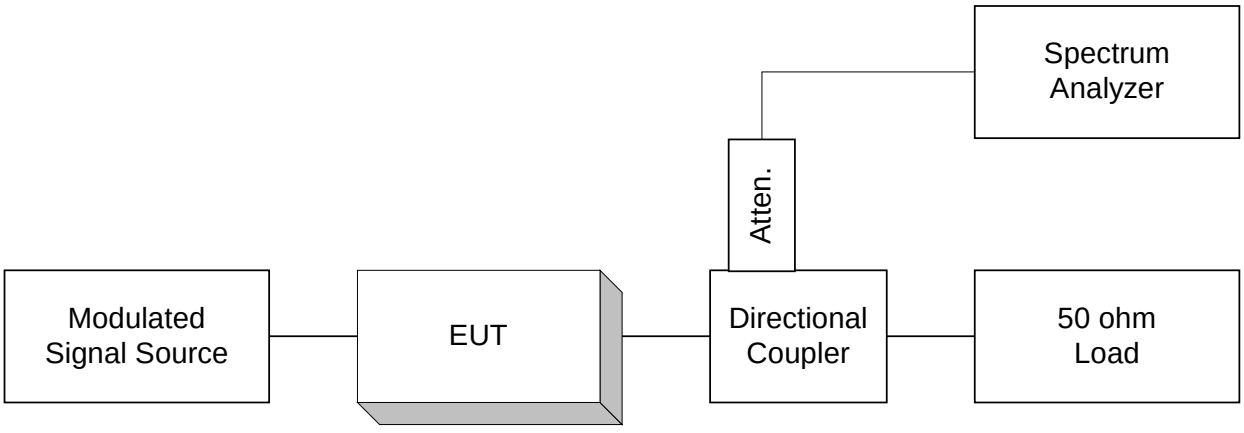
Frequency Stability With Temperature Variation:
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

ANNEX B - TEST DIAGRAMS

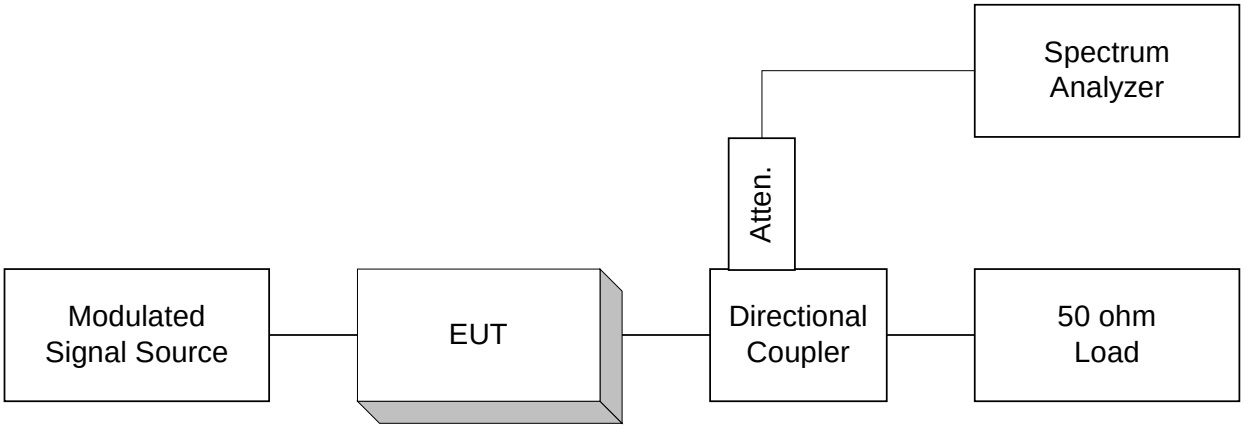
Para. No. 2.985 - R.F. Power Output

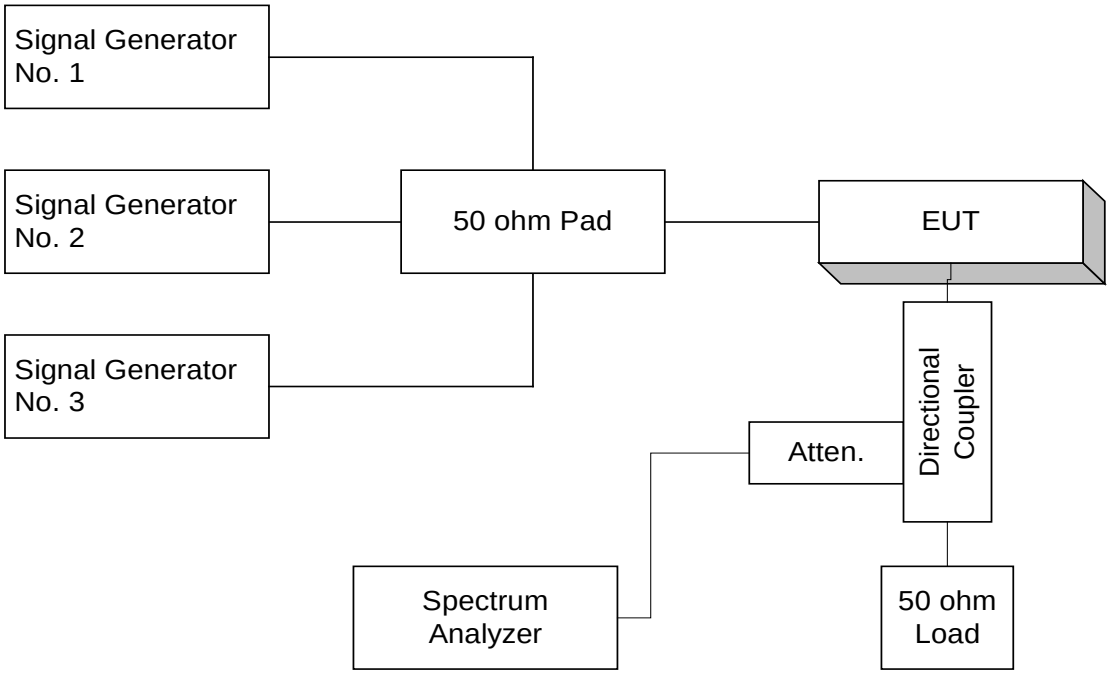


Para. No. 2.989 - Occupied Bandwidth

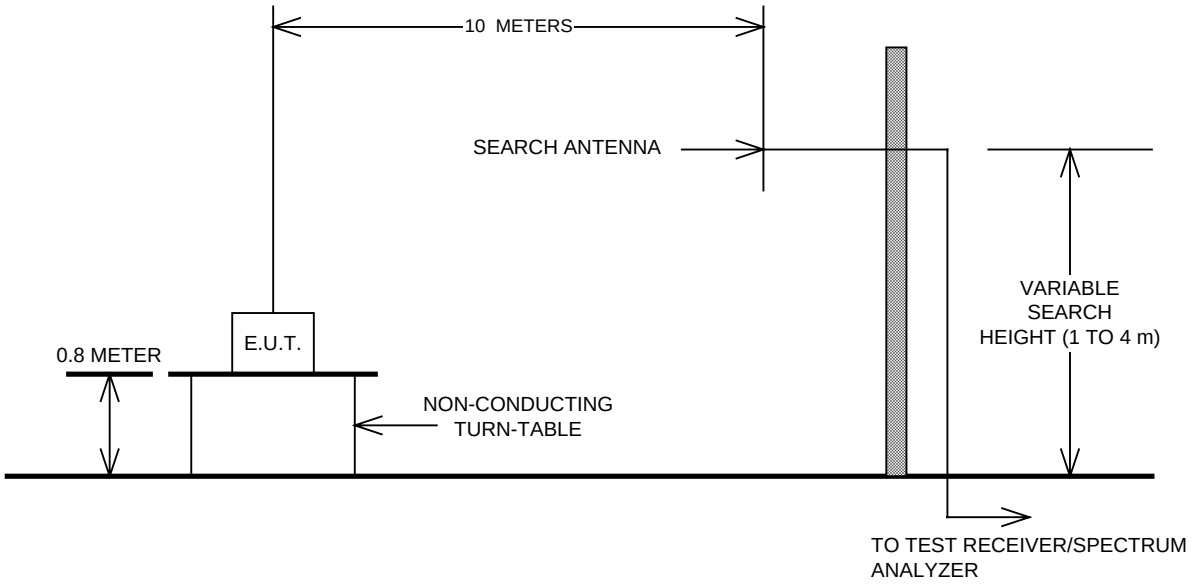


Para. No. 2.991 Spurious Emissions at Antenna Terminals





Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability