

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

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

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EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

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



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

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EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

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:**

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

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.

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

Test Conditions:

Indoor Temperature: 22°C
 Humidity: 25 %

Outdoor Temperature: 28°C
 Humidity: 30%

.

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

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:	<u>CDMA</u>	<u>TDMA</u>	<u>AMPS</u>
	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
	☒	☐	☒

KTL Dallas

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 9L0298RUS

EQUIPMENT: MOR801 Repeater

FCC ID: BCR-RPT-MOR801

KTL Dallas

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 9L0298RUS

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

Description of Modifications For Class II Permissive Change

Not Applicable

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

Modifications Made During Testing

Not Applicable

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

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:

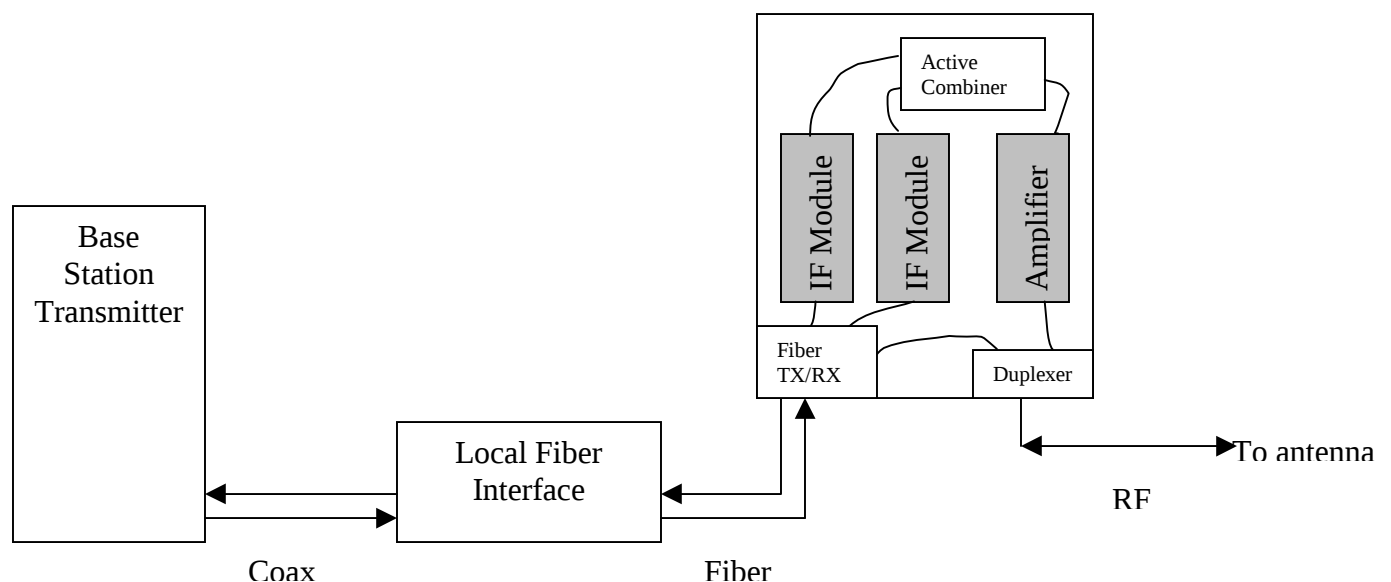
TDMA IF module: This module is intended to operate in an NADC (IS-136) system. The IF filtering is 40kHz wide for these signals.

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



EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

Section 3. RF Power Output

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

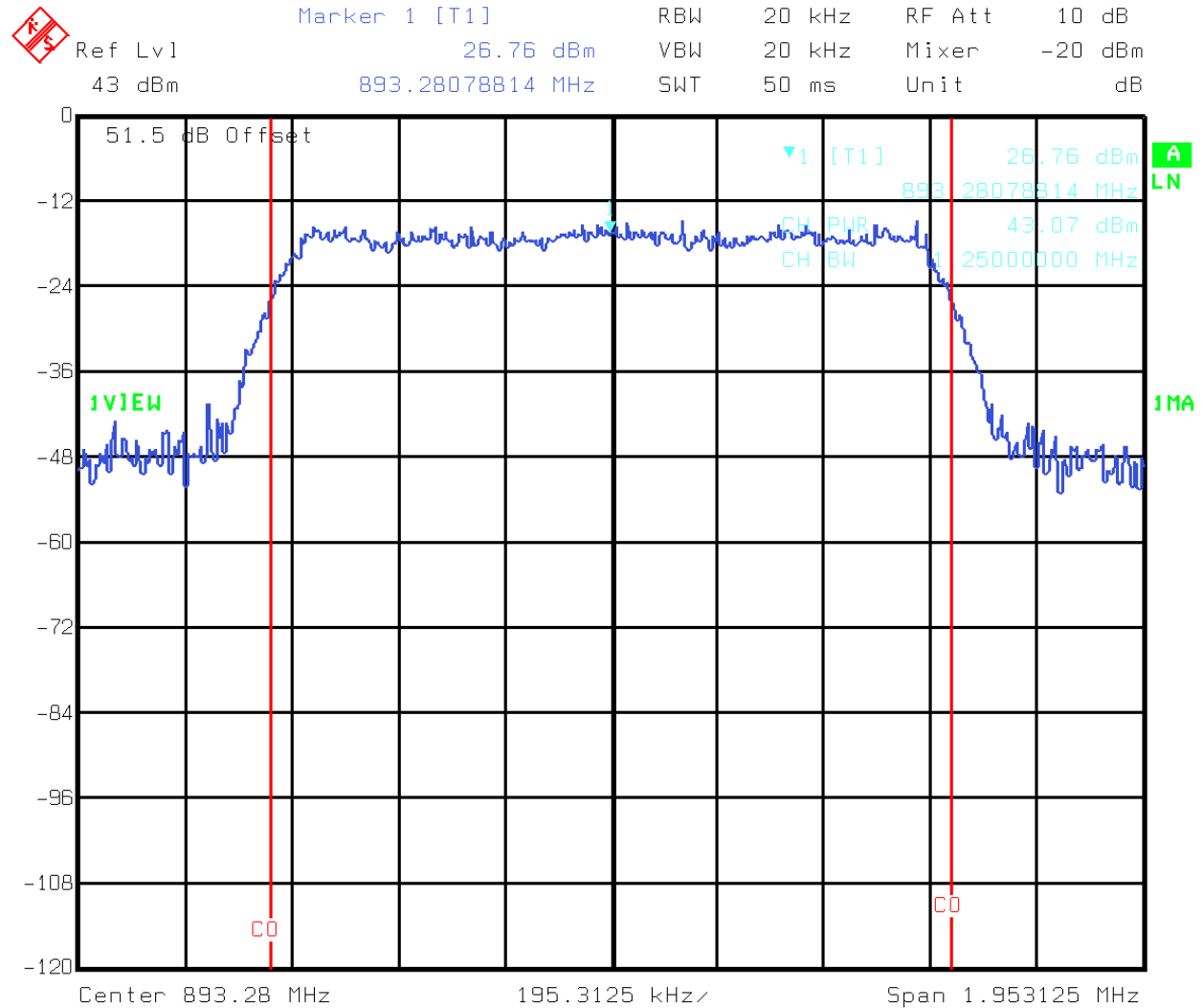
Test Results: Complies.**Measurement Data:****20 Watt Amplifier ID # 148630**

	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

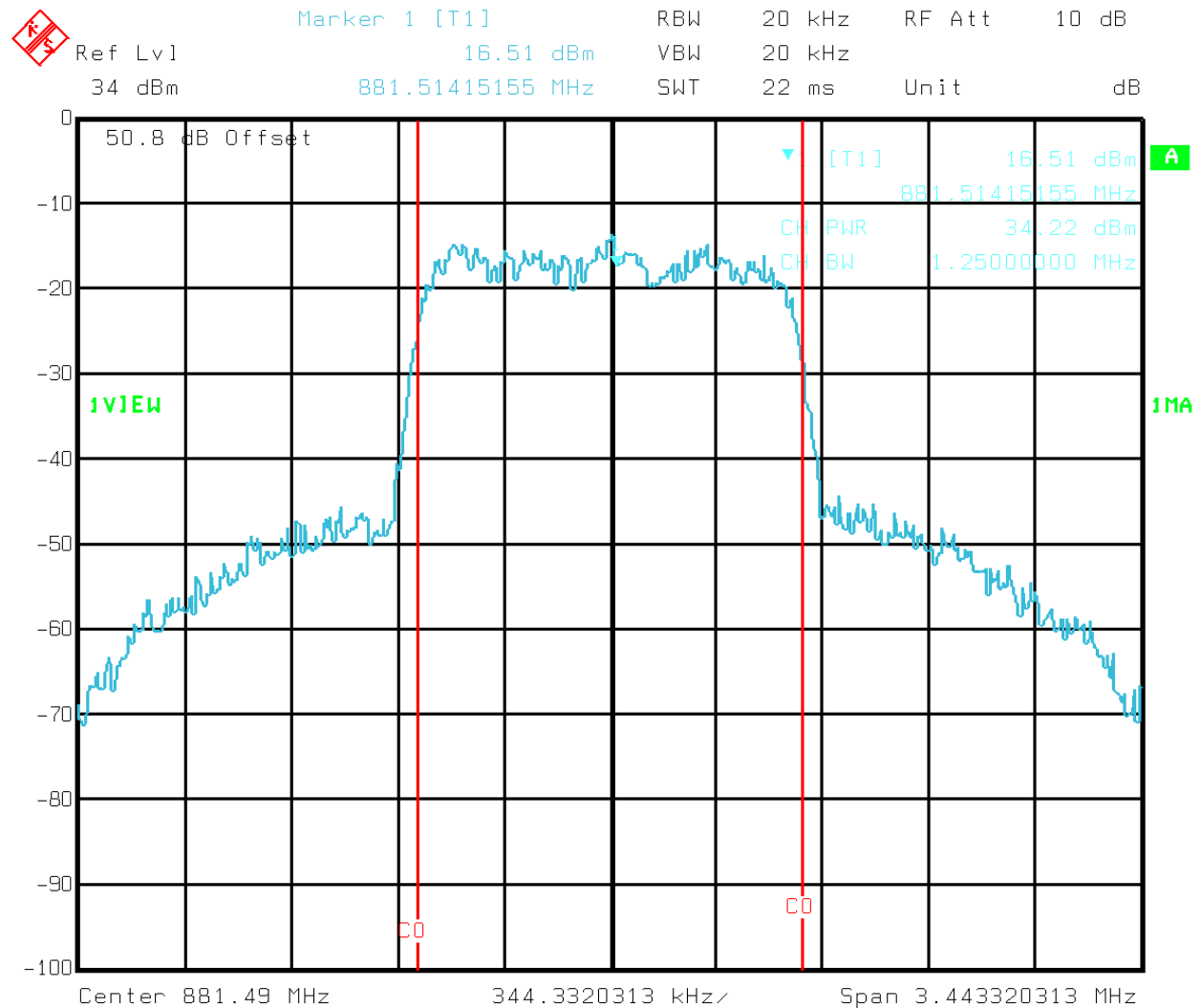
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



Title: Upper Bandedge Channel Power Ch.776(CDMA)
Comment A: MOR801B
Date: 3.SEP.1999 9:32:57

Plot 1

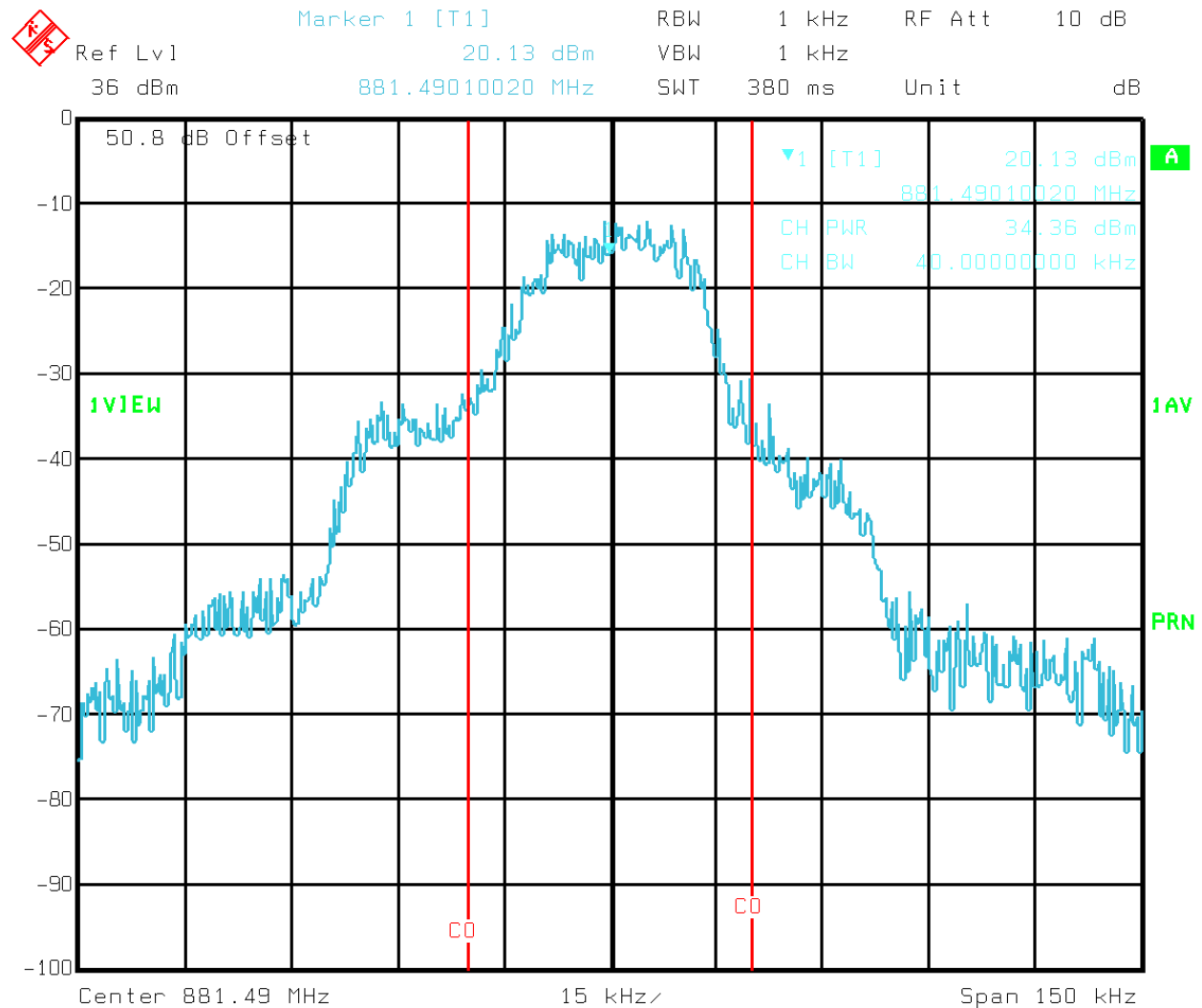
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



Title: Channel Power CDMA 8 Watt Amplifier ID#148698
Comment A: MOR801B (Channel 383)
Date: 14.SEP.1999 15:12:16

Plot 2

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



Title: Channel Power TDMA 8 Watt Amplifier ID#148698
Comment A: MOR801B
Date: 14.SEP.1999 13:26:19

Plot 3

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

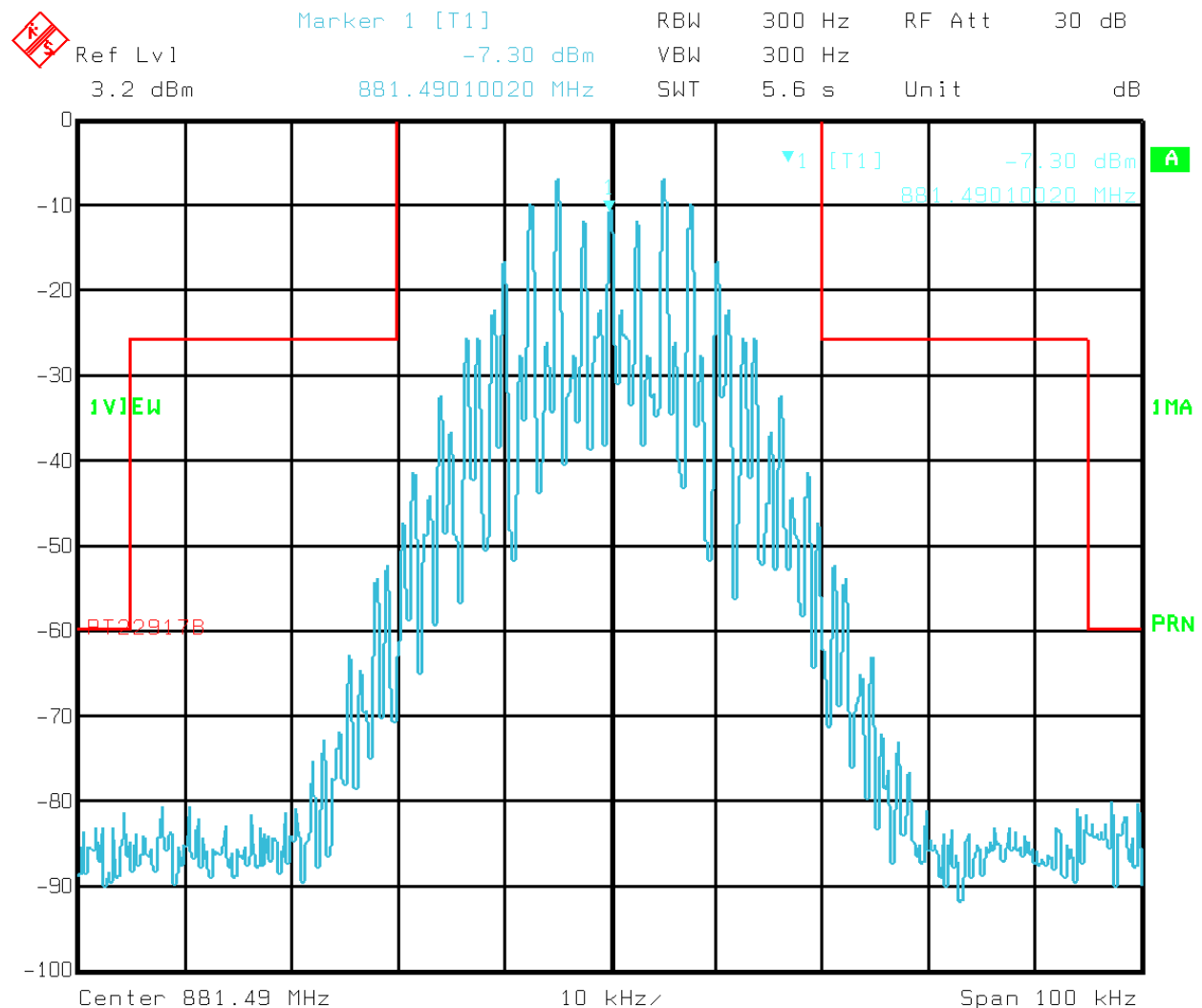
Section 4. Occupied Bandwidth

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).

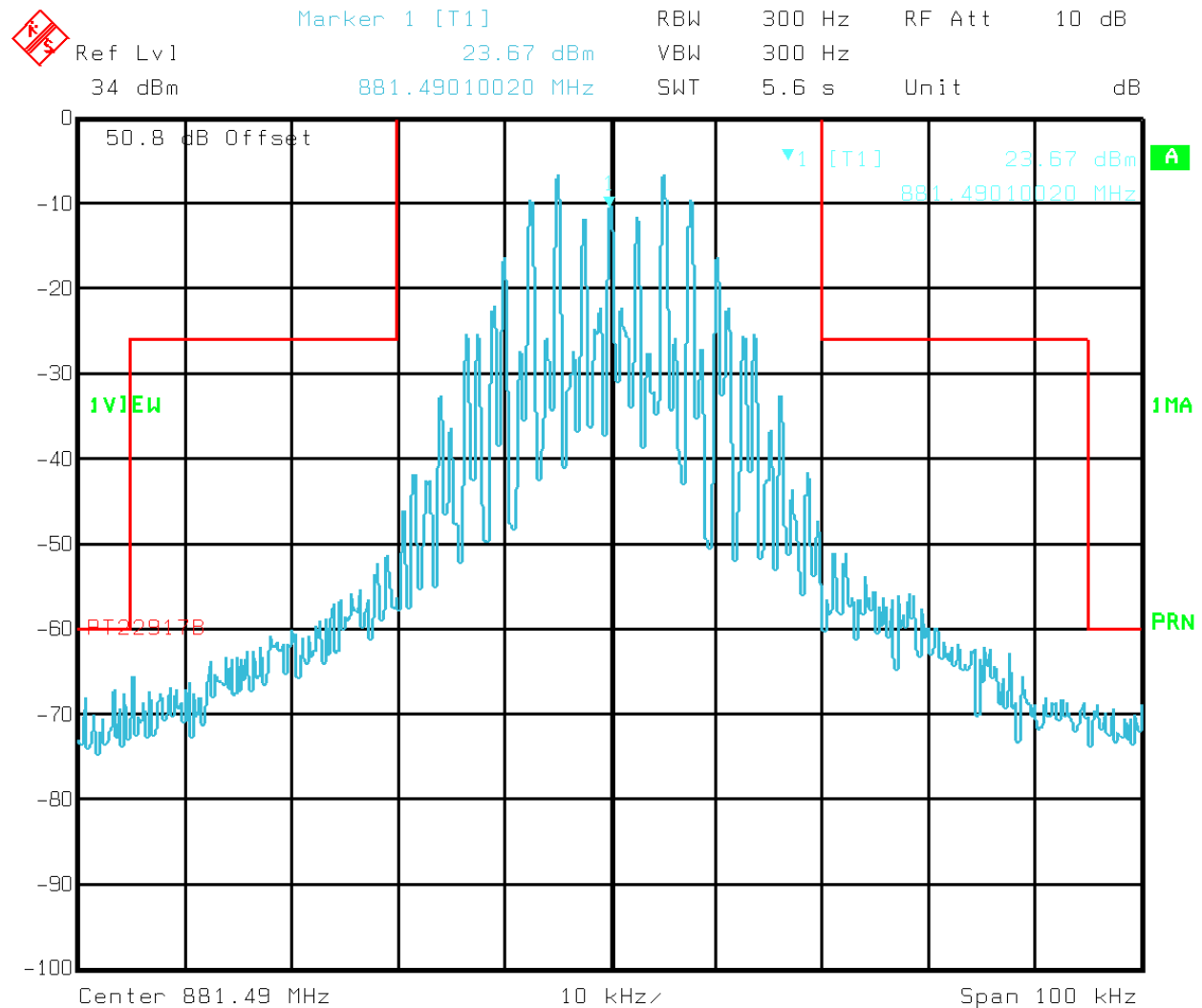
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



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

Plot 4

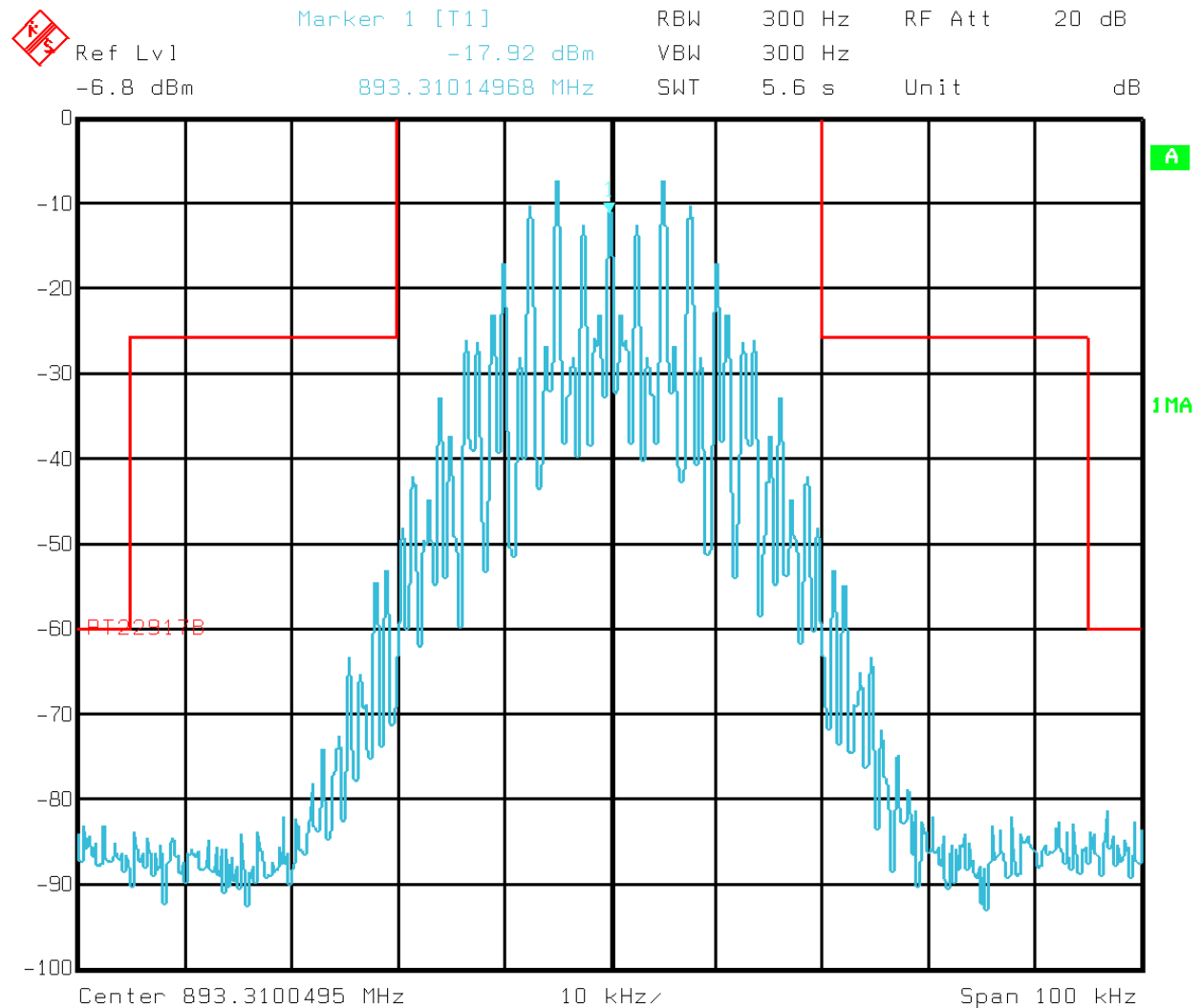
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



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

Plot 5

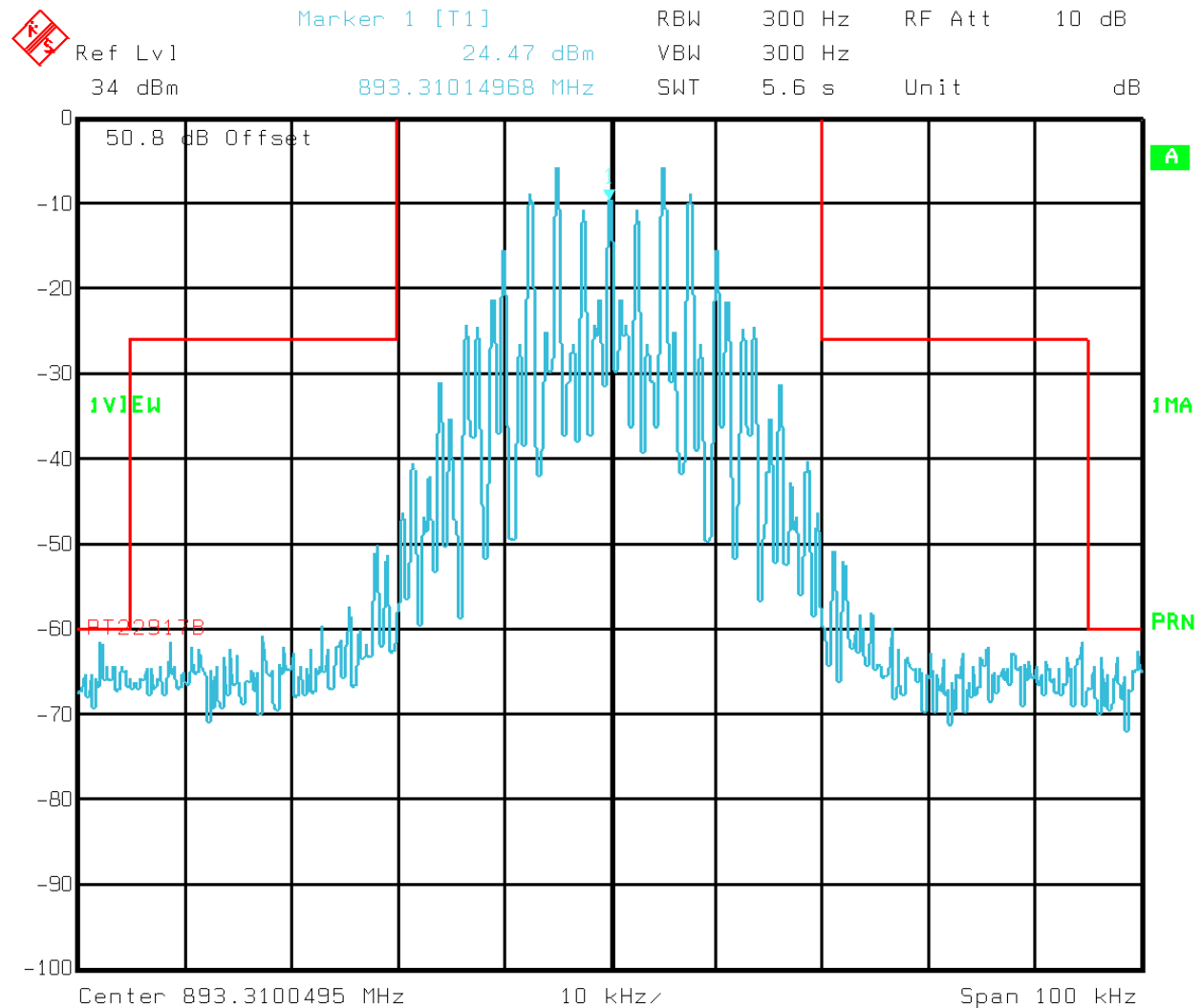
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



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

Plot 6

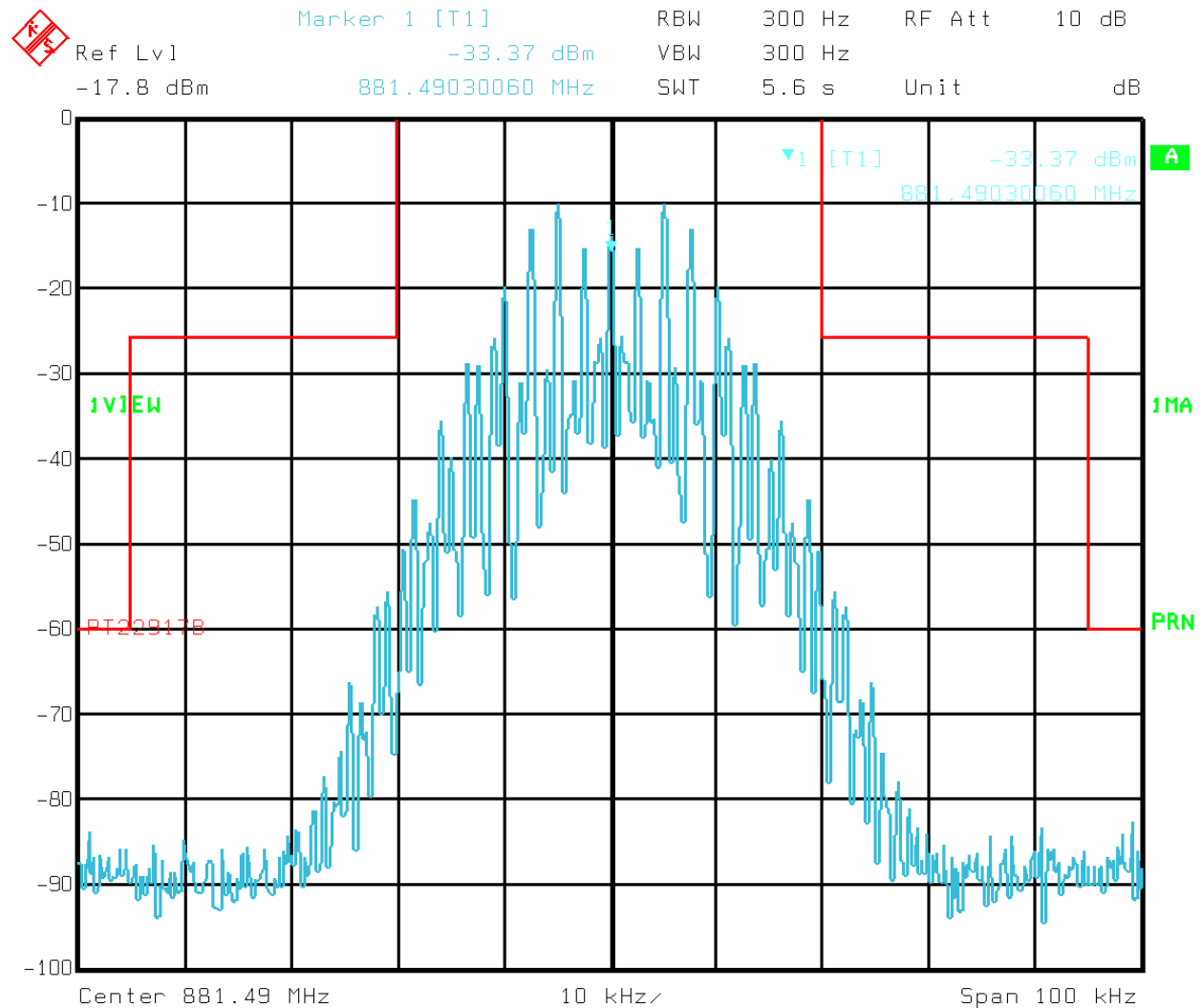
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



Title: Voice/SAT CDMA Modules 8 Watt Amplifier
Comment A: MOR801B (Channel 777)
Date: 20.SEP.1999 11:15:59

Plot 7

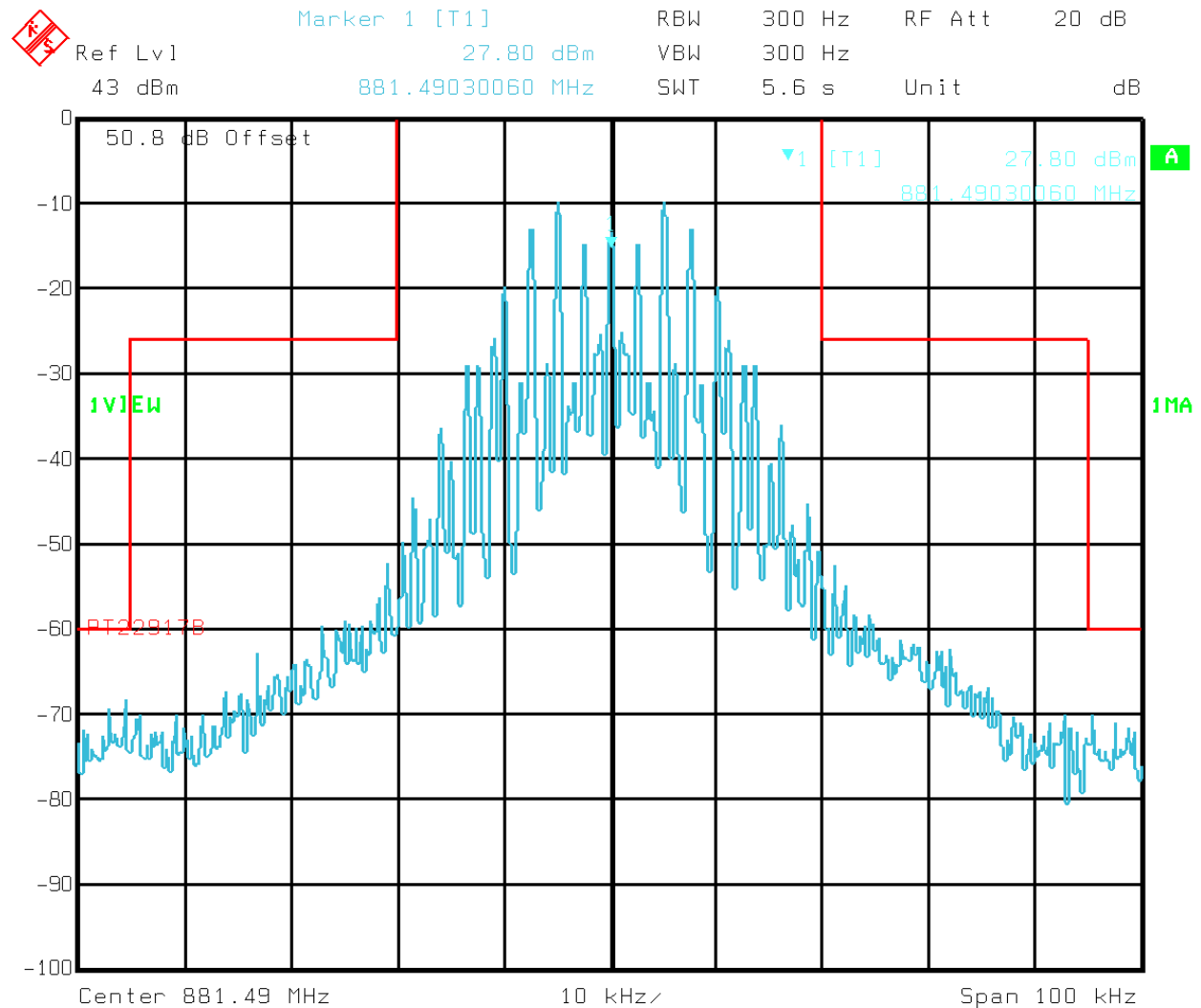
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



Title: Voice/SAT Input TDMA Modules
Comment A: MOR801B (Channel 383)
Date: 21.SEP.1999 8:46:27

Plot 8

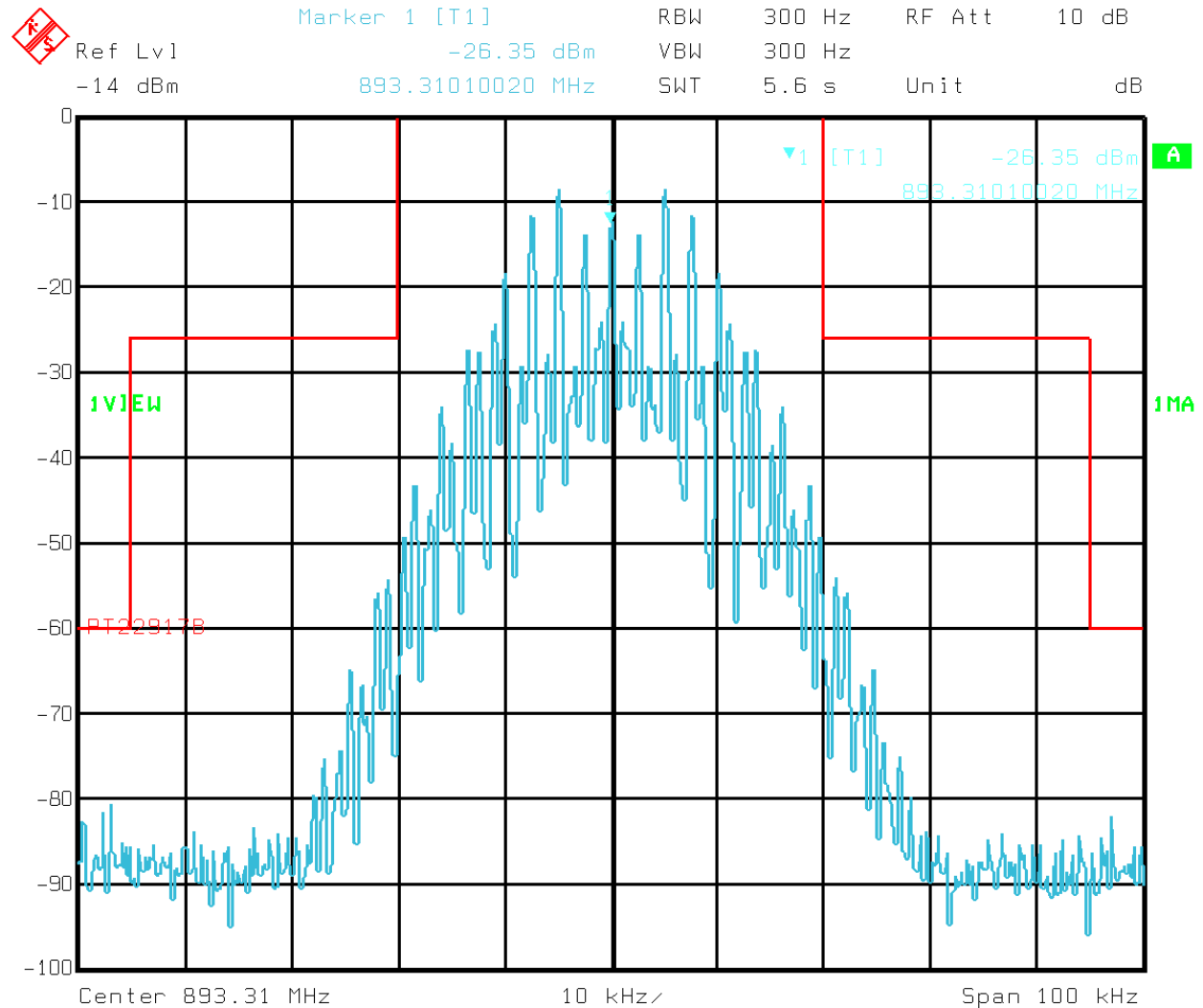
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



Title: Voice/SAT TDMA Modules
Comment A: MOR801B (Channel 383)
Date: 21.SEP.1999 8:49:24

Plot 9

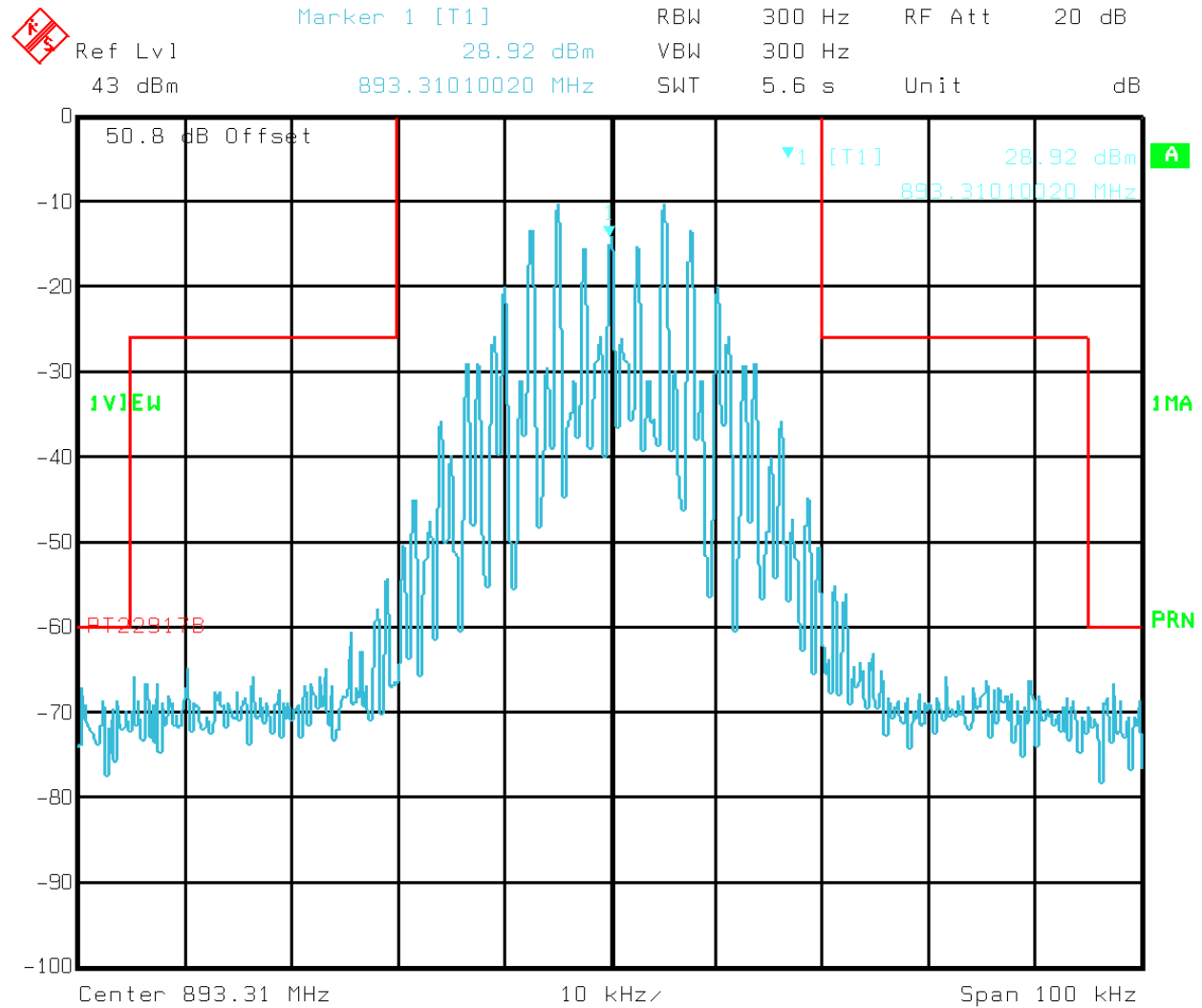
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



Title: Voice/SAT Input CDMA Modules
Comment A: MOR801B (Channel 777)
Date: 21.SEP.1999 9:36:20

Plot 10

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



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

Plot 11

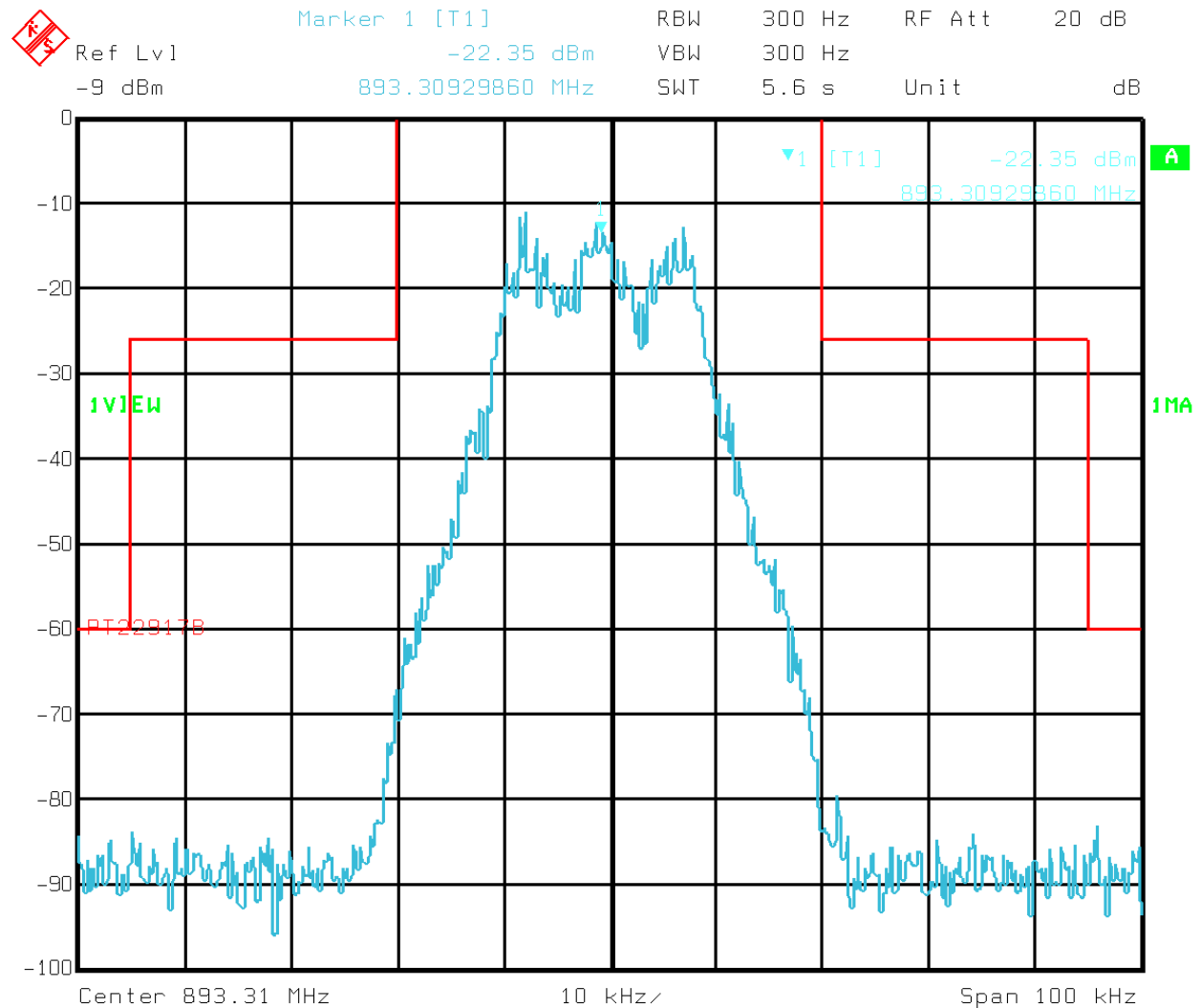
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

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).

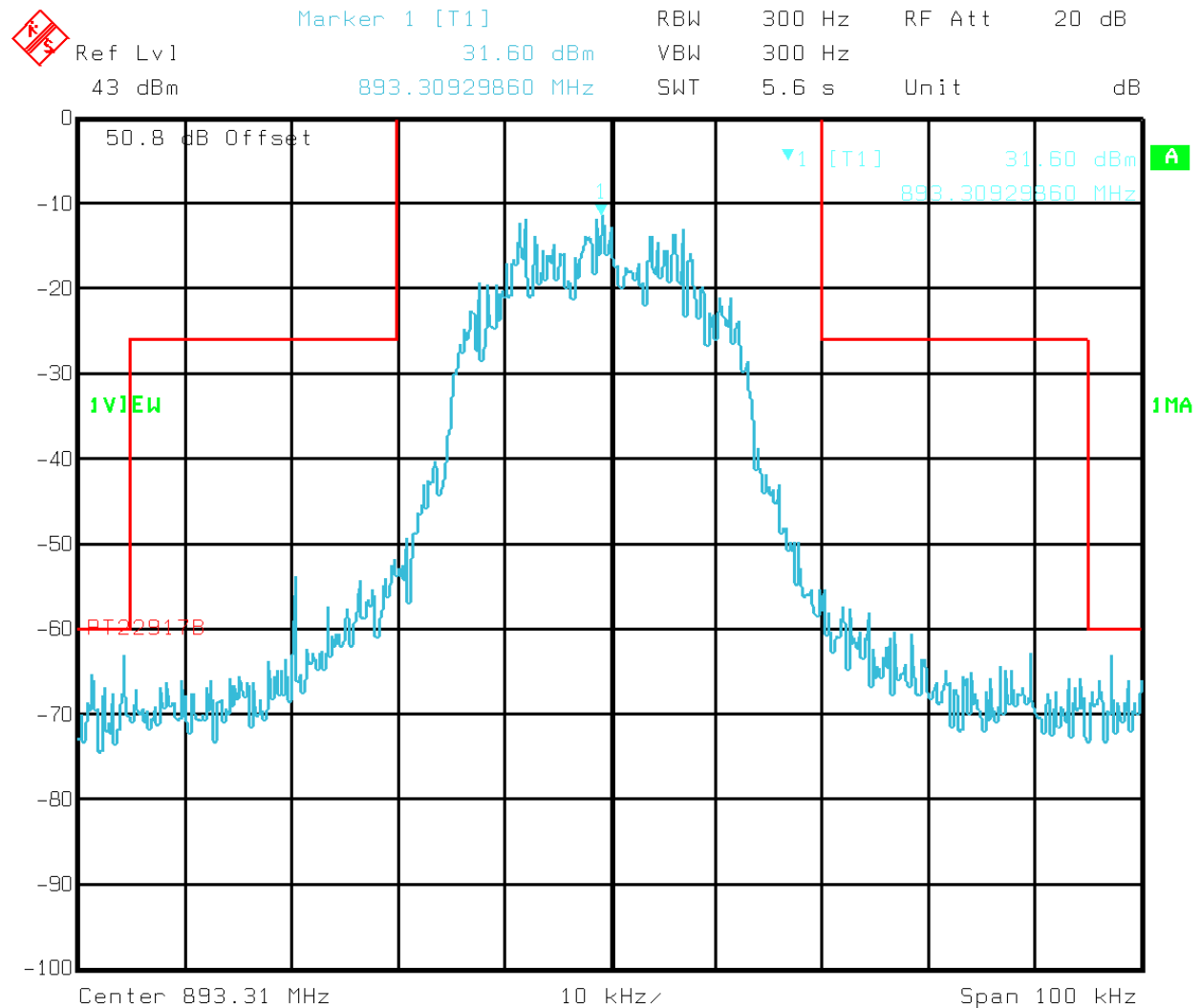
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



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

Plot 12

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



Title: Wideband Data CDMA Modules
Comment A: MOR801B (Channel 777)
Date: 21.SEP.1999 10:13:16

Plot 13

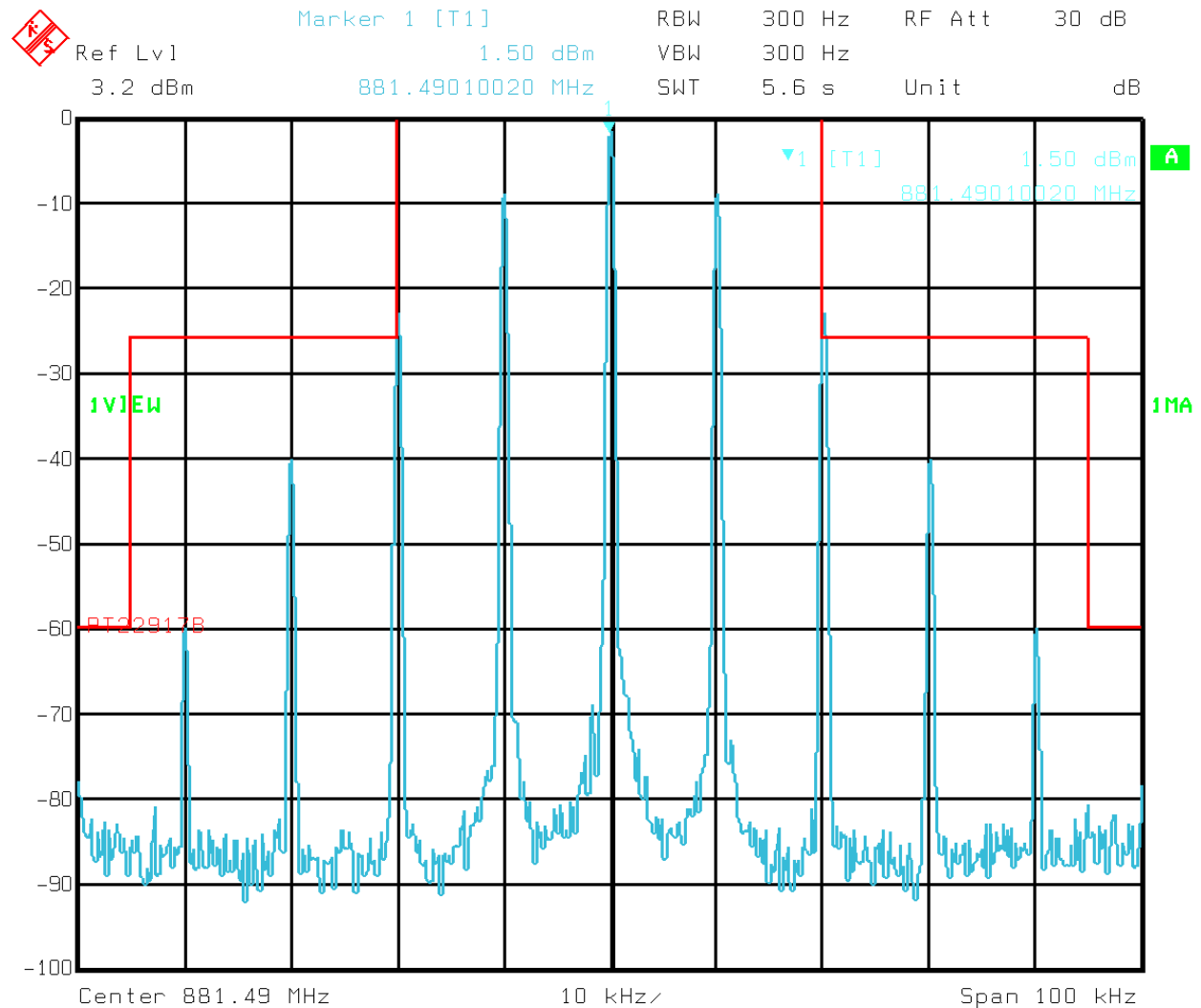
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

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).

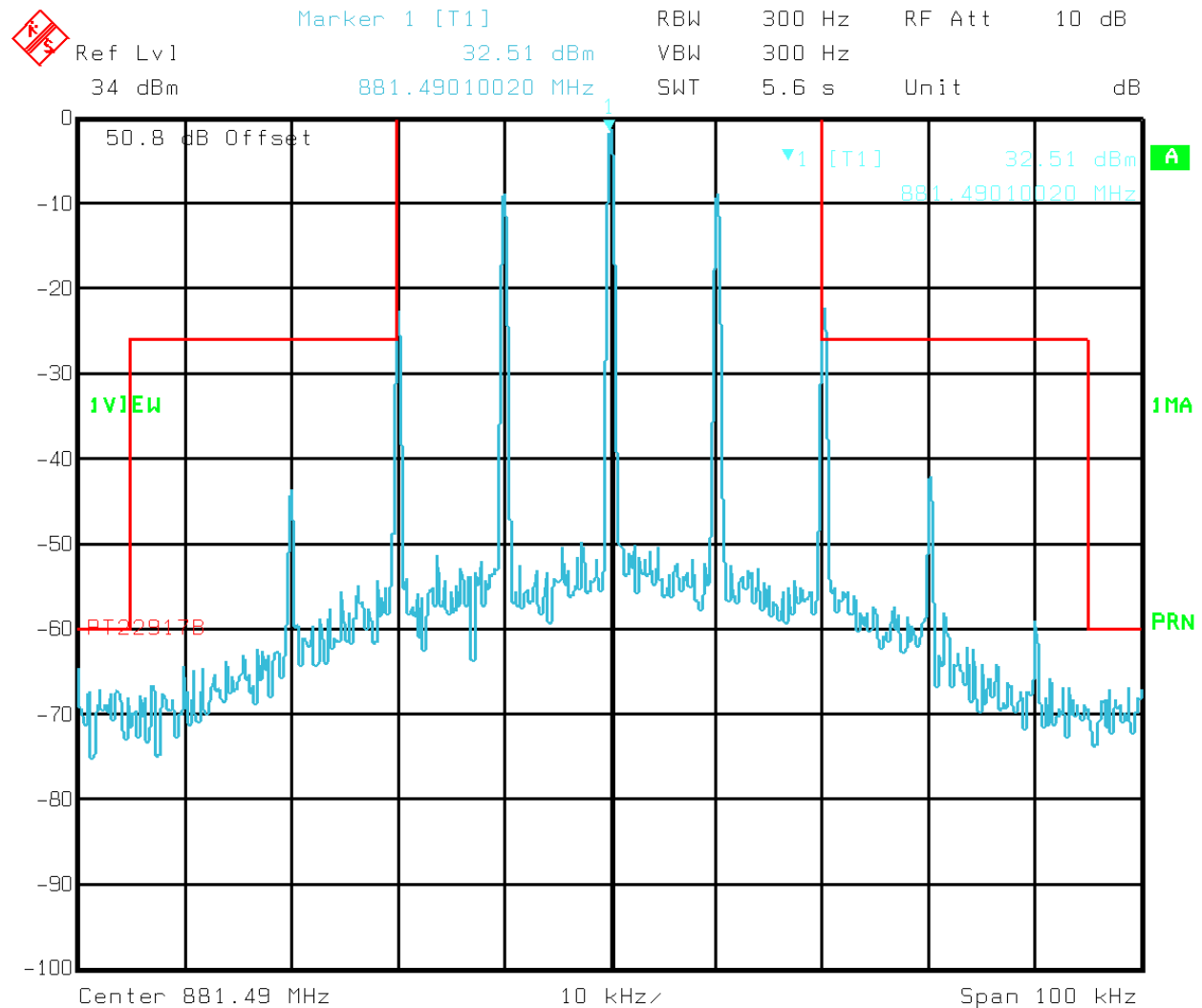
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



Title: Signal Tone Input TDMA Modules 8 Watt Amplifier
Comment A: MOR801B (Channel 383)
Date: 20.SEP.1999 14:02:36

Plot 14

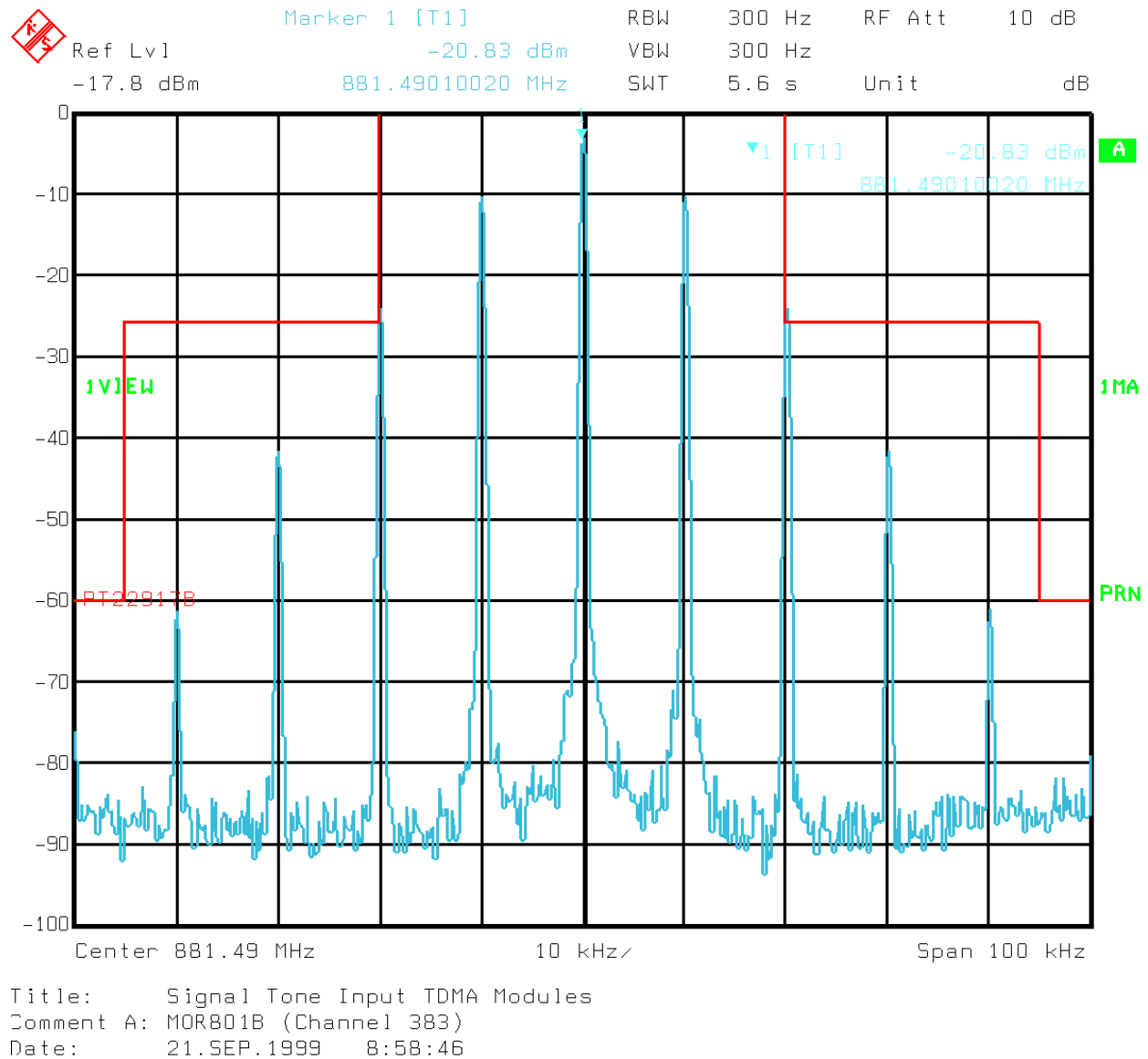
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



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

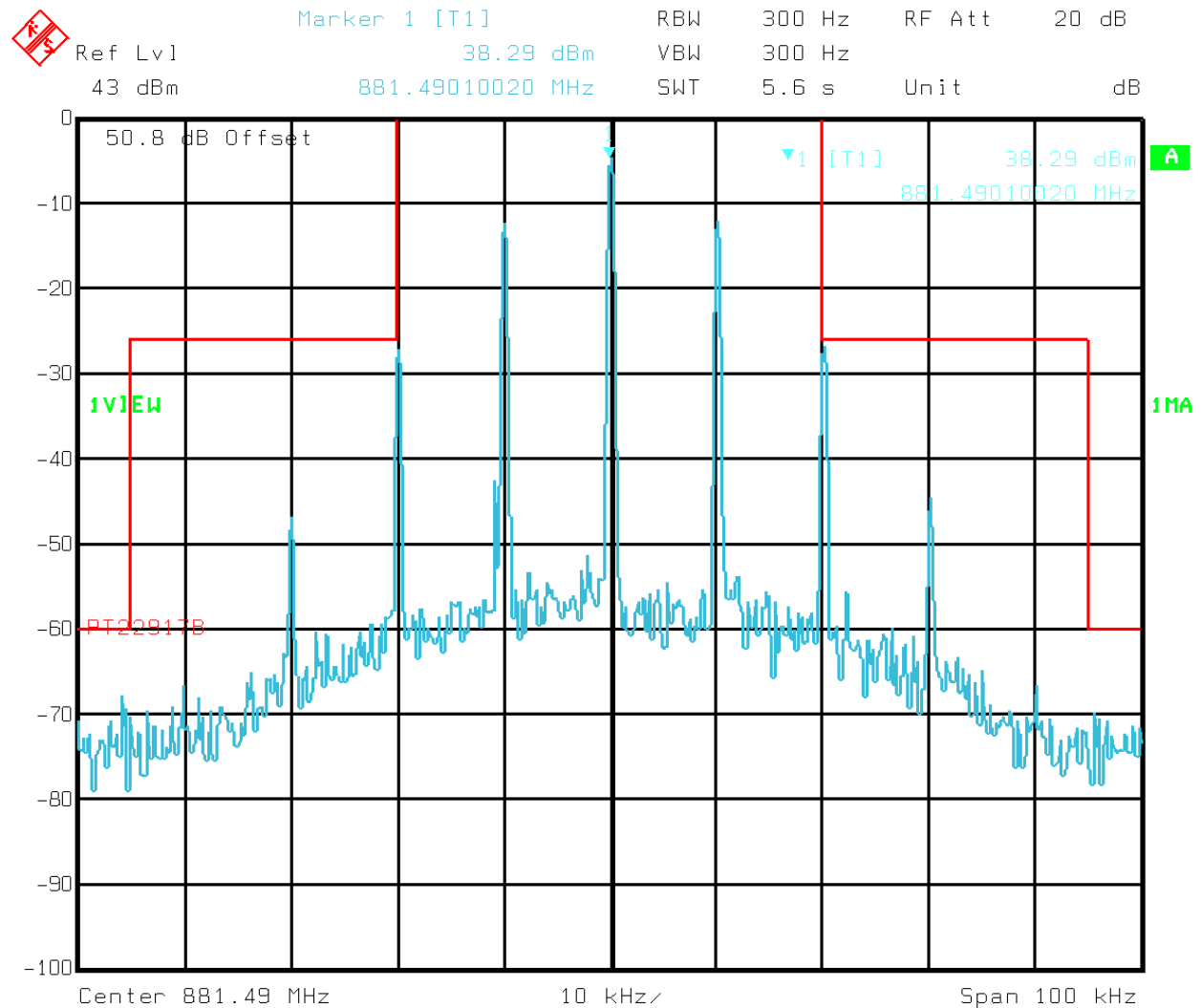
Plot 15

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



Plot 16

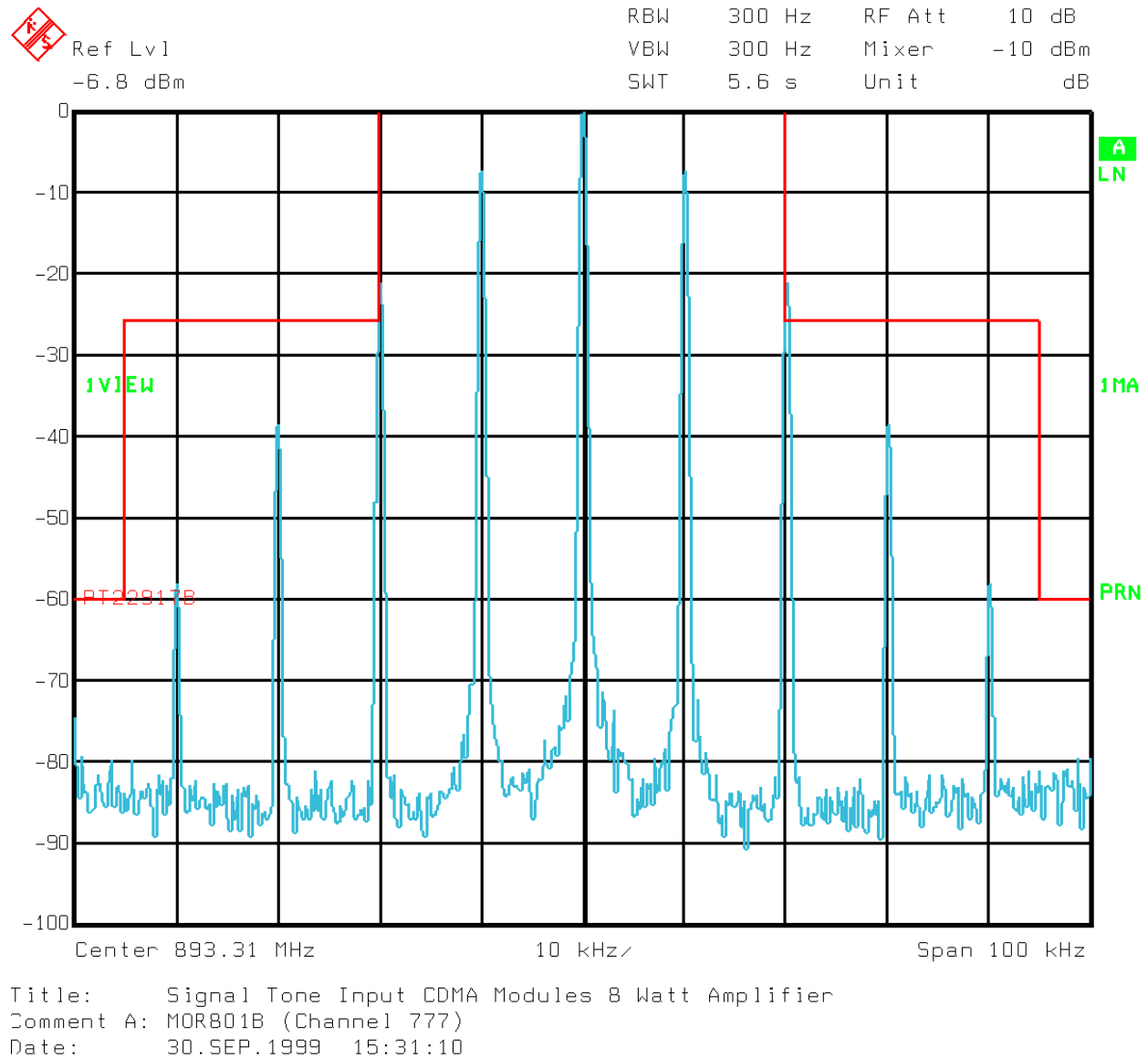
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



Title: Signal Tone TDMA Modules
Comment A: MOR801B (Channel 383)
Date: 21.SEP.1999 8:55:51

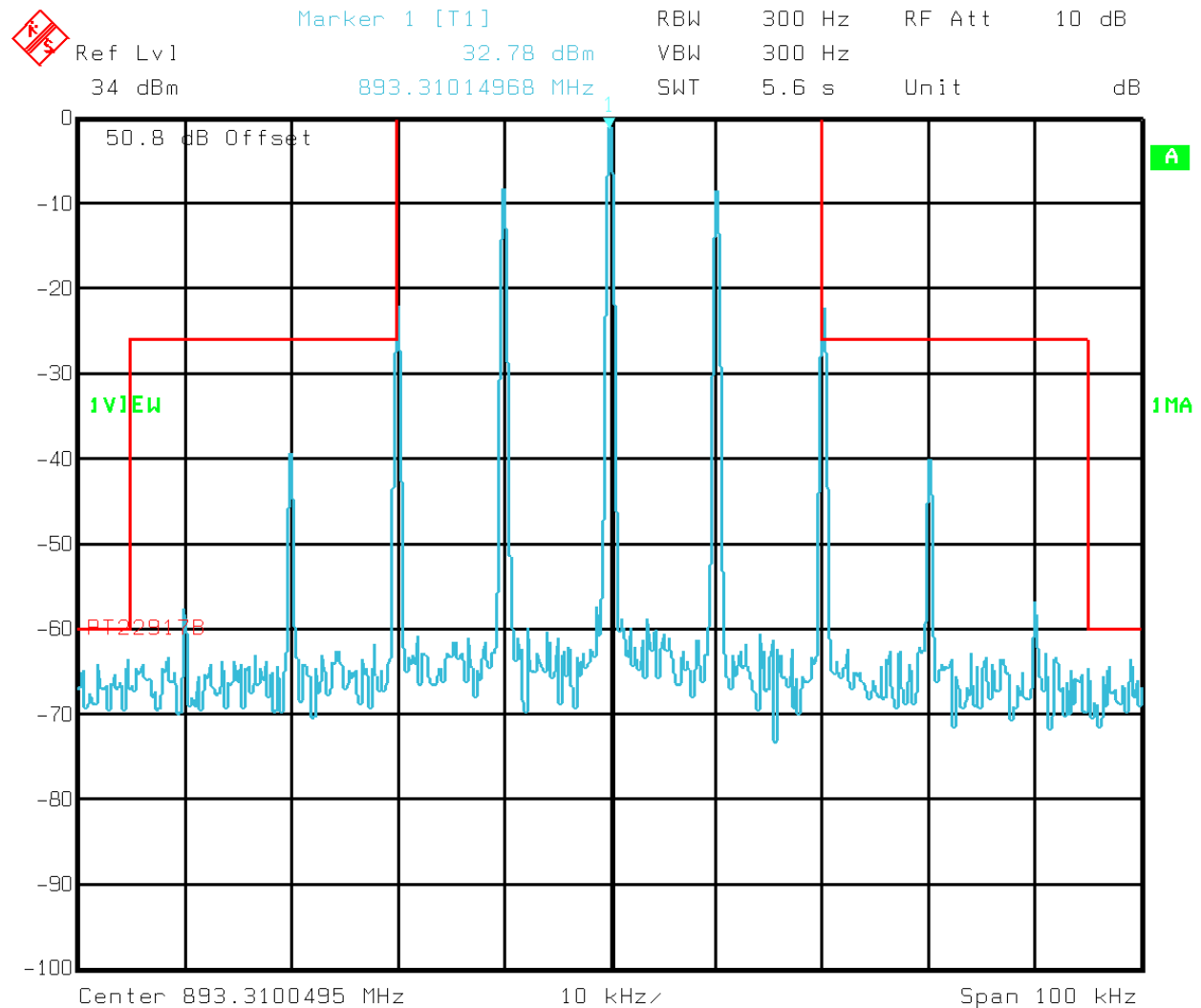
Plot 17

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



Plot 18

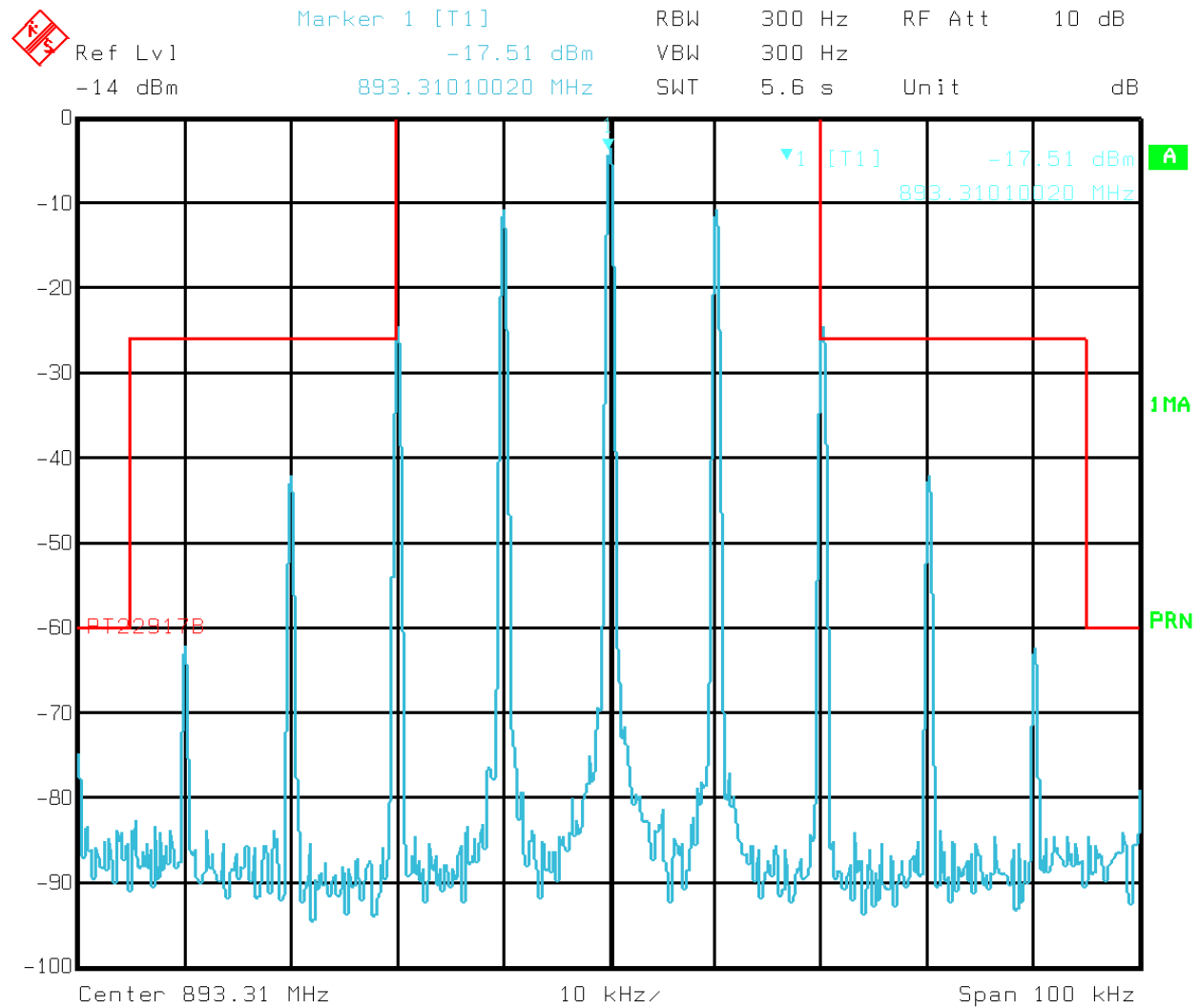
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



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

Plot 19

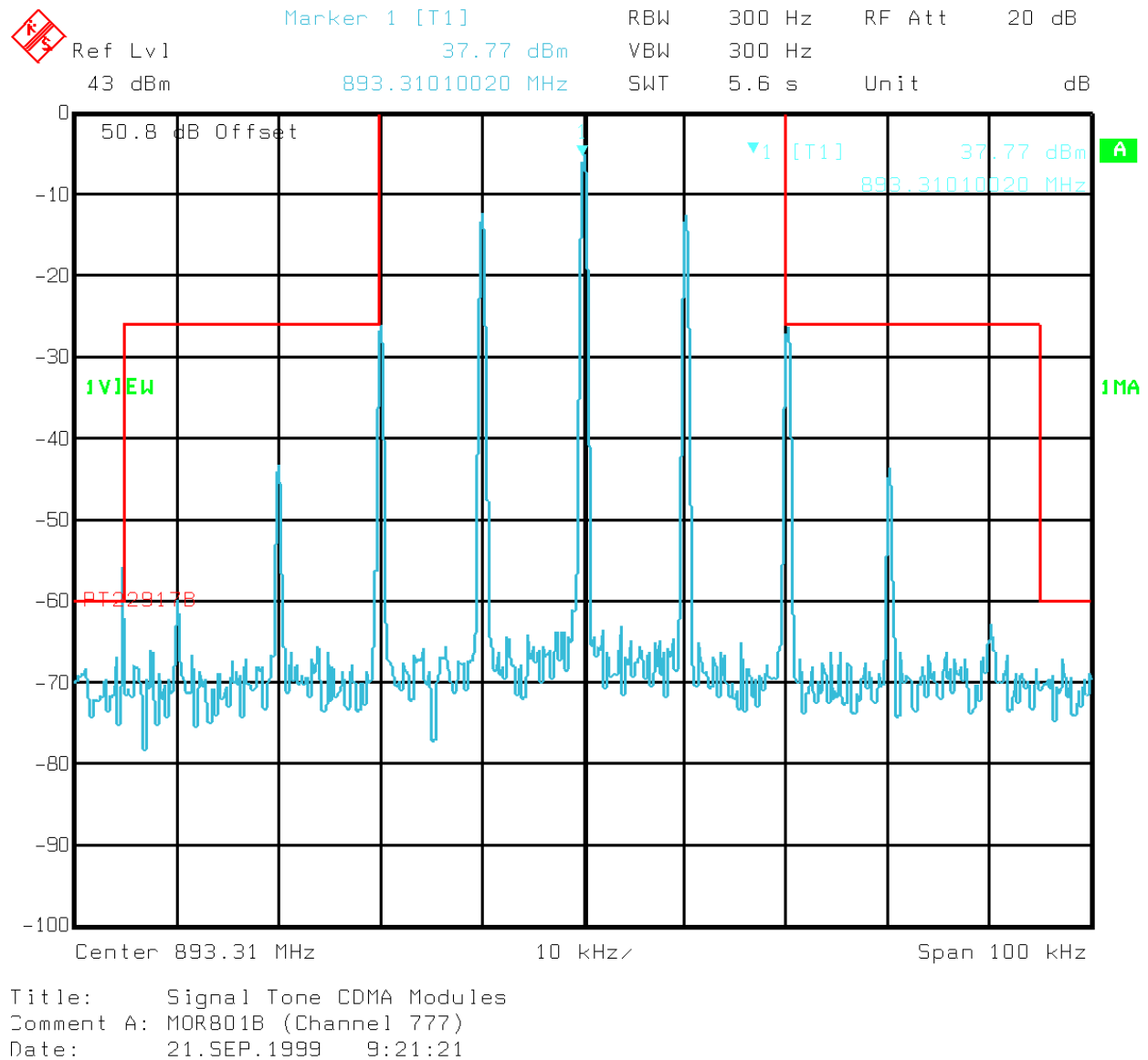
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



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

Plot 20

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



Plot 21

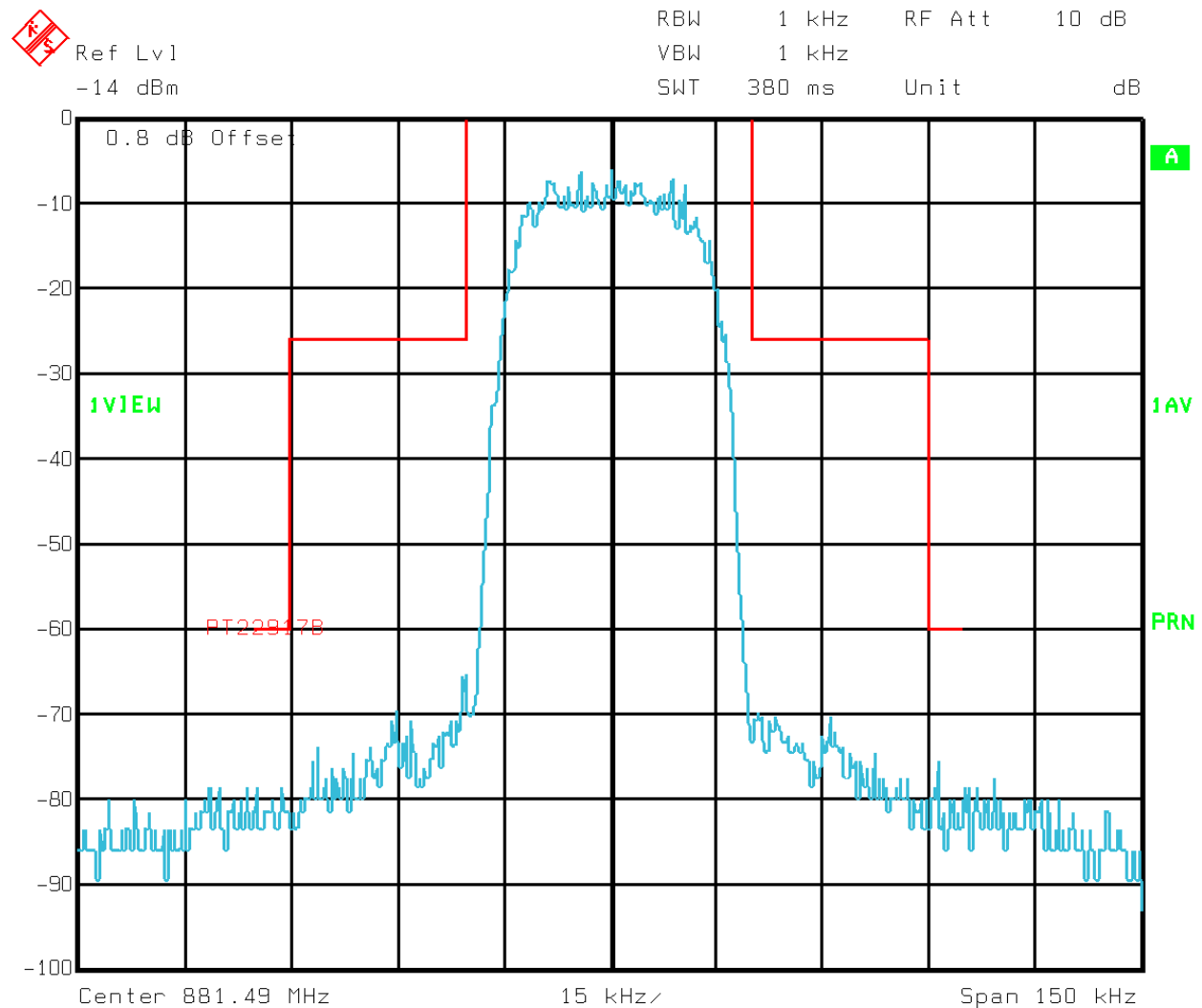
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

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).

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



Title: Occupied Bandwidth Input TDMA 8 Watt Amplifier ID#148698
Comment A: MOR801B
Date: 14.SEP.1999 13:39:29

Plot 22

Ref Lvl 36 dBm
RBW 1 kHz
VBW 1 kHz
SWT 380 ms
RF Att 10 dB
Unit dB

Marker 1 [T1]
-17.29 dBm
881.44380762 MHz

50.8 dB Offset

1V1EW

D1 -13 dBm

T22917B

1V1AV

PRN

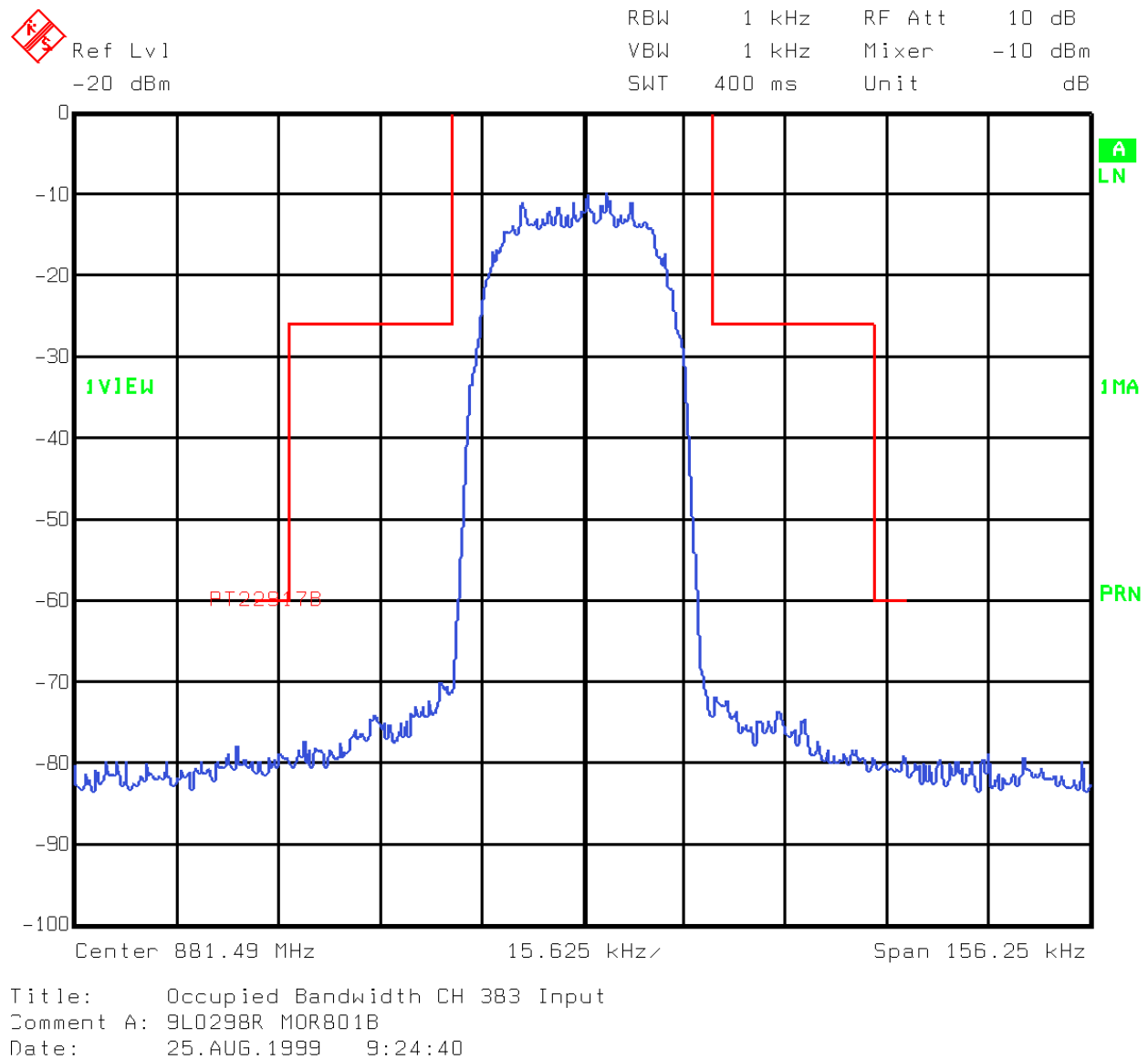
Center 881.49 MHz
15 kHz
Span 150 kHz

Title: Occupied Bandwidth TDMA 8 Watt Amplifier ID#148698
Comment A: MOR801B
Date: 14.SEP.1999 13:28:49

The figure is a spectrum plot showing the occupied bandwidth of a TDMA 8 Watt amplifier. The x-axis represents frequency, with a center frequency of 881.49 MHz and a span of 150 kHz. The y-axis represents power in dB, ranging from -100 to 0. A blue line plot shows the signal spectrum, which has a peak power of -17.29 dBm at 881.44380762 MHz. A red line plot shows the noise floor, with a level of -13 dBm. A green line plot shows the reference level, with a level of 36 dBm. The plot includes a grid and various markers and labels.

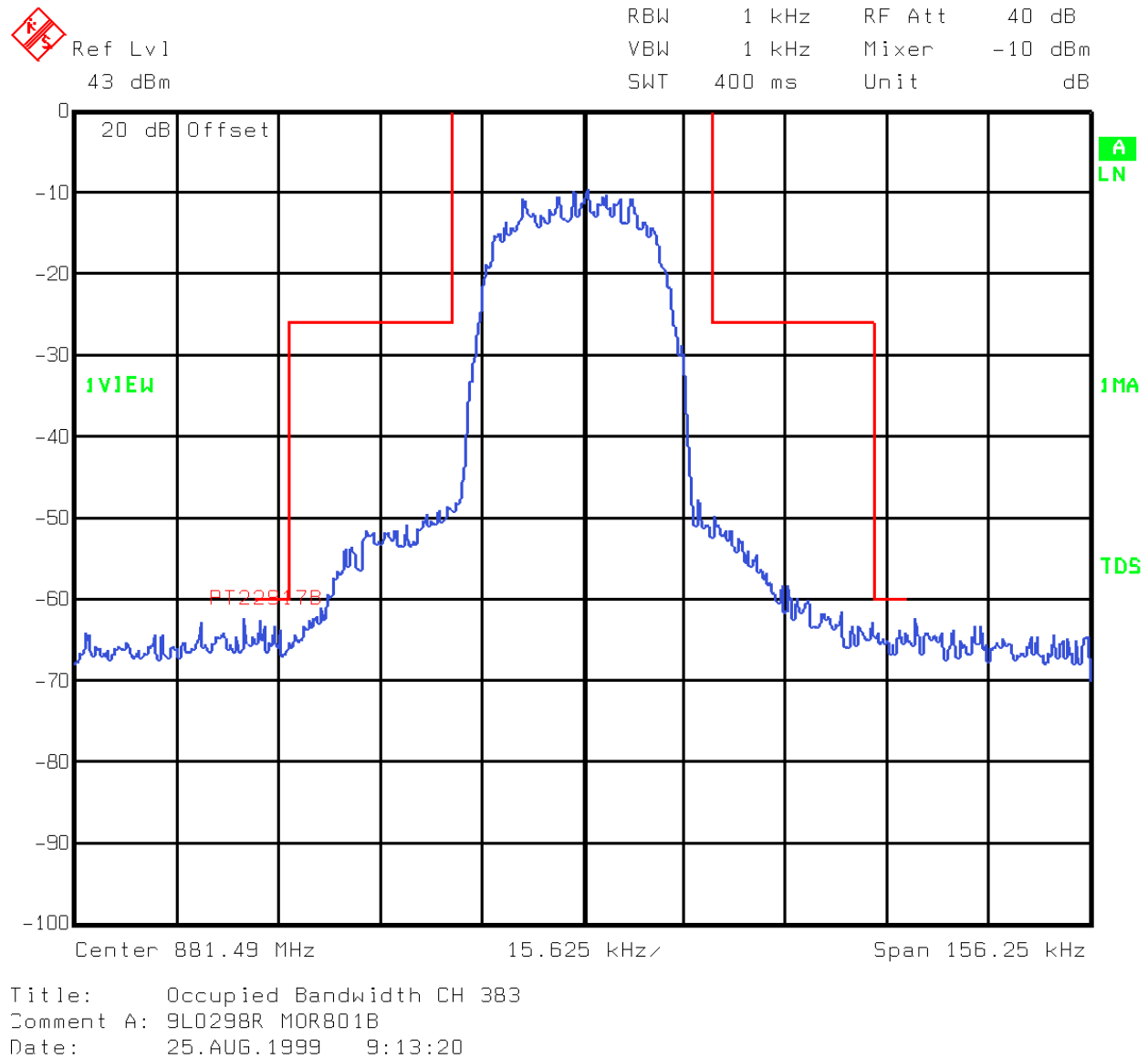
Plot 23

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



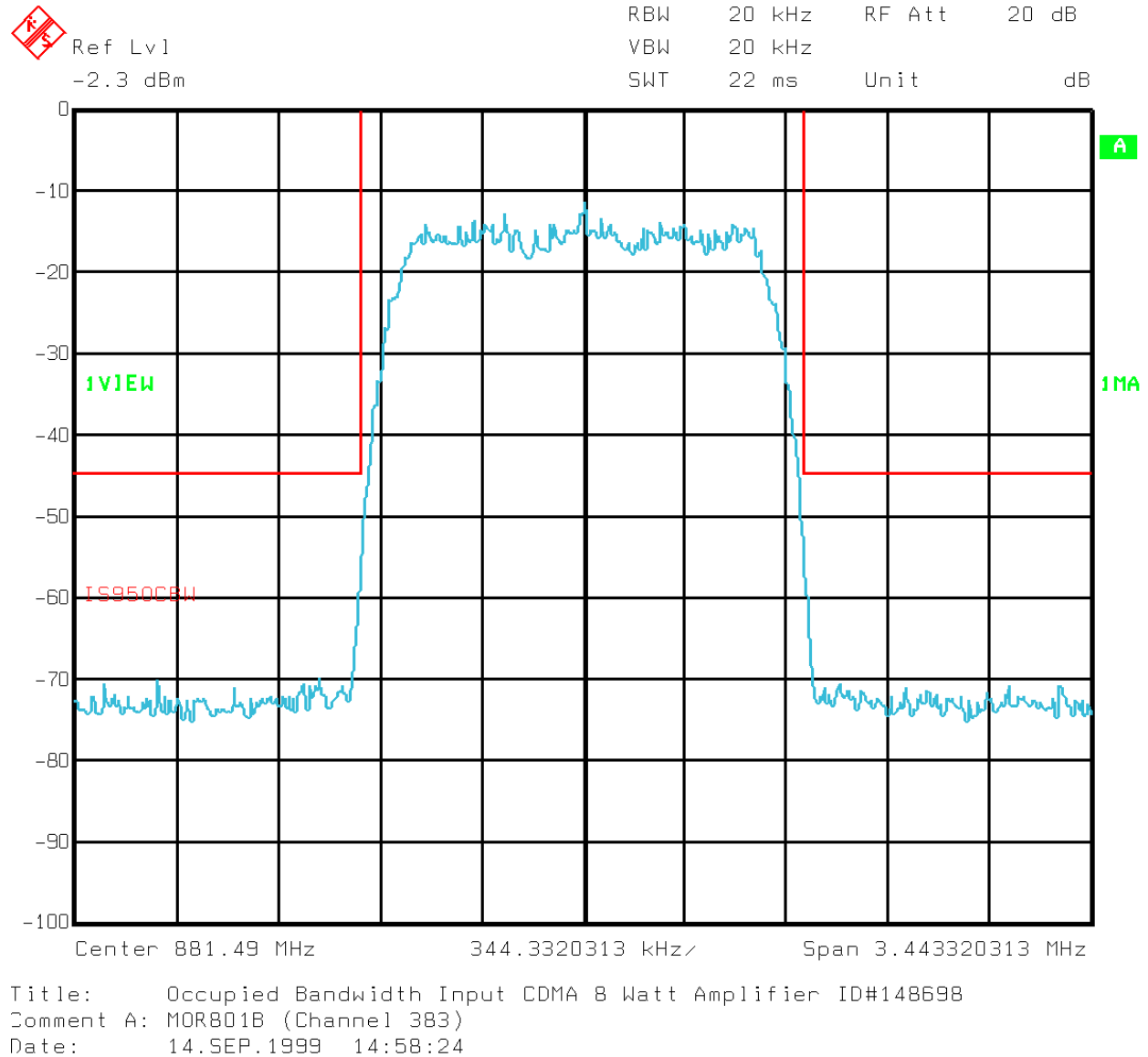
Plot 24

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



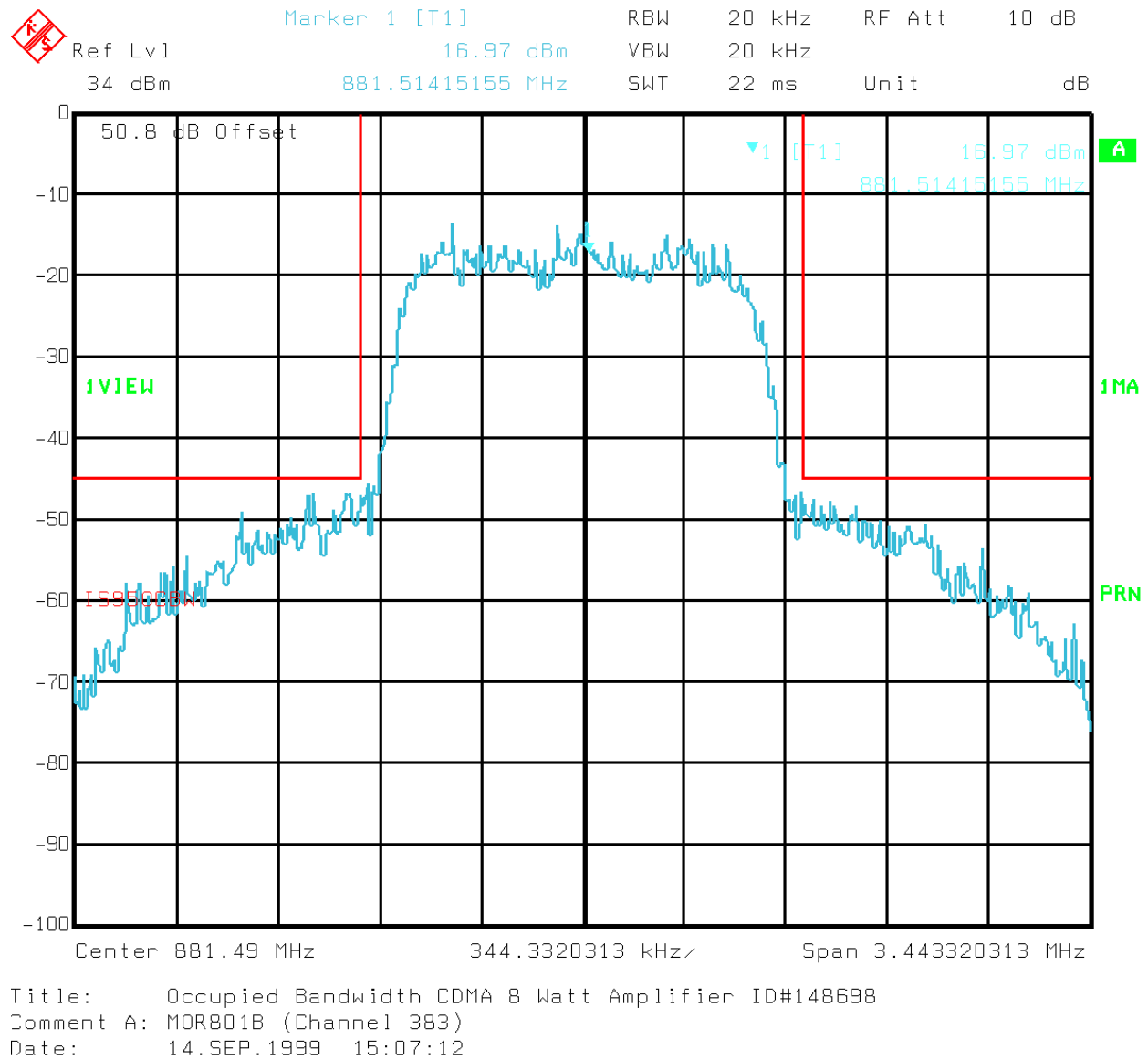
Plot 25

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



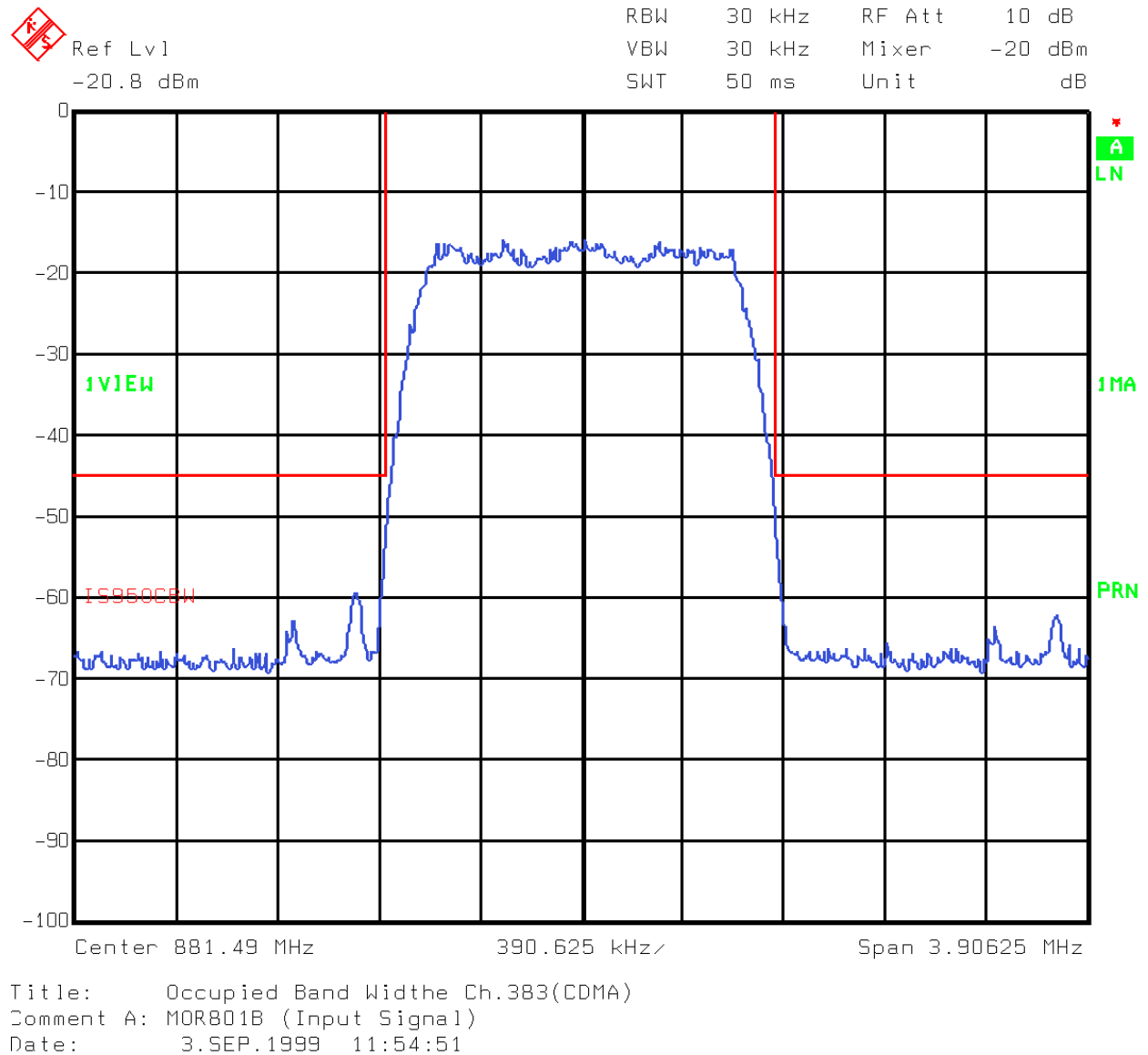
Plot 26

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



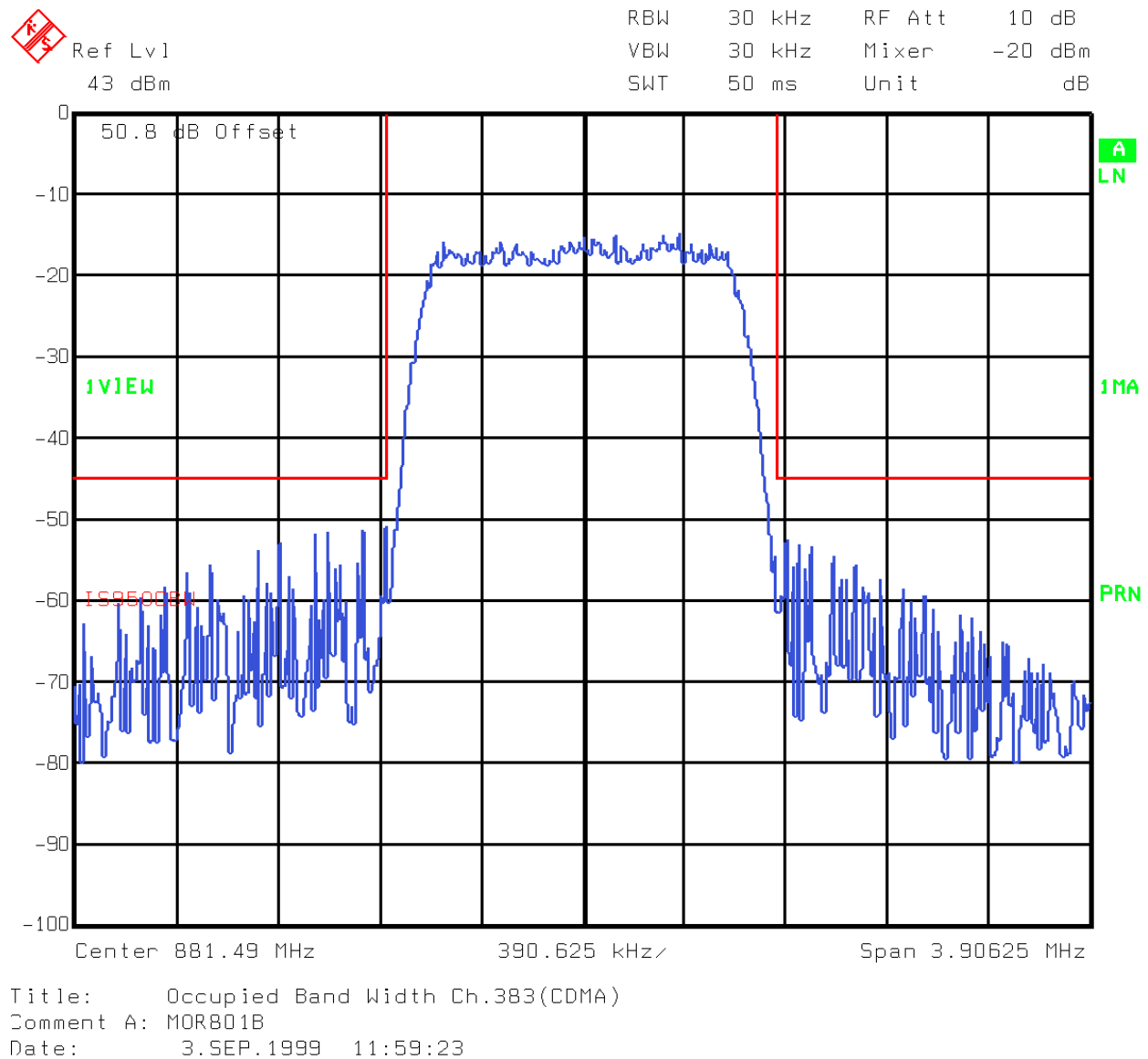
Plot 27

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



Plot 28

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



Plot 29

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

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

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

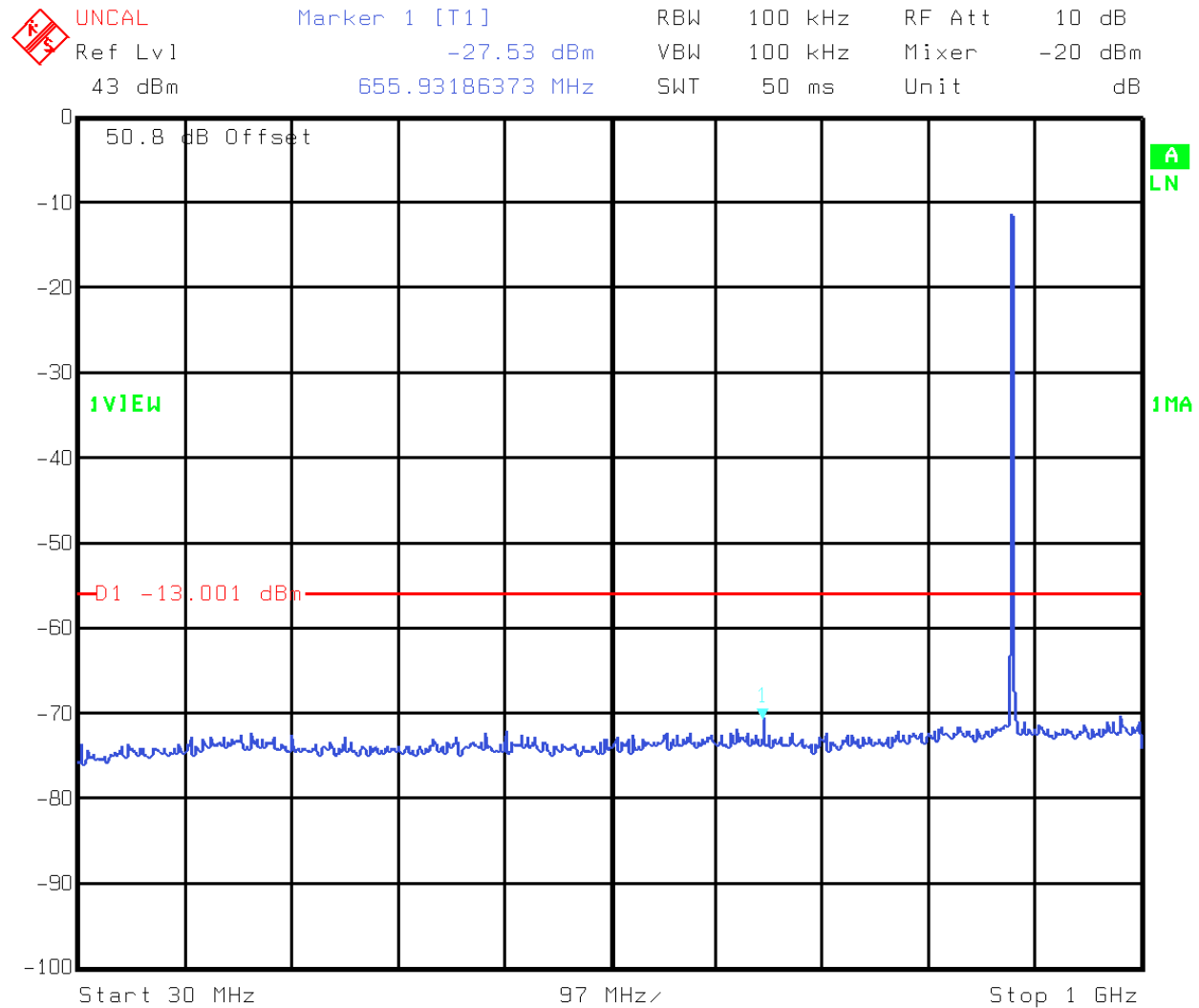
Test Data - (Continued)**8 Watt Amplifier ID# 148698 CDMA Module**

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

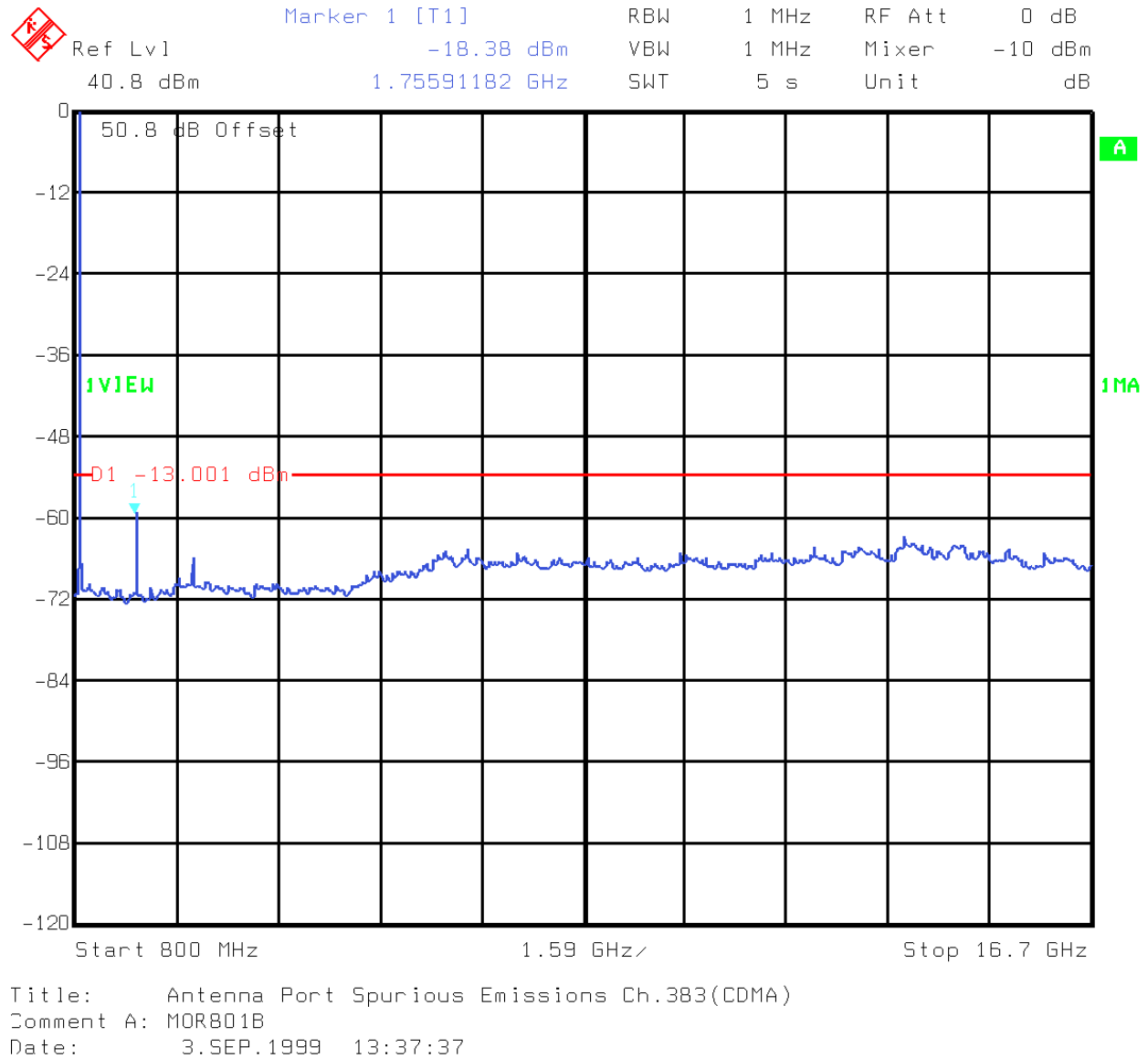
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



Title: Antenna Port Spurious Emissions Ch.383(CDMA)
Comment A: MOR801B
Date: 3.SEP.1999 13:18:17

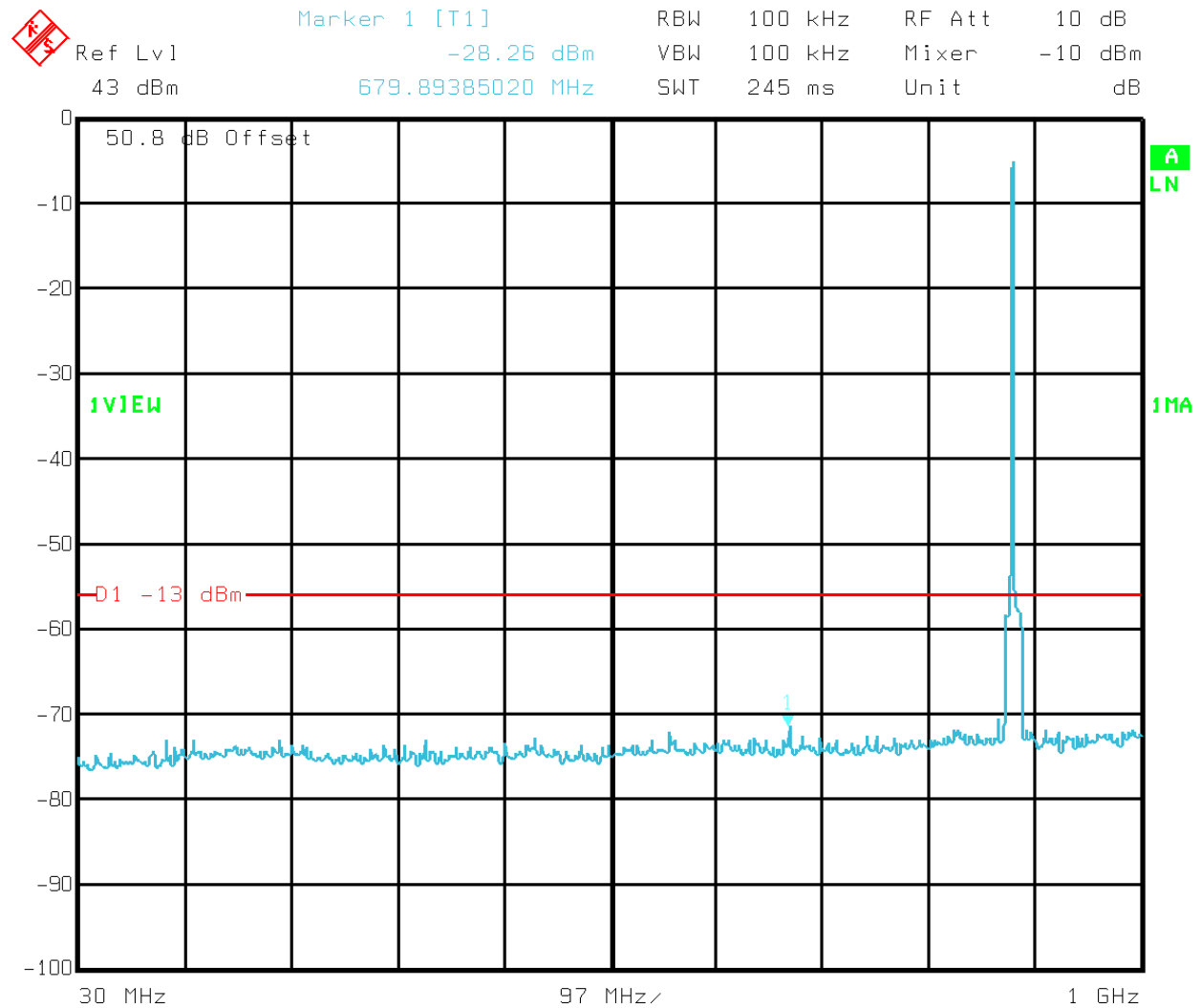
Plot 30

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



Plot 31

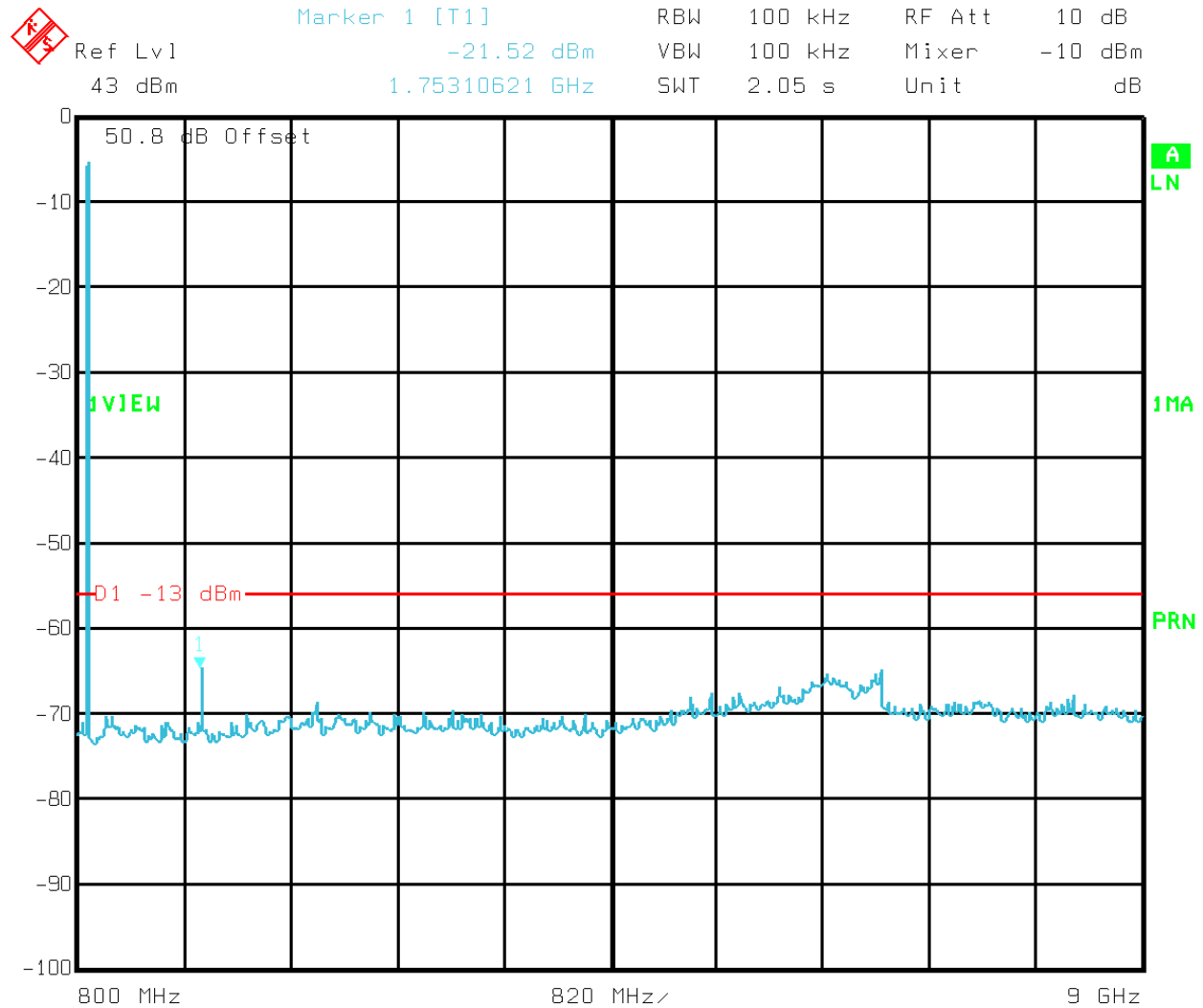
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



Title: Spurious Emissions CDMA/Variable Bandwidth Modules
Comment A: MOR801B
Date: 23.SEP.1999 10:05:14

Plot 32

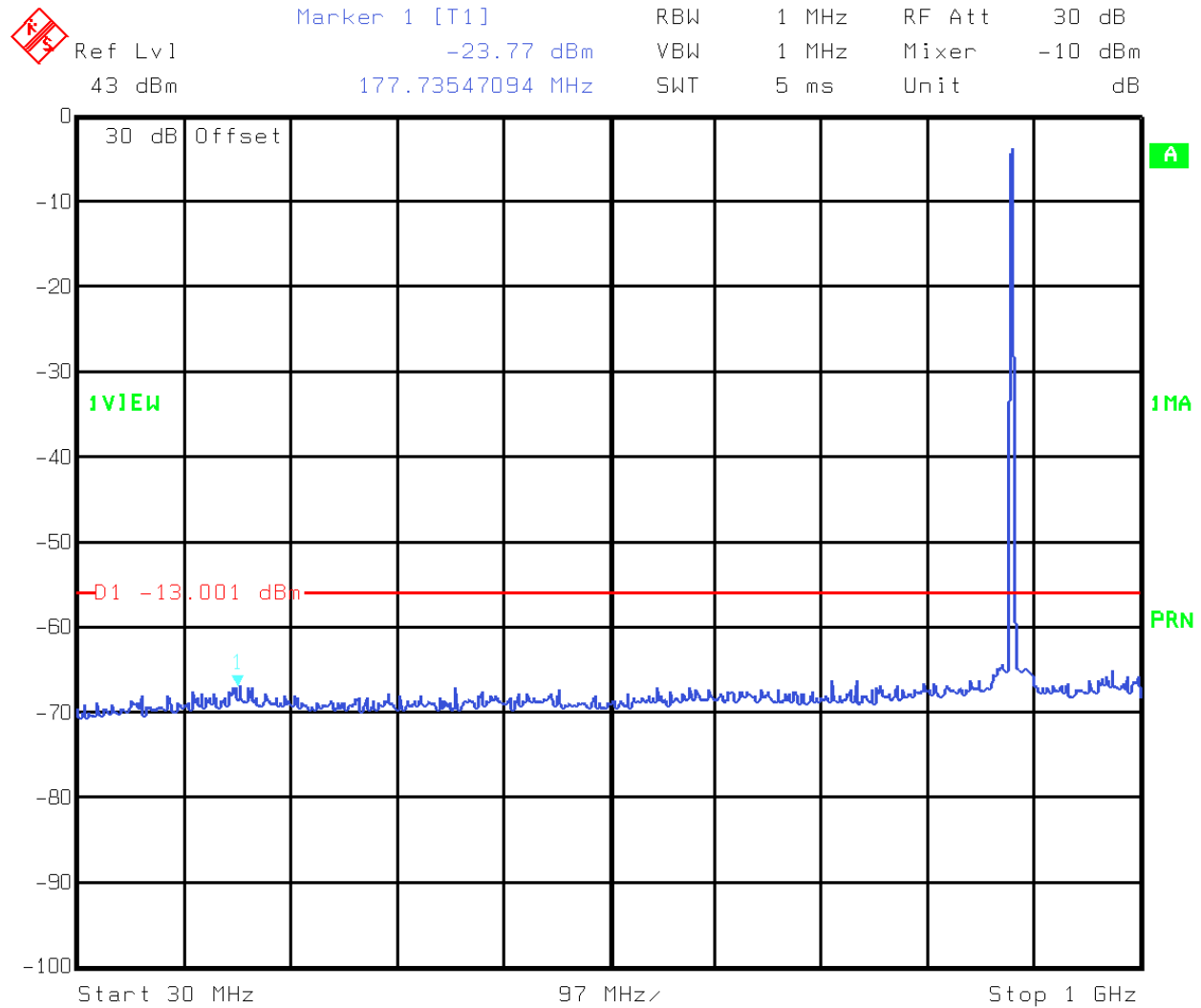
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



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

Plot 33

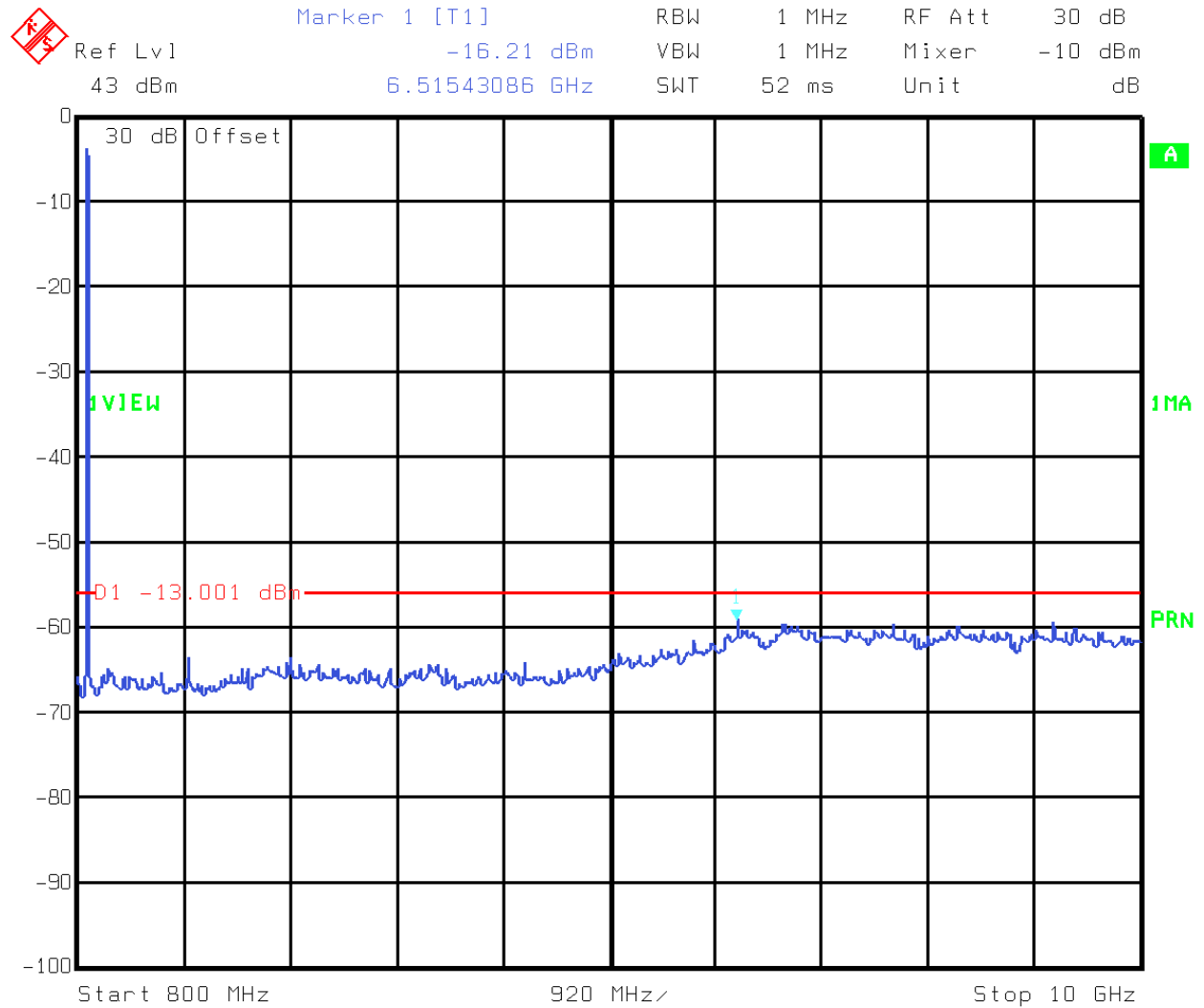
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



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

Plot 34

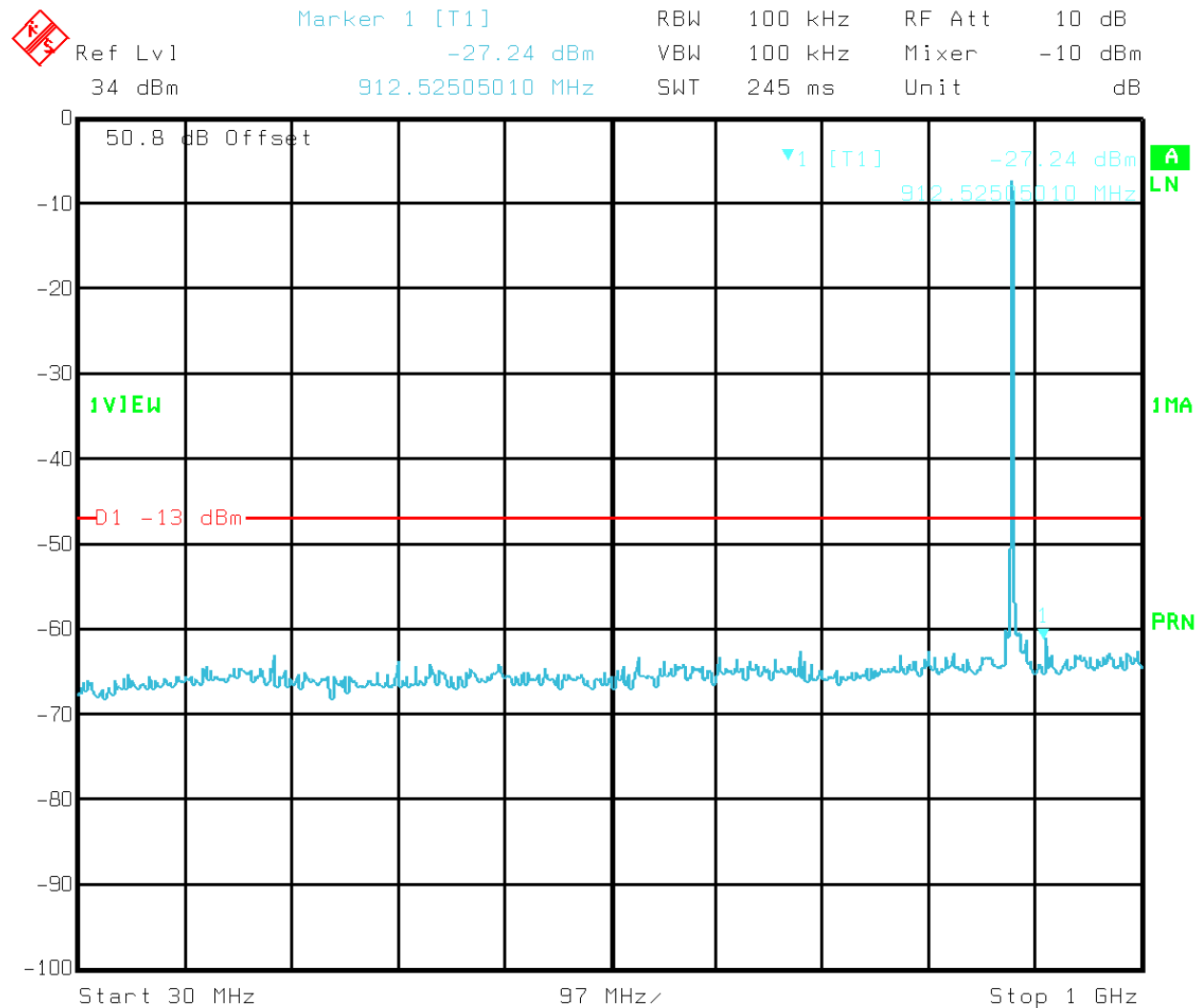
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



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

Plot 35

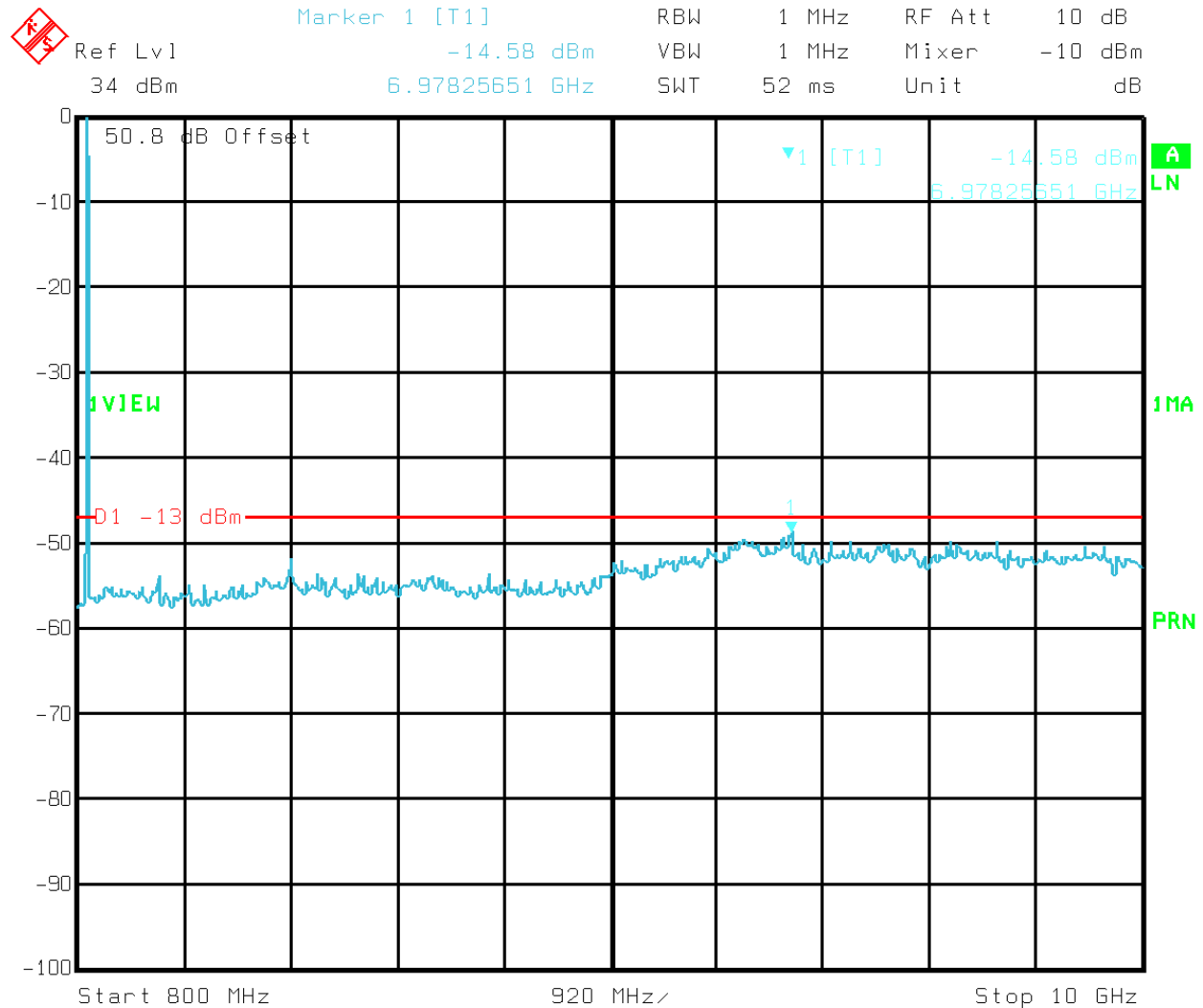
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



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

Plot 36

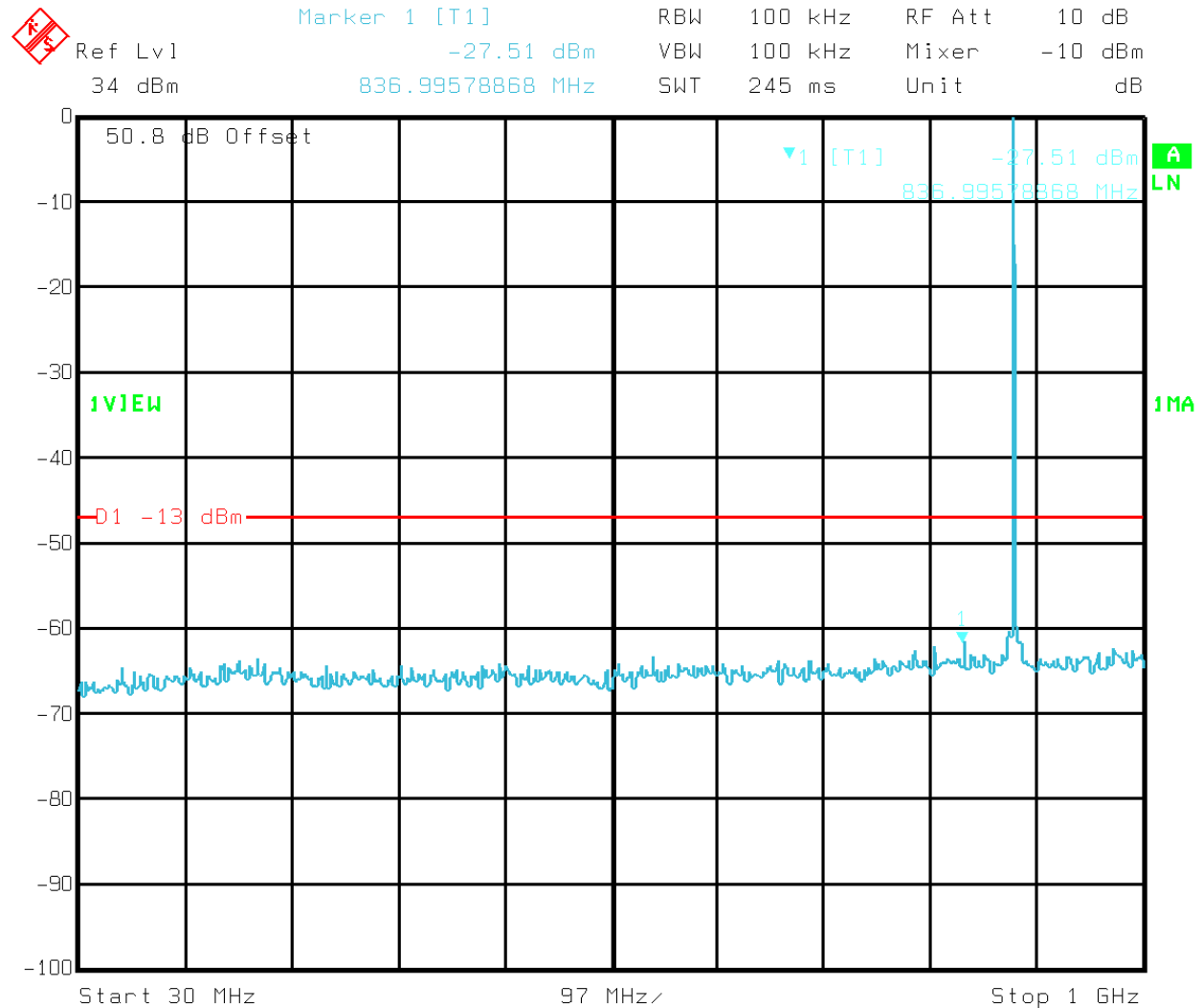
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



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

Plot 37

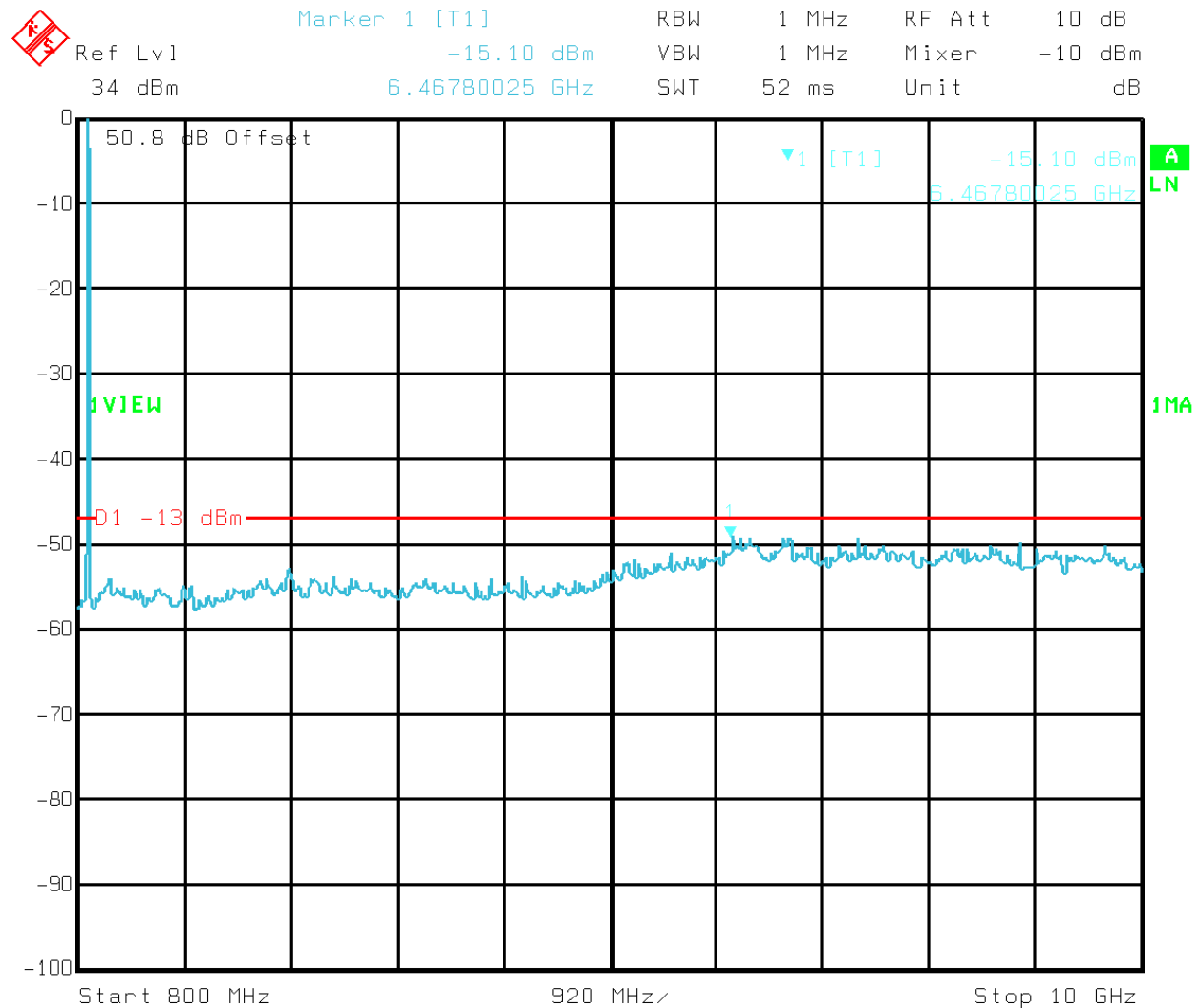
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



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

Plot 38

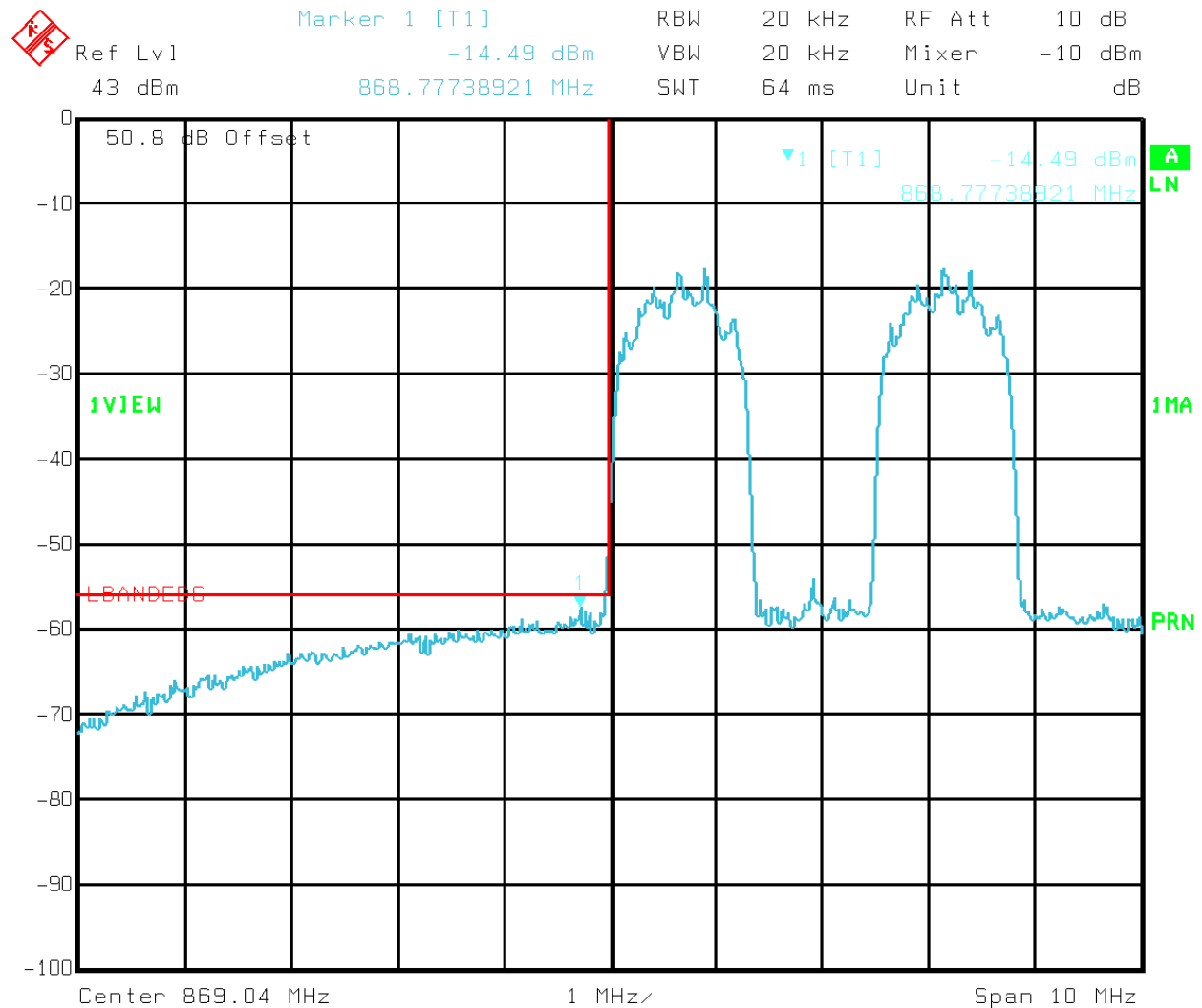
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



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

Plot 39

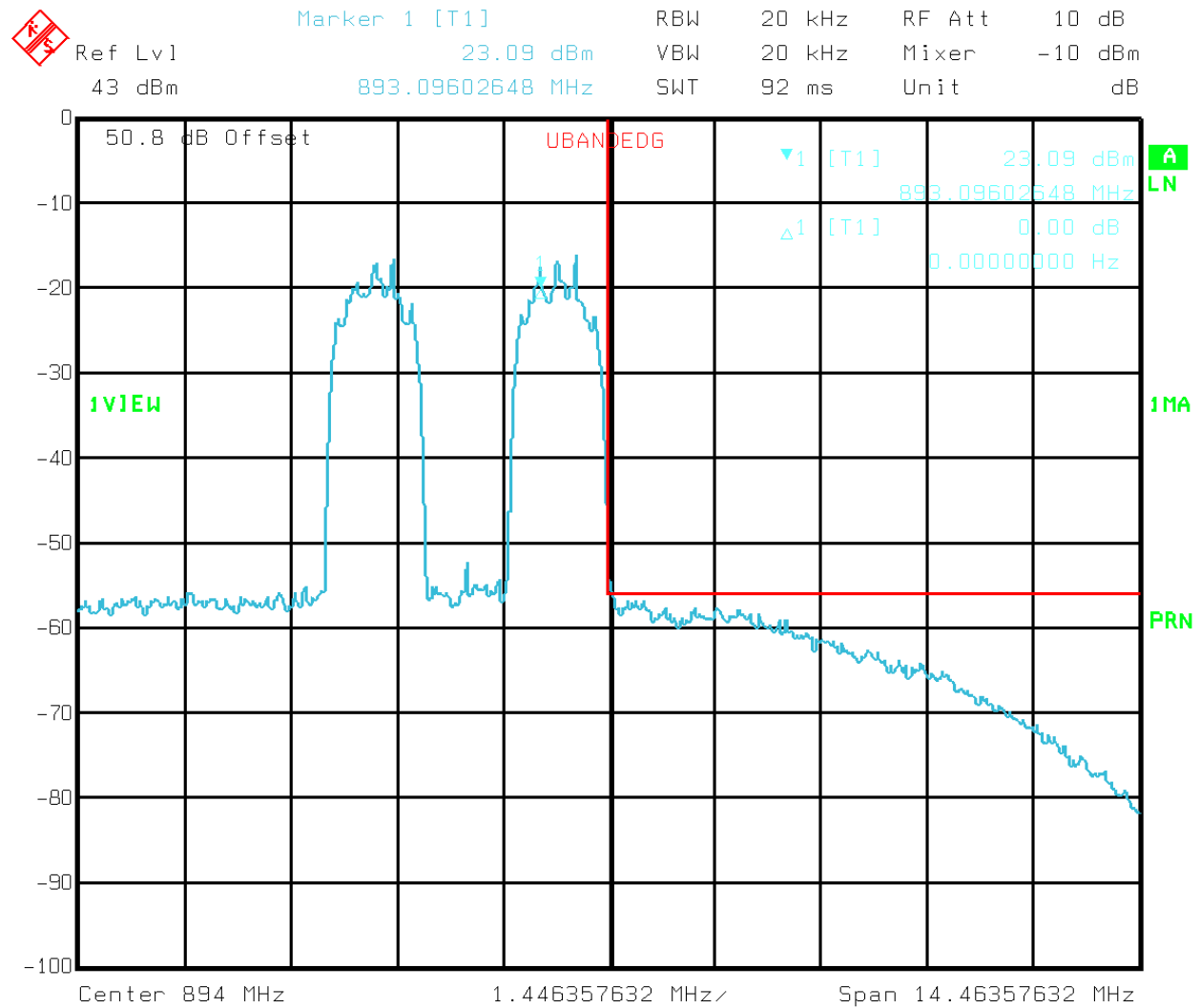
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



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

Plot 40

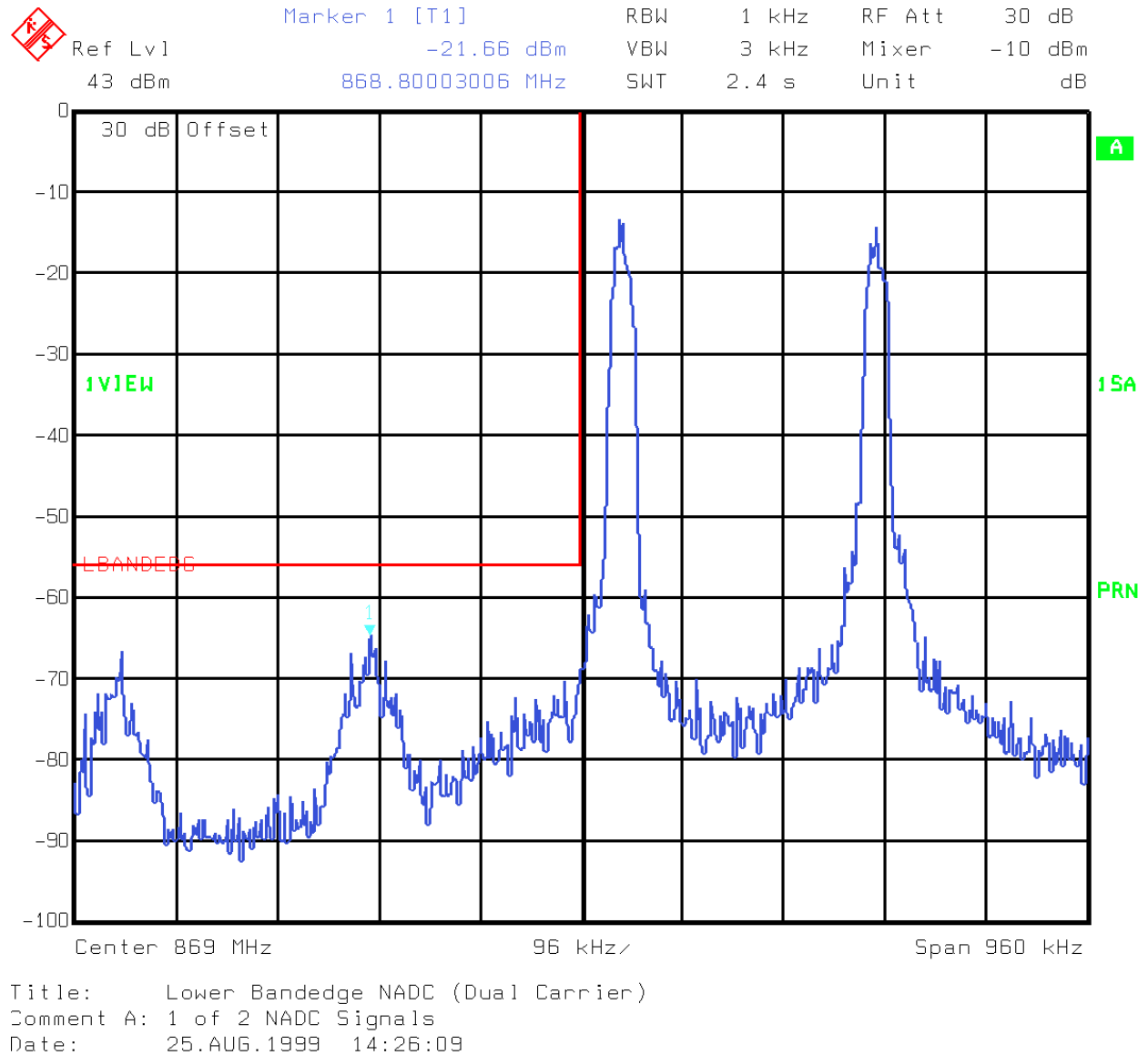
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



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

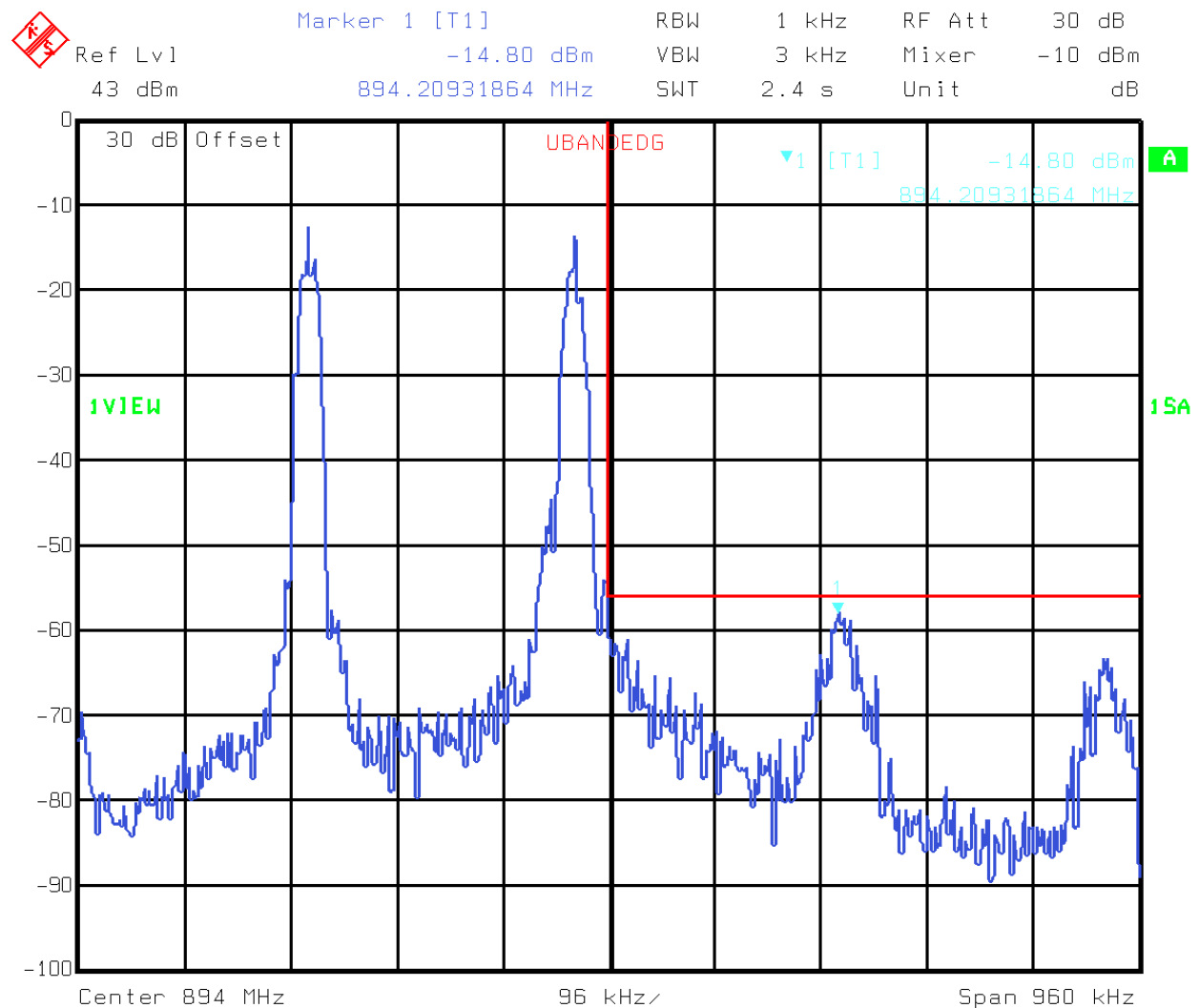
Plot 41

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



Plot 42

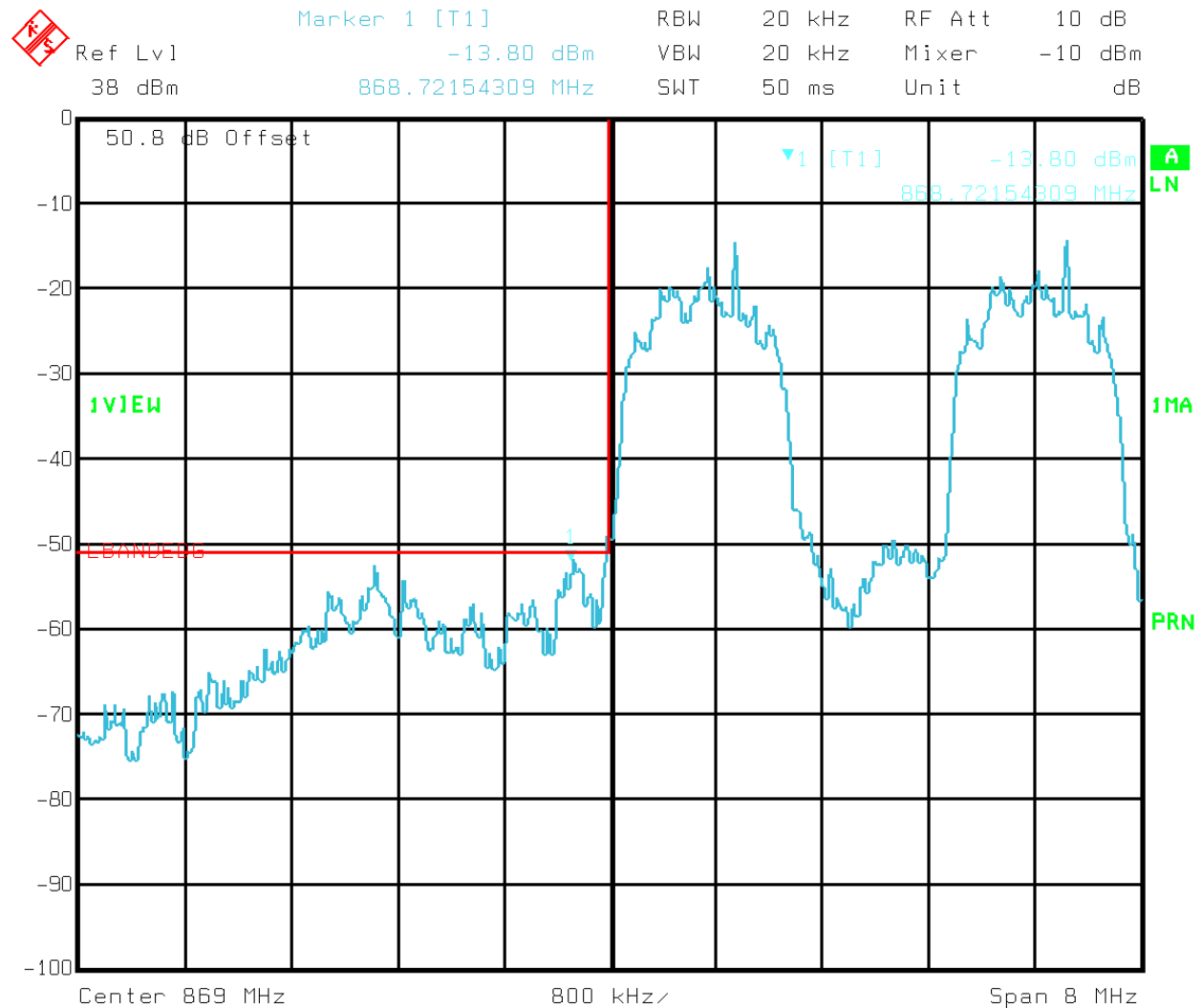
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



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

Plot 43

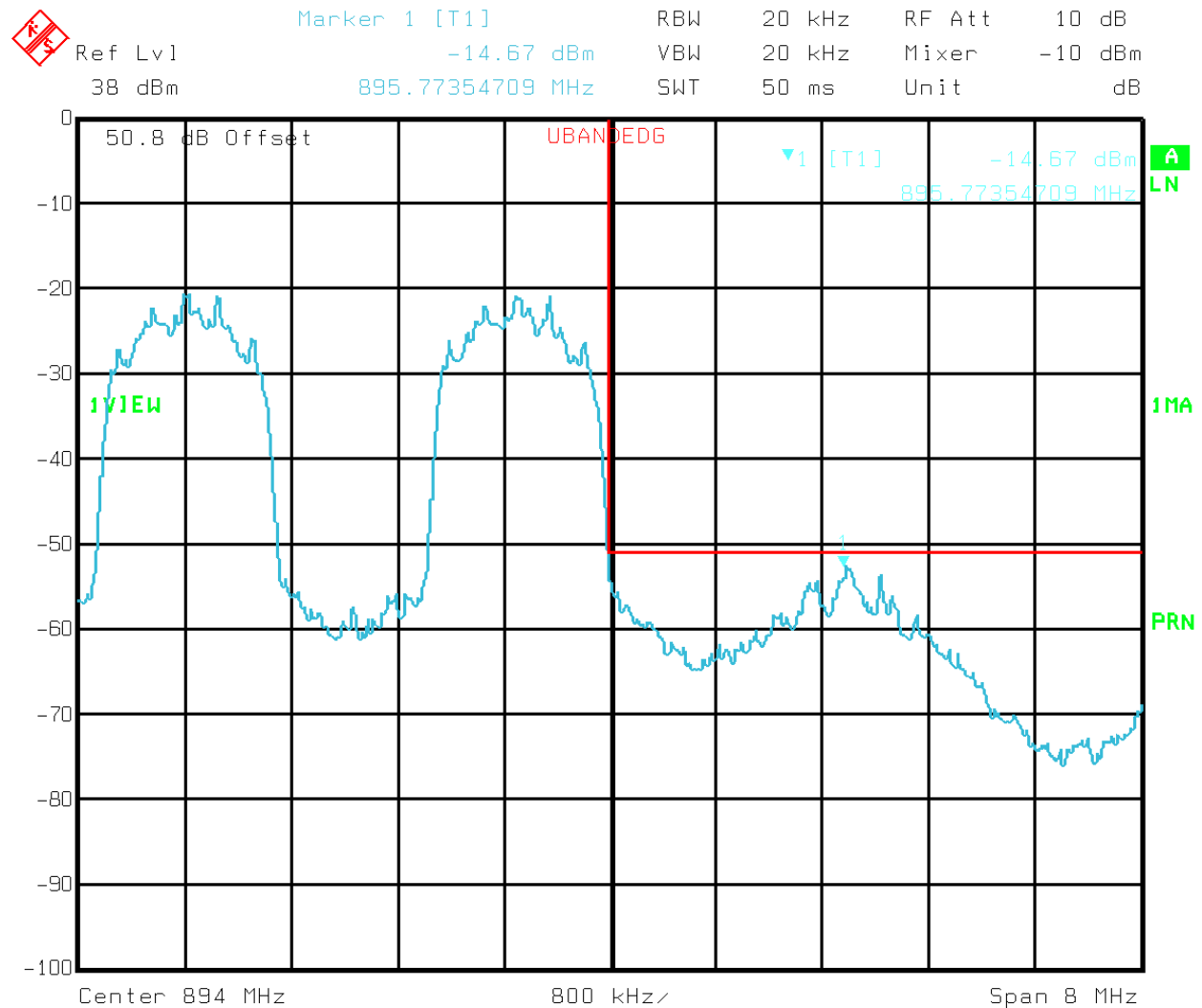
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



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

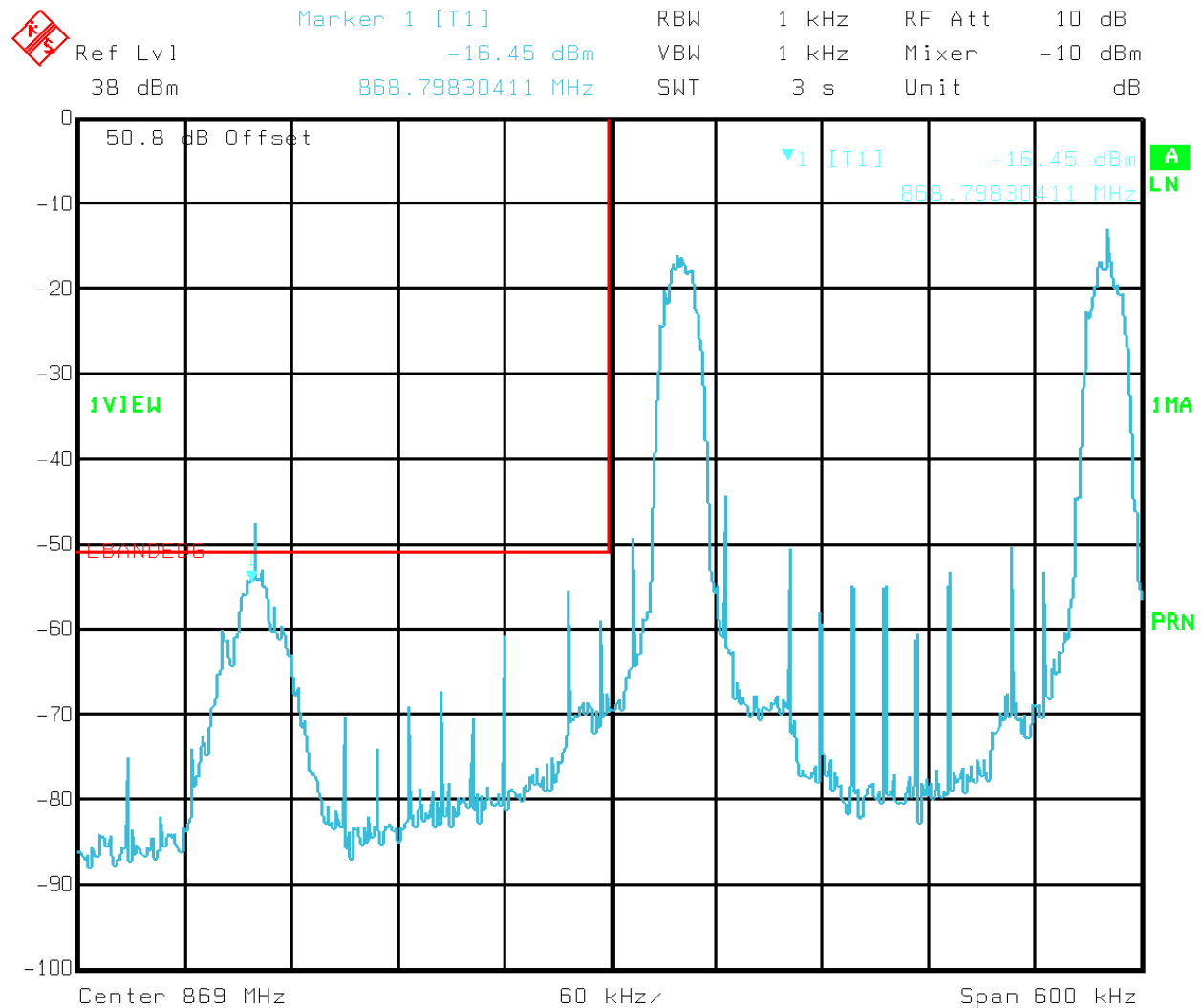
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



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

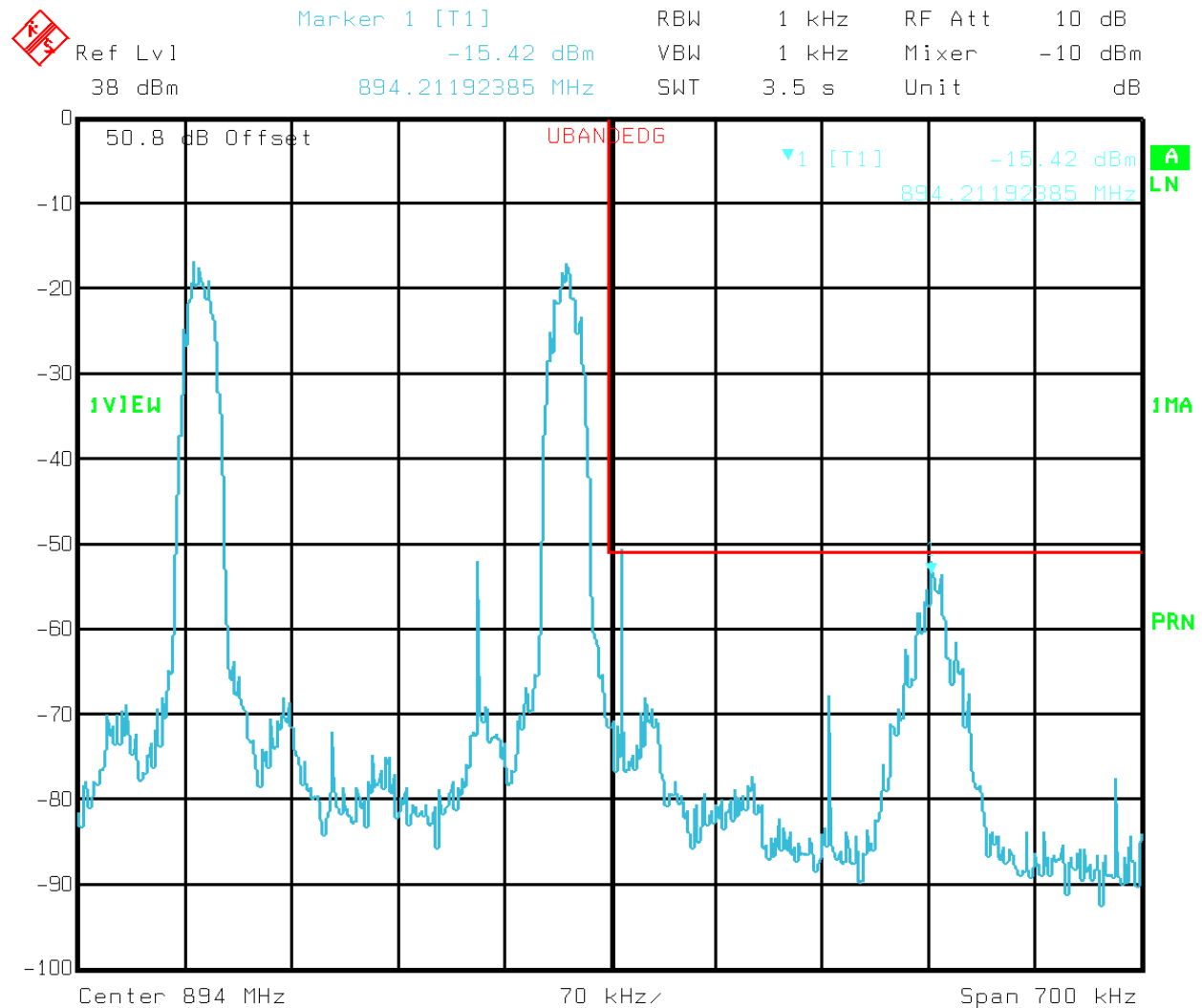
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



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

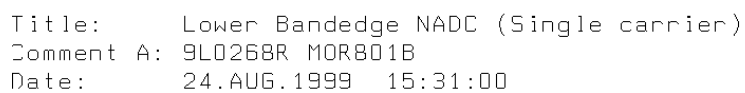
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



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

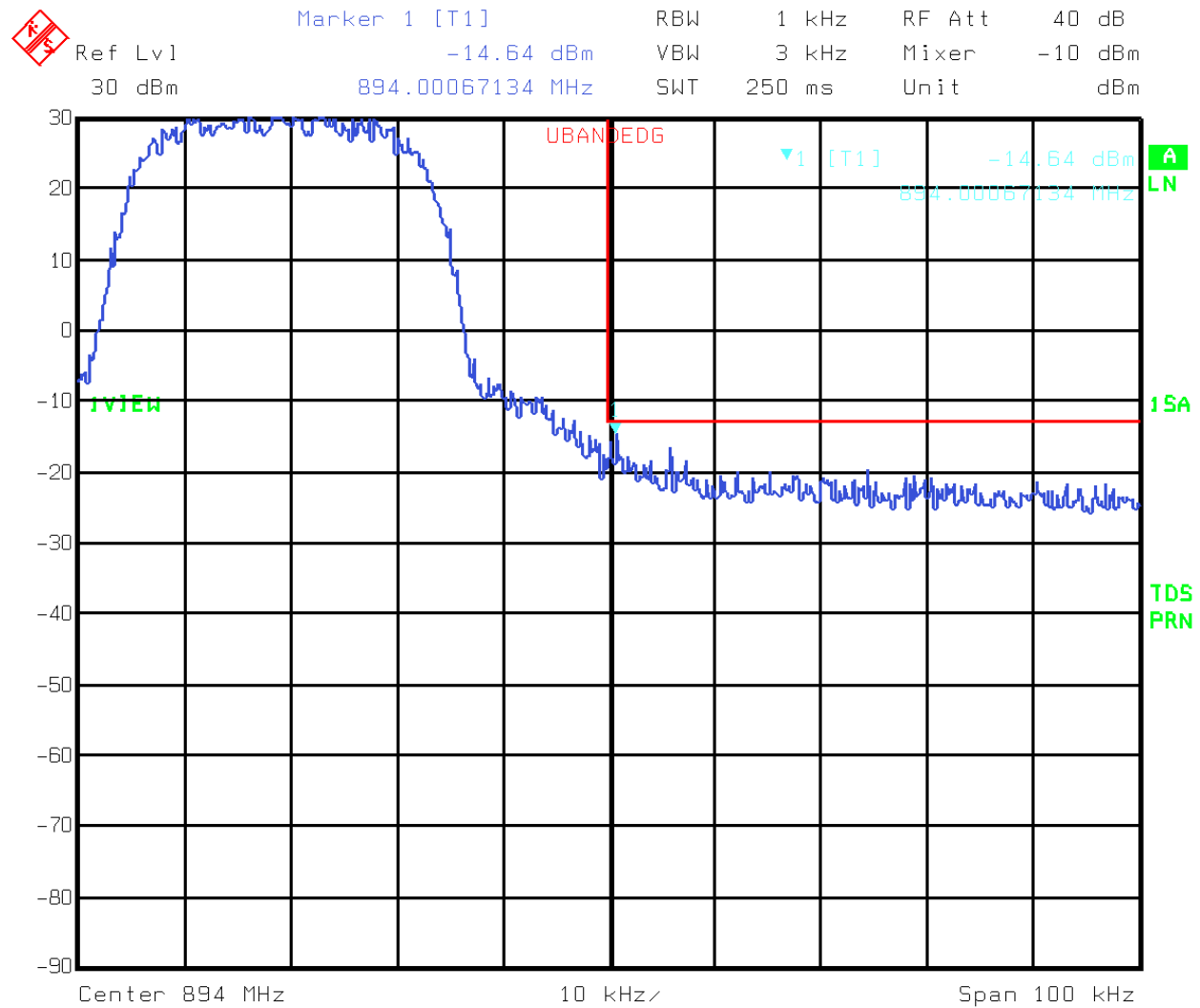
Plot 47

FCC ID: BCR-RPT-MOR801



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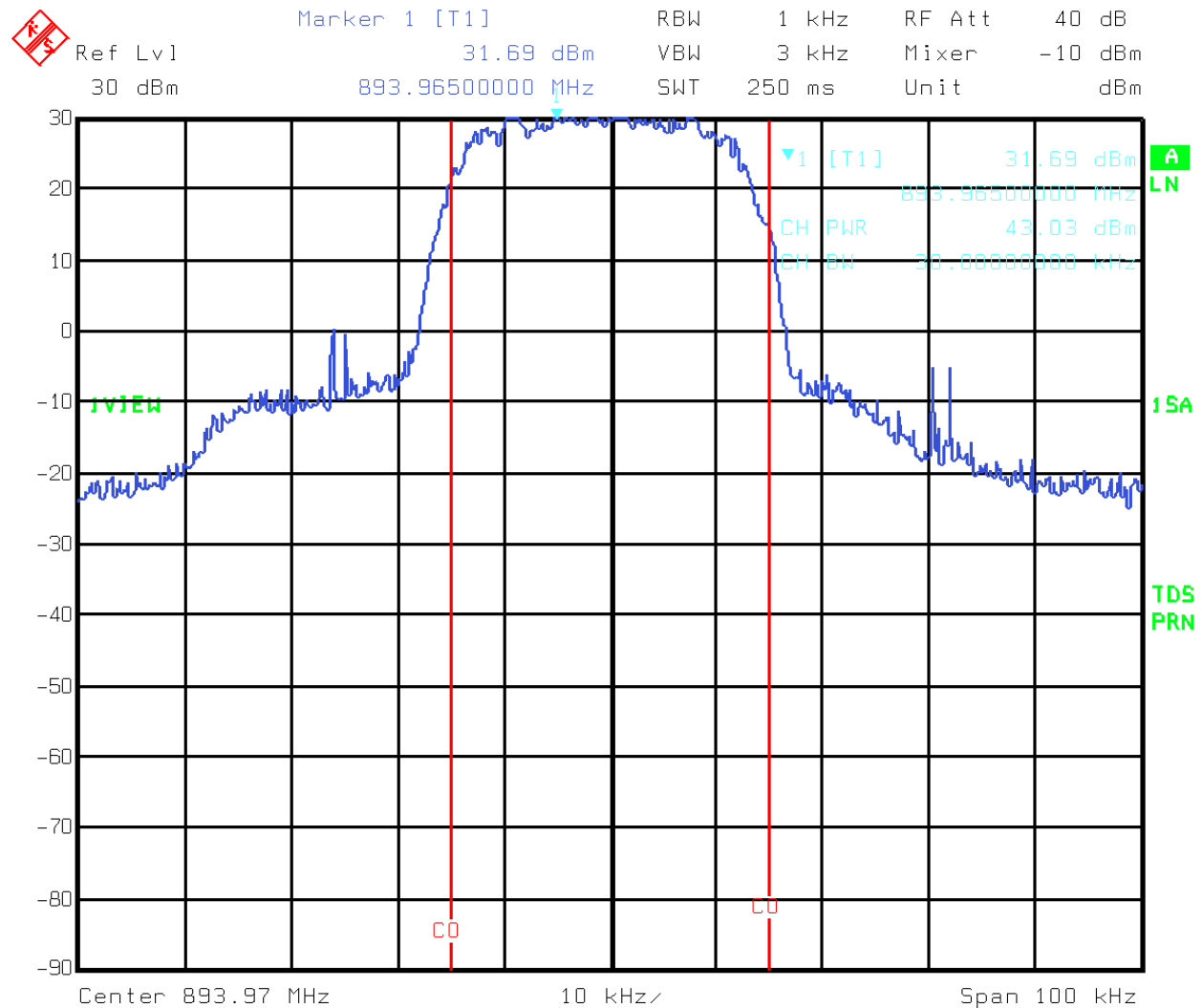
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



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

Plot 49

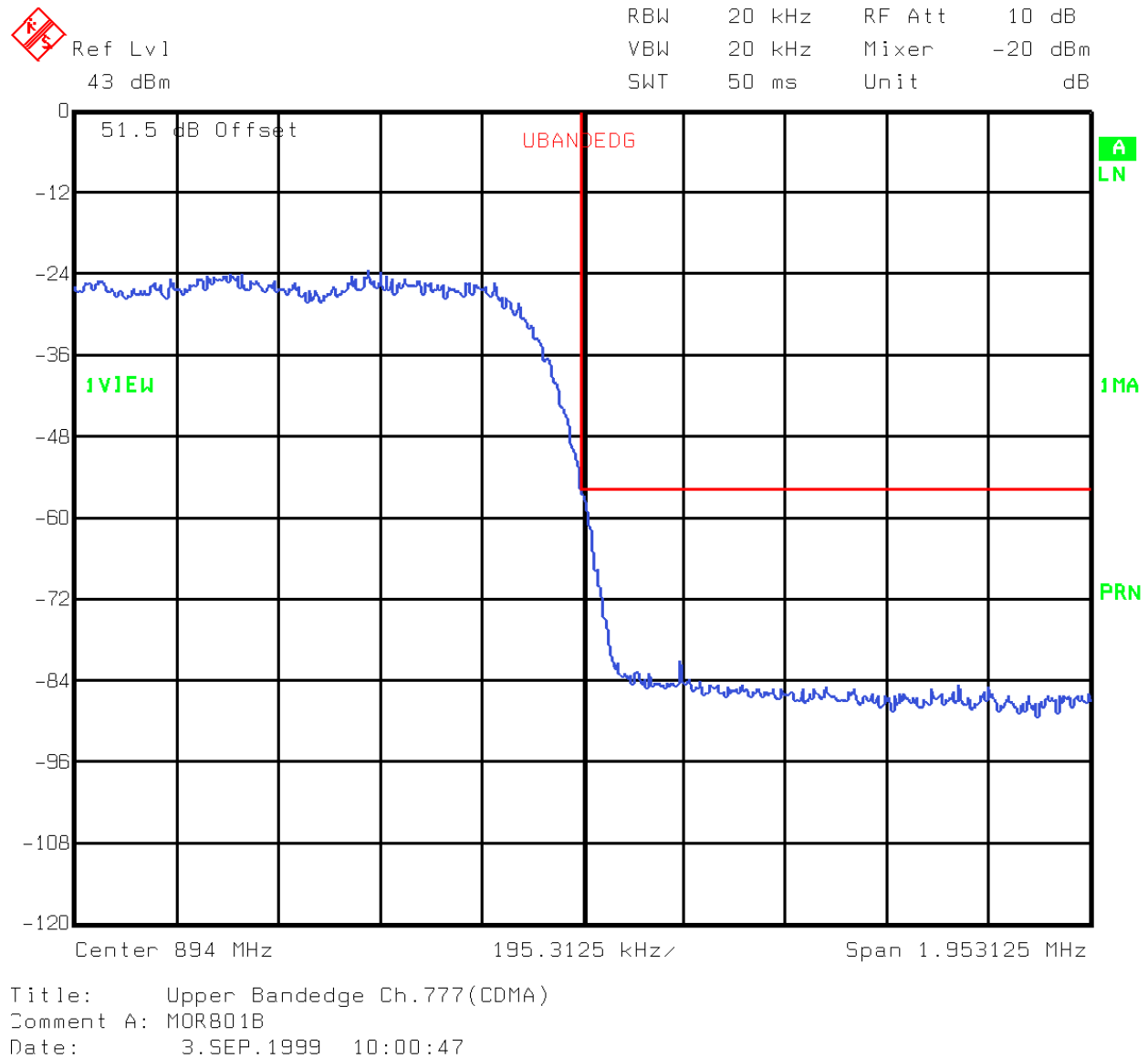
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



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

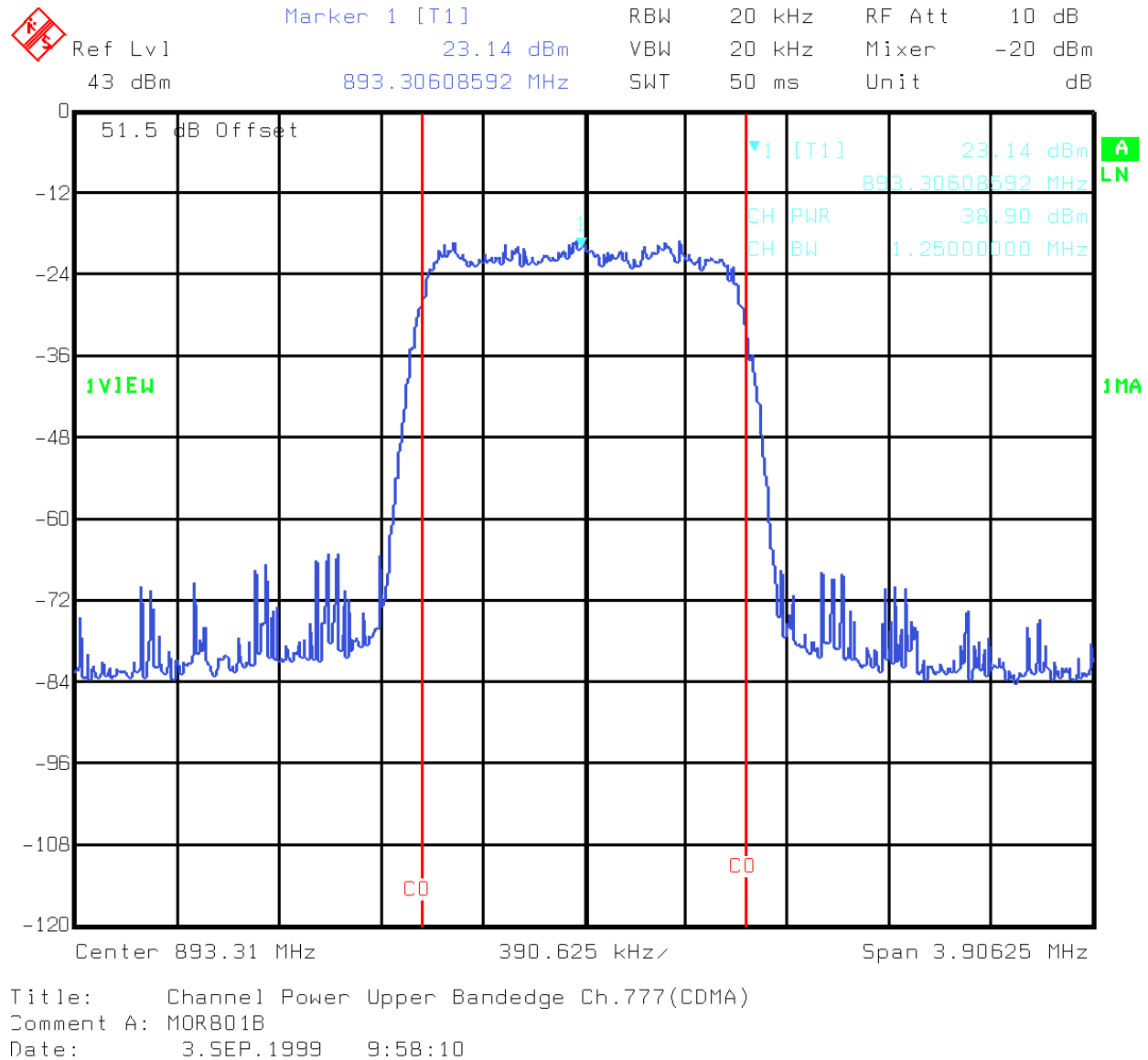
Plot 50

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



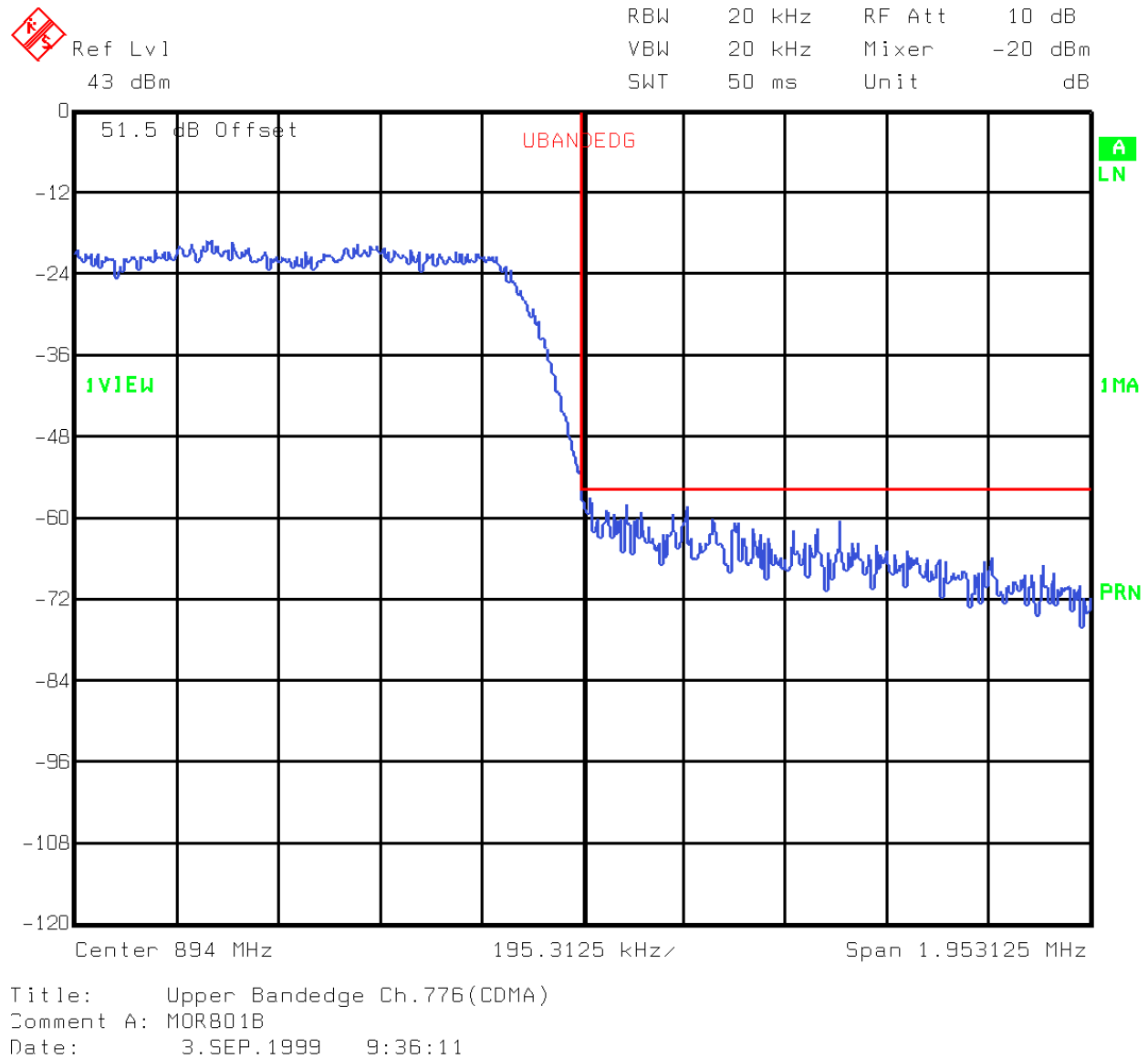
Plot 51

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



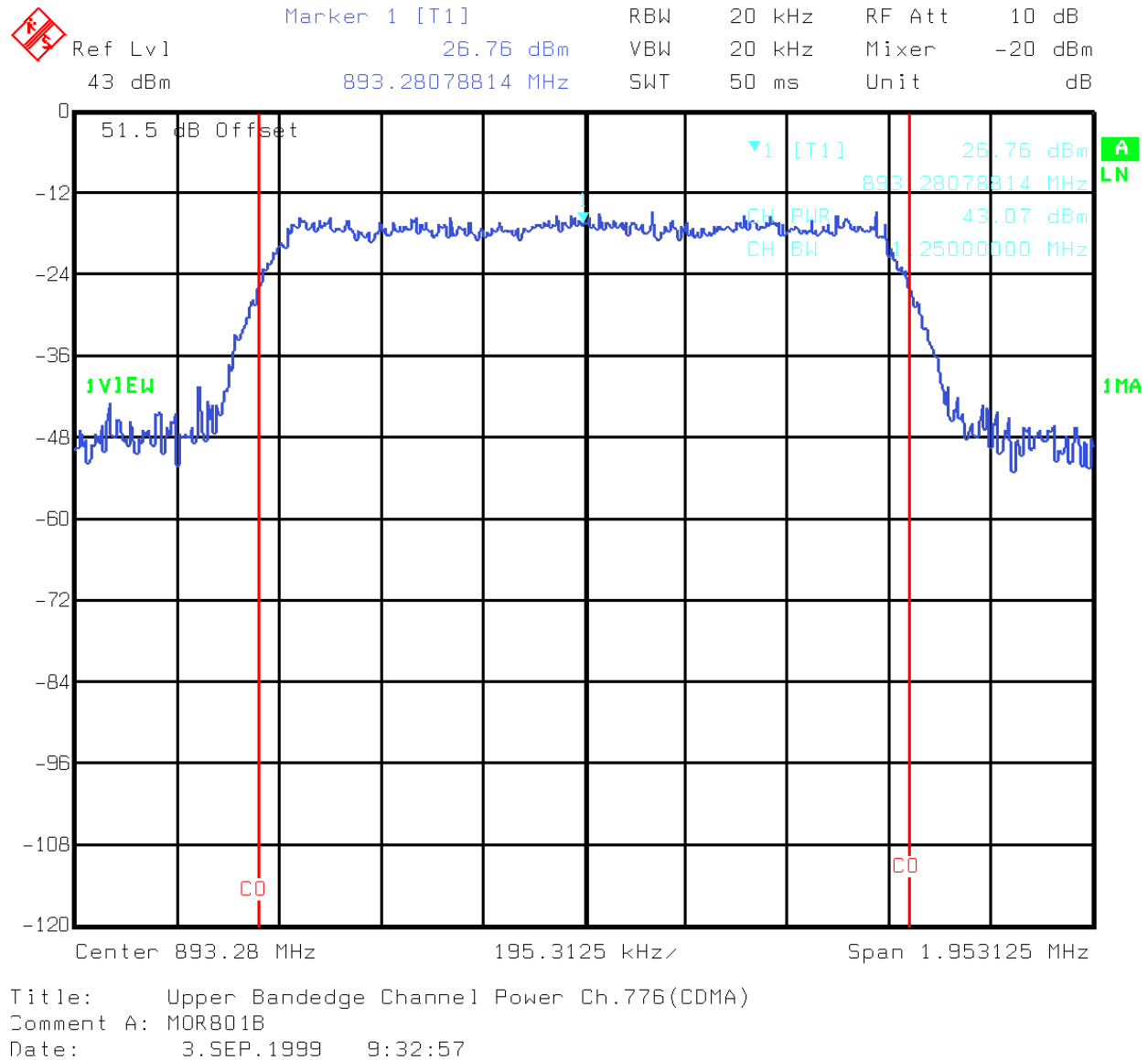
Plot 52

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



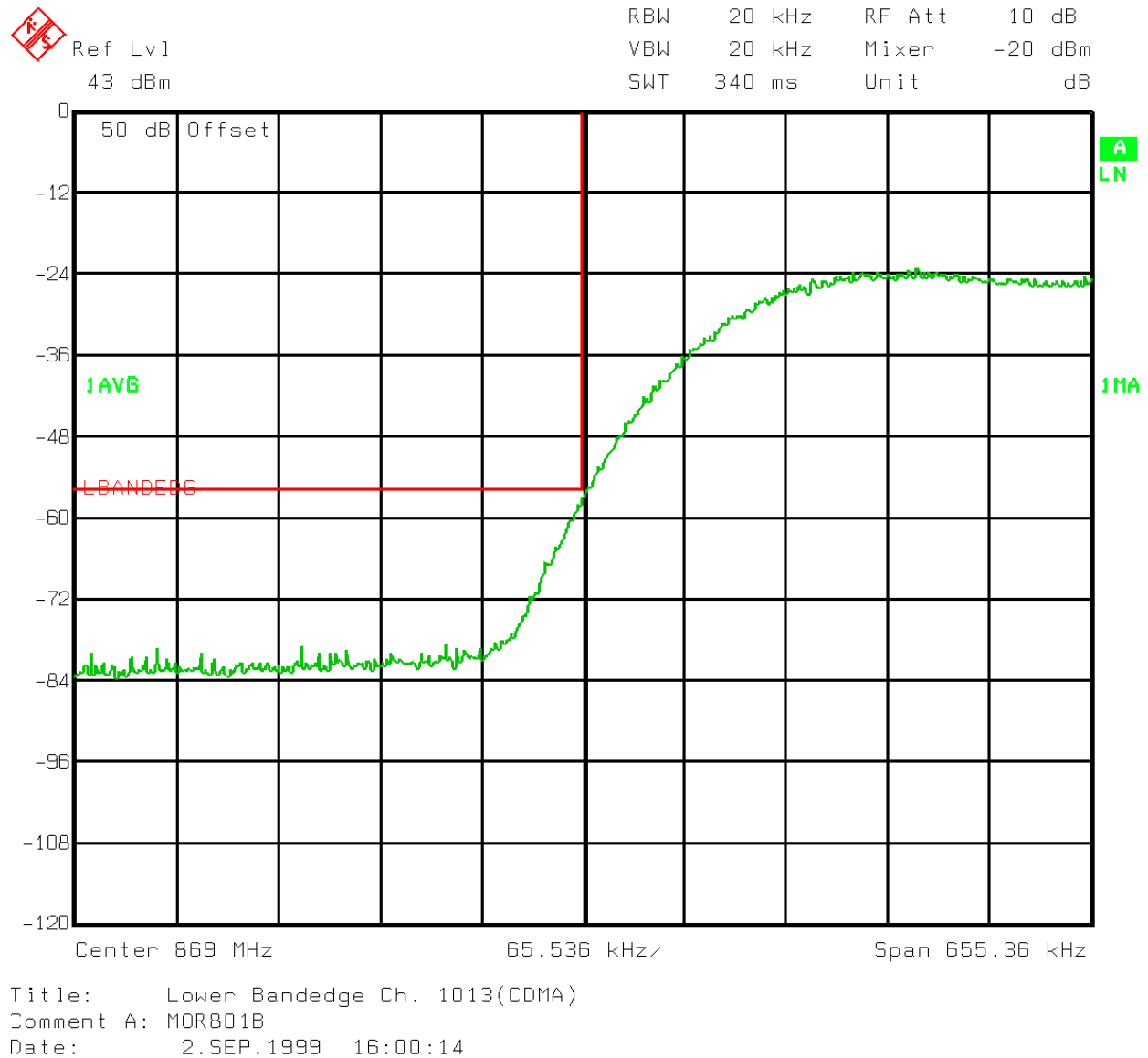
Plot 53

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



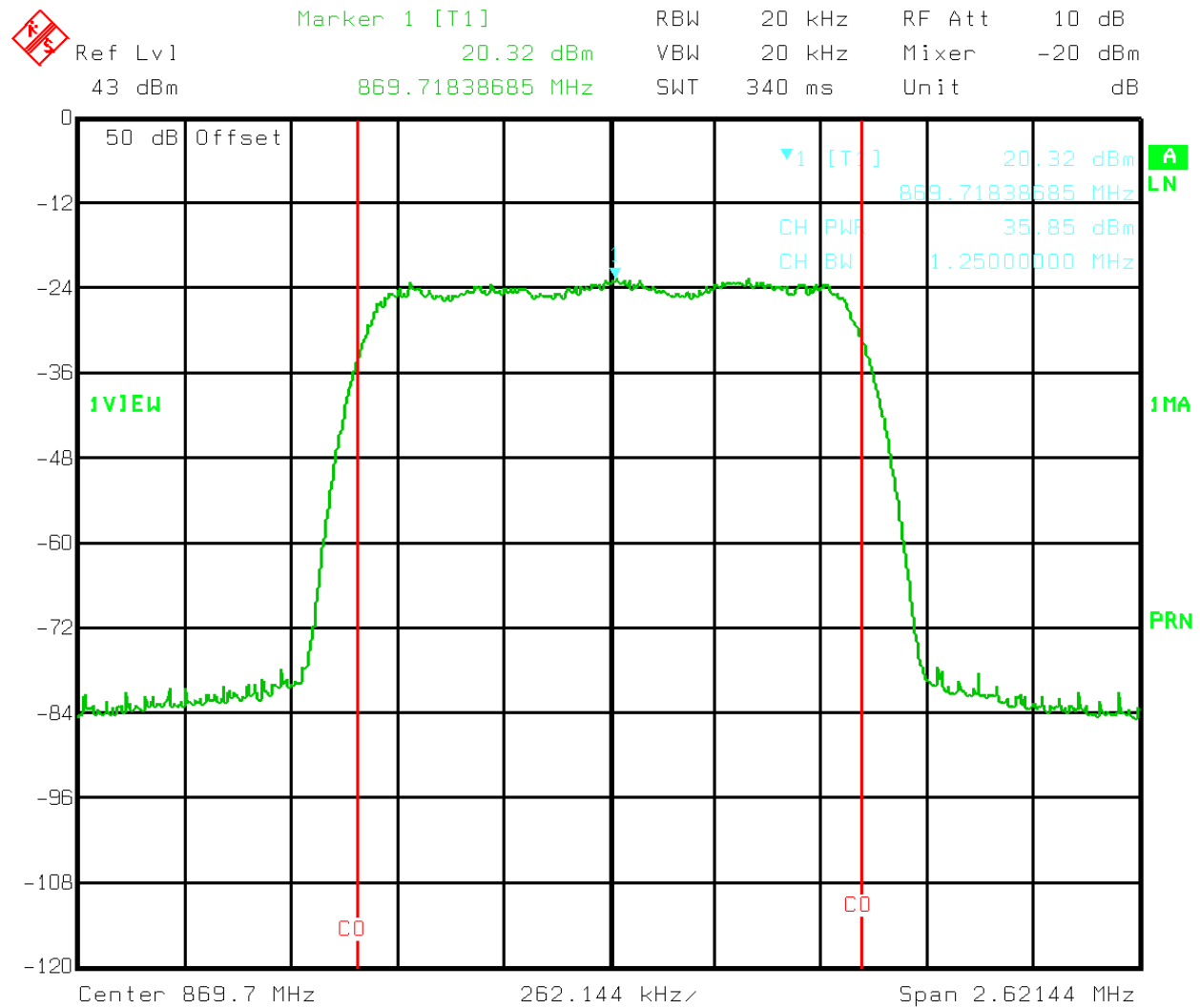
Plot 54

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



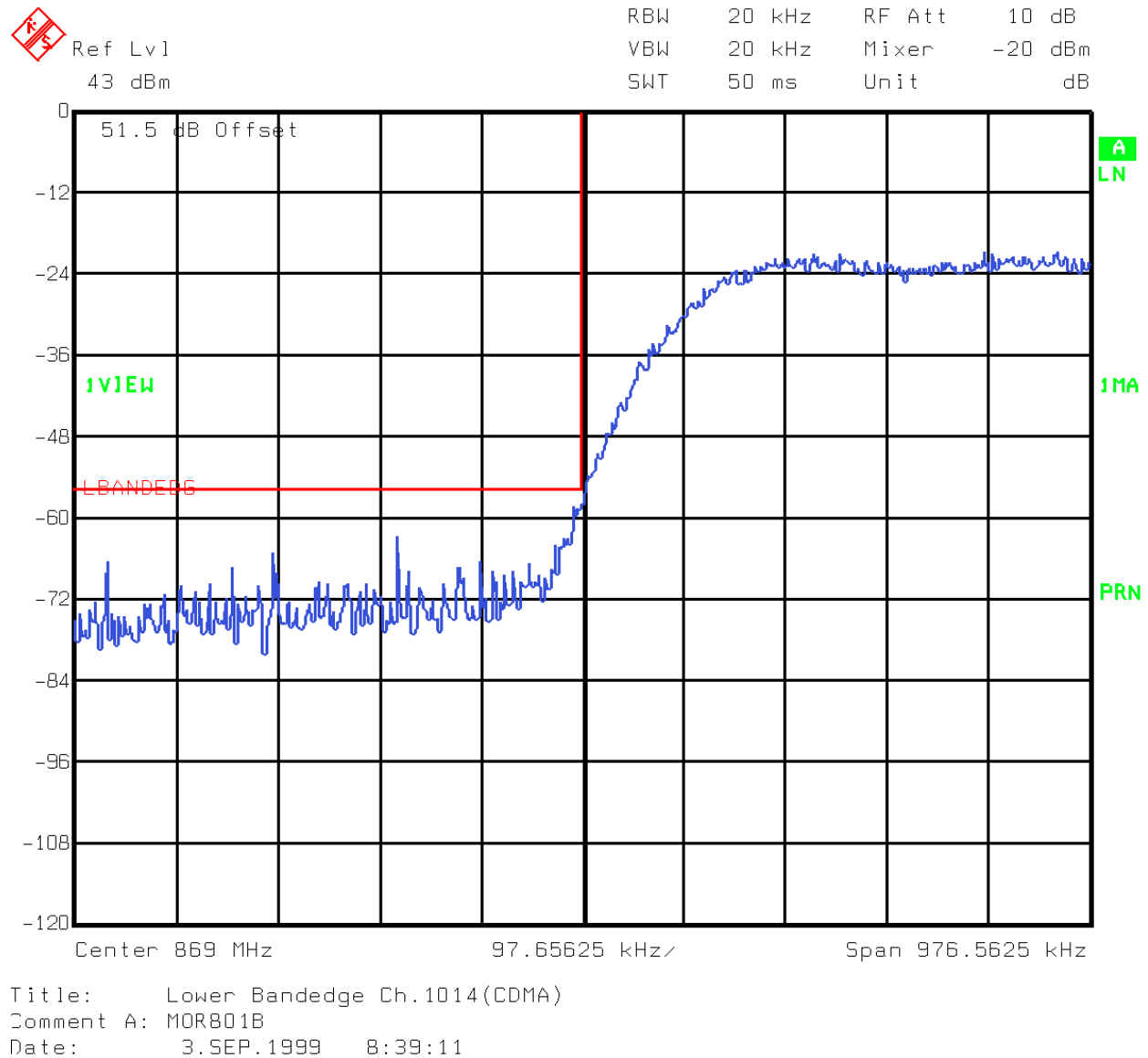
Plot 55

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



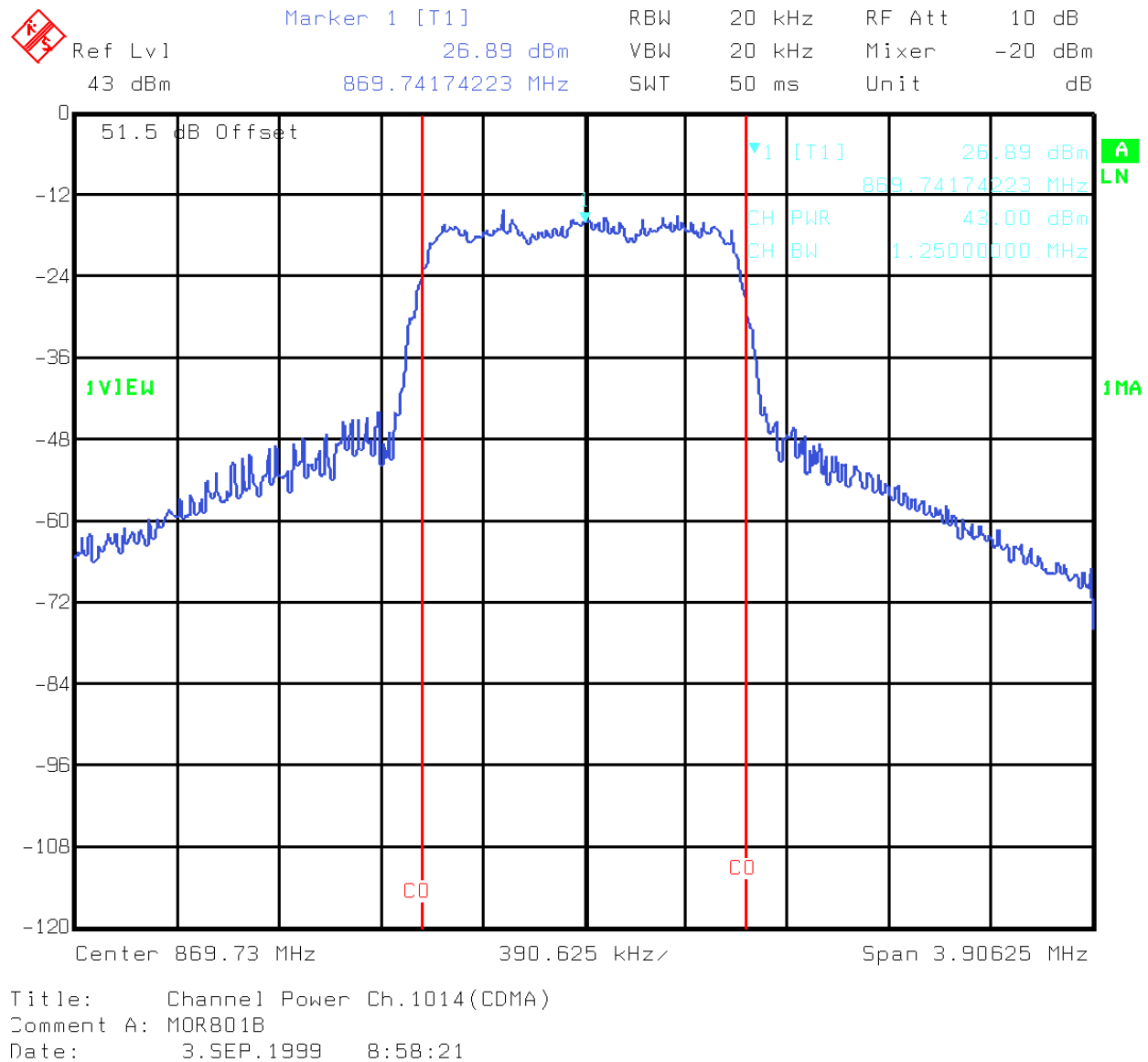
Plot 56

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



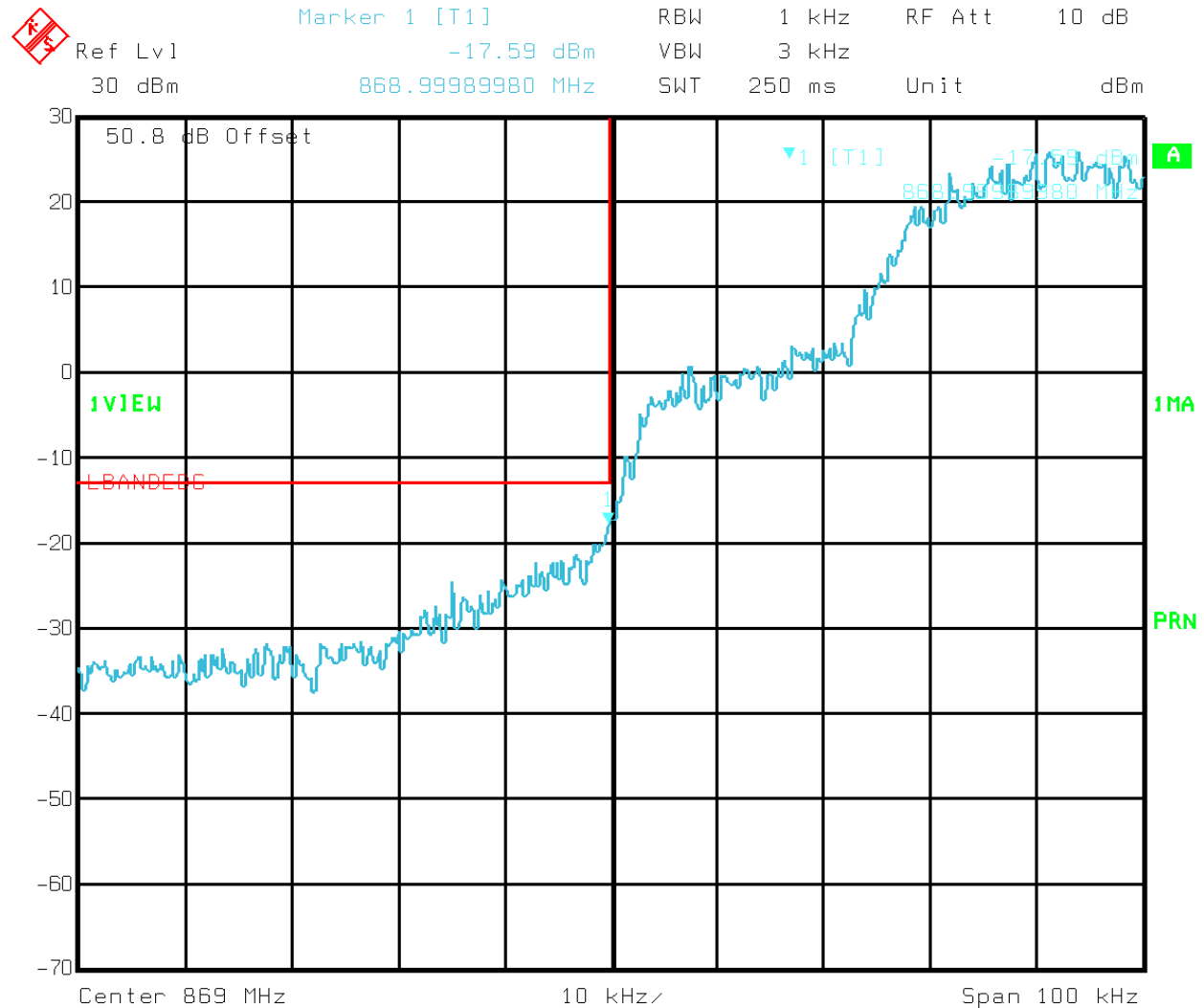
Plot 57

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



Plot 58

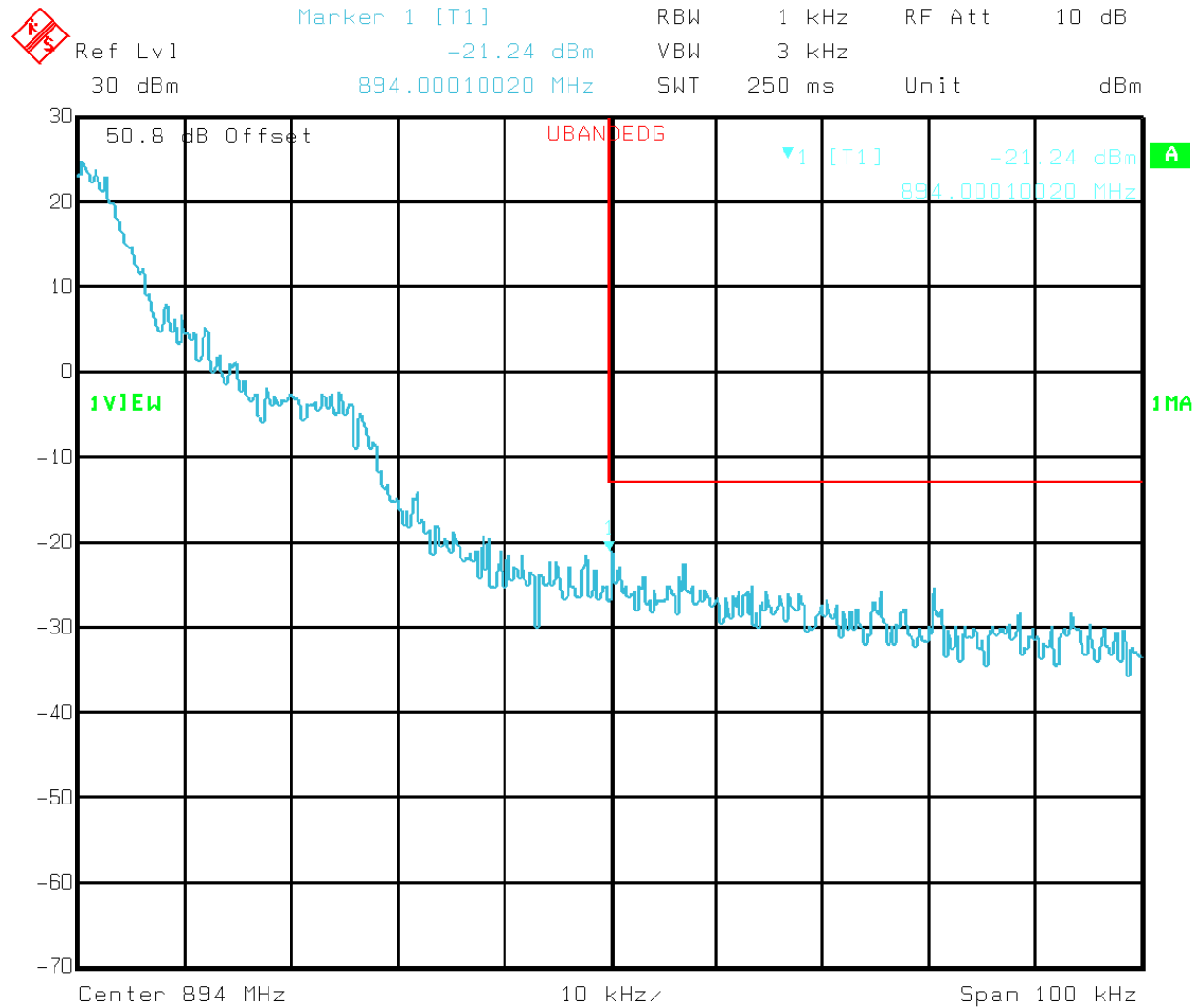
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



Title: Lower Bandedge TDMA 8 Watt Amplifier ID#148698
Comment A: MOR801B
Date: 14.SEP.1999 11:26:00

Plot 59

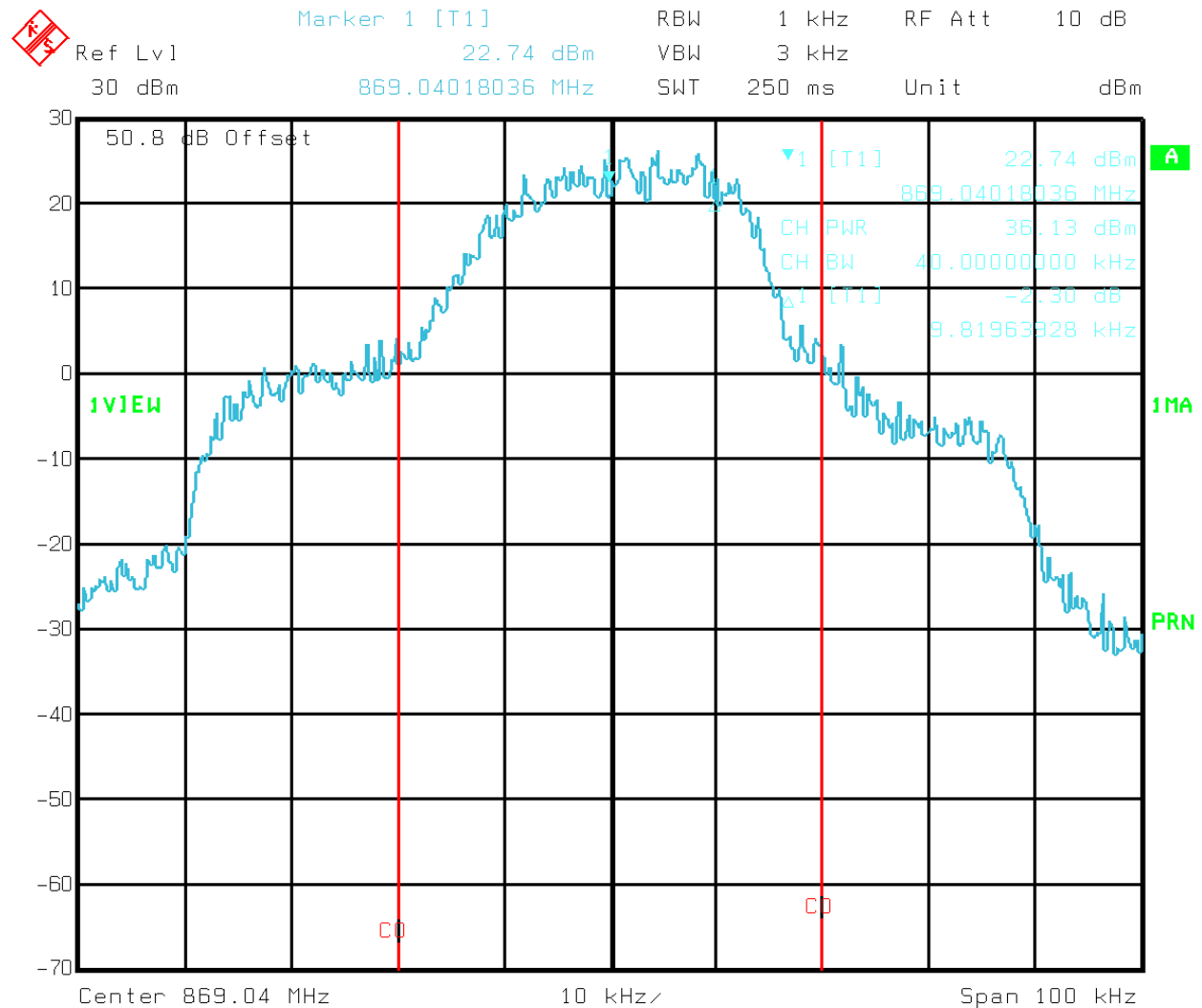
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



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

Plot 60

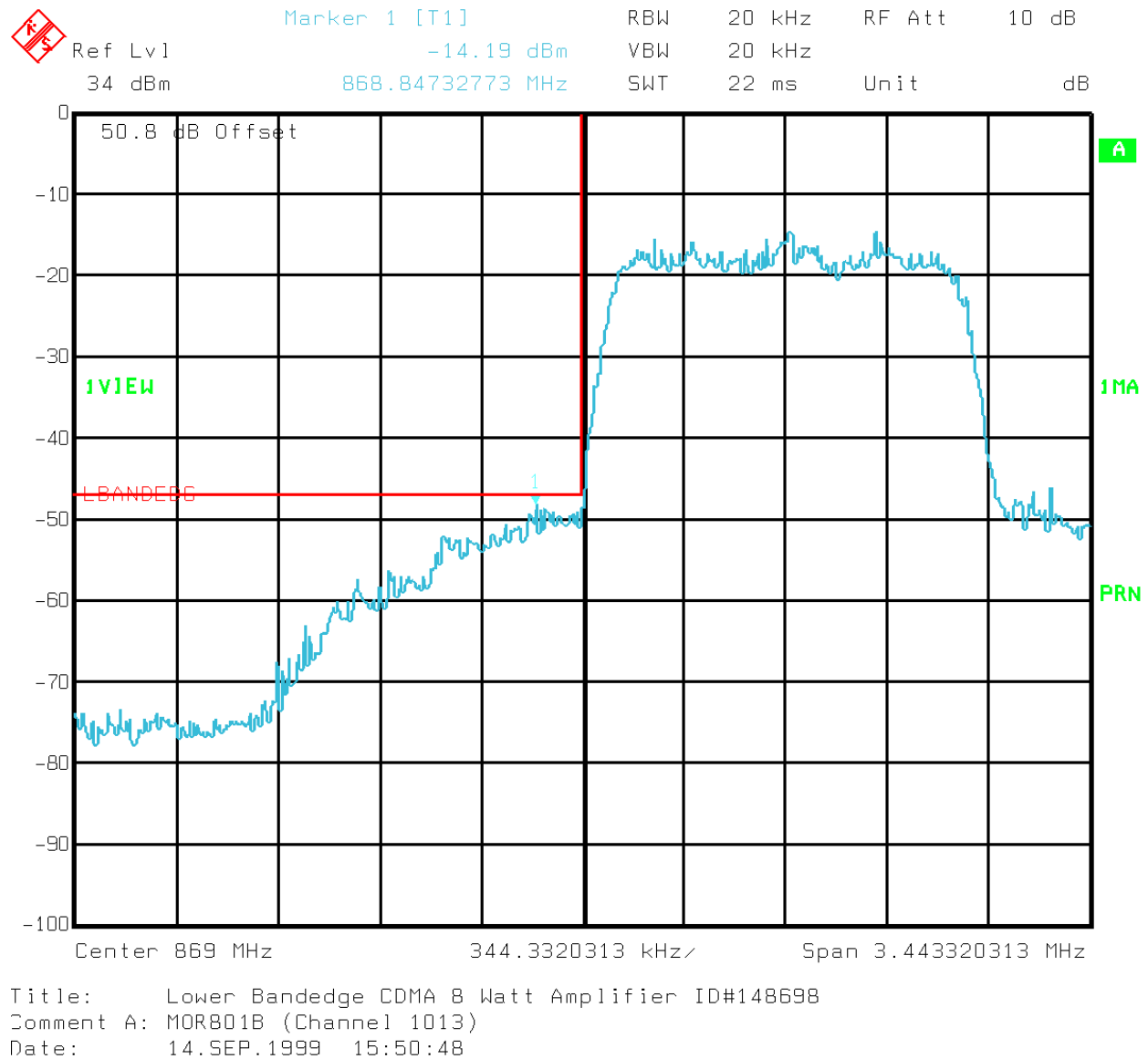
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



Title: Lower Bandedge Channel Power TDMA 8 Watt Amplifier ID#148698
Comment A: MOR801B
Date: 14.SEP.1999 11:22:48

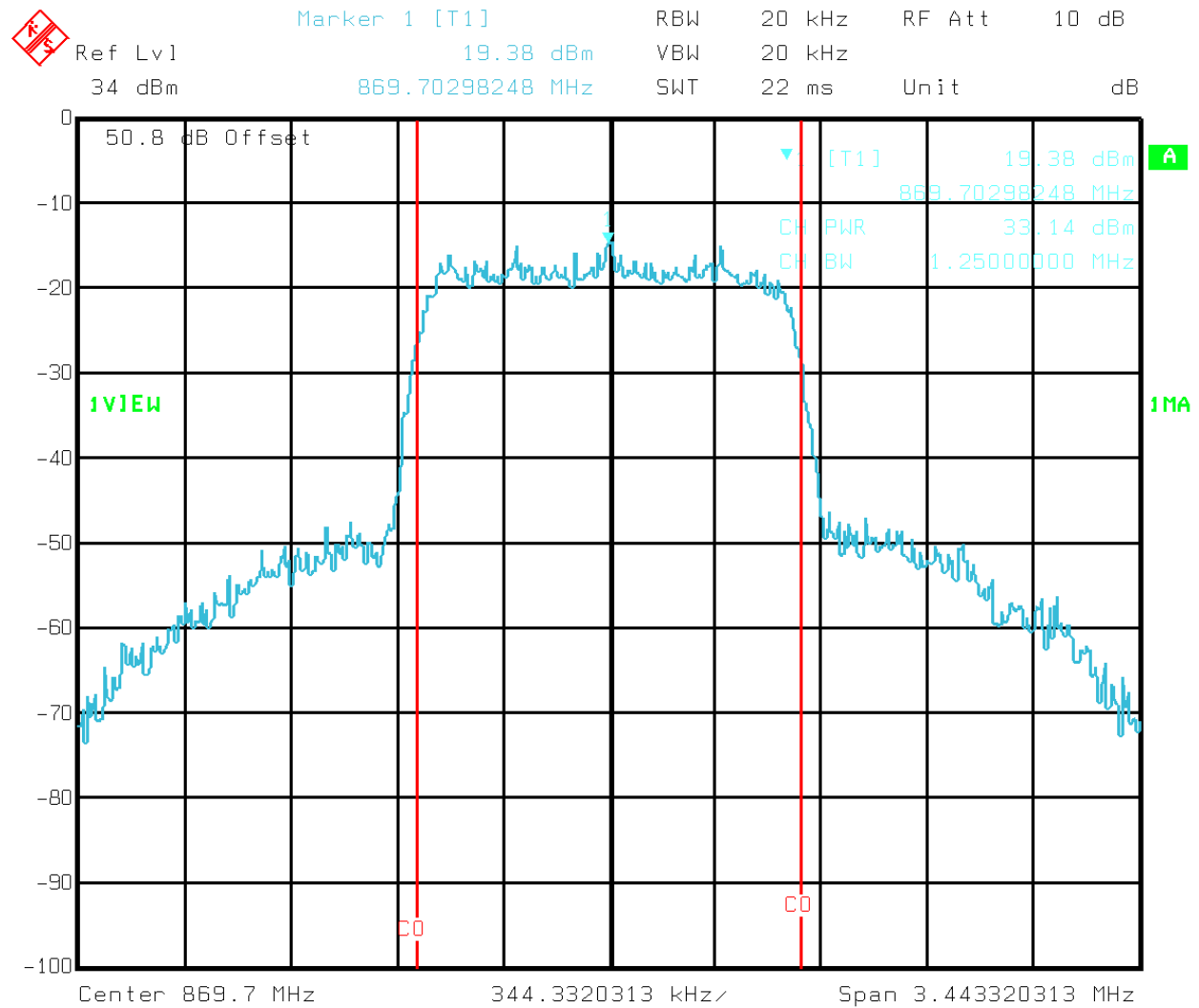
Plot 61

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



Plot 62

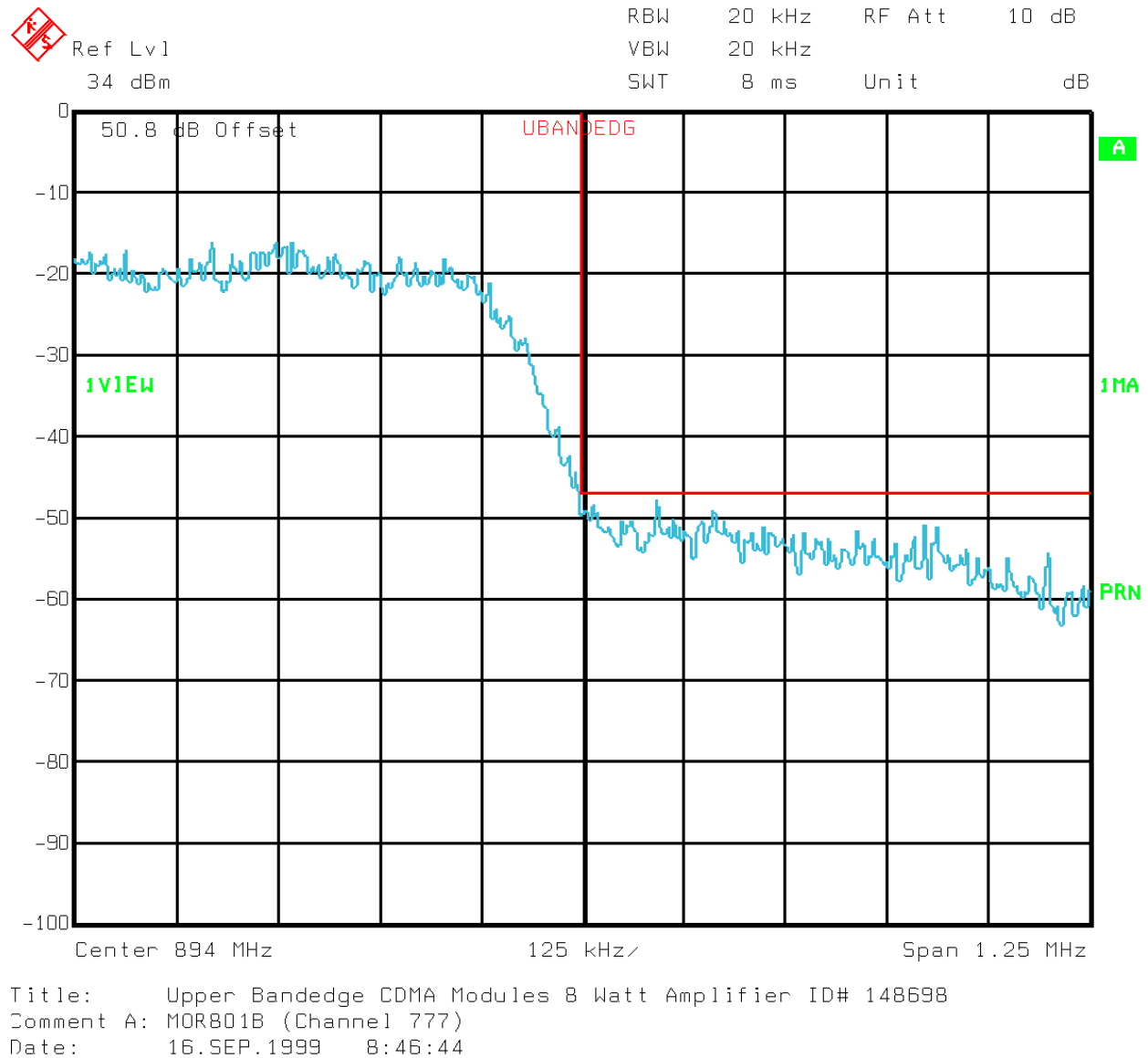
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



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

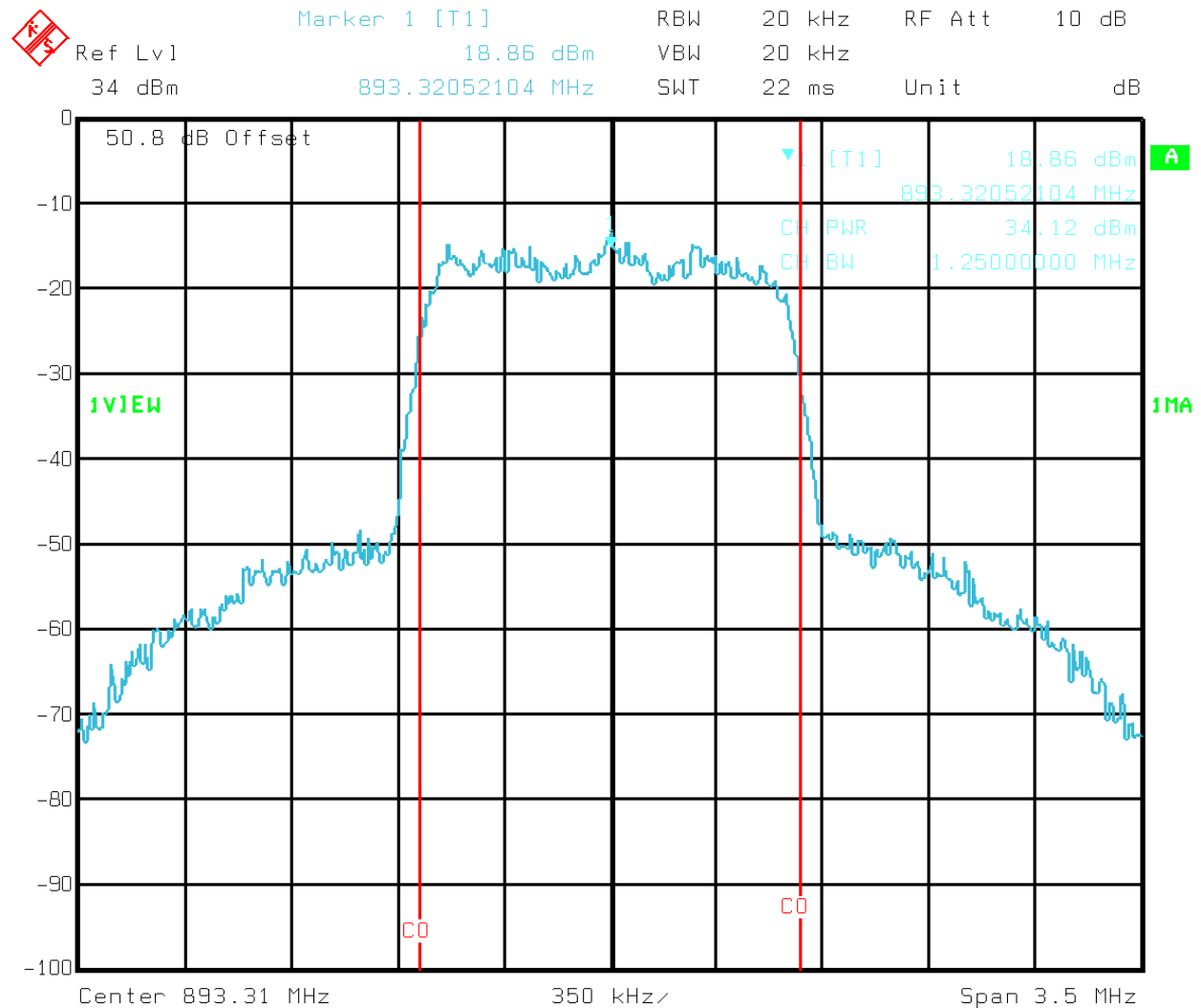
Plot 63

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



Plot 64

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801



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

Plot 65

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

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 dB μ V/m @ 2644 MHz @ 3m.

Test Data: See attached table.

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

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 ☒ Preliminary ☐ Page 1 of 1Client: AllenTelecom Test #: MW-1 W.O.#: 9L0298REUT: MOR801B S/N: None Photo ID: 9L0298R MW-1Technician: Ron Gaytan Specification: CFR 47 Part 2.1053 Lab: A OATS Date: 9/21/99Equipment Used 667-G2023-CF31Configuration: Tx at max power into 50 ohm load.Bandwidth: 1MHz Video Bandwidth: 1MHz Antenna Distance 3 m Detector:

Climatic Conditions: EUT Power: ☒ 115 V.A.C. ☒ 60 Hz ☒ Peak
 Temperature: 20 C ☐ 208 V.A.C. ☐ 50 Hz ☐ Average
 Relative Humidity: 42 % ☐ 230 V.A.C.
 Atmospheric Pressure: 998 mbar ☐ 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

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

Photographs of Test Setup

FRONT VIEW



REAR VIEW



EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

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

Not Applicable

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

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

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

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

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

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

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

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

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

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

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

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: $\geq$ RBW

Span: As required

Sweep: Auto

Mask:

Input Signal Characteristics:

RF level: Maximum recommended by manufacturer

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

NAME OF TEST: Spurious Emission at Antenna Terminals	PARA. NO.: 2.991
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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: $\geq$ RBW

Start Frequency: 0 MHz

Stop Frequency: 10 GHz

Sweep: Auto

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

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

$R = 3\text{m}$ (Measurement Distance)

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

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

For emissions > 1 GHz:

$G = 1$ (Isotropic Gain)

$P = 1 \times 10^{-5}$ Watts (Maximum spurious output power)

$R = 3\text{m}$ (Measurement Distance)

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

The spectrum is searched to 10 GHz.

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

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 $\leq$ 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.

KTL Dallas

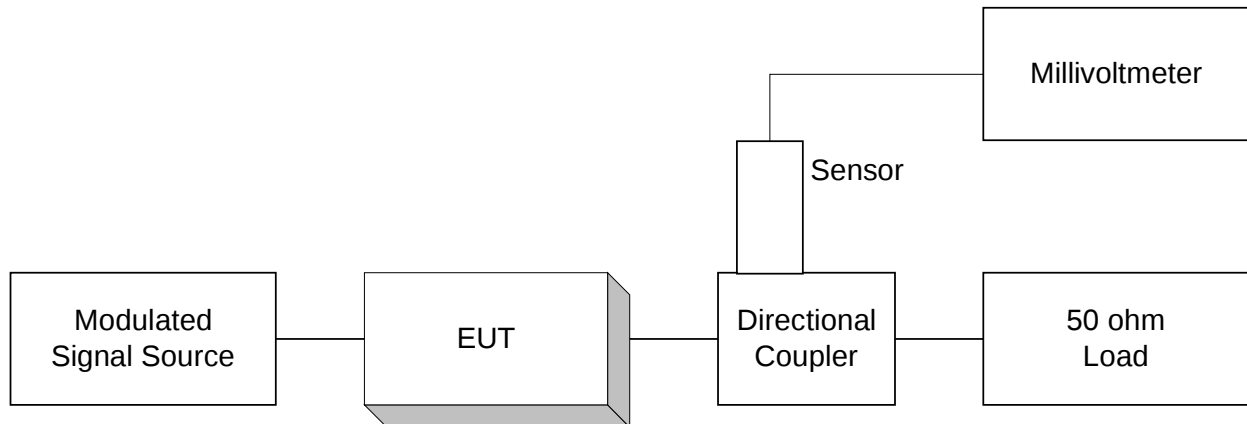
FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 9L0298RUS

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

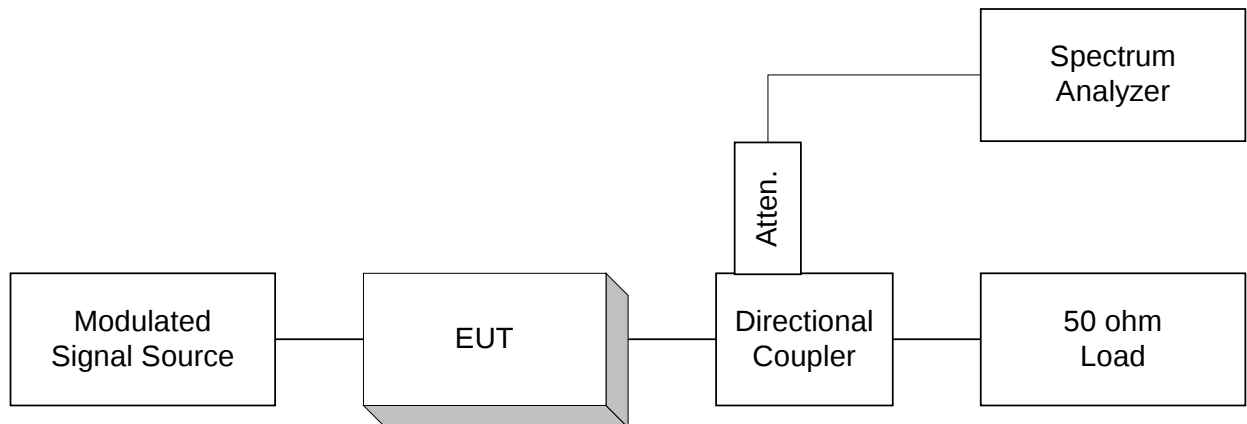
ANNEX B - TEST DIAGRAMS

EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

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

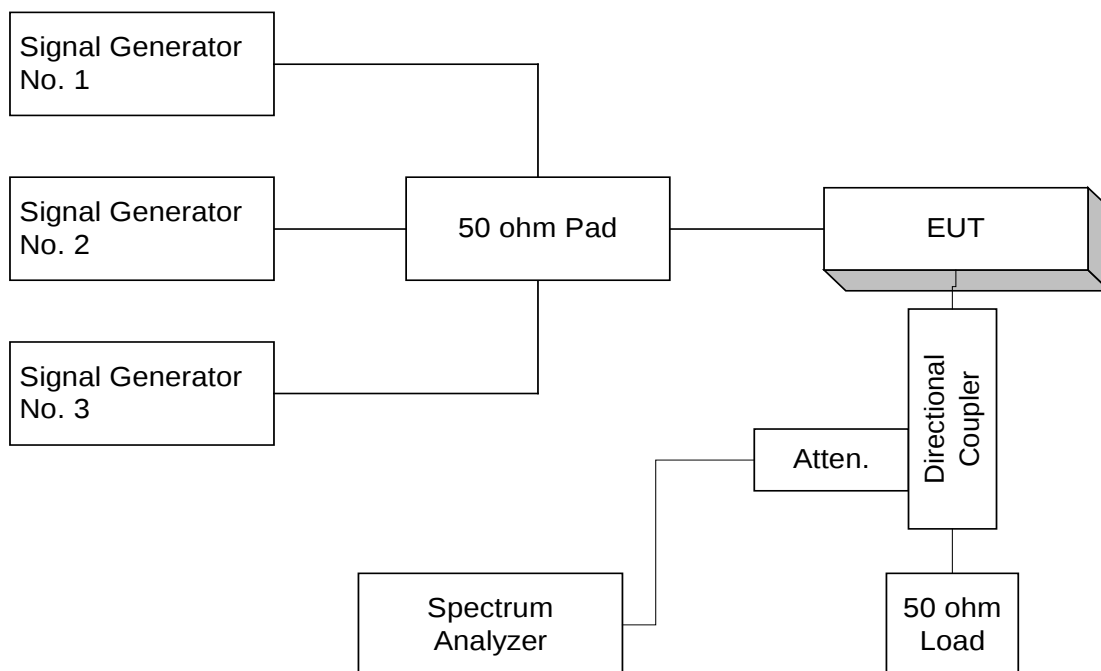
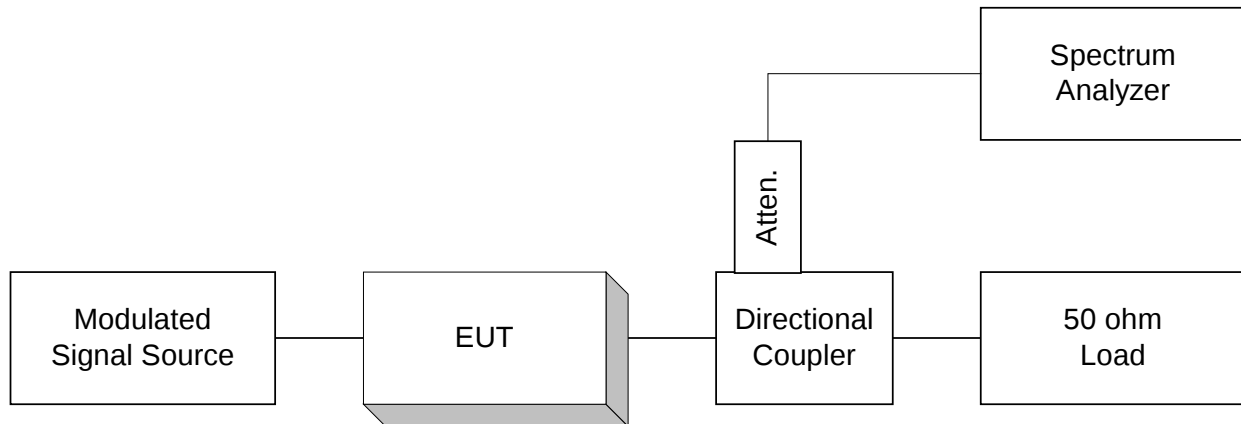


Para. No. 2.989 - Occupied Bandwidth



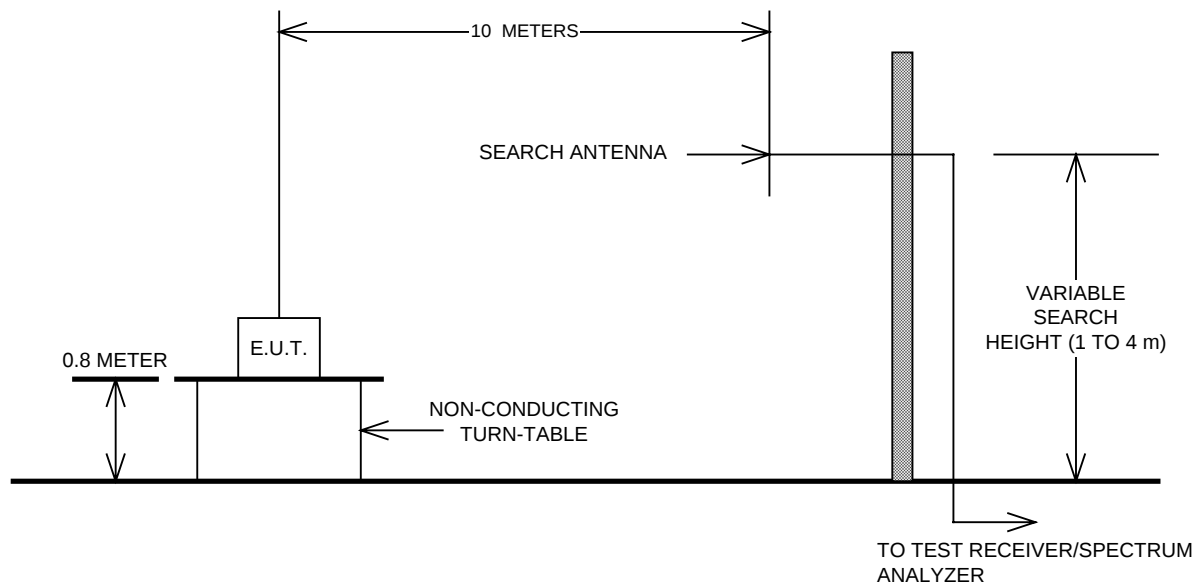
EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

Para. No. 2.991 Spurious Emissions at Antenna Terminals



EQUIPMENT: MOR801 Repeater
FCC ID: BCR-RPT-MOR801

Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability

