

KTL Test Report:	0R02788
Applicant:	Radio Frequency Systems 4100 SW Research Way Corvallis, OR 97333 USA
Equipment Under Test: (E.U.T.)	48750 / 48751 Repeater
In Accordance With:	FCC Part 22, Subpart H Cellular Band Repeaters
Tested By:	KTL Ottawa Inc. 3325 River Road, R.R. 5 Ottawa, Ontario K1V 1H2
Authorized By:	G. Westwell, Technologist
Date:	
Total Number of Pages:	80

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EQUIPMENT: 48750 / 48751 Repeater

Section 1. Summary of Test Results**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



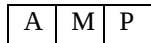
Production Unit



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: _____
Russell Grant, Wireless Group Manager

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This report applies only to the items tested.

EQUIPMENT: 48750 / 48751 Repeater

Summary Of Test Data

Name Of Test	Para. No.	Result
RF Power Output	22.913(a)	Complies
Occupied Bandwidth	22.917(c)	Complies
Spurious Emissions at Antenna Terminals	22.917	Complies
Field Strength of Spurious Emissions	22.917	Complies
Frequency Stability	22.355	Complies

Footnotes For N/A's:

.

EQUIPMENT: 48750 / 48751 Repeater

Section 2. General Equipment Specification

Manufacturer:	Radio Frequency Systems
Model No.:	48750 / 48751
Date Received In Laboratory:	September 18, 2000
KTL Identification No.:	48750: Item #1 48751: Item #2
Supply Voltage Input:	120 VAC
Frequency Range:	48750: Downlink: 869-880 MHz 890-891.5 MHz Uplink: 824-835 MHz 845-846.5 MHz 48751: Downlink: 880-890 MHz 891.5-894 MHz Uplink: 835-845 MHz 846.5-849 MHz
Output Impedance:	50 ohms
RF Output (Rated):	AMPS 1W CDMA and TMDA 0.5W
Emissions Designator:	AMPS F8W, F1D TDMA F9W CDMA DXW

EQUIPMENT: 48750 / 48751 Repeater

Section 3. RF Power Output

Test Performed By: Russell Grant	Date of Test: September 20, 2000
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Minimum Standard: Para. No. 22.913(a).

Test Results: Does Not Comply. The maximum RF output power is within ± 1 dB of the manufacturer's rating. The RF output power is de-rated according to the number of channels via AGC and is equal to $P_{\max} - 10 \log N$,

$P_{\max}$ = Maximum RF output power

N = Number of channels

EQUIPMENT: 48750 / 48751 Repeater

Section 4 Occupied Bandwidth

Test Performed By: Russell Grant	Date of Test: September 21, 2000
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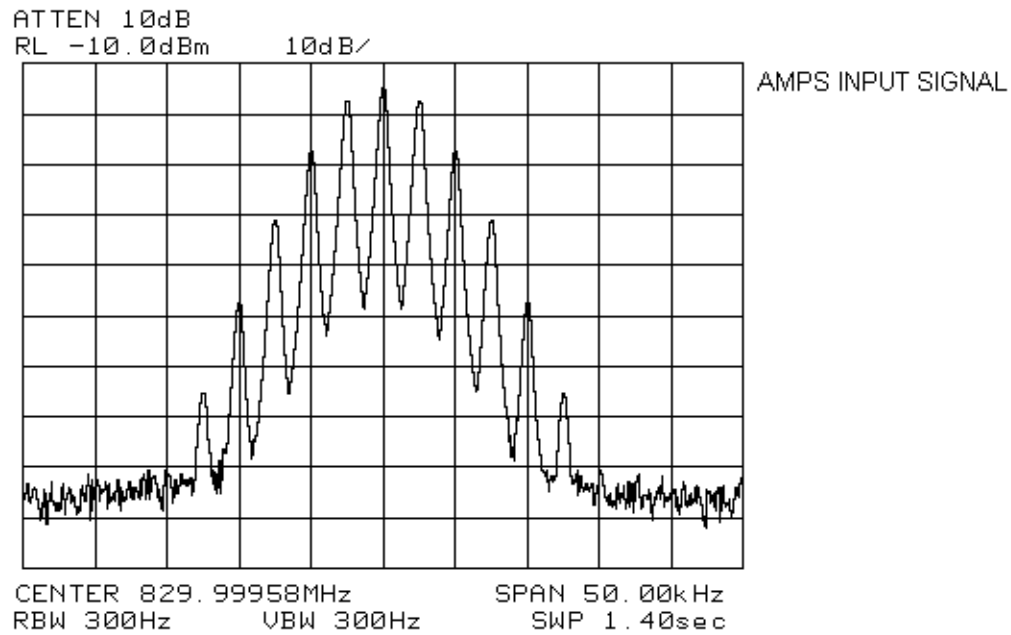
Minimum Standard: 22.917

Test Results: Complies. There is no degradation in the output signal.

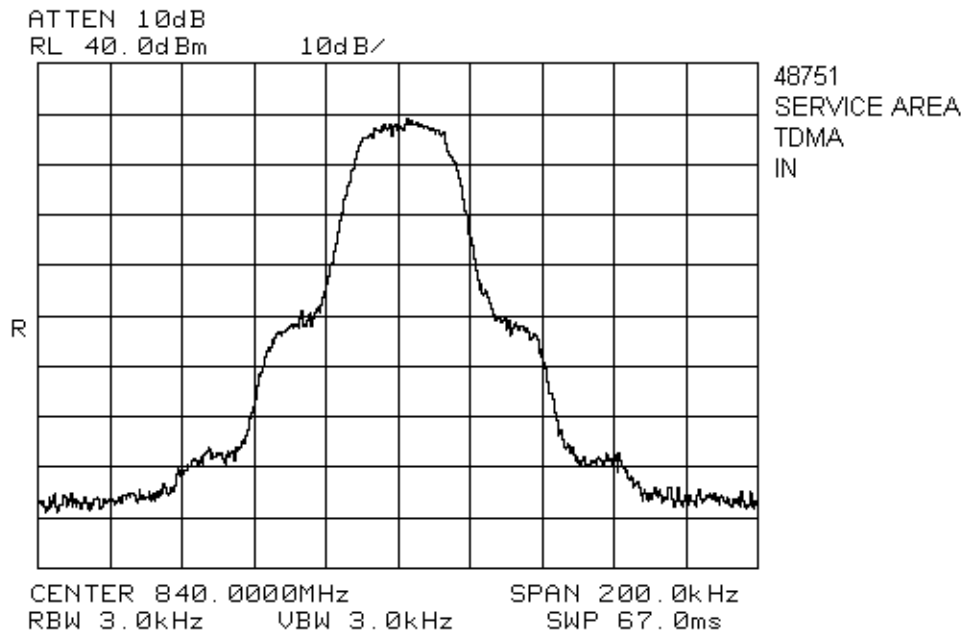
Test Data: See attached graph(s).

The occupied bandwidth was measured by comparison of the input to the output signal. This was done in order to determine if there was any degradation to the output signal due to the amplification through the repeater.

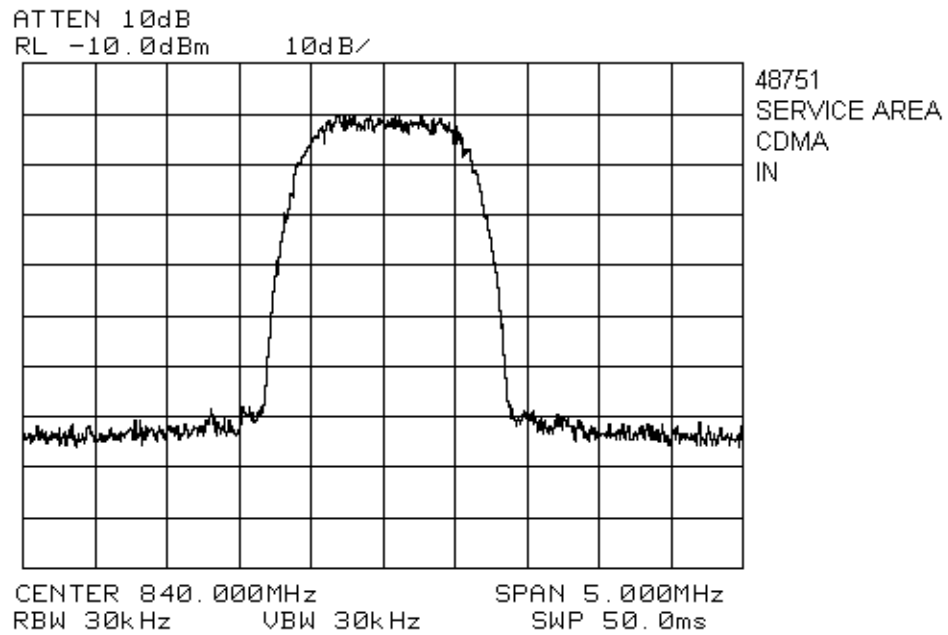
EQUIPMENT: 48750 / 48751 Repeater



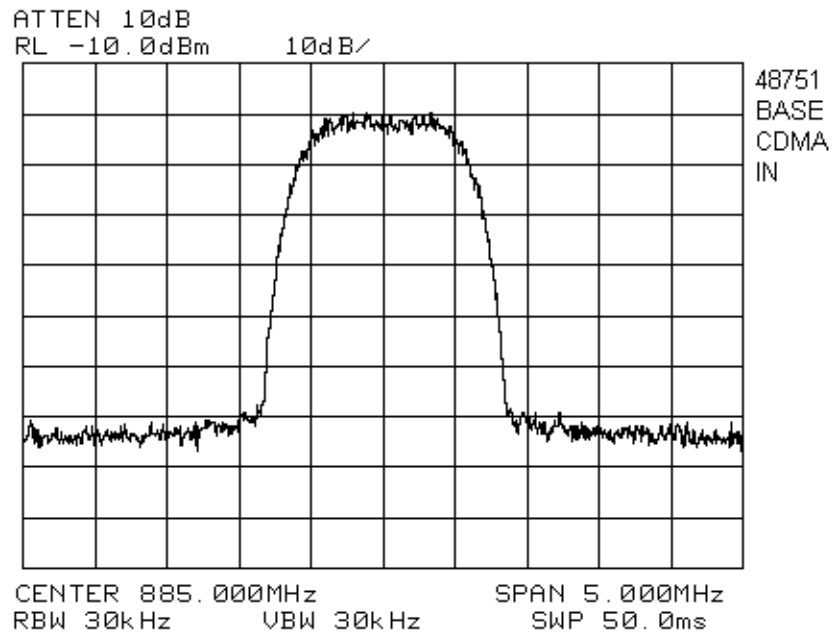
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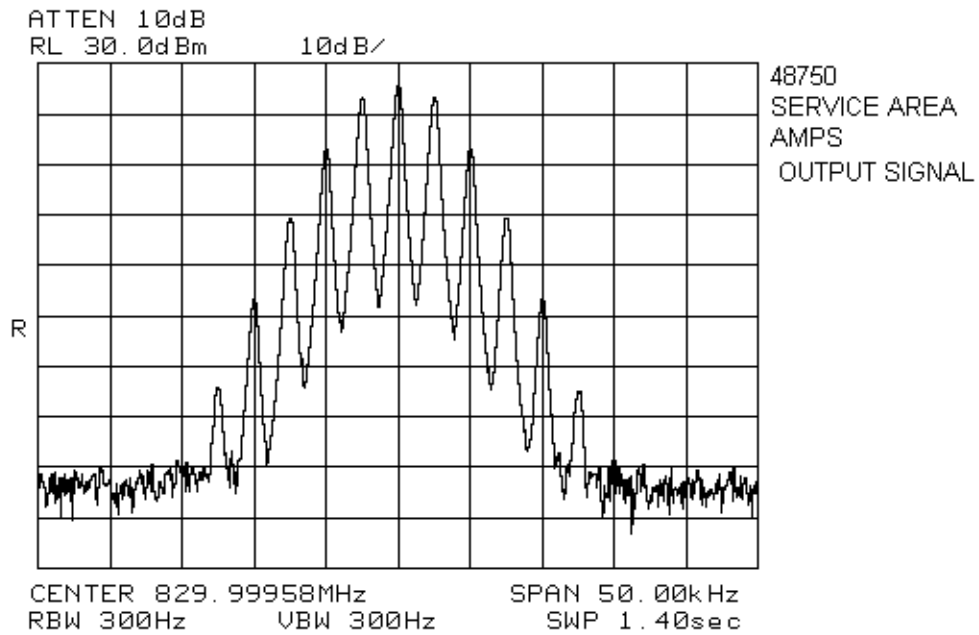
EQUIPMENT: 48750 / 48751 Repeater



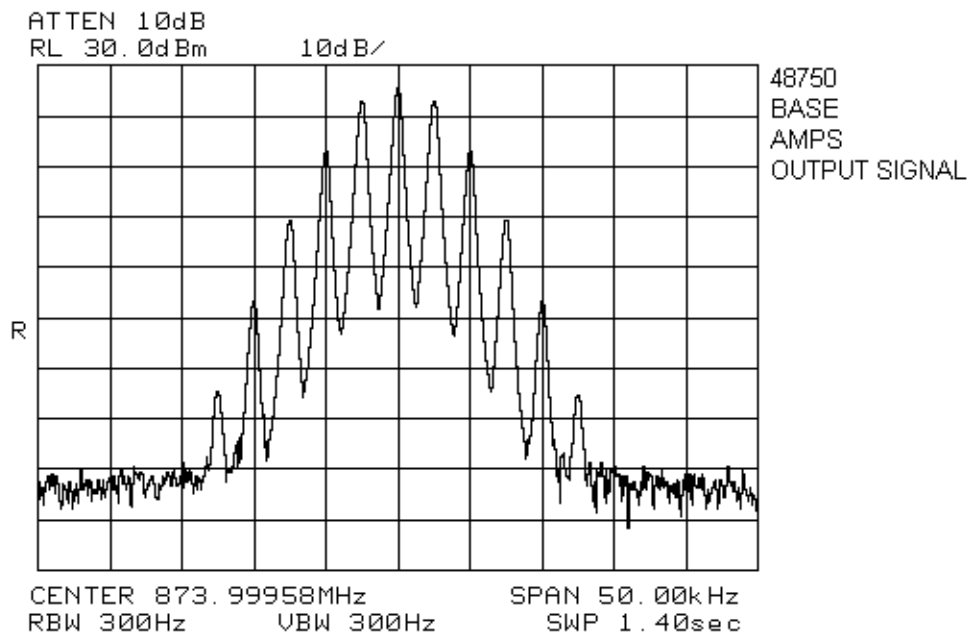
EQUIPMENT: 48750 / 48751 Repeater



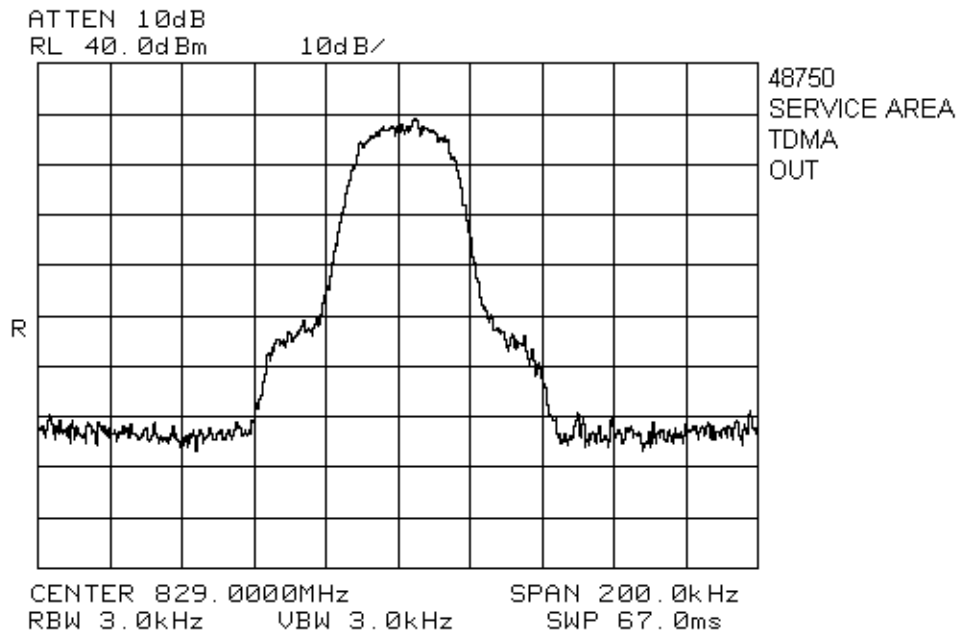
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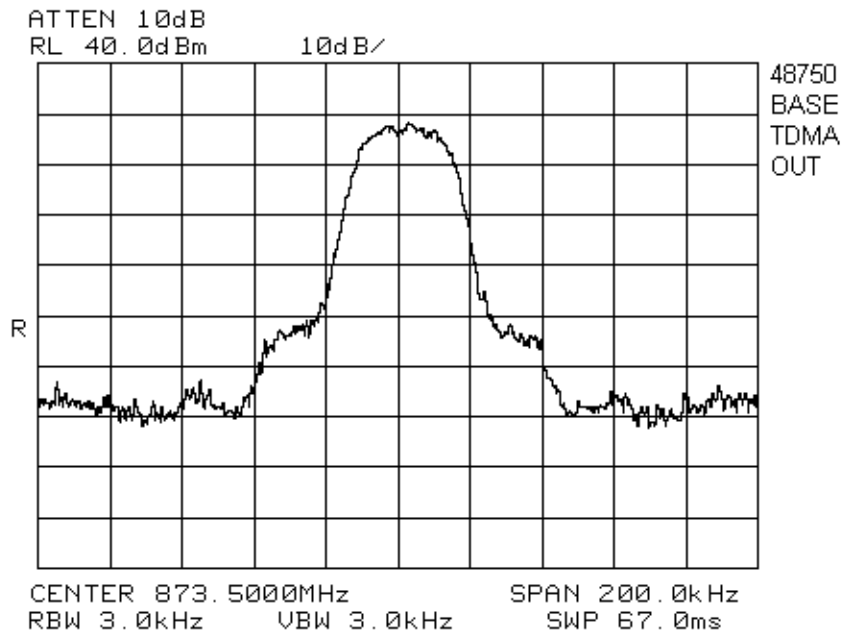
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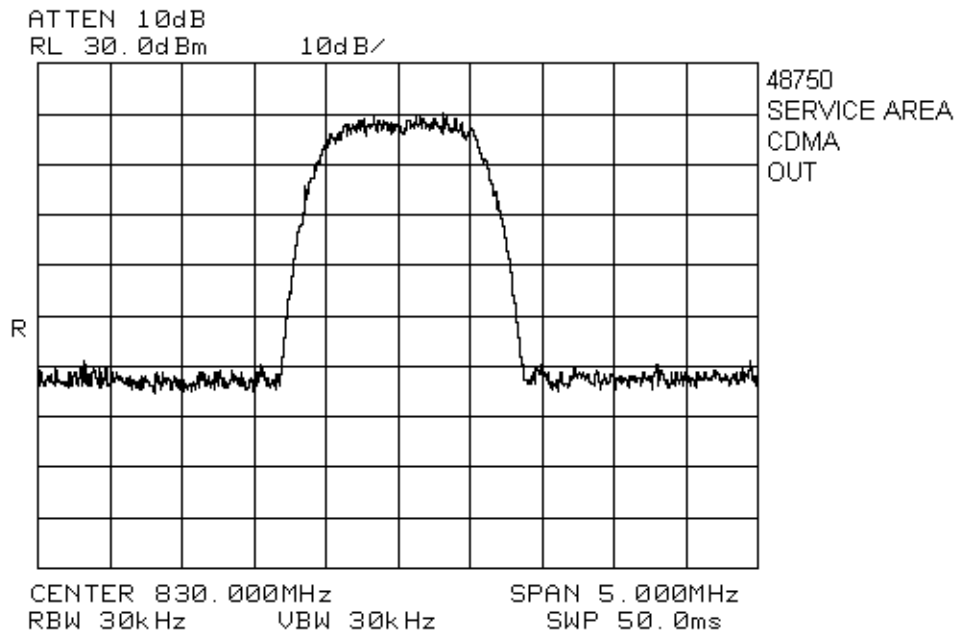
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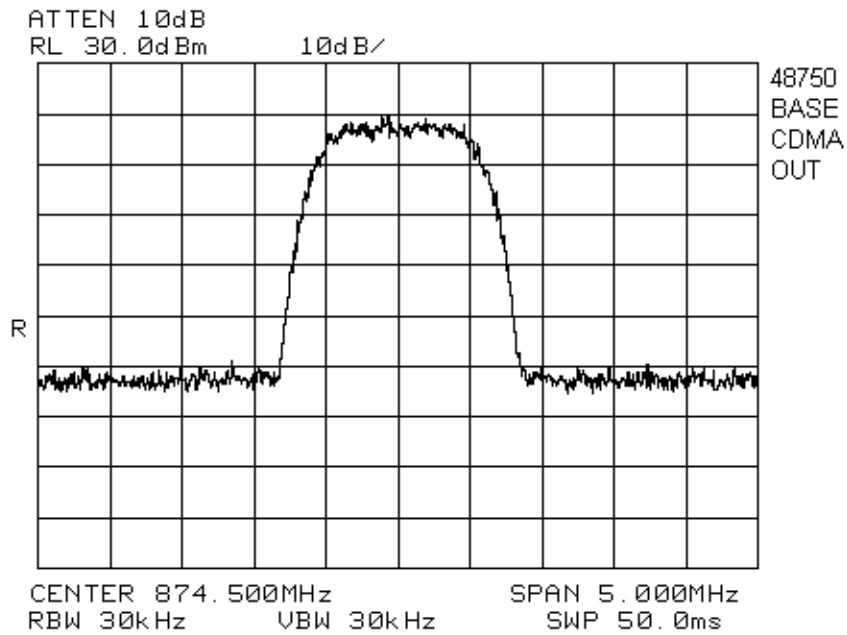
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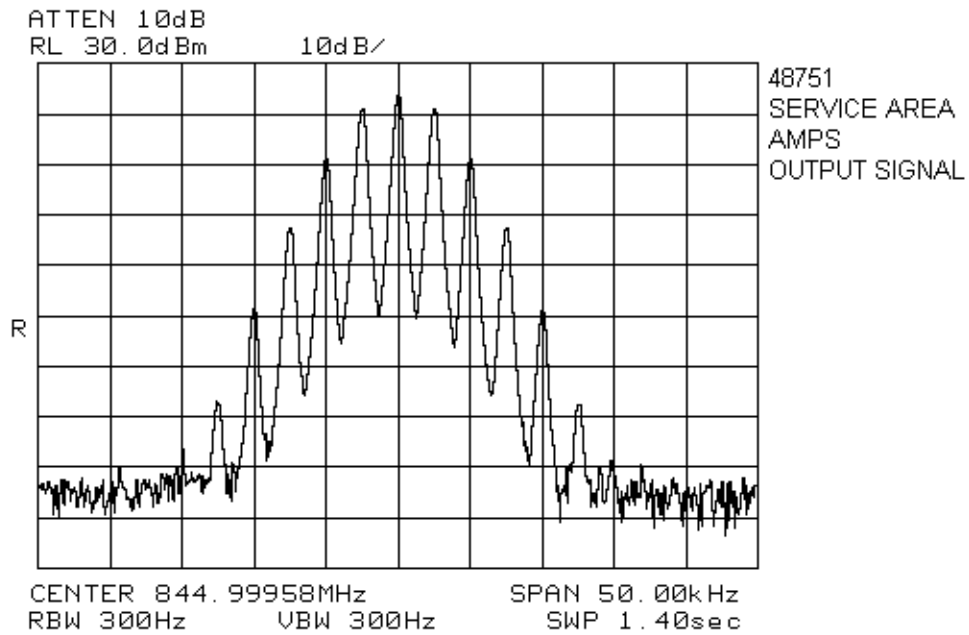
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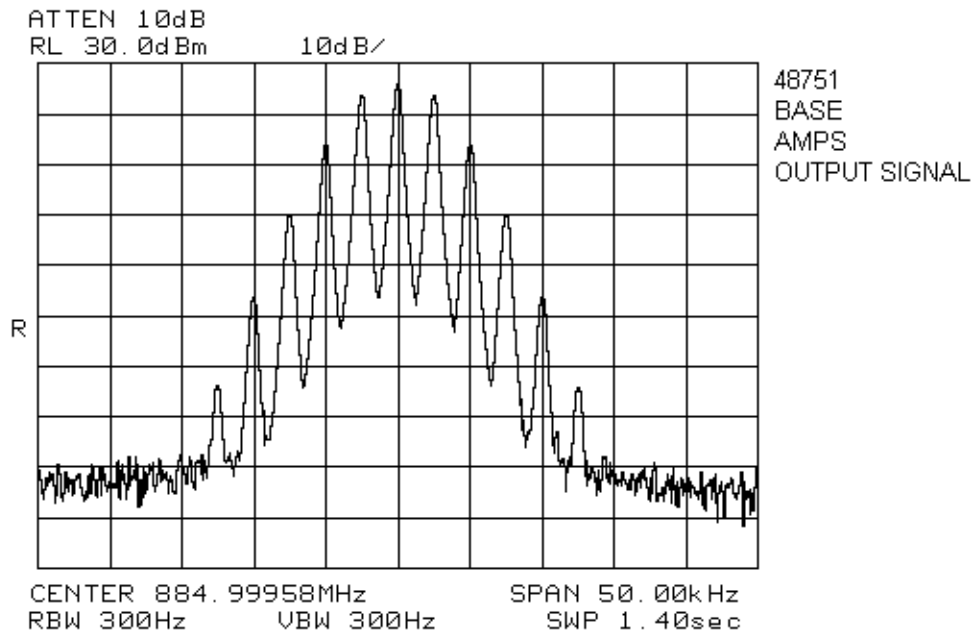
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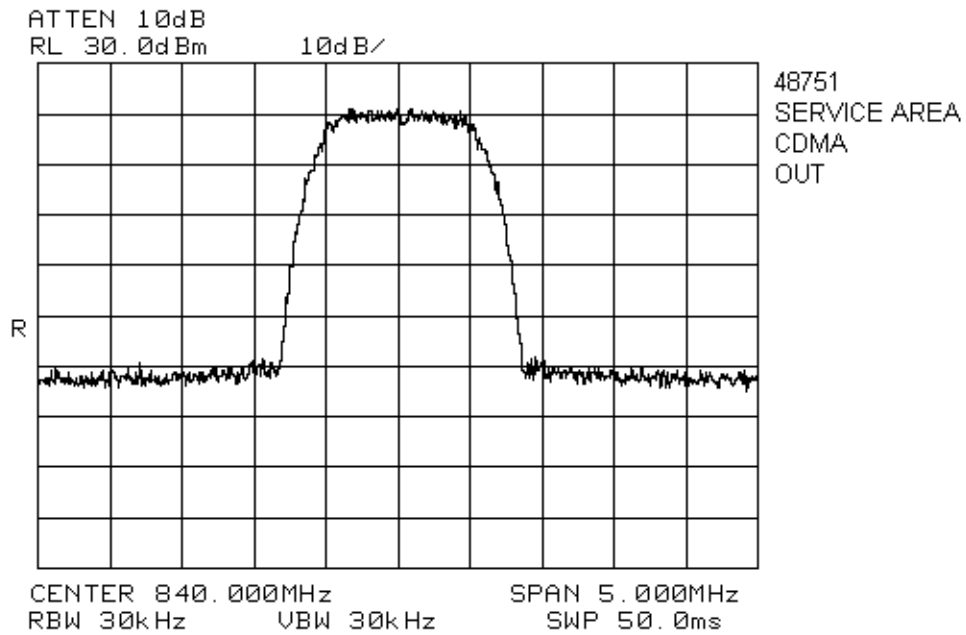
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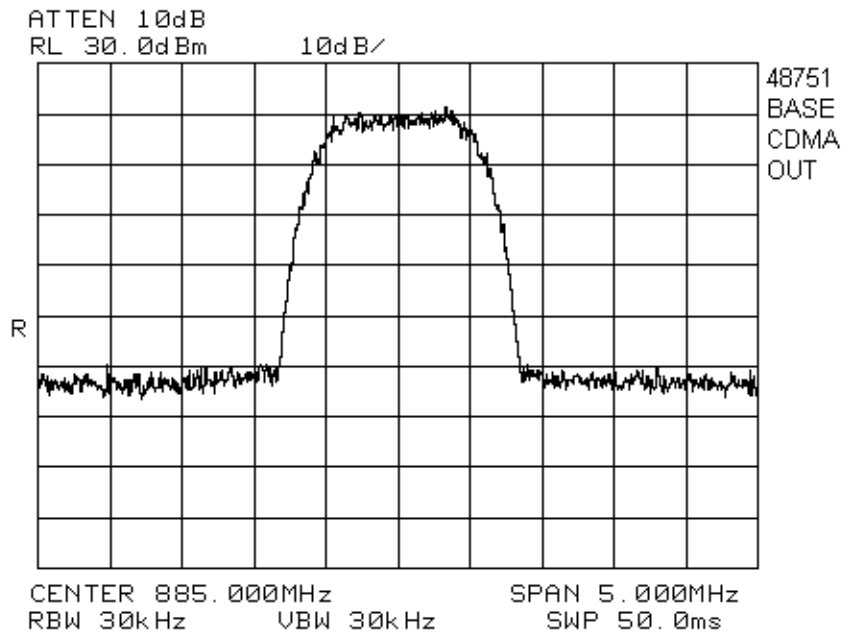
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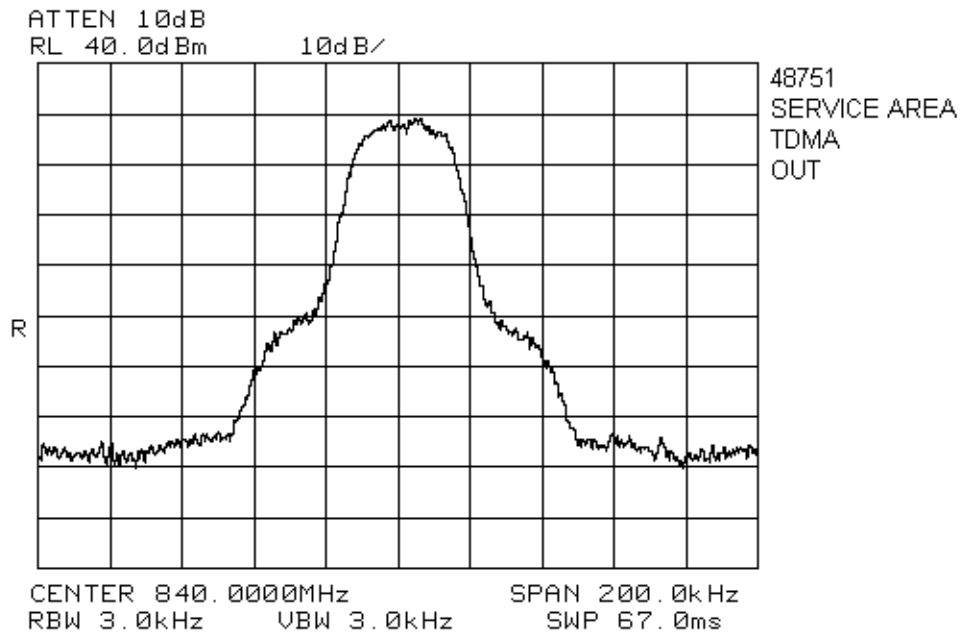
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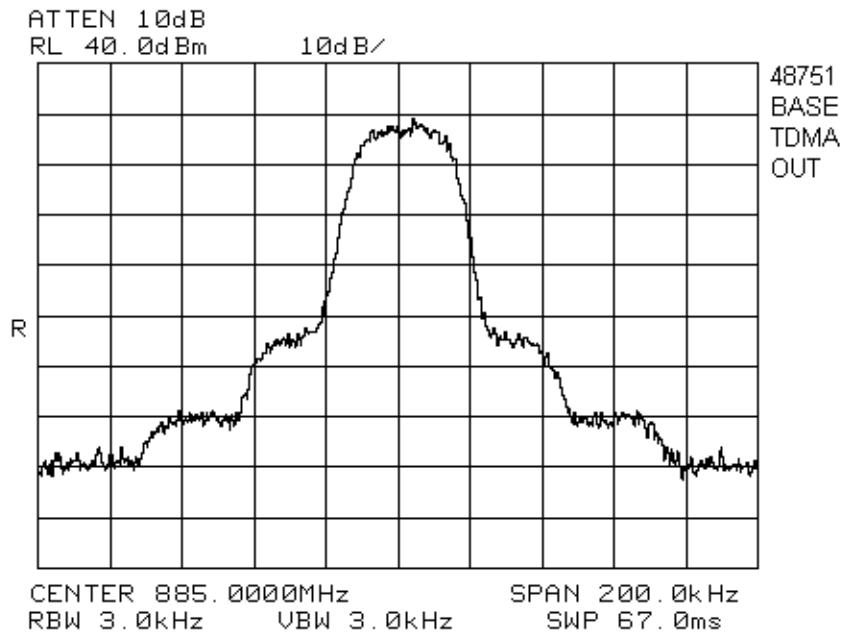
EQUIPMENT: 48750 / 48751 Repeater



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Section 5. Spurious Emissions at Antenna Terminals

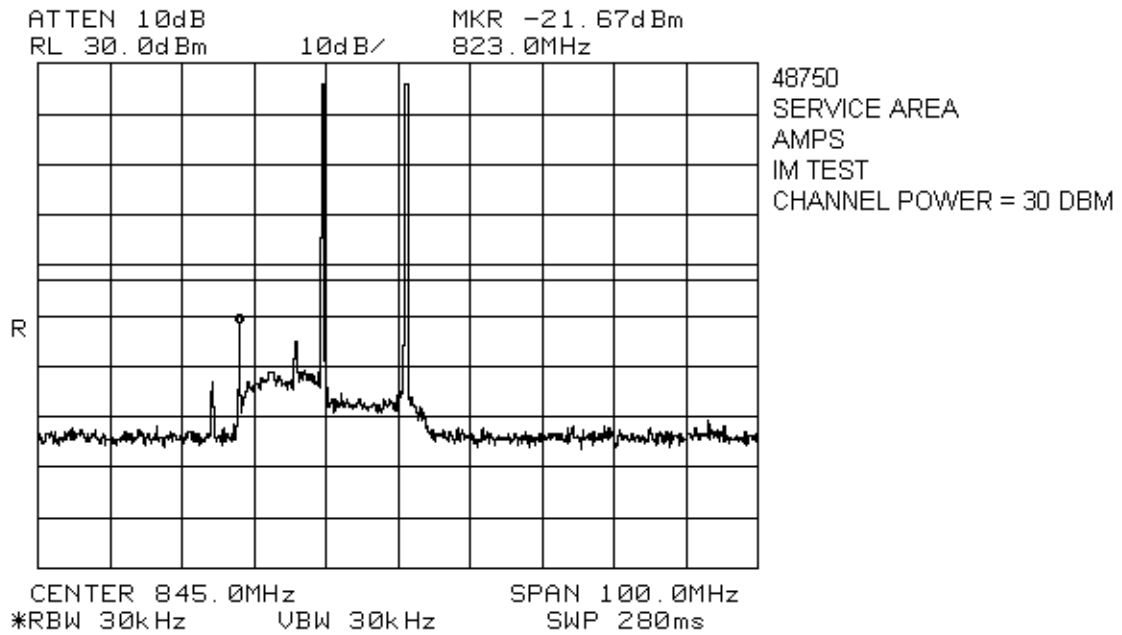
Test Performed By: Russell Grant	Date of Test: September 21, 2000
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Minimum Standard: Para. No. 22.917(e).

Test Results: Complies.

Test Data: See attached graphs.

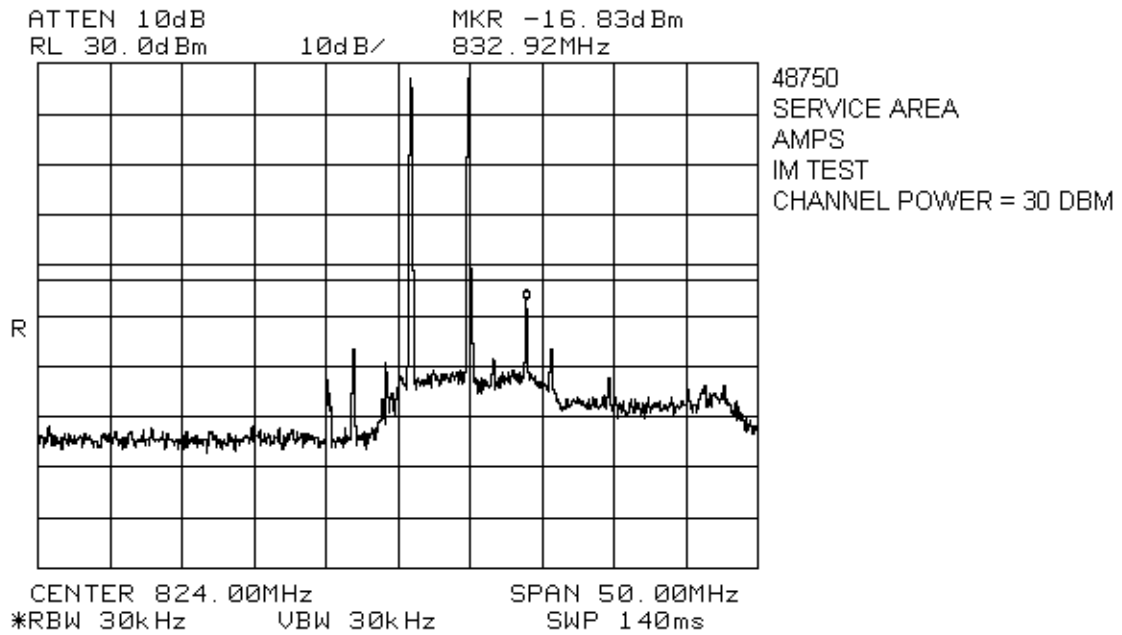
EQUIPMENT: 48750 / 48751 Repeater



Tx = 834.300 MHz

Tx = 845.790 MHz

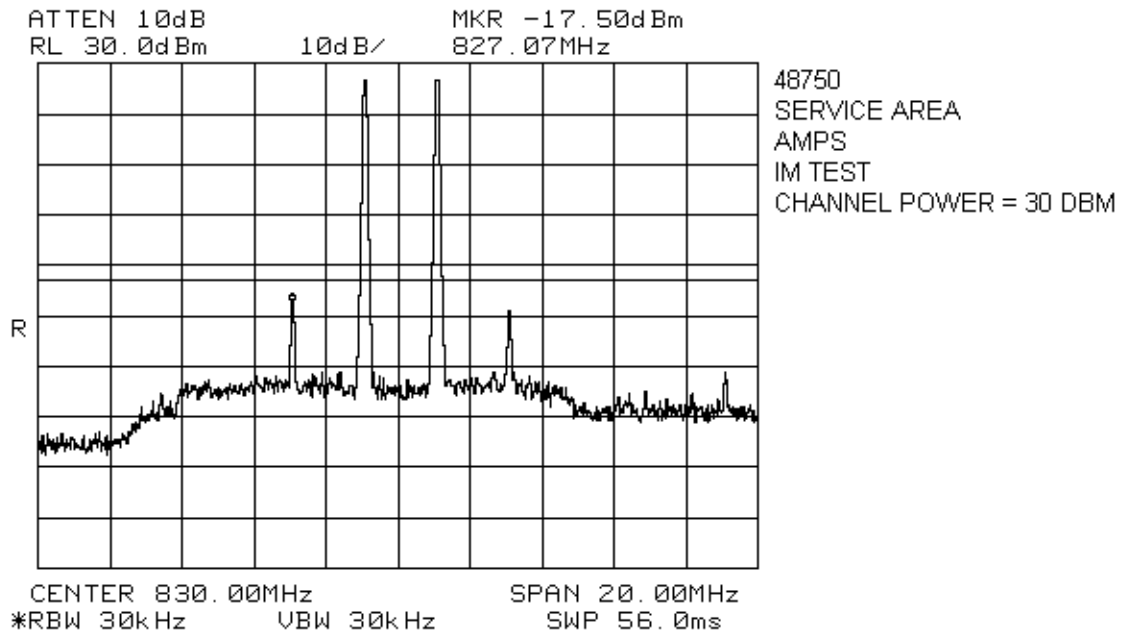
EQUIPMENT: 48750 / 48751 Repeater



Tx = 824.730 MHz

Tx = 828.720 MHz

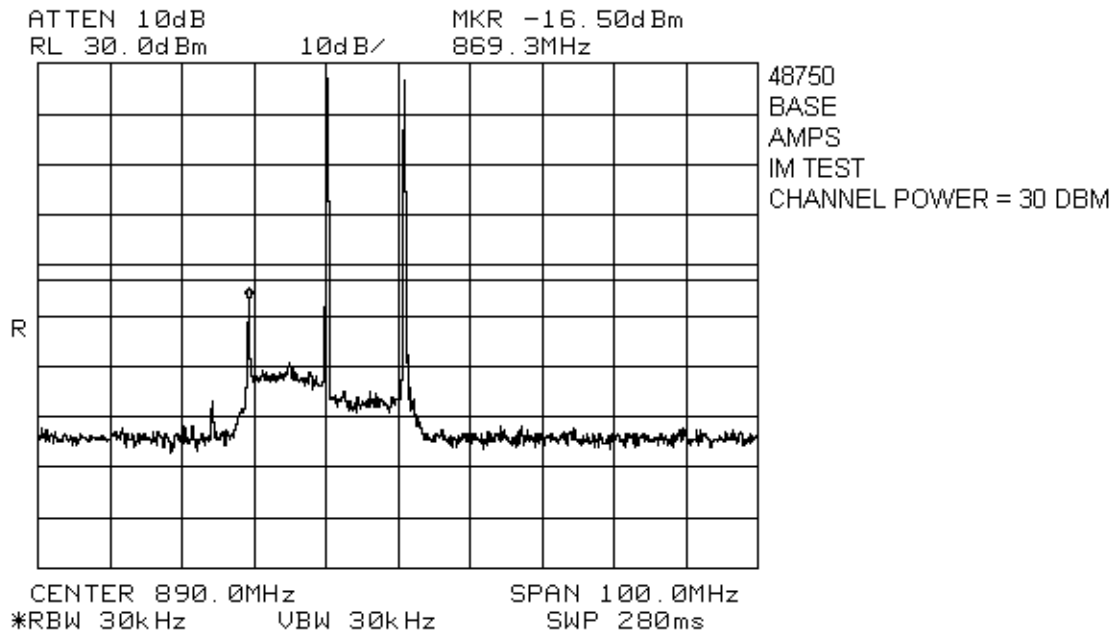
EQUIPMENT: 48750 / 48751 Repeater



Tx = 829 MHz

Tx = 831 MHz

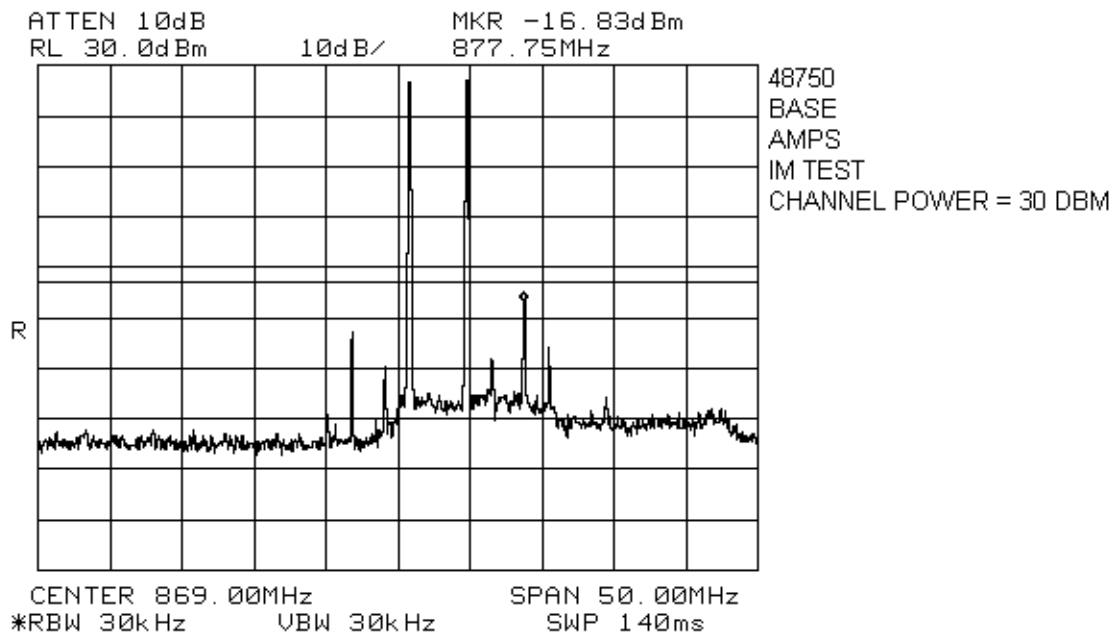
EQUIPMENT: 48750 / 48751 Repeater



Tx = 879.300 MHz

Tx = 890.790 MHz

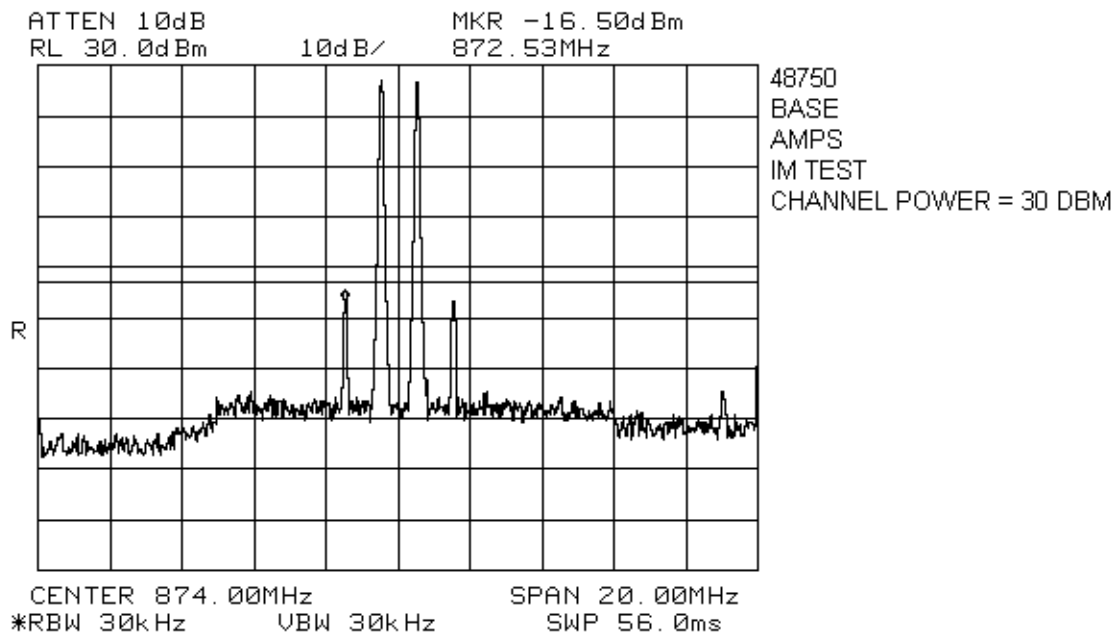
EQUIPMENT: 48750 / 48751 Repeater



Tx = 869.730 MHz

Tx = 873.720 MHz

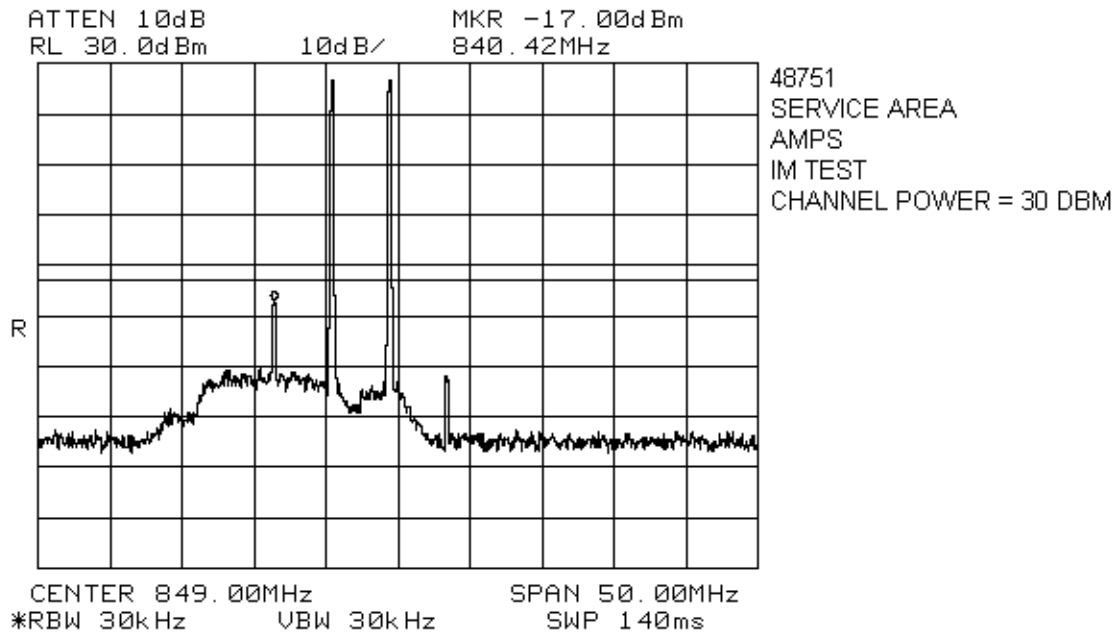
EQUIPMENT: 48750 / 48751 Repeater



Tx = 873.5 MHz

Tx = 875.5 MHz

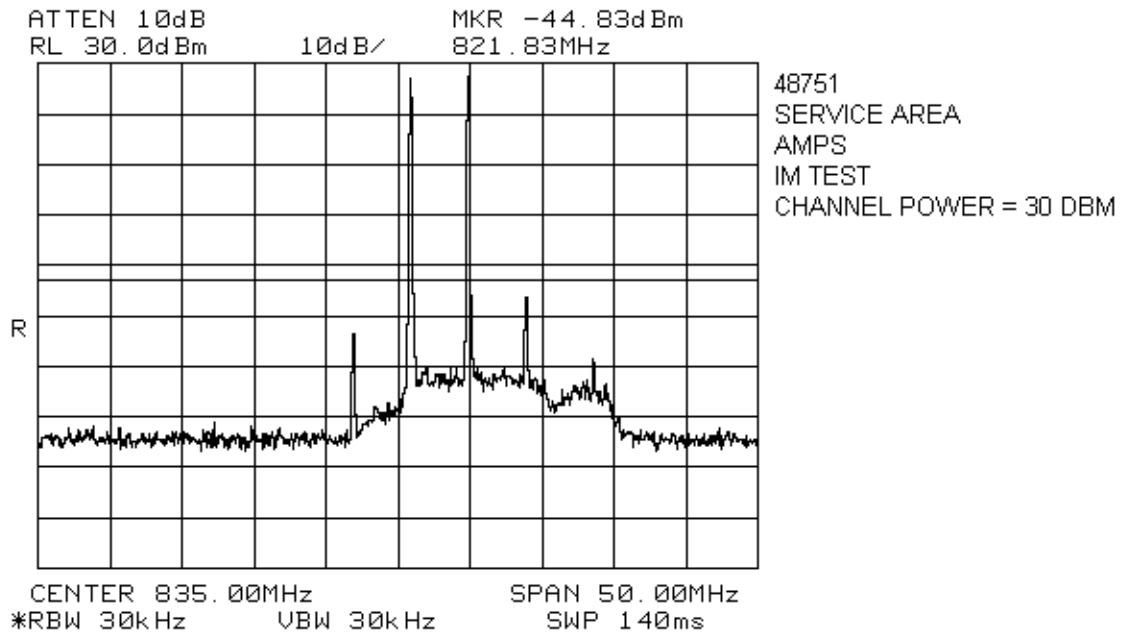
EQUIPMENT: 48750 / 48751 Repeater



Tx = 844.290 MHz

Tx = 848.280 MHz

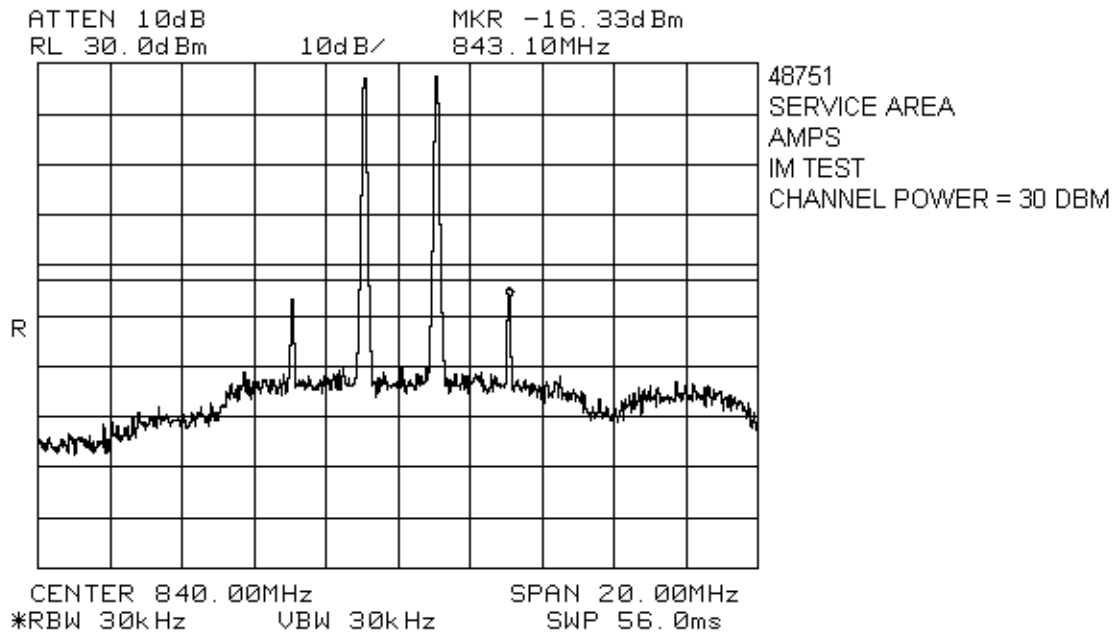
EQUIPMENT: 48750 / 48751 Repeater



Tx = 835.710 MHz

Tx = 839.700 MHz

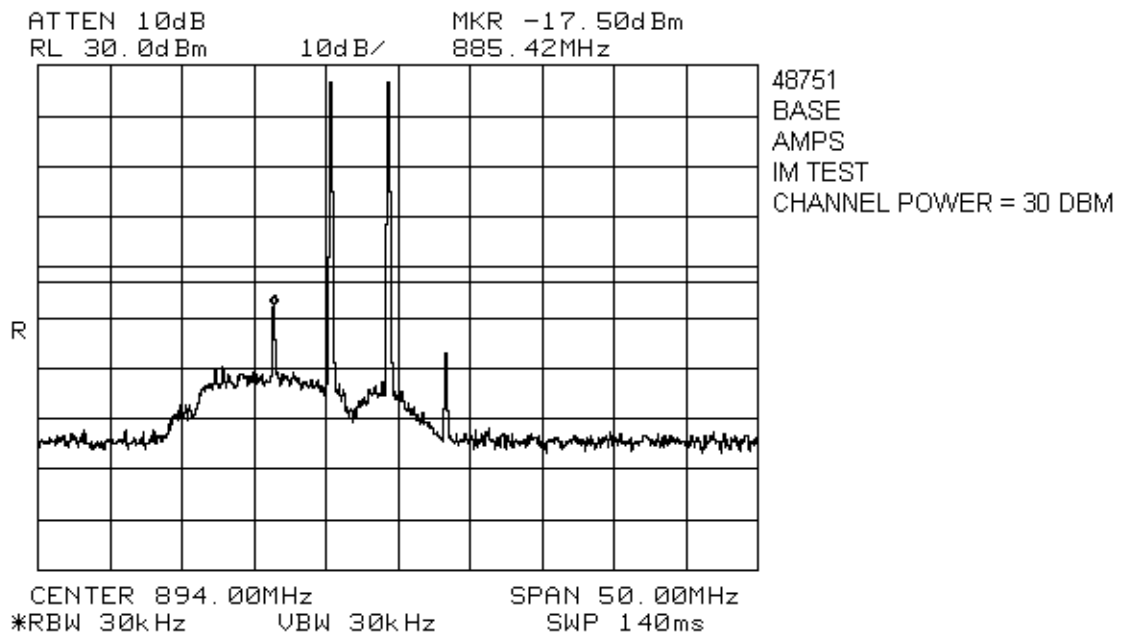
EQUIPMENT: 48750 / 48751 Repeater



Tx = 839 MHz

Tx = 841 MHz

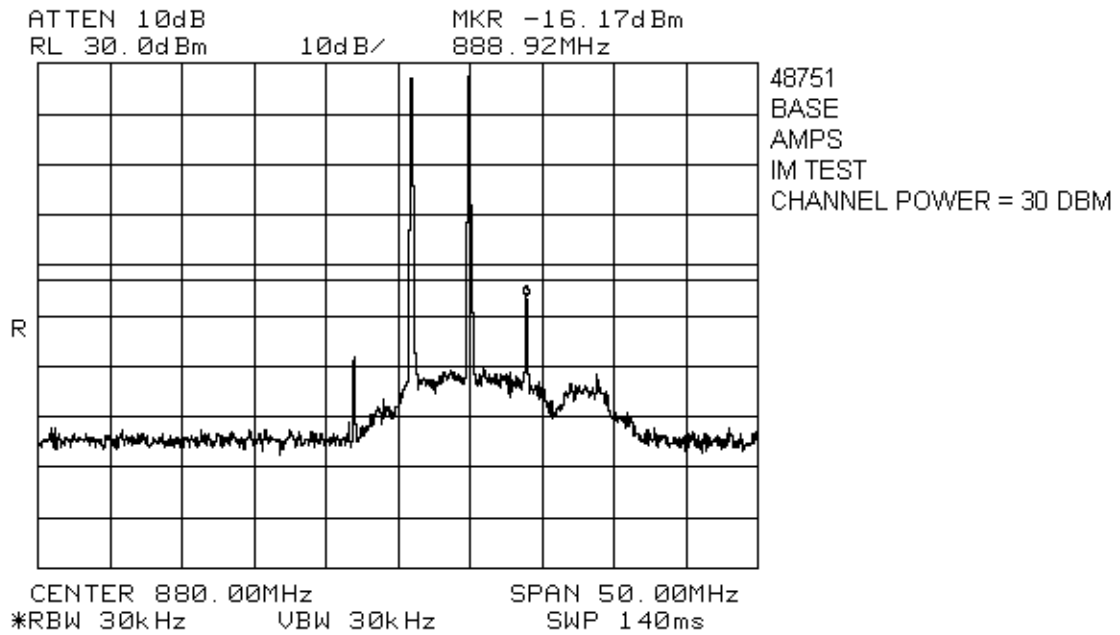
EQUIPMENT: 48750 / 48751 Repeater



Tx = 889.290 MHz

Tx = 893.280 MHz

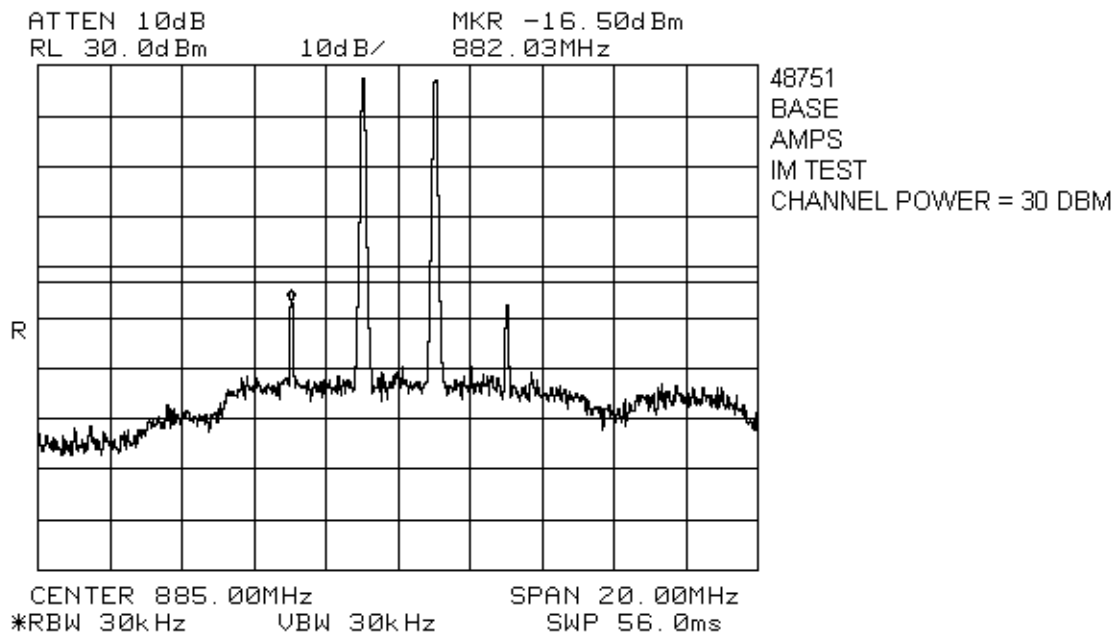
EQUIPMENT: 48750 / 48751 Repeater



Tx = 880.890 MHz

Tx 884.880 MHz

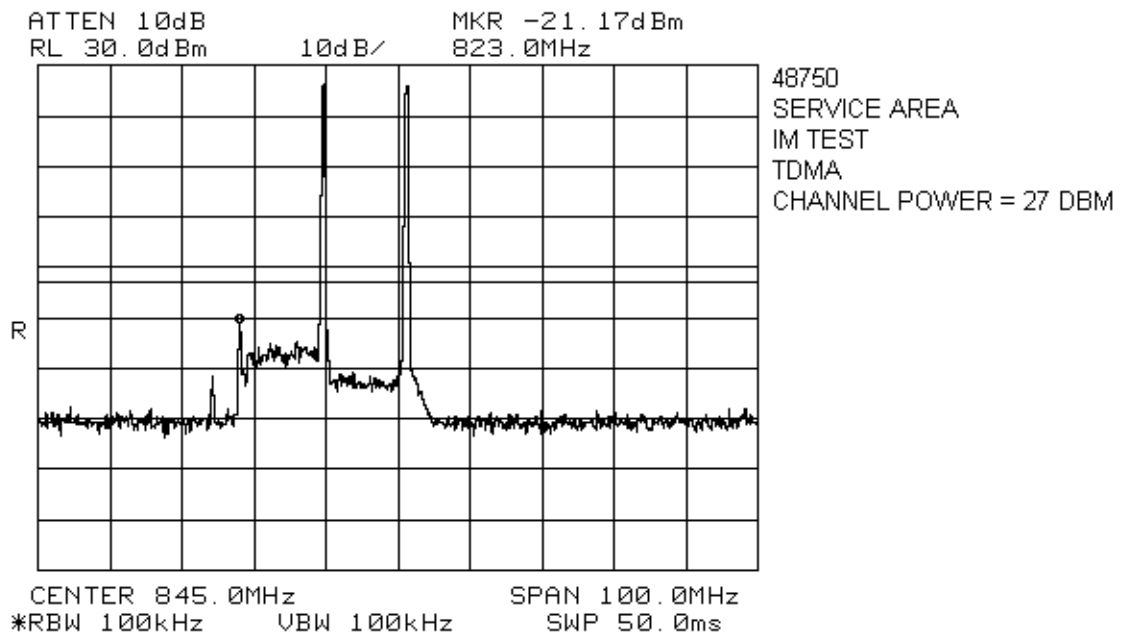
EQUIPMENT: 48750 / 48751 Repeater



Tx = 884 MHz

Tx = 886 MHz

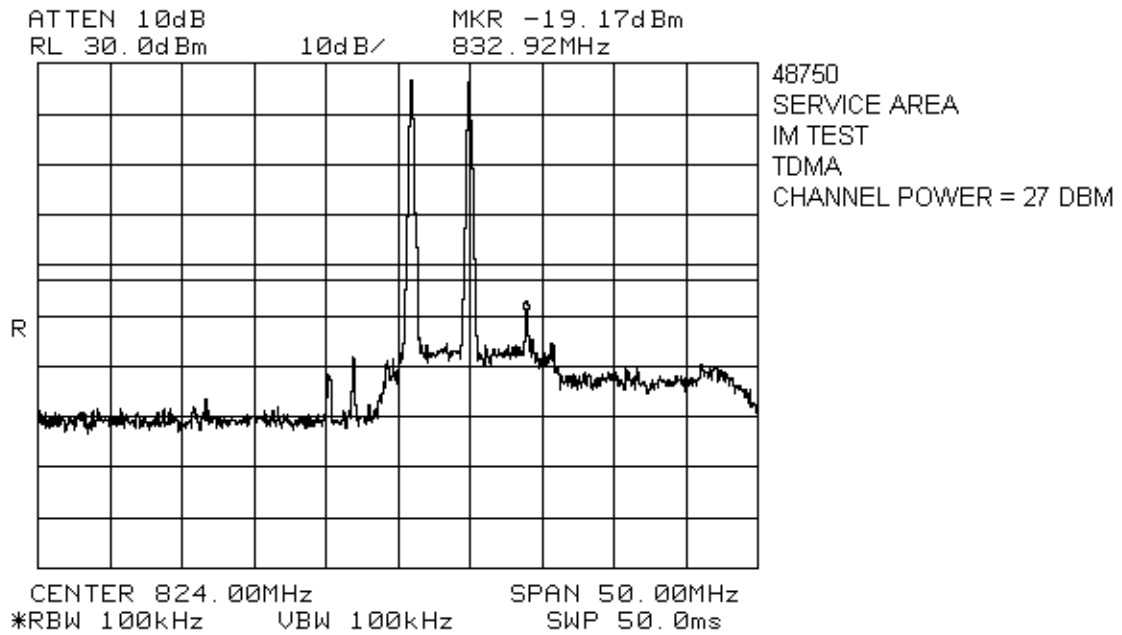
EQUIPMENT: 48750 / 48751 Repeater



Tx = 834.300 MHz

Tx = 845.790 MHz

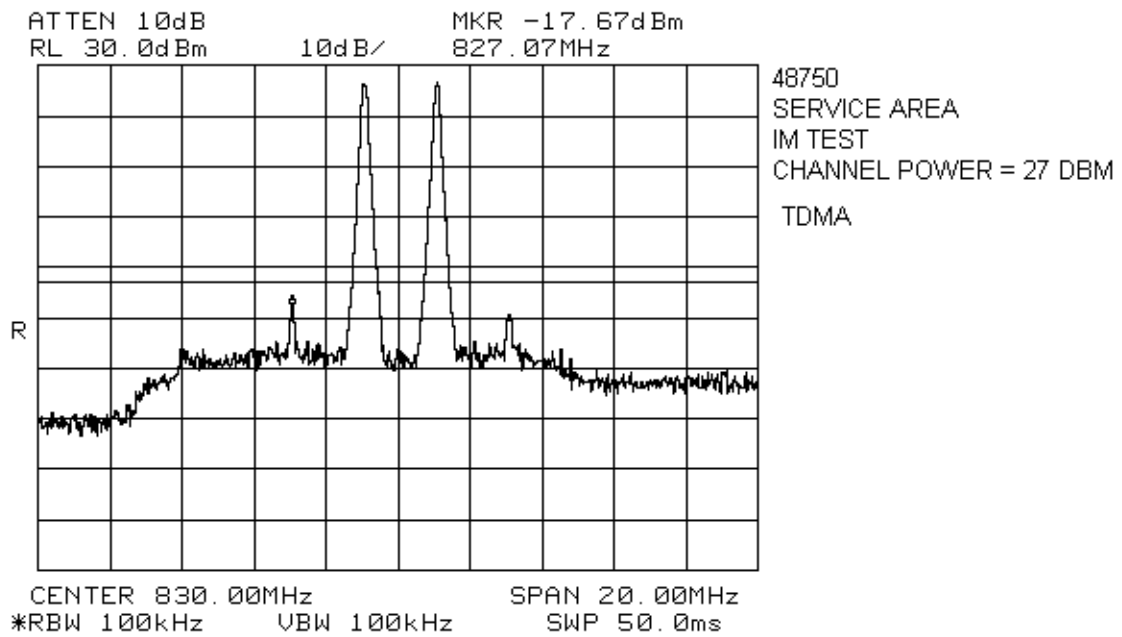
EQUIPMENT: 48750 / 48751 Repeater



Tx = 824.730 MHz

Tx = 828.720 MHz

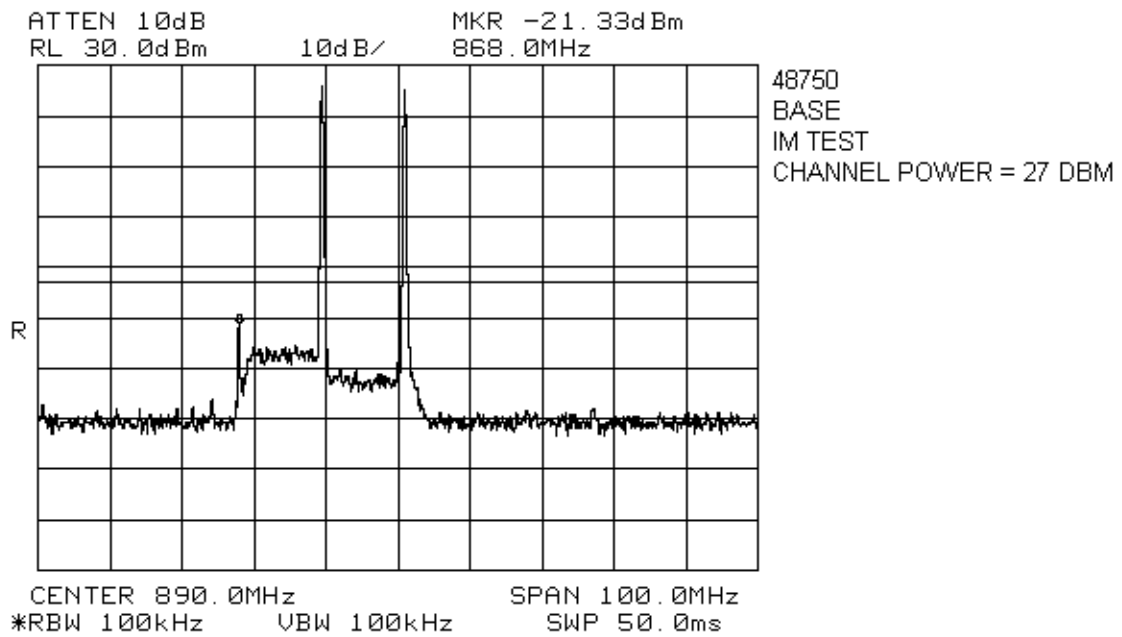
EQUIPMENT: 48750 / 48751 Repeater



Tx = 829 MHz

Tx = 831 MHz

EQUIPMENT: 48750 / 48751 Repeater

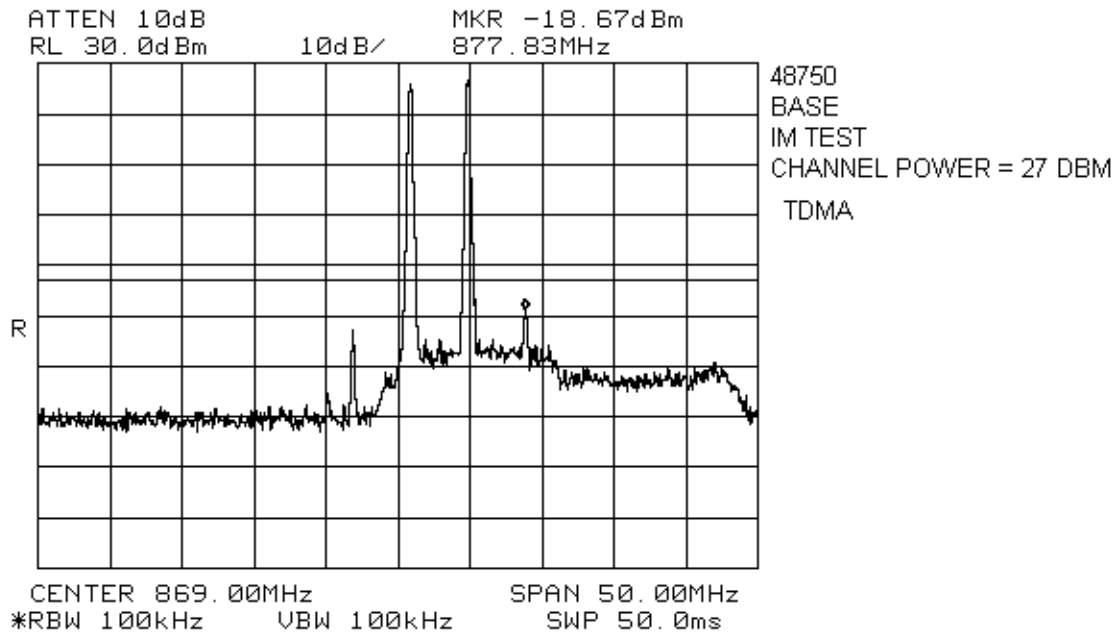


TDMA

Tx = 879.300 MHz

Tx = 890.790 MHz

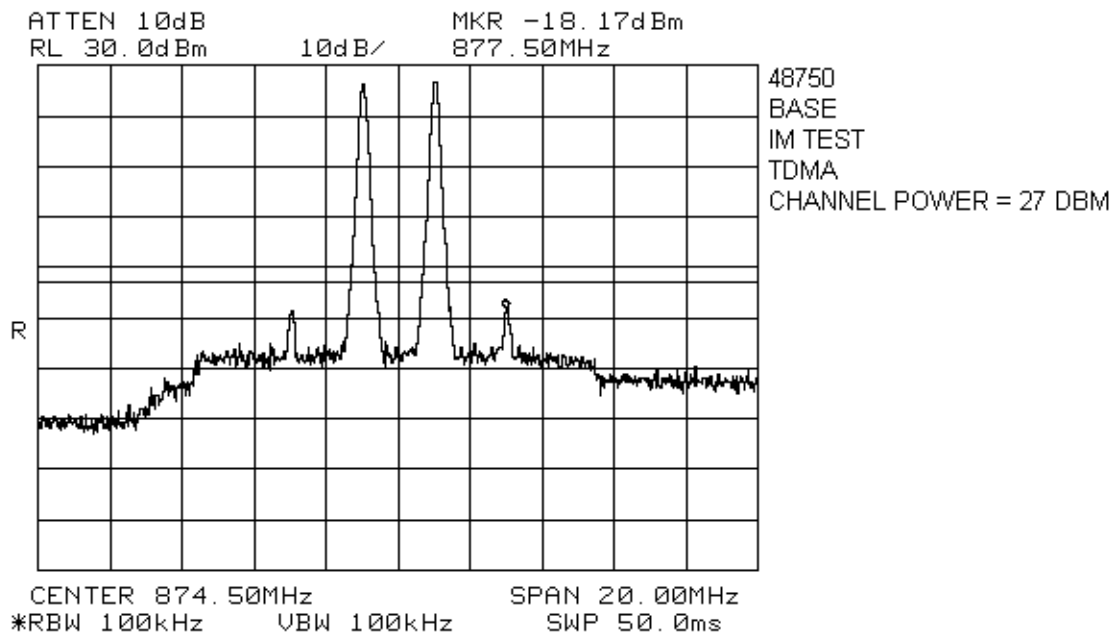
EQUIPMENT: 48750 / 48751 Repeater



Tx = 869.730 MHz

Tx = 873.720 MHz

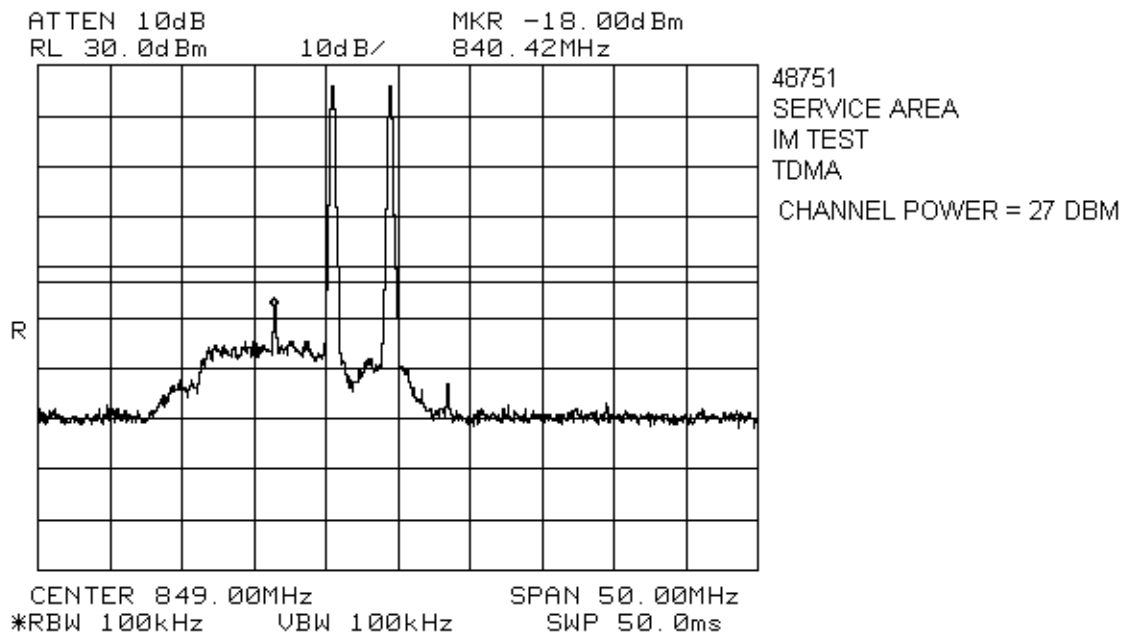
EQUIPMENT: 48750 / 48751 Repeater



Tx = 873.5 MHz

Tx = 875.5 MHz

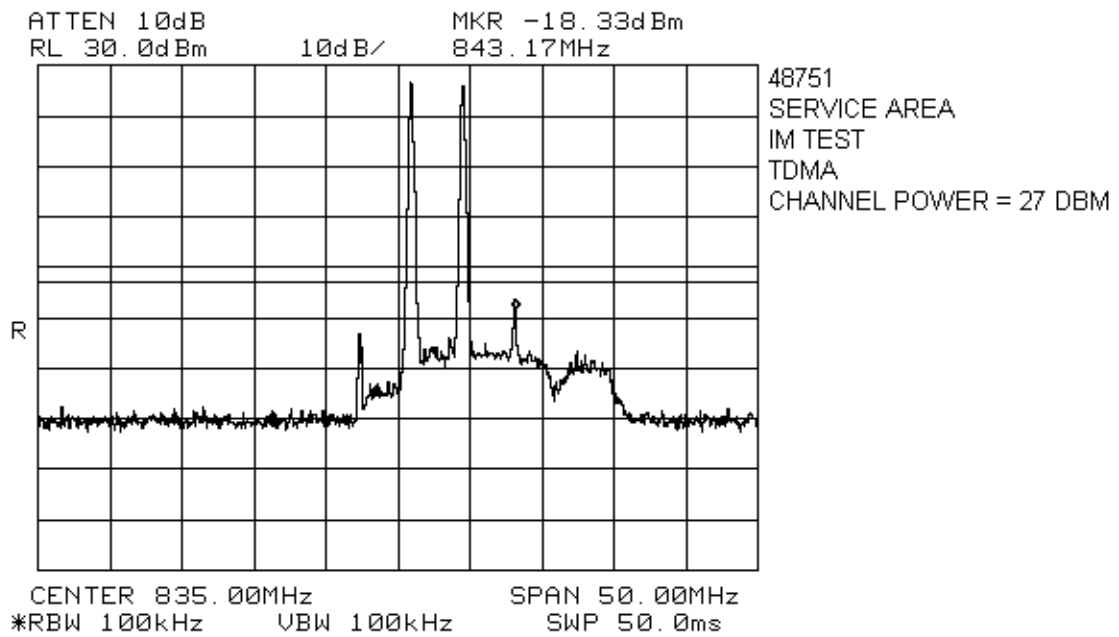
EQUIPMENT: 48750 / 48751 Repeater



Tx = 844.290 MHz

Tx = 848.280 MHz

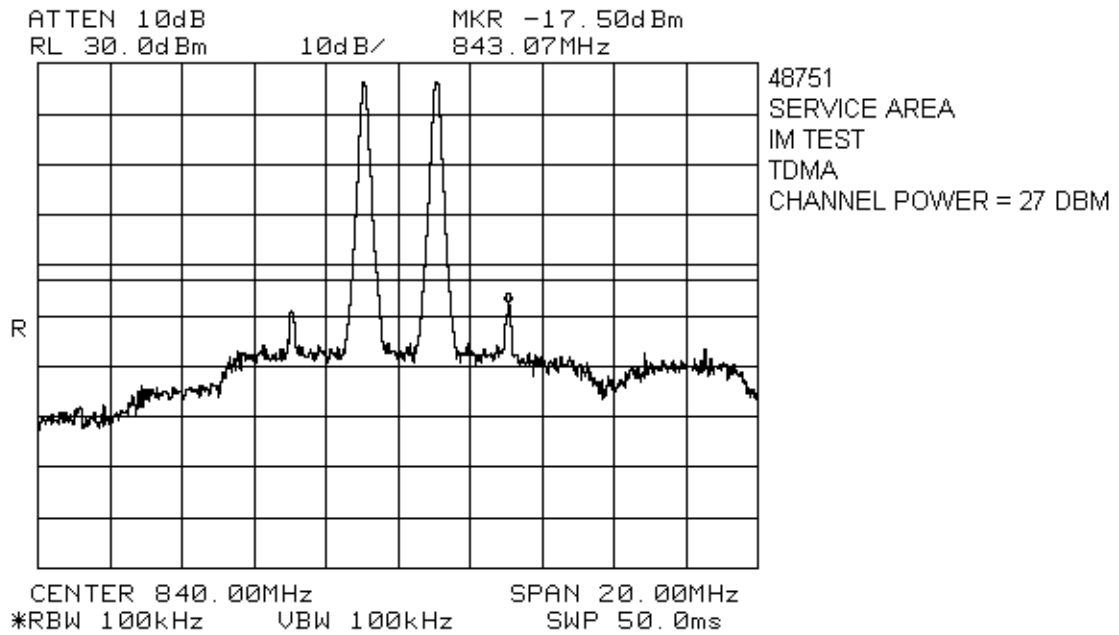
EQUIPMENT: 48750 / 48751 Repeater



Tx = 835.710 MHz

Tx = 839.700 MHz

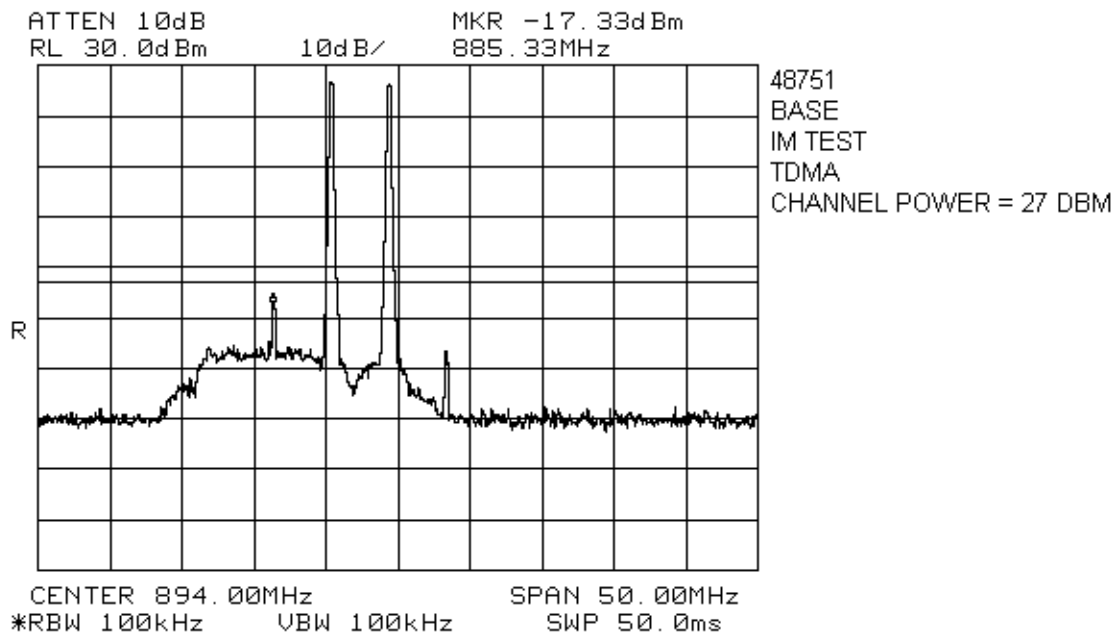
EQUIPMENT: 48750 / 48751 Repeater



Tx = 839 MHz

Tx = 841 MHz

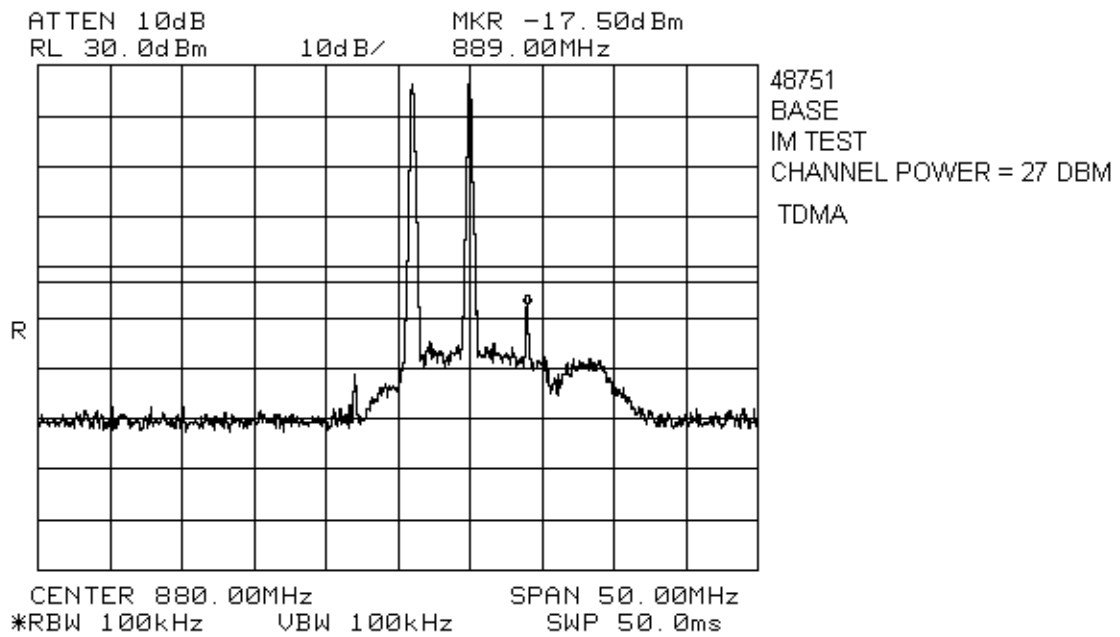
EQUIPMENT: 48750 / 48751 Repeater



Tx = 889.290 MHz

Tx = 893.280 MHz

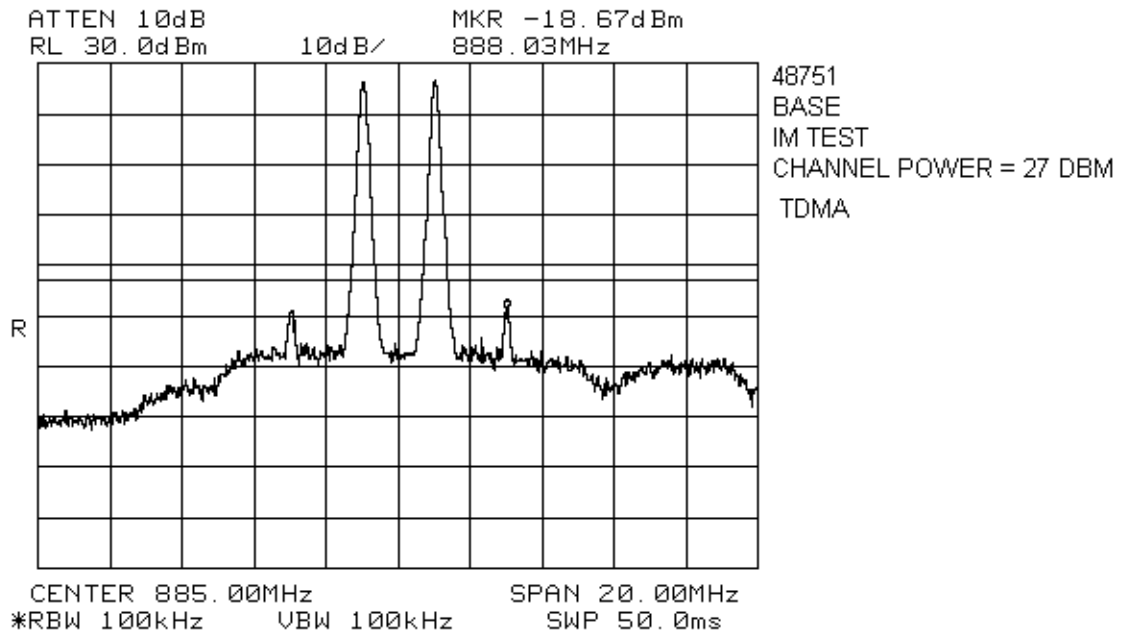
EQUIPMENT: 48750 / 48751 Repeater



Tx = 880.890 MHz

Tx = 884.880 MHz

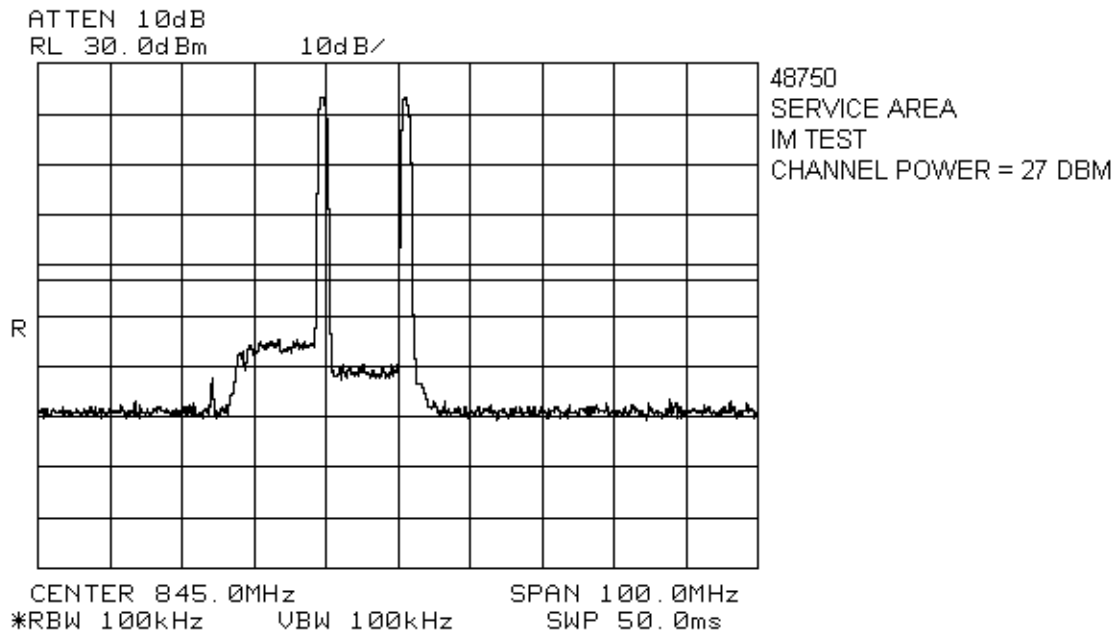
EQUIPMENT: 48750 / 48751 Repeater



Tx = 884 MHz

Tx = 886 MHz

EQUIPMENT: 48750 / 48751 Repeater

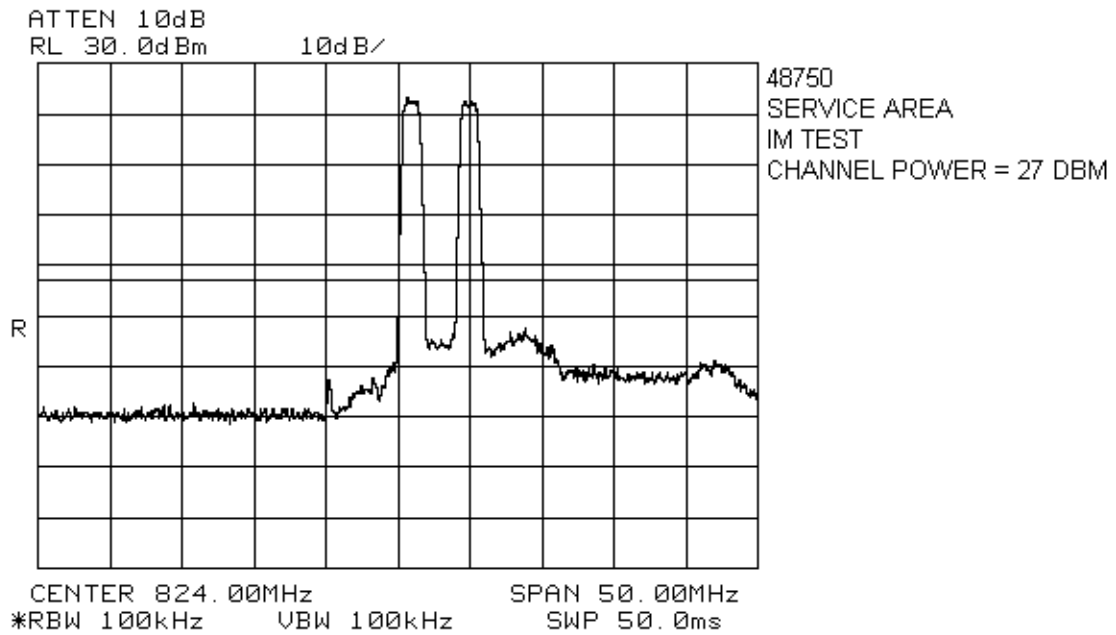


CDMA

Tx = 834.300 MHz

Tx = 845.790 MHz

EQUIPMENT: 48750 / 48751 Repeater

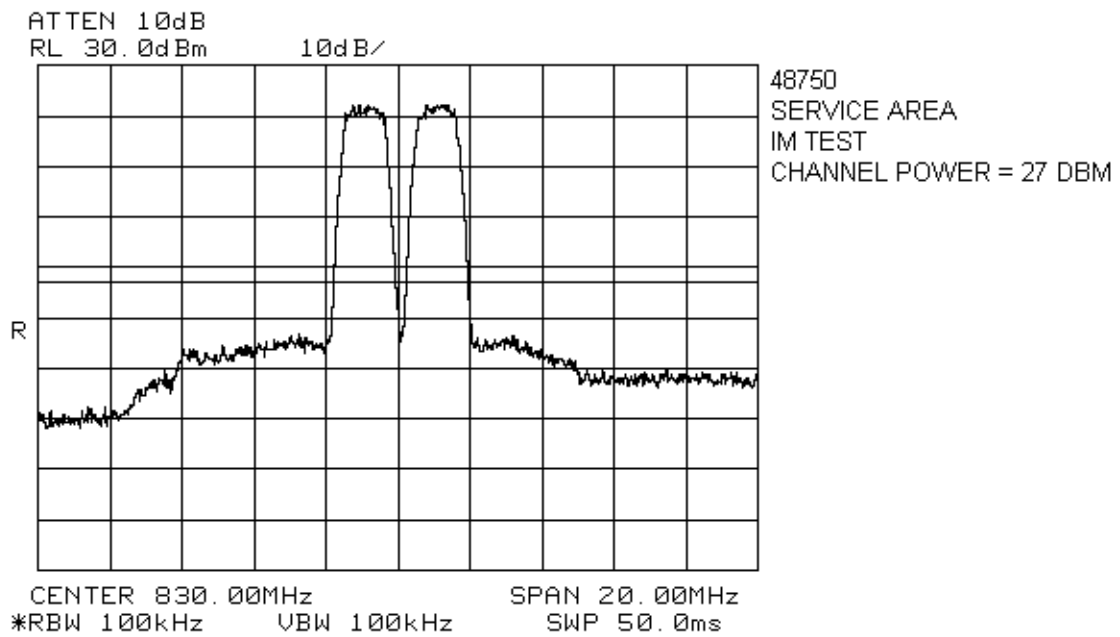


CDMA

Tx = 824.730 MHz

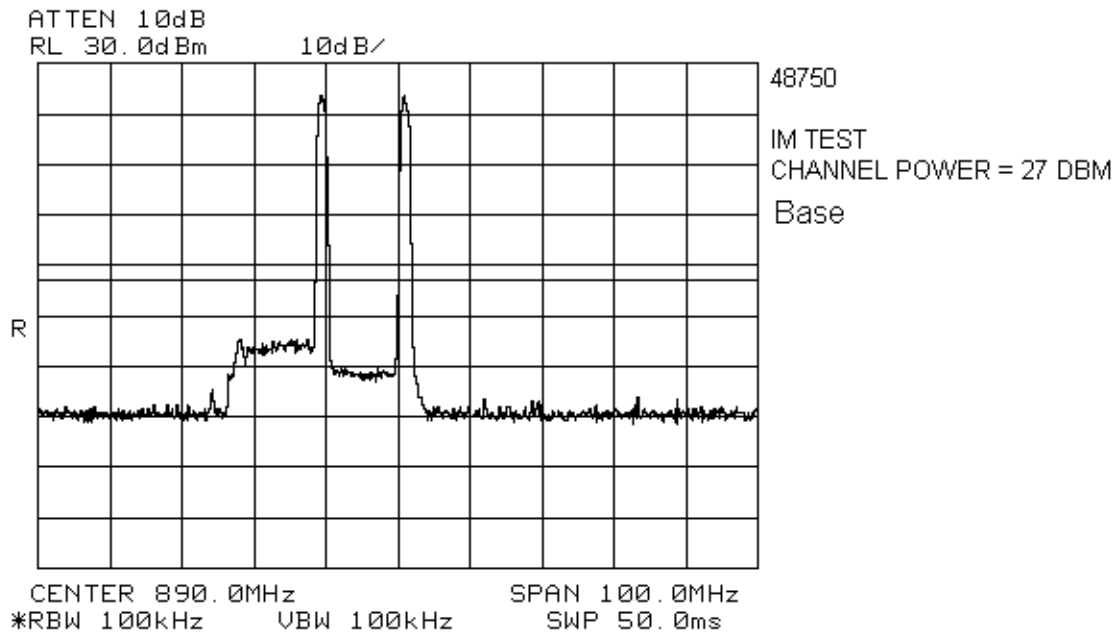
Tx = 828.720 MHz

EQUIPMENT: 48750 / 48751 Repeater



CMDA
Tx 829 MHz
Tx 831 MHz

EQUIPMENT: 48750 / 48751 Repeater

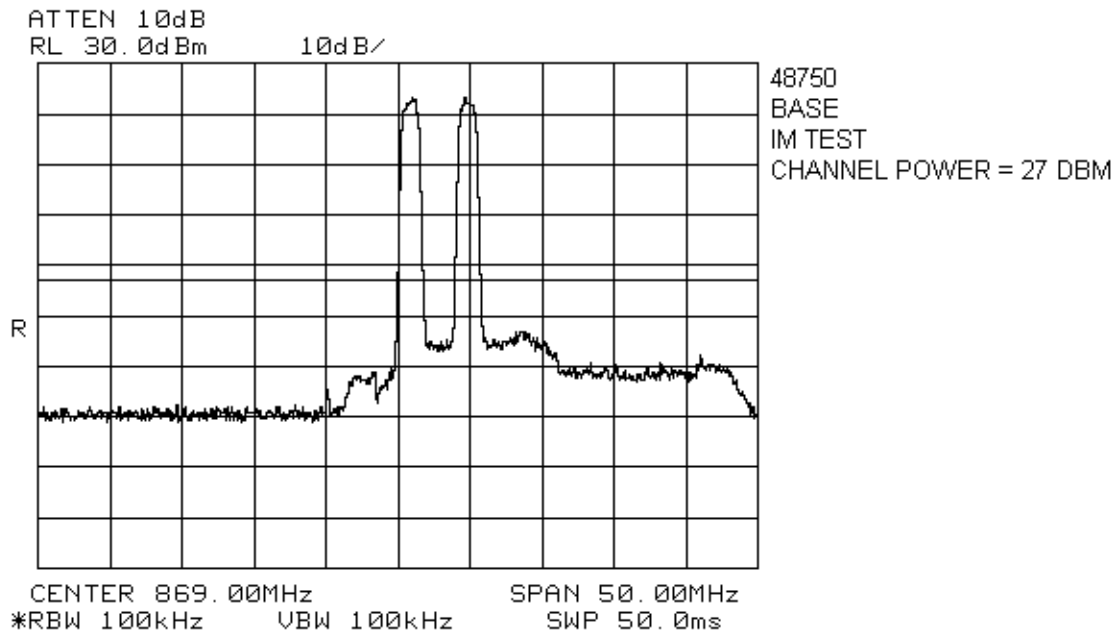


CDMA

Tx = 879.300 MHz

Tx = 890.790 MHz

EQUIPMENT: 48750 / 48751 Repeater

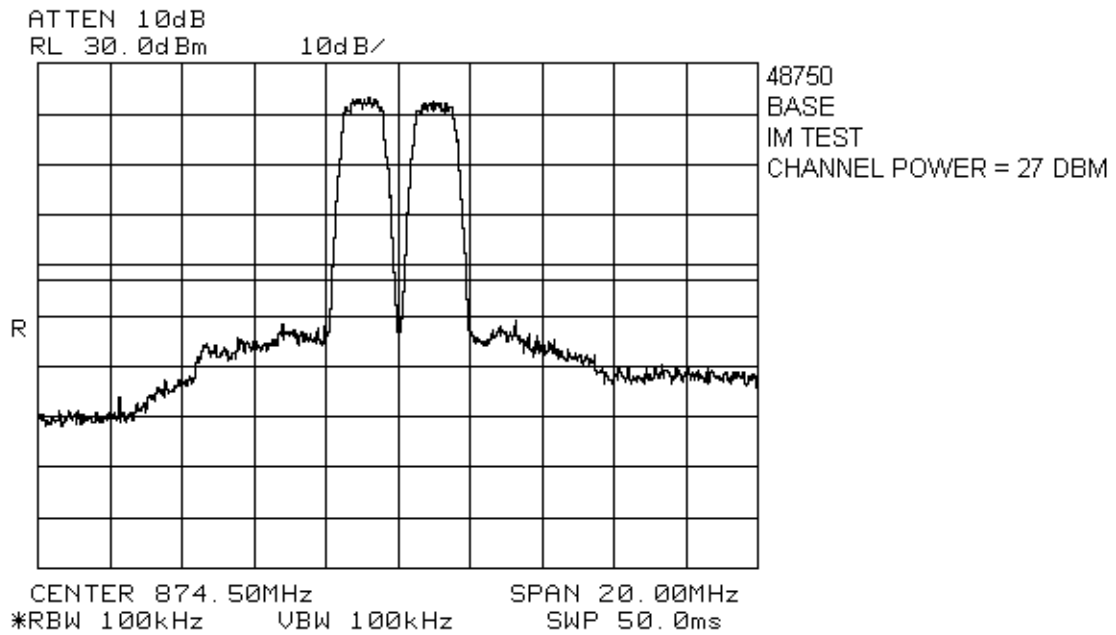


CMDA

Tx = 869.730 MHz

Tx = 873.720 MHz

EQUIPMENT: 48750 / 48751 Repeater

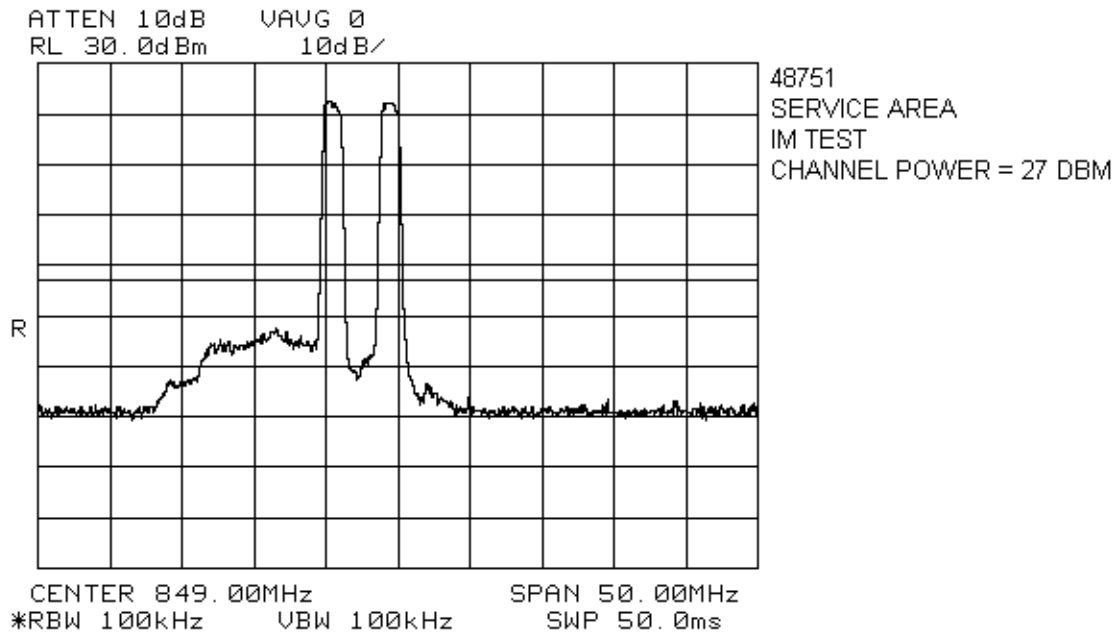


CMDA

Tx = 873.5 MHz

Tx = 875.5 MHz

EQUIPMENT: 48750 / 48751 Repeater

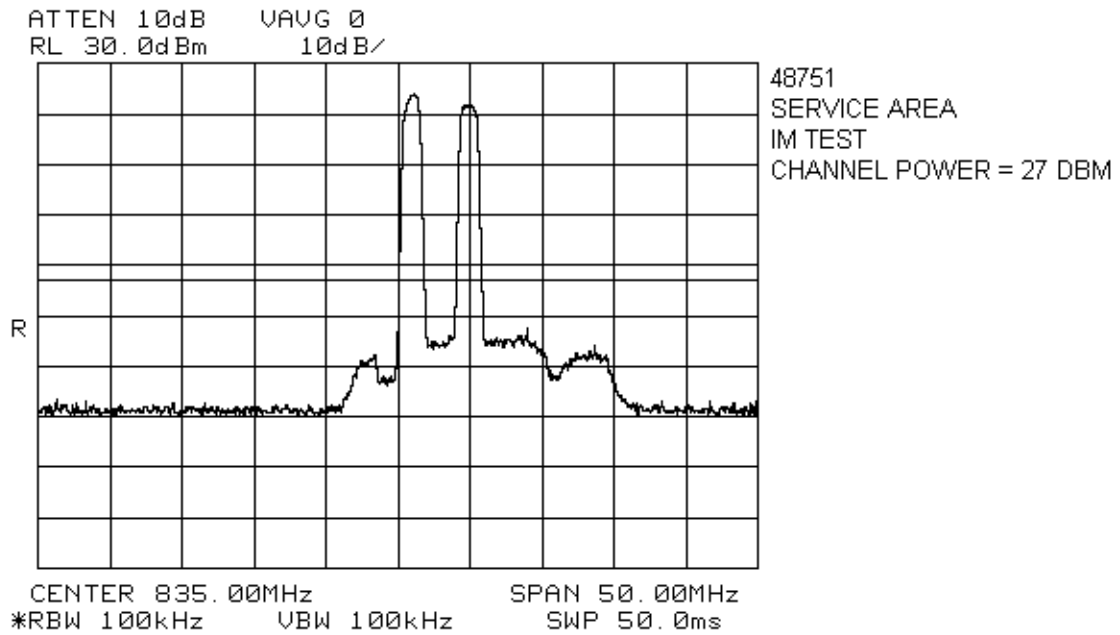


CDMA

Tx = 844.290 MHz

Tx = 848.280 MHz

EQUIPMENT: 48750 / 48751 Repeater

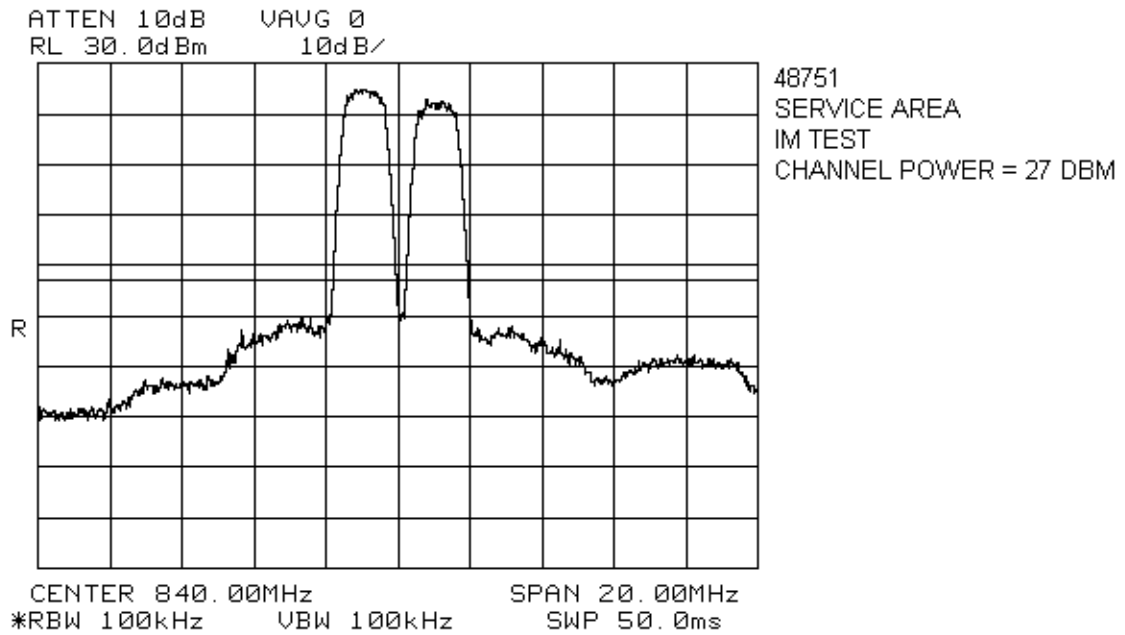


CDMA

Tx = 835.710 MHz

Tx = 839.700 MHz

EQUIPMENT: 48750 / 48751 Repeater

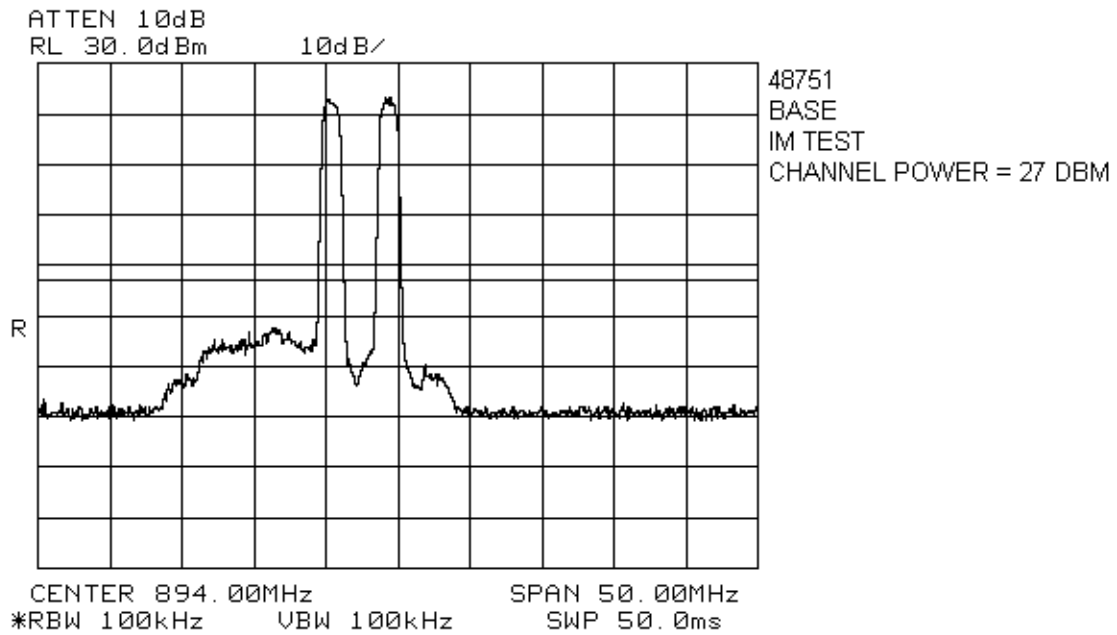


CDMA

Tx = 839 MHz

Tx = 841 MHz

EQUIPMENT: 48750 / 48751 Repeater

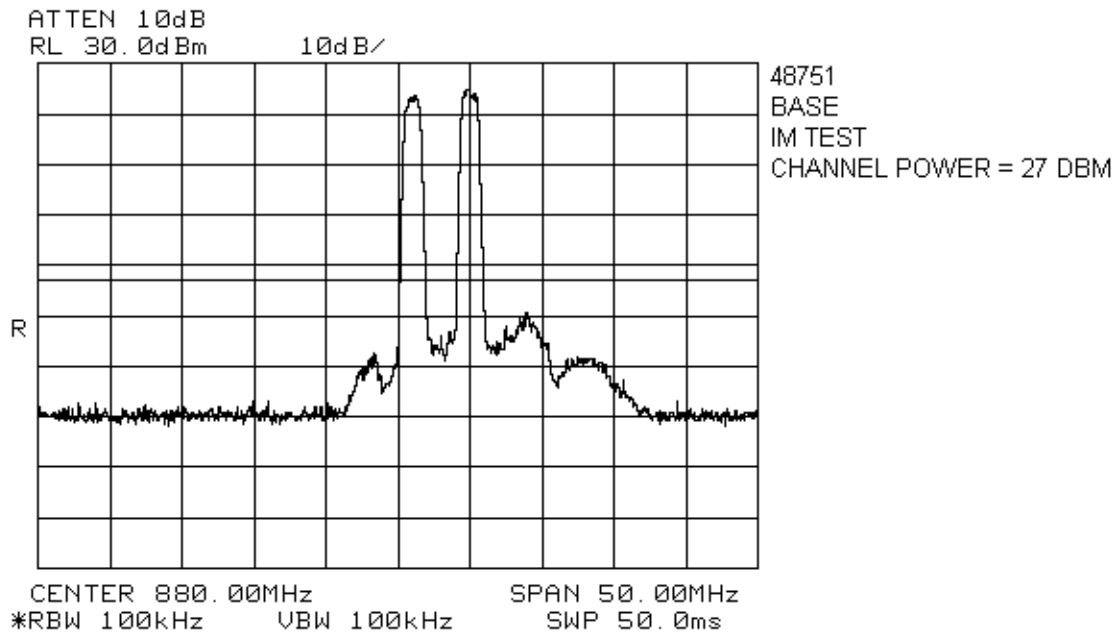


CDMA

Tx = 889.290 MHz

Tx = 893.280 MHz

EQUIPMENT: 48750 / 48751 Repeater

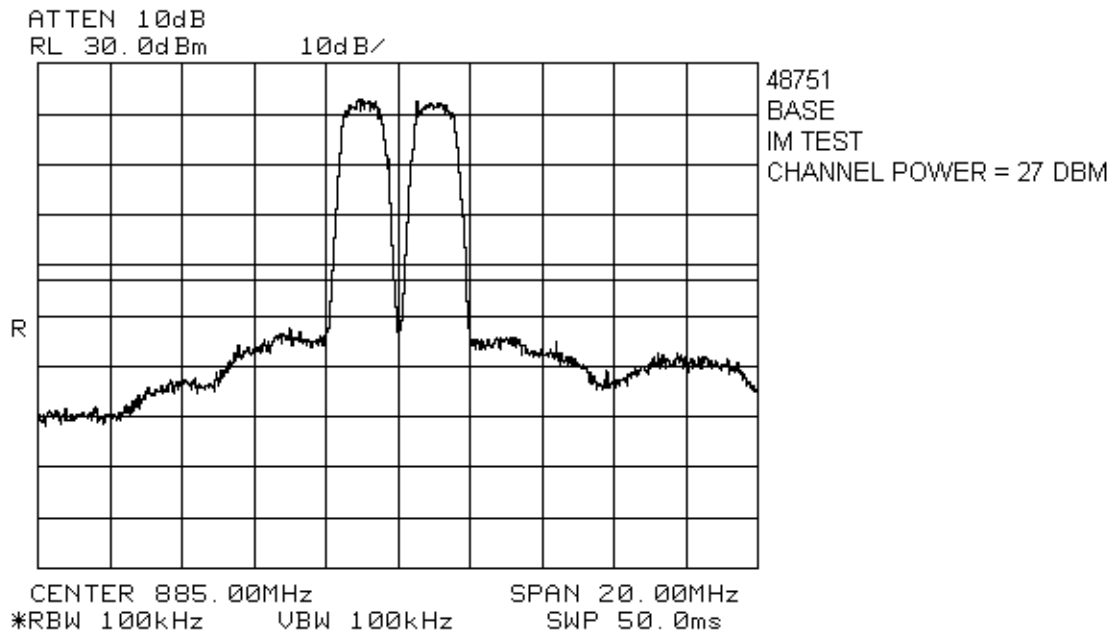


CDMA

Tx = 880.890 MHz

Tx 884.880 MHz

EQUIPMENT: 48750 / 48751 Repeater

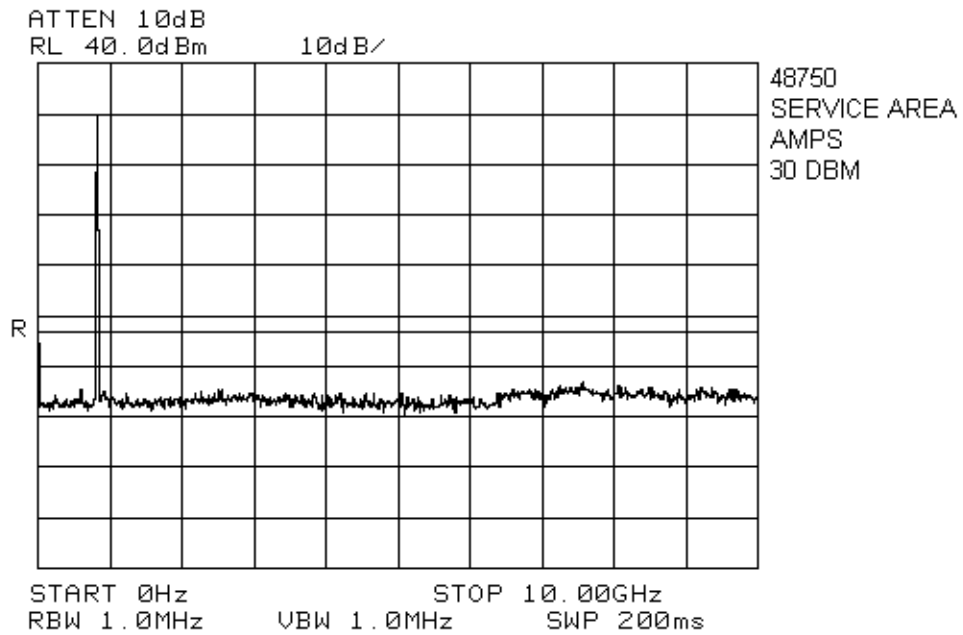


CDMA

Tx = 884 MHz

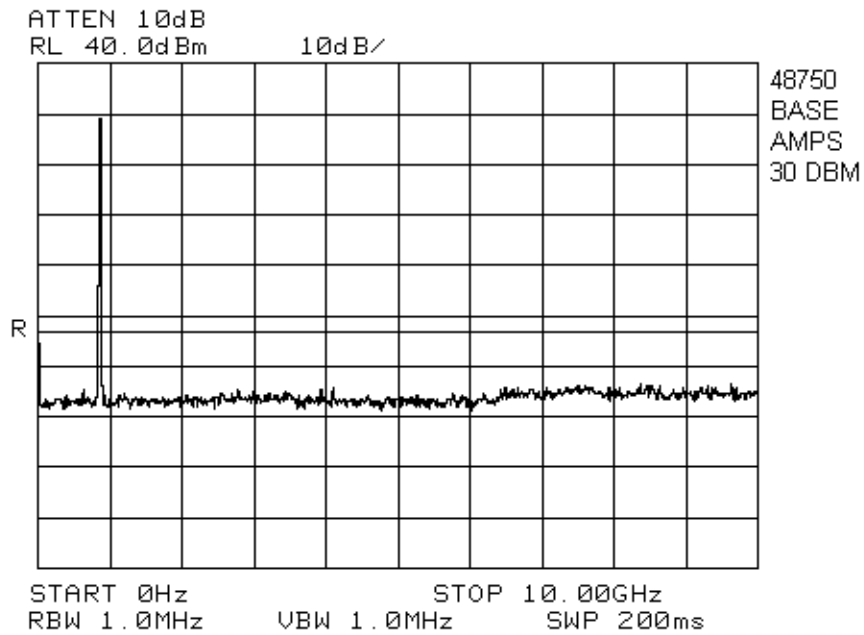
Tx = 886 MHz

EQUIPMENT: 48750 / 48751 Repeater



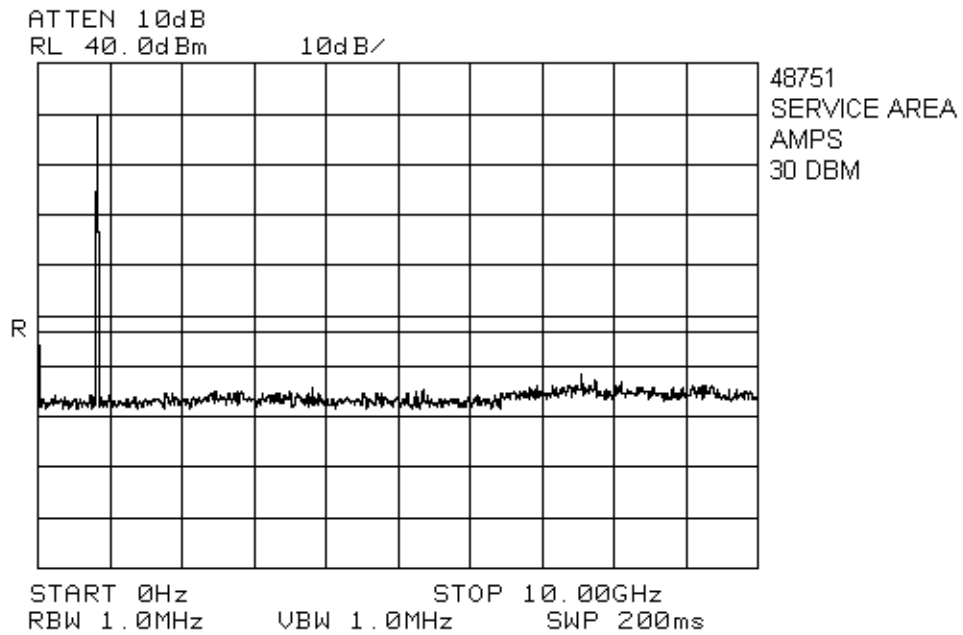
Tx = 830 MHz

EQUIPMENT: 48750 / 48751 Repeater



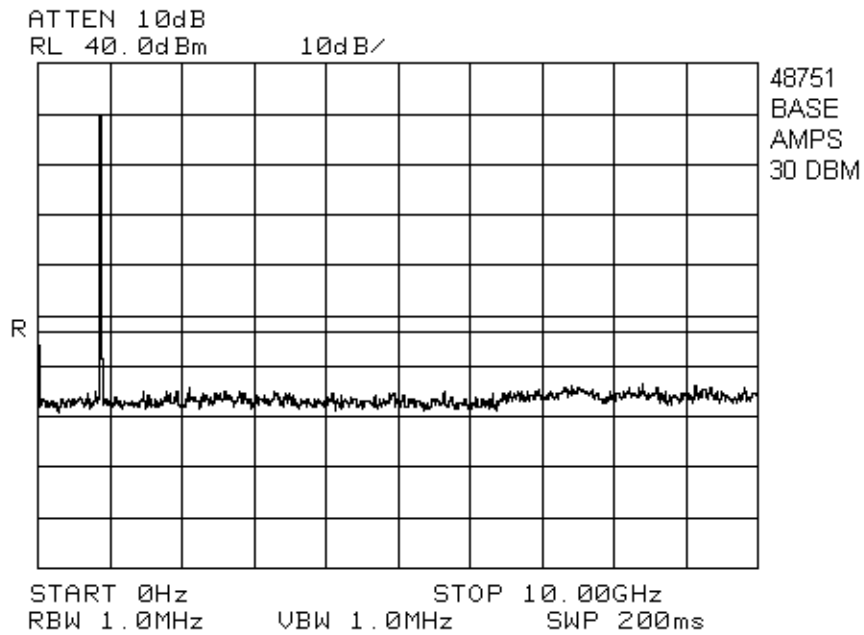
Tx = 874.5 MHz

EQUIPMENT: 48750 / 48751 Repeater



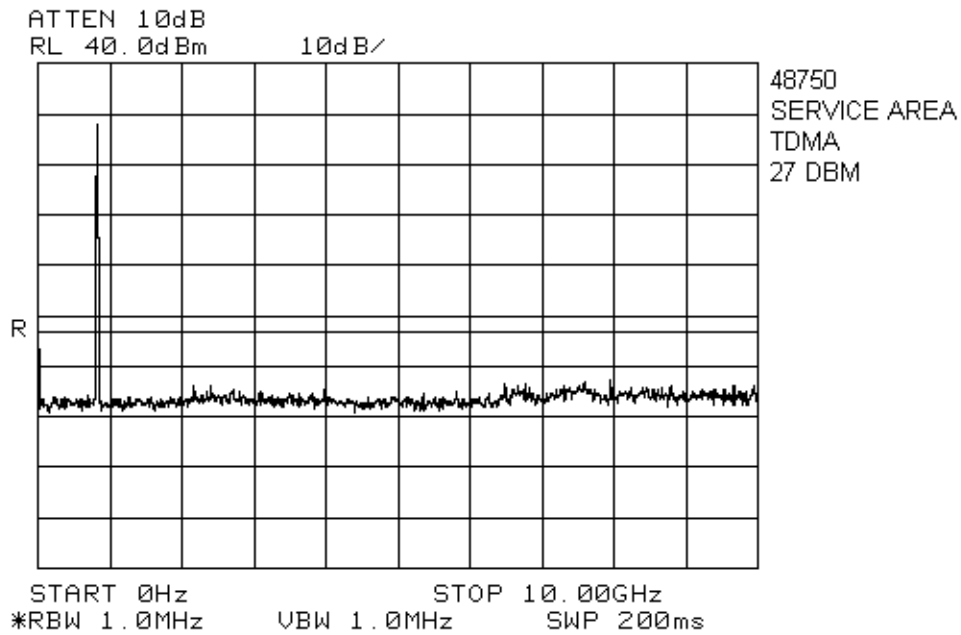
Tx = 840 MHz

EQUIPMENT: 48750 / 48751 Repeater



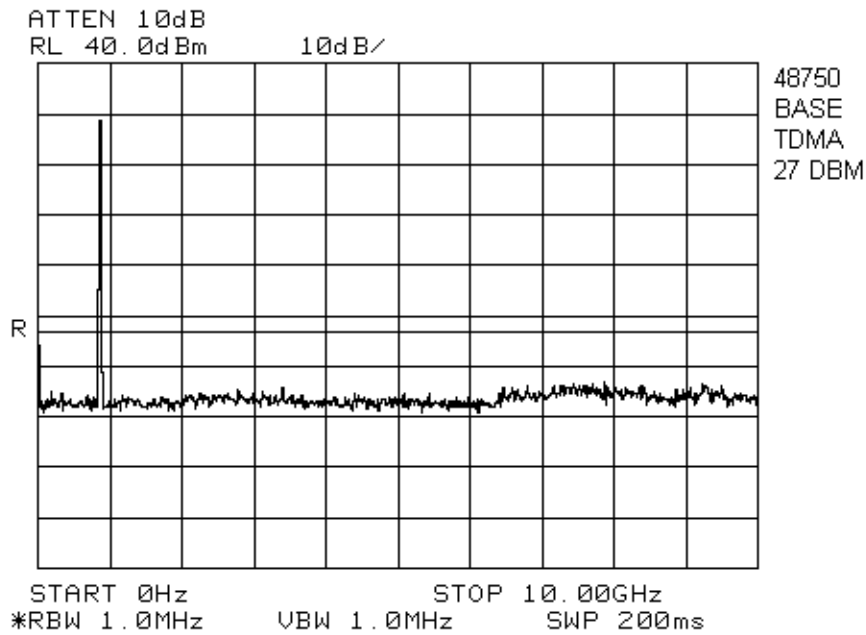
Tx = 885 MHz

EQUIPMENT: 48750 / 48751 Repeater



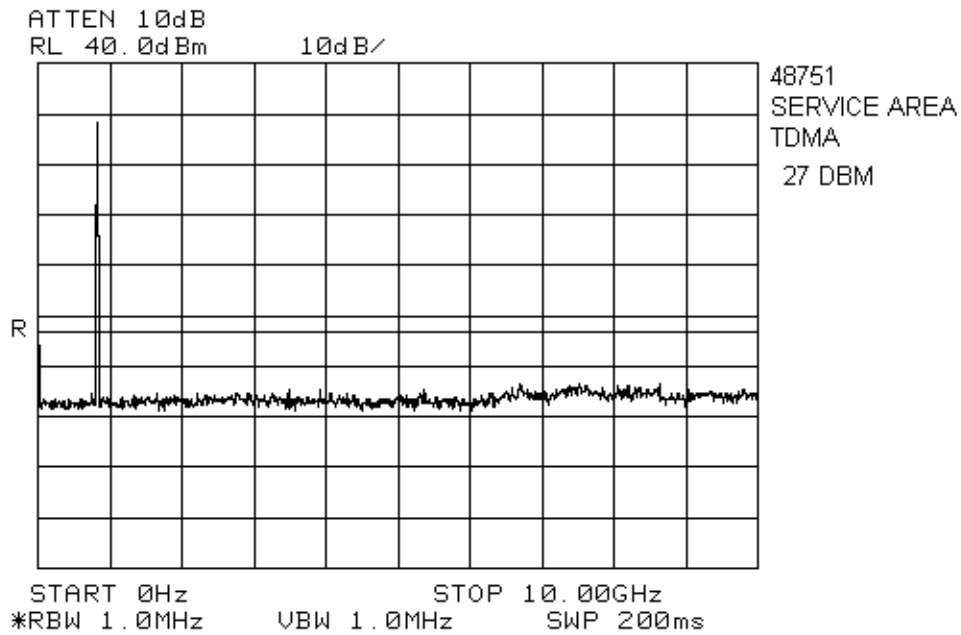
Tx = 830 MHz

EQUIPMENT: 48750 / 48751 Repeater



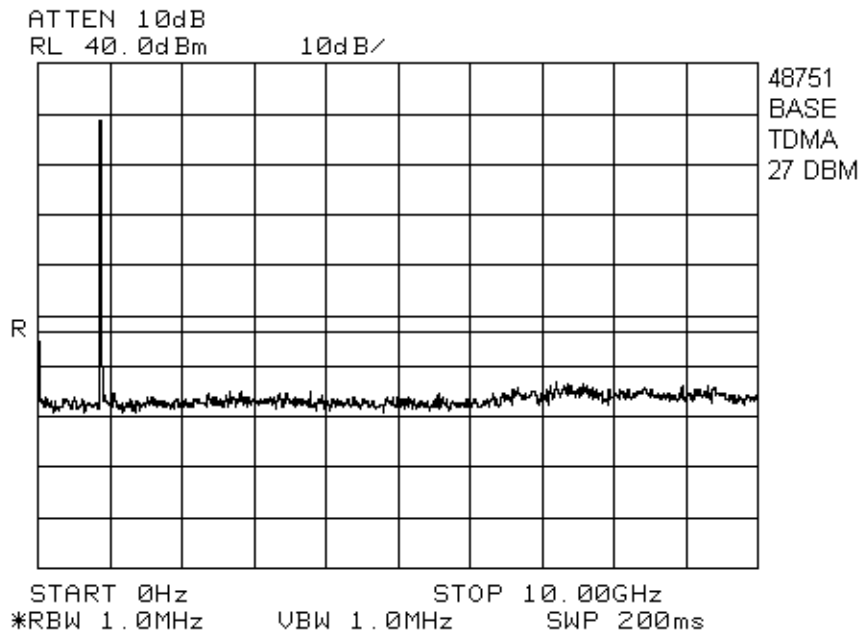
Tx = 874.5 MHz

EQUIPMENT: 48750 / 48751 Repeater



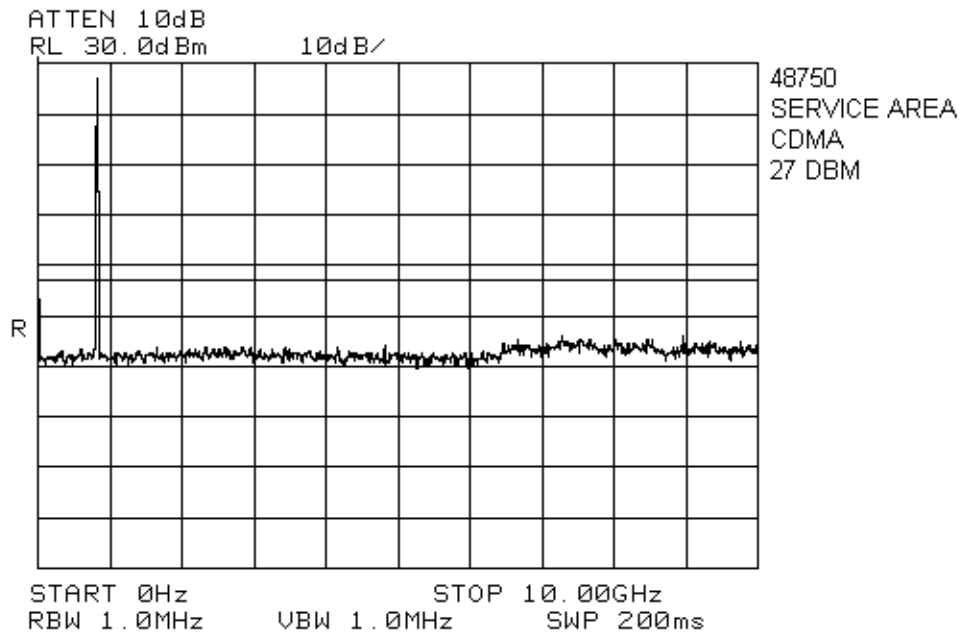
Tx = 840 MHz

EQUIPMENT: 48750 / 48751 Repeater



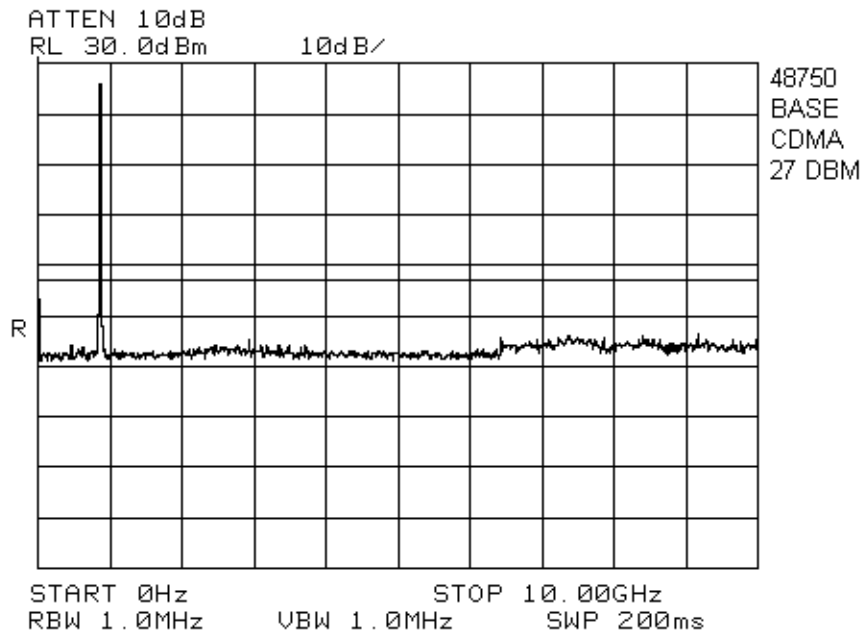
Tx = 885 MHz

EQUIPMENT: 48750 / 48751 Repeater



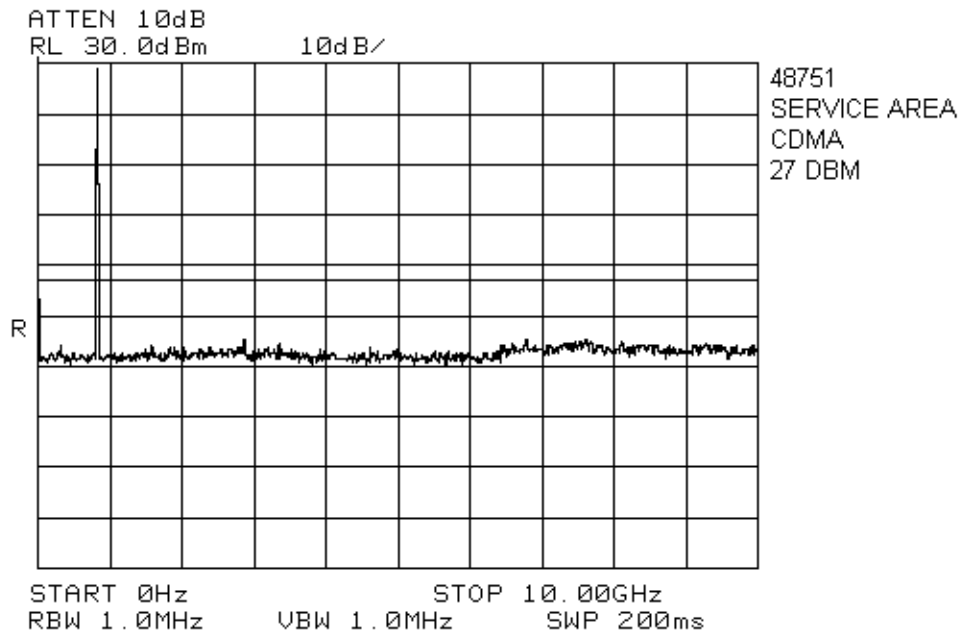
Tx = 830 MHz

EQUIPMENT: 48750 / 48751 Repeater



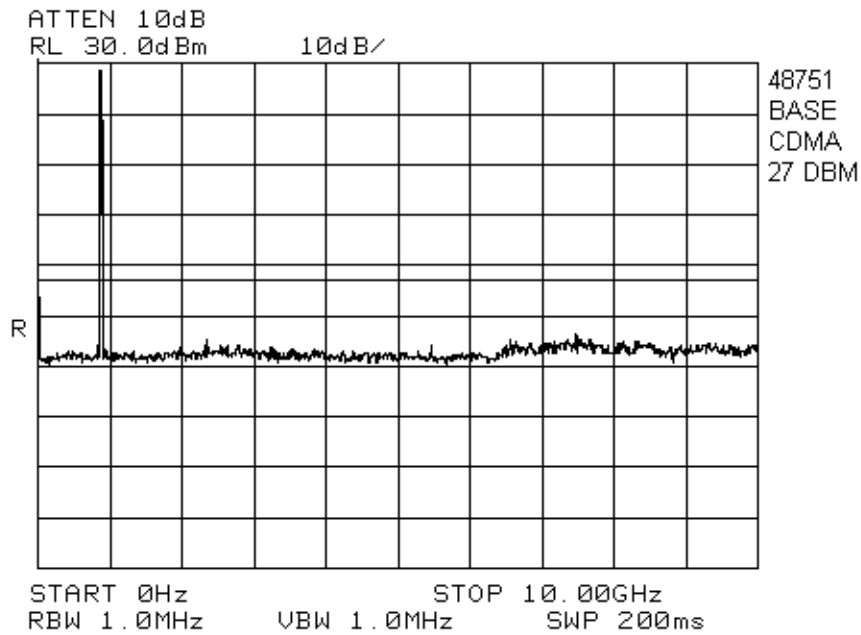
Tx = 874.5 MHz

EQUIPMENT: 48750 / 48751 Repeater



Tx = 840 MHz

EQUIPMENT: 48750 / 48751 Repeater



Tx = 885 MHz

EQUIPMENT: 48750 / 48751 Repeater

Section 6. Field Strength of Spurious

Test Performed By: Russell Grant	Date of Test: September 22, 2000
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Minimum Standard: Para. No. 22.917(e).

Test Results: Complies. The strongest emissions is -75.4 dBm at 1680 MHz.
This is 62.4 dB below the specification limit.

Test Data: See attached tabulated data.

EQUIPMENT: 48750 / 48751 Repeater

Test Data - Radiated Emissions

Test Distance (meters) : 3		Range: A Tower		Receiver: ESVP	RBW(kHz): 1000	Detector: Peak	
Freq. (MHz)	Ant. *	Pol. (V/H)	RCVD Signal (dBμV/m)	Conversion (dB)	Field Strength (dBm)	Limit (dBm)	Margin (dB)
1680.0	SSV	V	43.8	-117.4	-73.6	-13.0	60.6
1680.0	SSH	V	42.7	-118.1	-75.4	-13.0	62.4
1770.0	SSV	V	37.5	-116.8	-79.3	-13.0	66.3
1770.0	SSV	H	36.7	-116.8	-80.1	-13.0	67.1
1660.0	SSV	V	41.0	-117.4	-76.4	-13.0	63.4
1660.0	SSH	H	42.0	-118.0	-76.0	-13.0	63.0
1750.0	SSV	V	39.0	-116.9	-77.9	-13.0	64.9
1750.0	SSH	H	38.0	-117.4	-79.4	-13.0	66.4
Notes: B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole * Re-measured using dipole antenna. ** Includes cable loss when amplifier is not used. *** Includes cable loss. () Denotes failing emission level. N.D. = Not Detected							

EQUIPMENT: 48750 / 48751 Repeater

Section 7. Frequency Stability

Para. No.: 22.355

Test Performed By: Russell Grant	Date of Test: October 2, 2000
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Minimum Standard: Para. No. 22.355.

Test Results: Complies. The maximum frequency drift is 0 Hz.

Measurement Data: Standard Test Frequency: 840,885, 830, 870 MHz
 Standard Test Voltage: 120 VAC

 -30°C to 50°C in 10° Steps.
 20°C ± 15% Standard Test Voltage.

EQUIPMENT: 48750 / 48751 Repeater

Section 8. Test Equipment List

CAL CYCLE	EQUIPMENT	MANUFACTURER	MODEL	SERIAL	LAST CAL.	NEXT CAL.
1 Year	Spectrum Analyzer	Hewlett Packard	8565E	FA000981	June 16/00	June 16/01
1 Year	Climate Chamber	Thermotron	SM-16C	15649-S	COU	COU
1 Year	Attenuator	Narda	768-10	9707	Aug. 23/99	Aug. 23/00
1 Year	Attenuator	Narda	768-10	9709	Oct. 8/99	Oct. 8/00
1 Year	Attenuator	Narda	769-20	4153	Oct. 1/99	Oct. 1/00
1 Year	Horn Antenna	EMCO #2	3115	4336	Nov. 11/99	Nov. 11/00
1 Year	RF AMP	JCA	2-4 GHz	FA001496	May 31/00	May 31/01
1 Year	RF AMP	JCA	1-2 GHz	FA001498	May 31/00	May 31/01
1 Year	RF AMP	JCA	4-8 GHz	FA001497	May 31/00	May 31/01
1Year	Frequency Counter	Hewlett Packard	HP5350A	2444A00135	May 7/00	Nov. 7/00
3 Year	RF Generator	Rohde & Schwarz	SIMIQ03E	DE24154	Oct. 4/99	Oct. 4/01

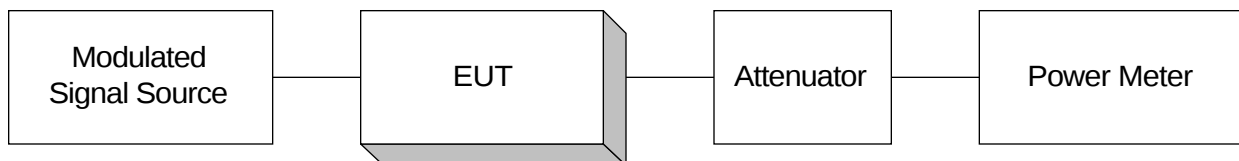
NA: Not Applicable
NCR: No Cal Required
COU: CAL On Use

EQUIPMENT: 48750 / 48751 Repeater

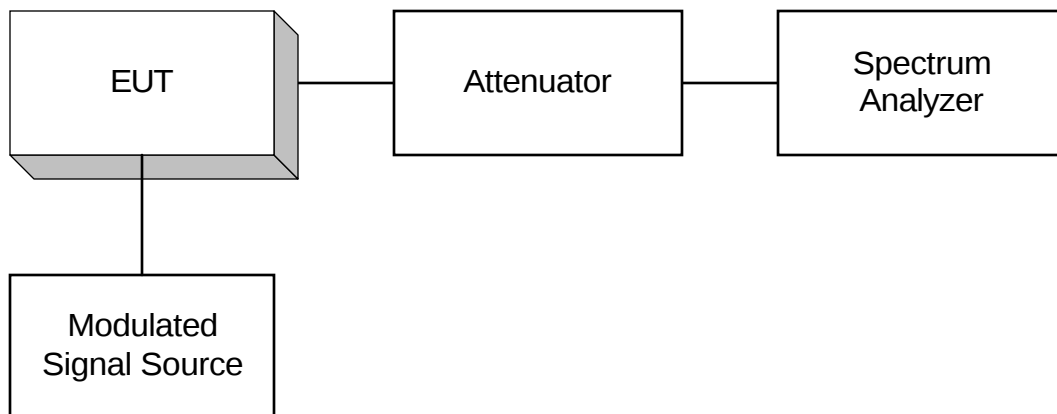
Annex A
Test Diagrams

EQUIPMENT: 48750 / 48751 Repeater

R.F. Power Output

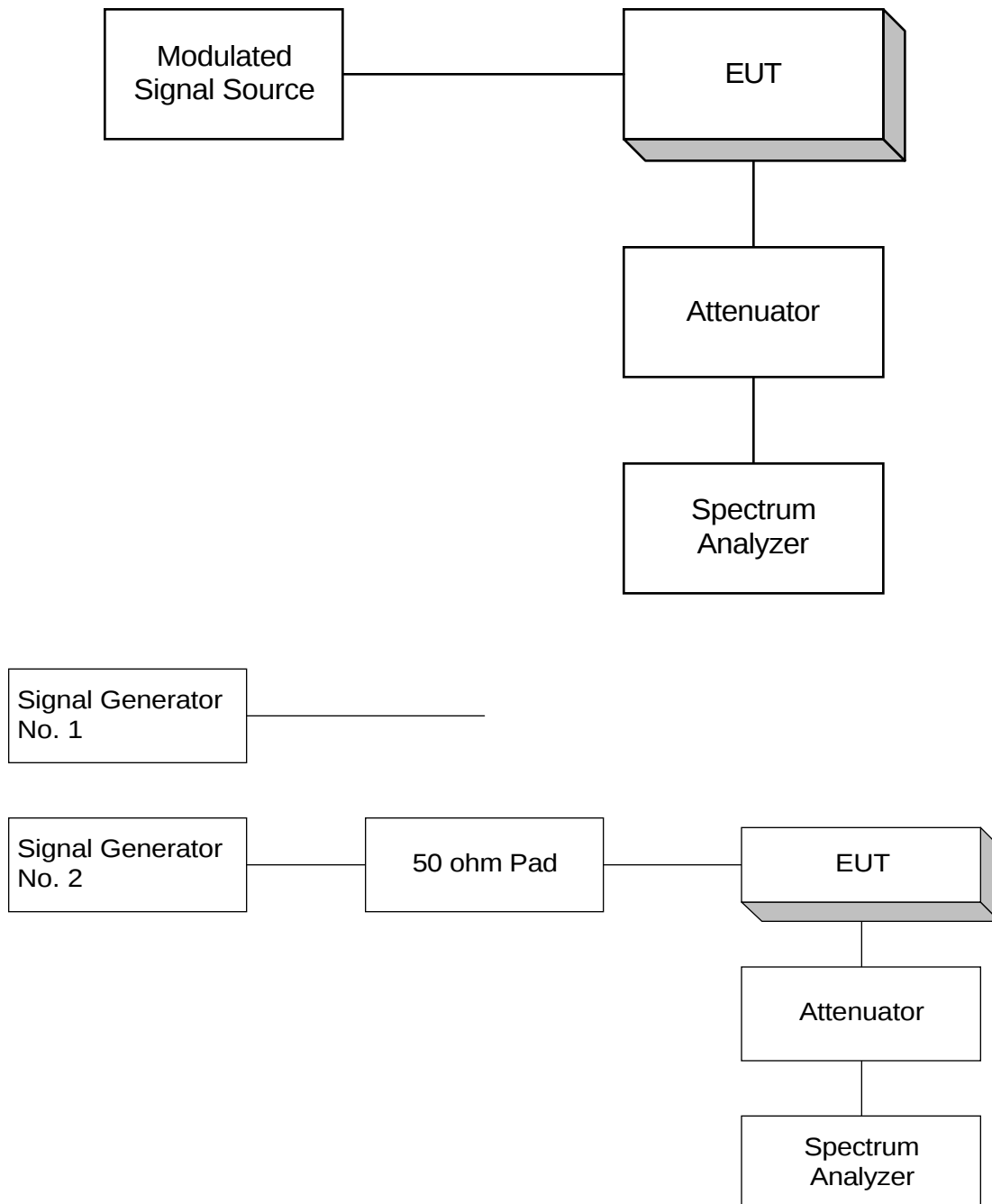


Occupied Bandwidth



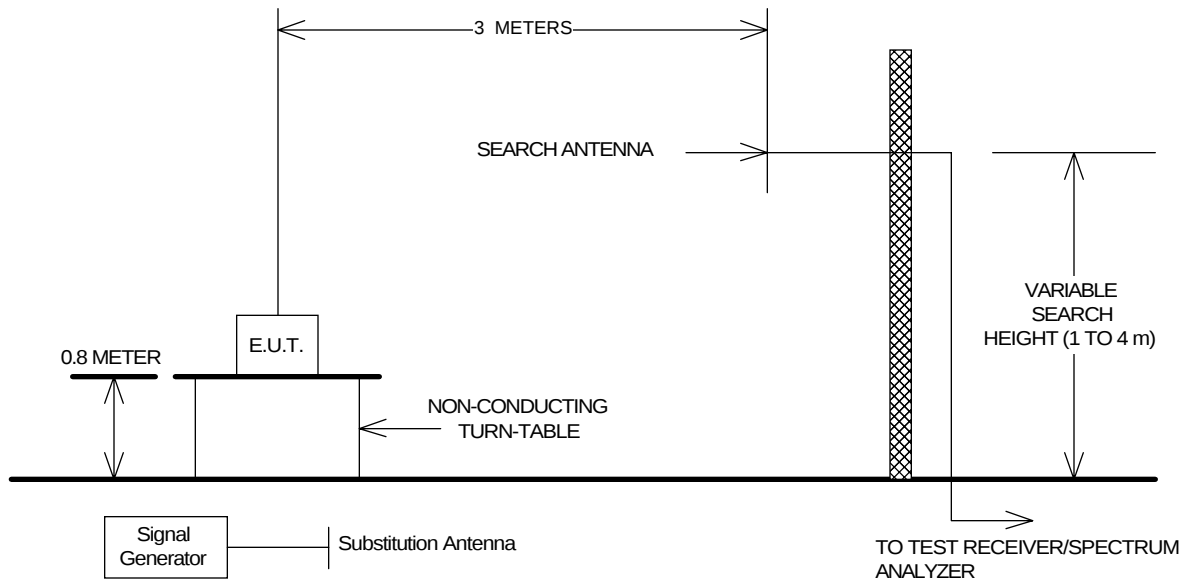
EQUIPMENT: 48750 / 48751 Repeater

Spurious Emissions at Antenna Terminals



EQUIPMENT: 48750 / 48751 Repeater

Field Strength of Spurious Radiation



Frequency Stability

