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

Table of Contents

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

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: _____
Russell Grant, Wireless Group Manager

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:

.

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

Section 3. RF Power Output

Test Performed By: Russell Grant	**Date of Test:** September 20, 2000

Minimum Standard: Para. No. 22.913(a).

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

Pmax = Maximum RF output power
N = Number of channels

Section 4 Occupied Bandwidth

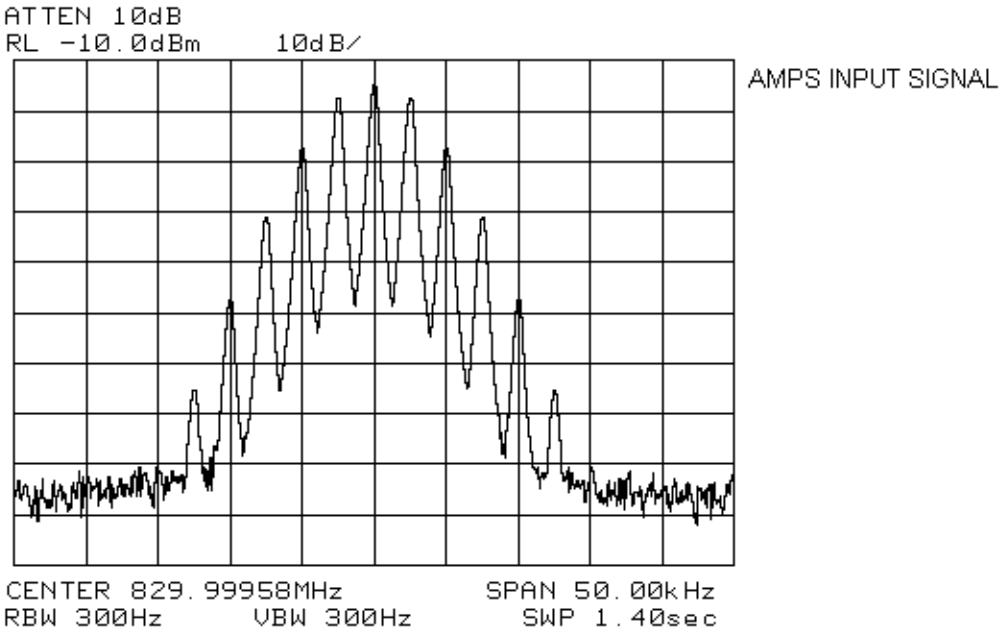
Test Performed By: Russell Grant	**Date of Test:** September 21, 2000

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.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10dB/
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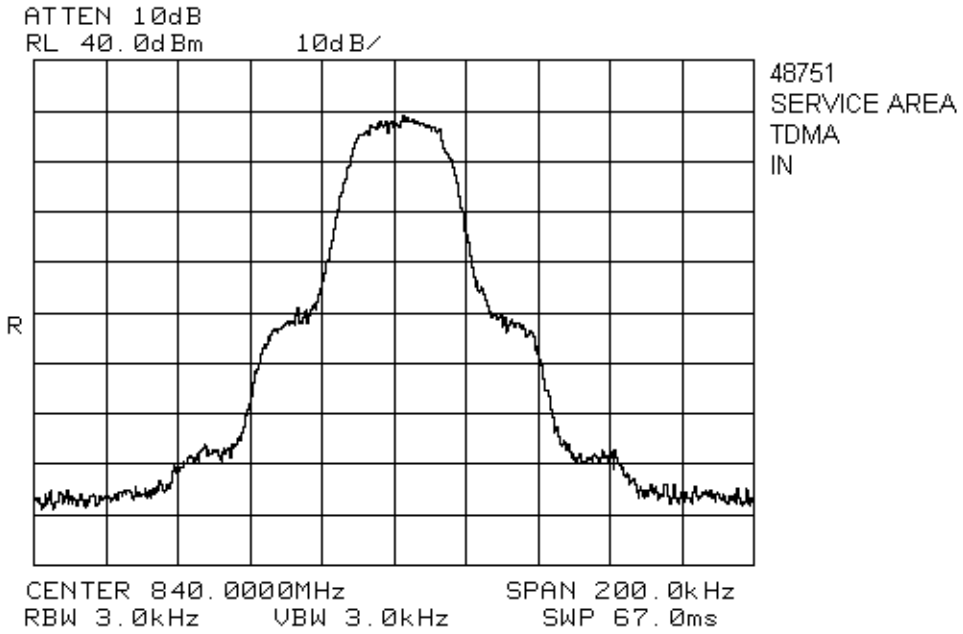
VBW 300Hz
SWP 1.40sec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10dB/
R
48751
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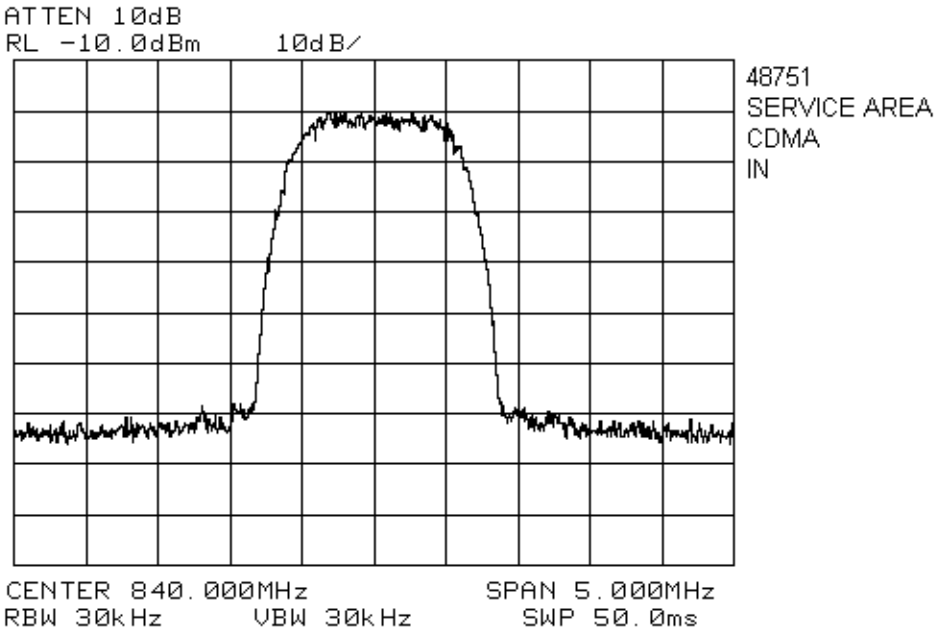
TDMA
IN
CENTER 840.0000MHz
SPAN 200.0kHz
RBW 3.0kHz
VBW 3.0kHz
SWP 67.0ms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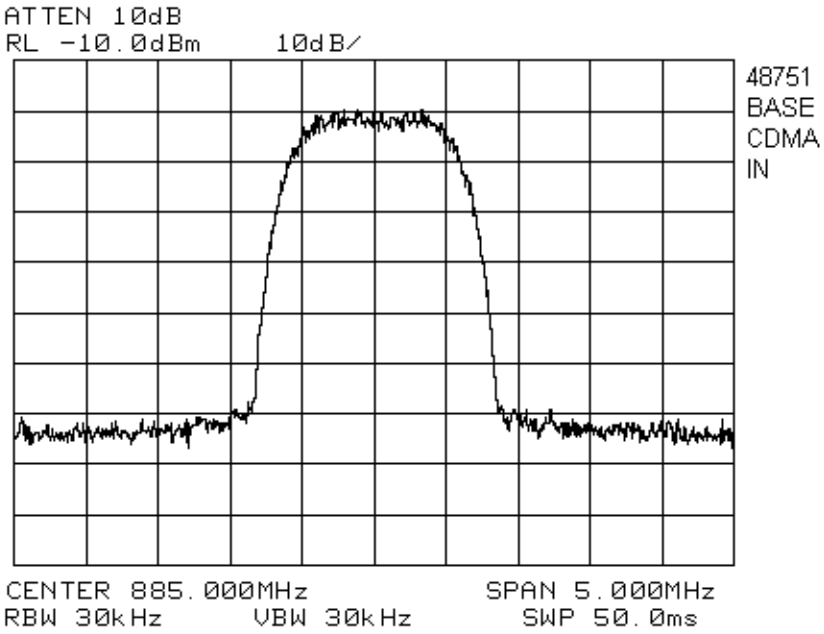
VBW 30kHz
SWP 50.0ms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10dB/
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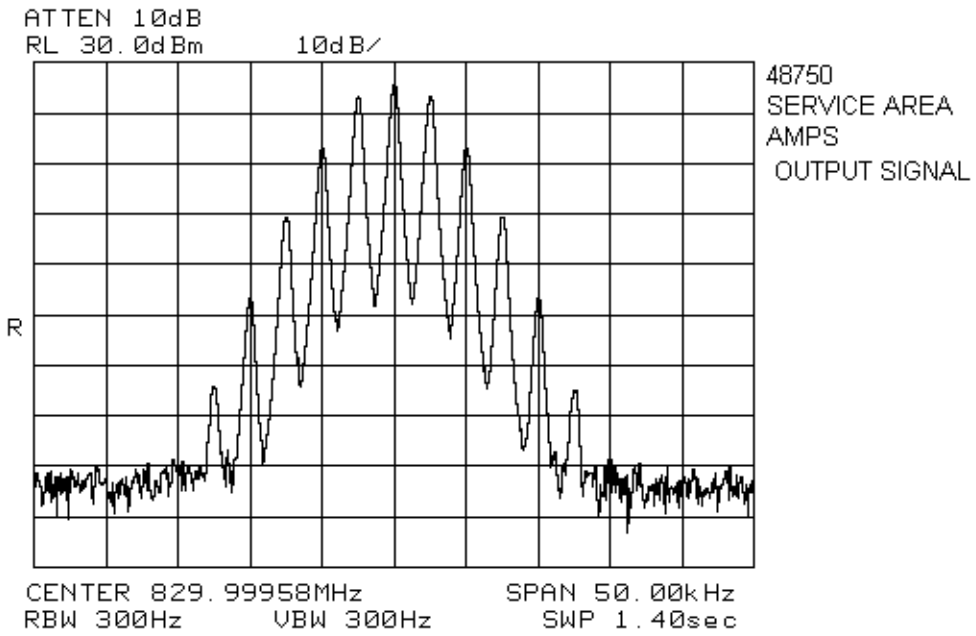
CDMA
IN
CENTER 885.000MHz
SPAN 5.000MHz
RBW 30kHz
VBW 30kHz
SWP 50.0ms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48750
SERVICE AREA
AMPS
OUTPUT SIGNAL
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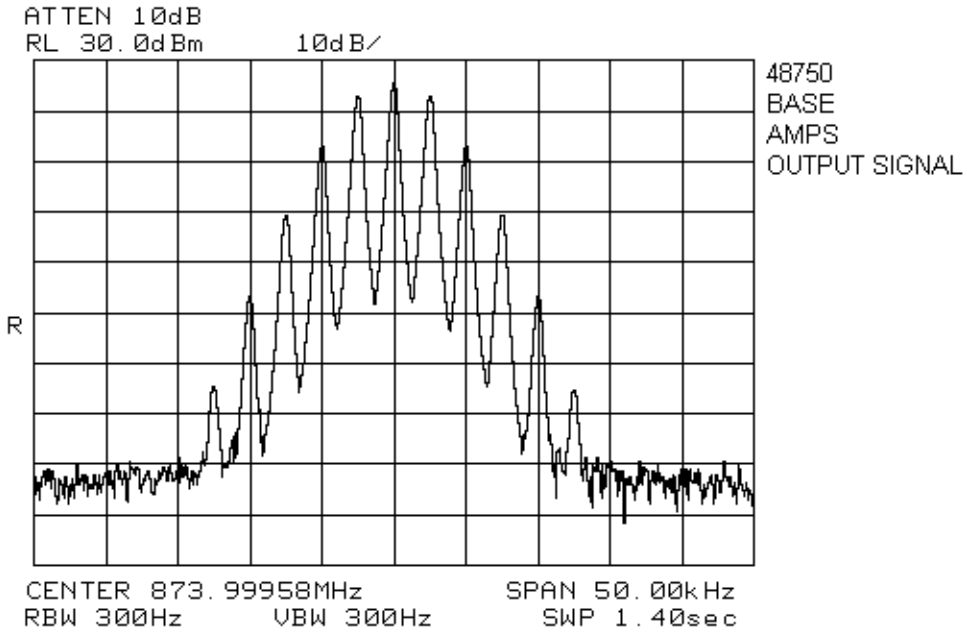
SPAN 50.00kHz
RBW 300Hz
VBW 300Hz
SWP 1.40sec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10dB/
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48750
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AMPS
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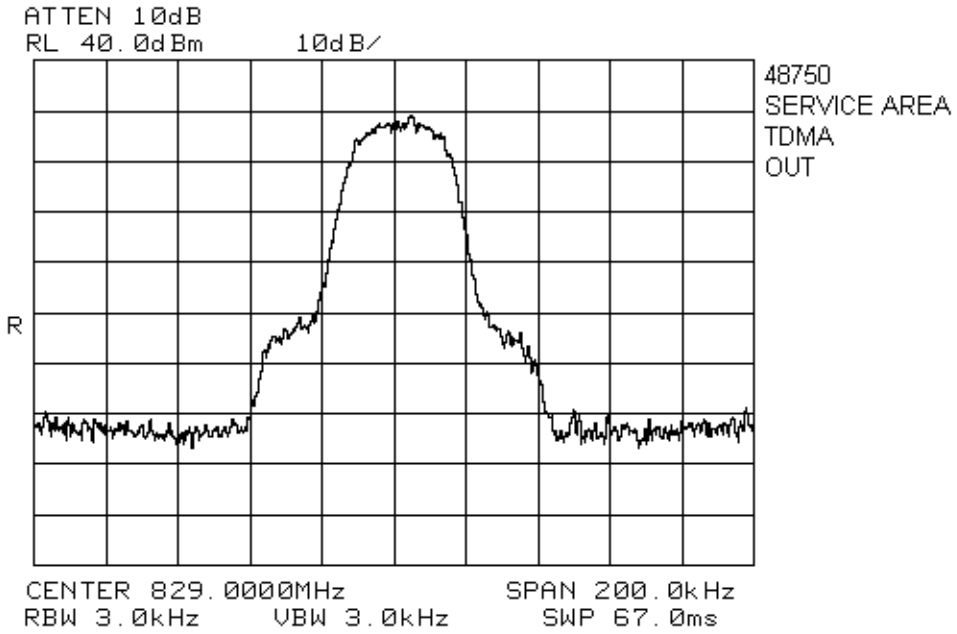
RBW 300Hz
VBW 300Hz
SWP 1.40sec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48750
SERVICE AREA
TDMA
OUT
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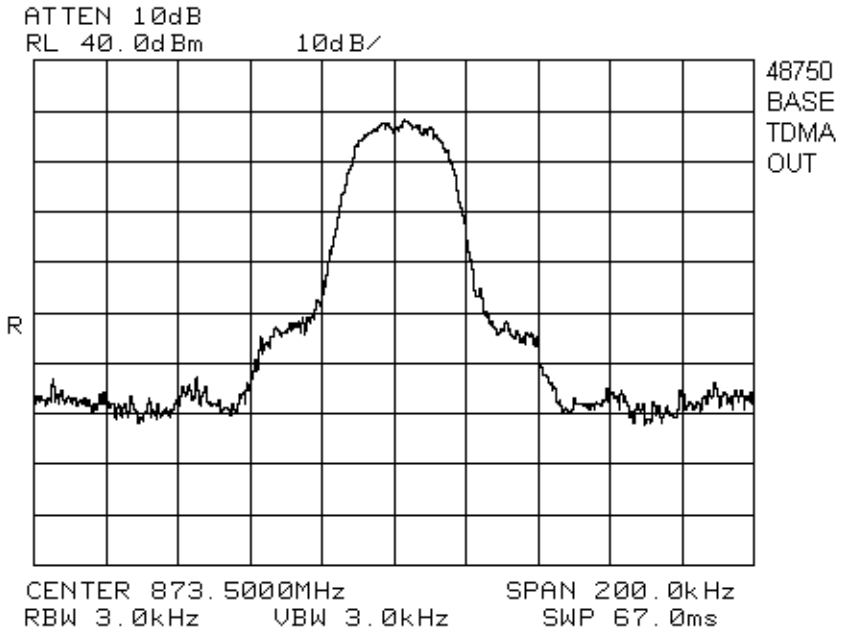
CENTER 829.0000MHz
SPAN 200.0kHz
RBW 3.0kHz
VBW 3.0kHz
SWP 67.0ms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10dB/
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TDMA
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R
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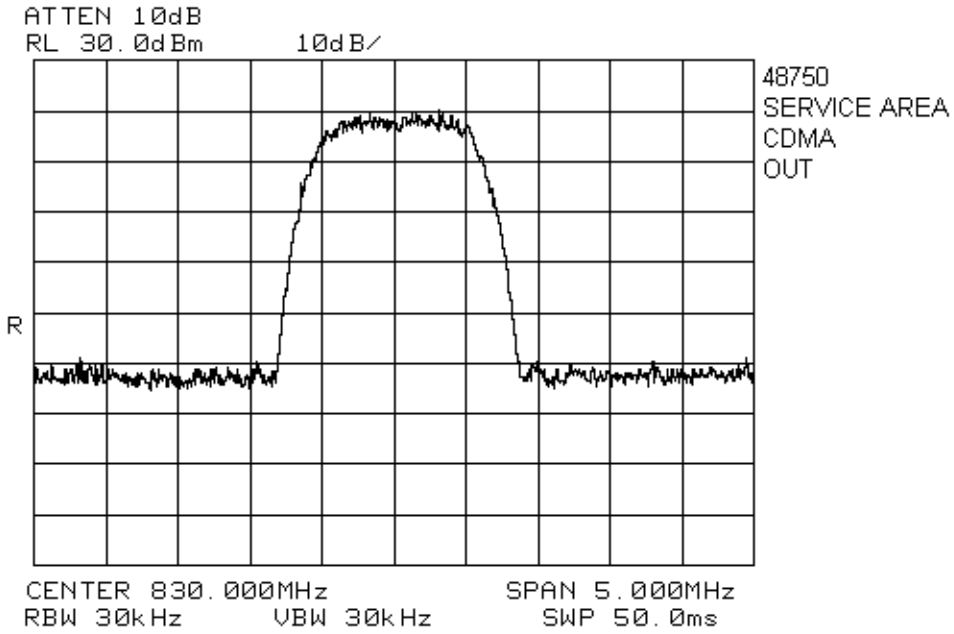
RBW 3.0kHz
VBW 3.0kHz
SWP 67.0ms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10dB/
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48750
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CDMA
OUT
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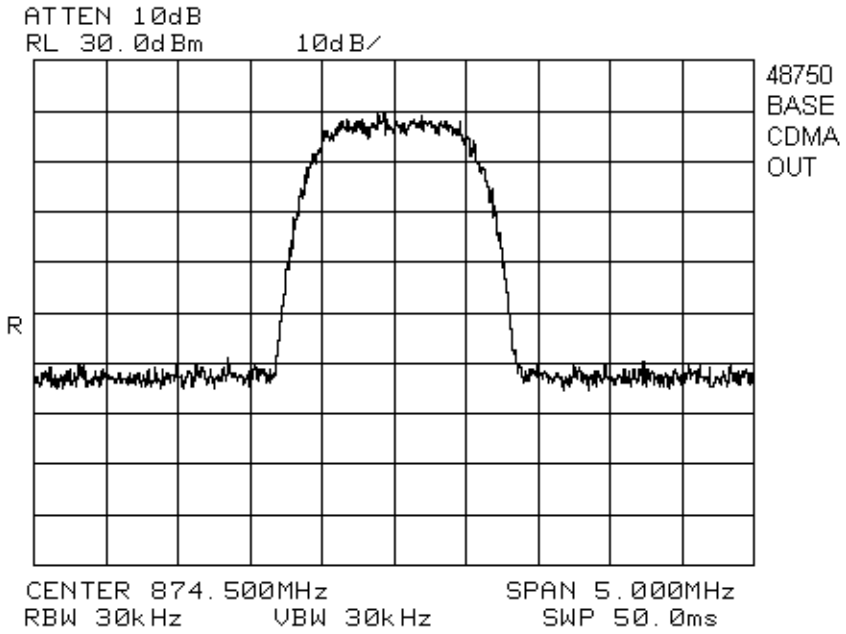
SPAN 5.000MHz
RBW 30kHz
VBW 30kHz
SWP 50.0ms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10dB/
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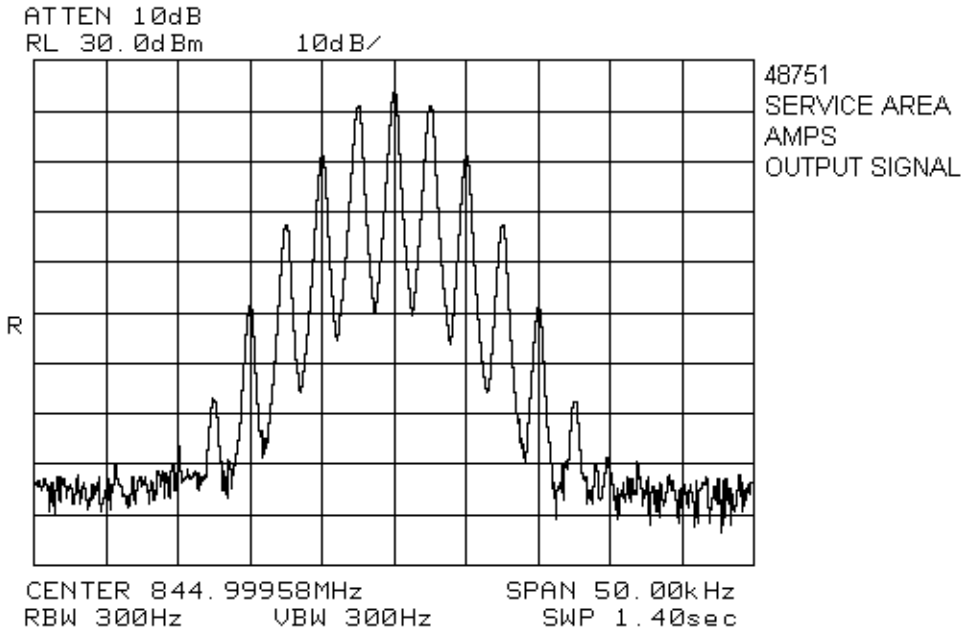
SPAN 5.000MHz
RBW 30kHz
VBW 30kHz
SWP 50.0ms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10dB/
R
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AMPS
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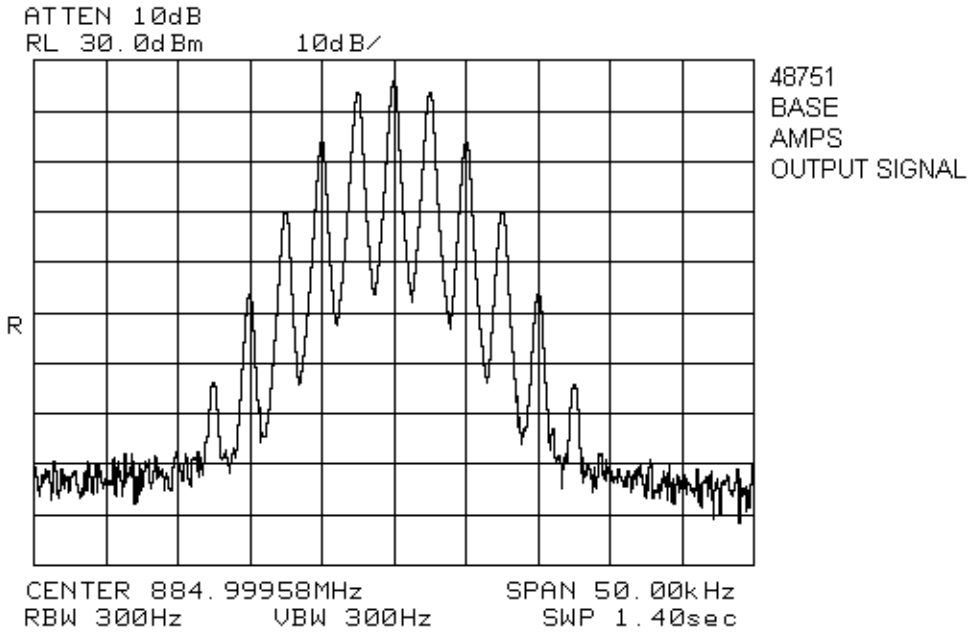
SPAN 50.00kHz
RBW 300Hz
VBW 300Hz
SWP 1.40sec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10dB/
R
48751
BASE
AMPS
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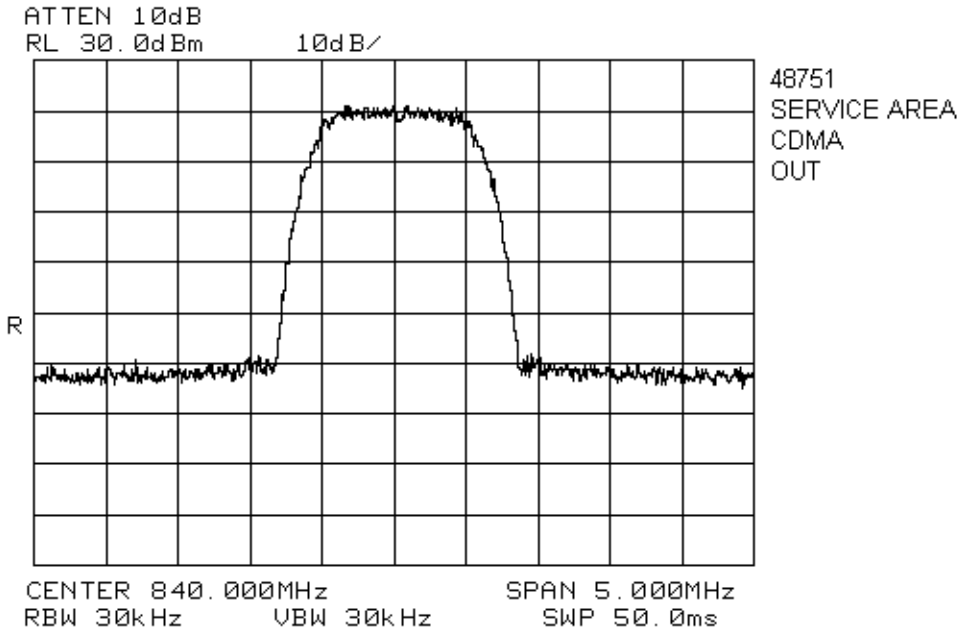
SPAN 50.00kHz
RBW 300Hz
VBW 300Hz
SWP 1.40sec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10dB/
R
48751
SERVICE AREA
CDMA
OUT
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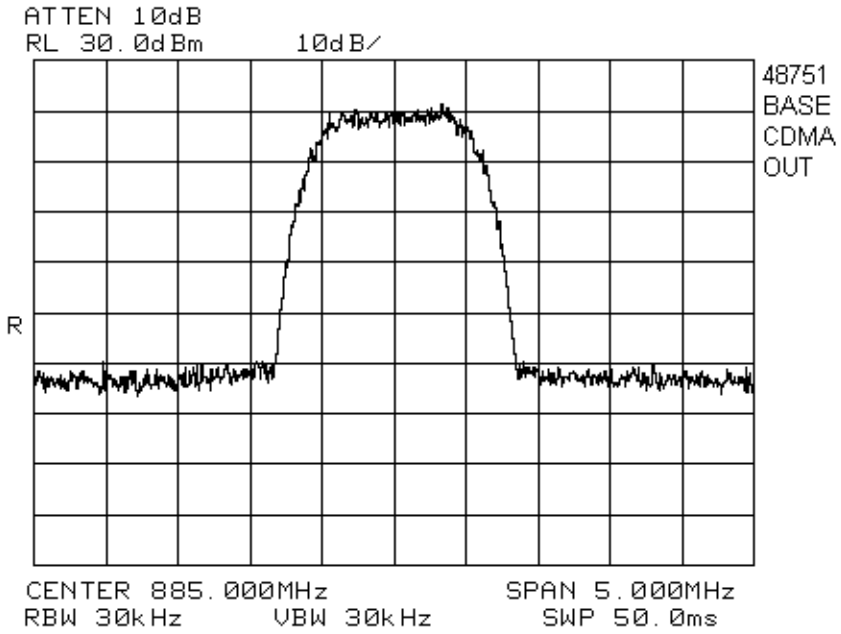
SPAN 5.000MHz
RBW 30kHz
VBW 30kHz
SWP 50.0ms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RL 30.0dBm
10dB/
48751
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OUT
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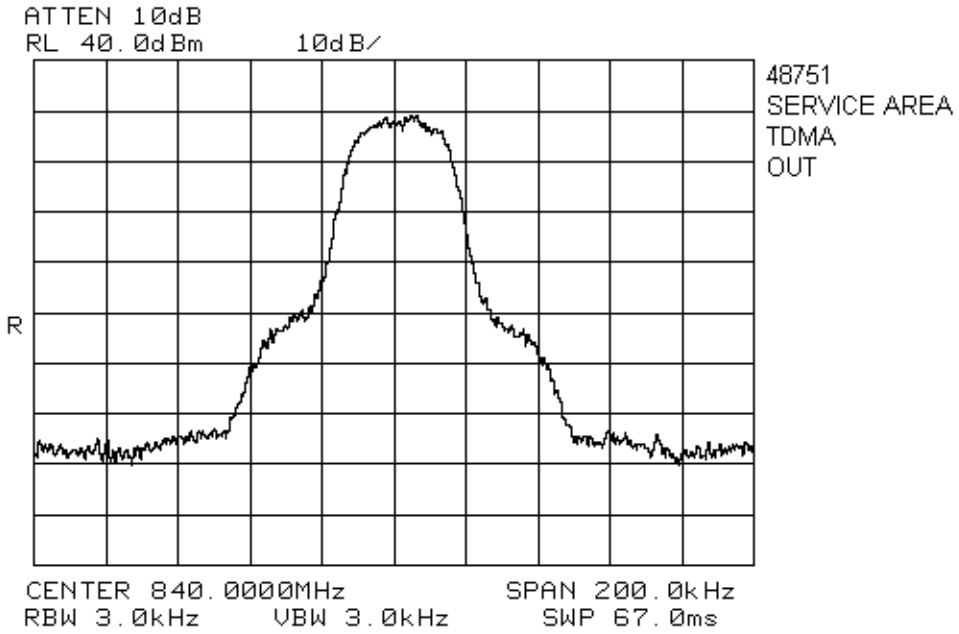
SPAN 5.000MHz
RBW 30kHz
VBW 30kHz
SWP 50.0ms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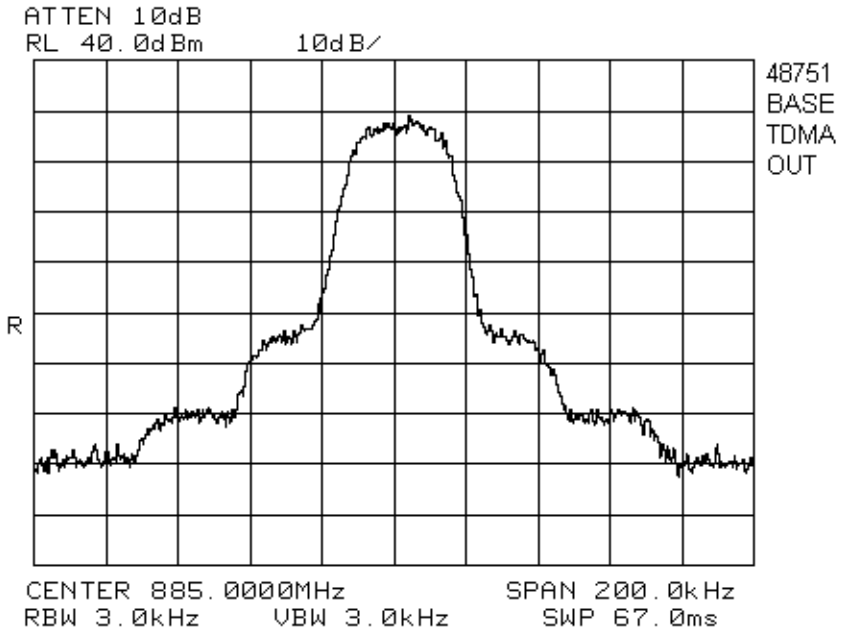
VBW 3.0kHz
SWP 67.0ms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R
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SPAN 200.0kHz
RBW 3.0kHz
VBW 3.0kHz
SWP 67.0ms

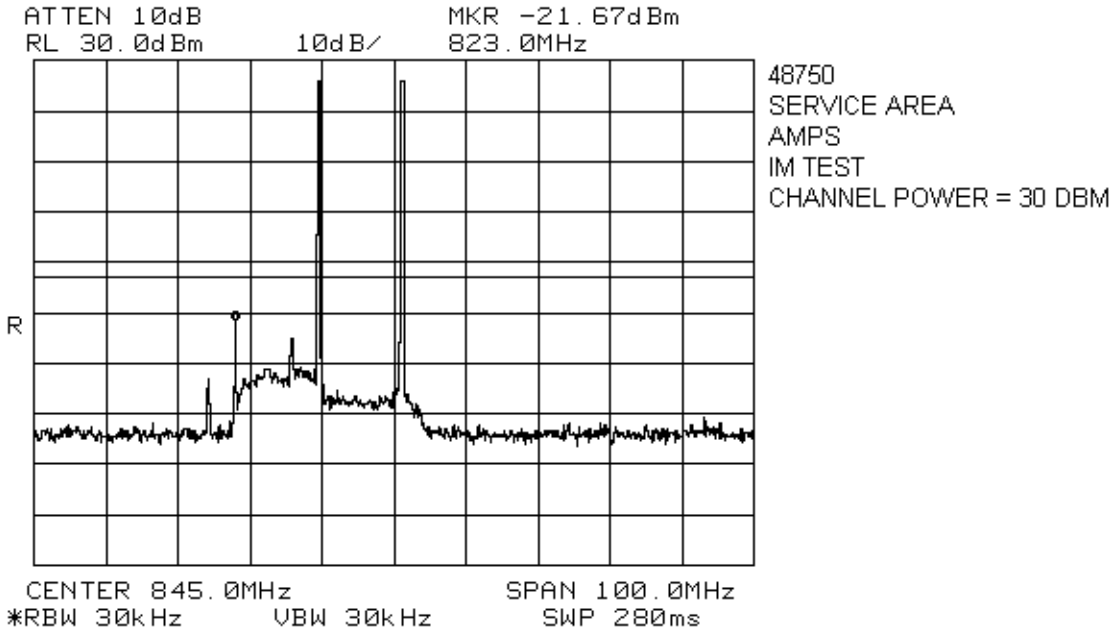
Section 5. Spurious Emissions at Antenna Terminals

Test Performed By: Russell Grant	**Date of Test:** September 21, 2000

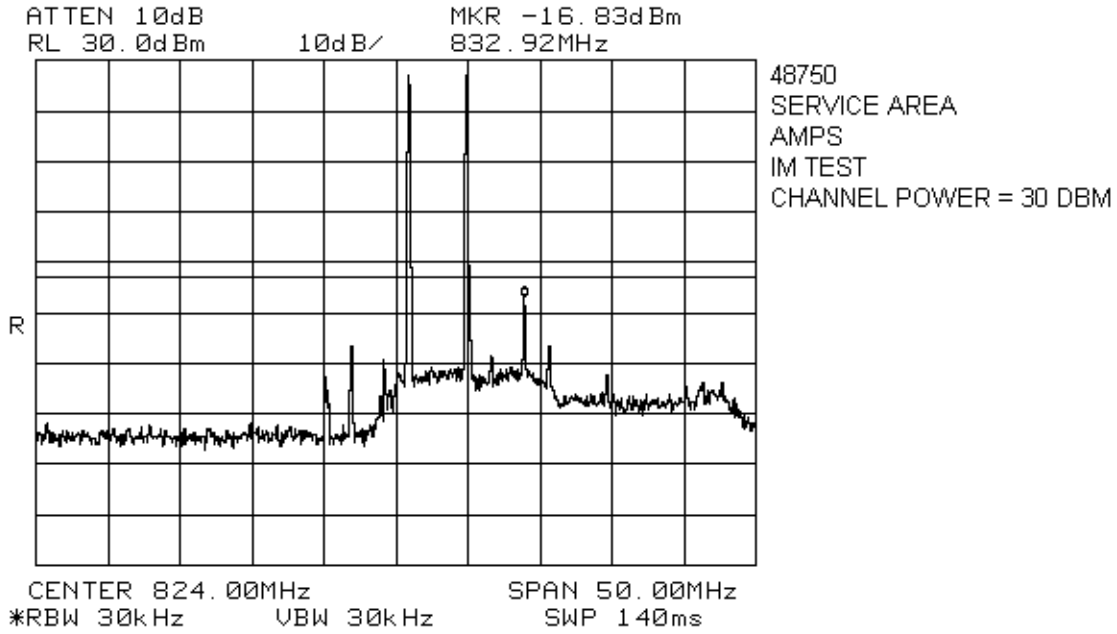
Minimum Standard: Para. No. 22.917(e).

Test Results: Complies.

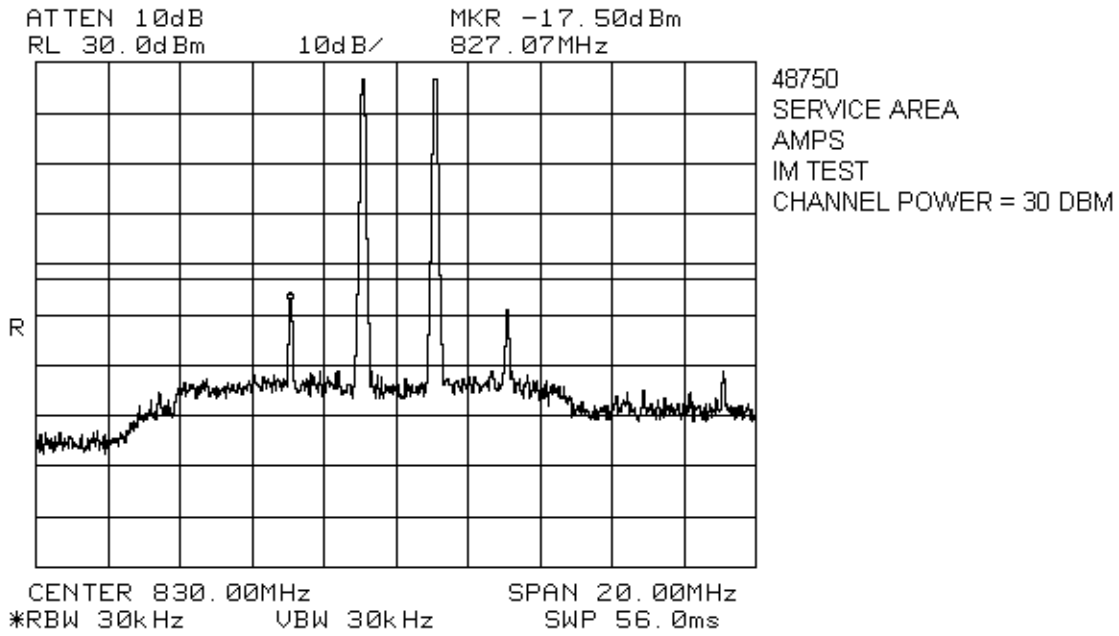
Test Data: See attached graphs.



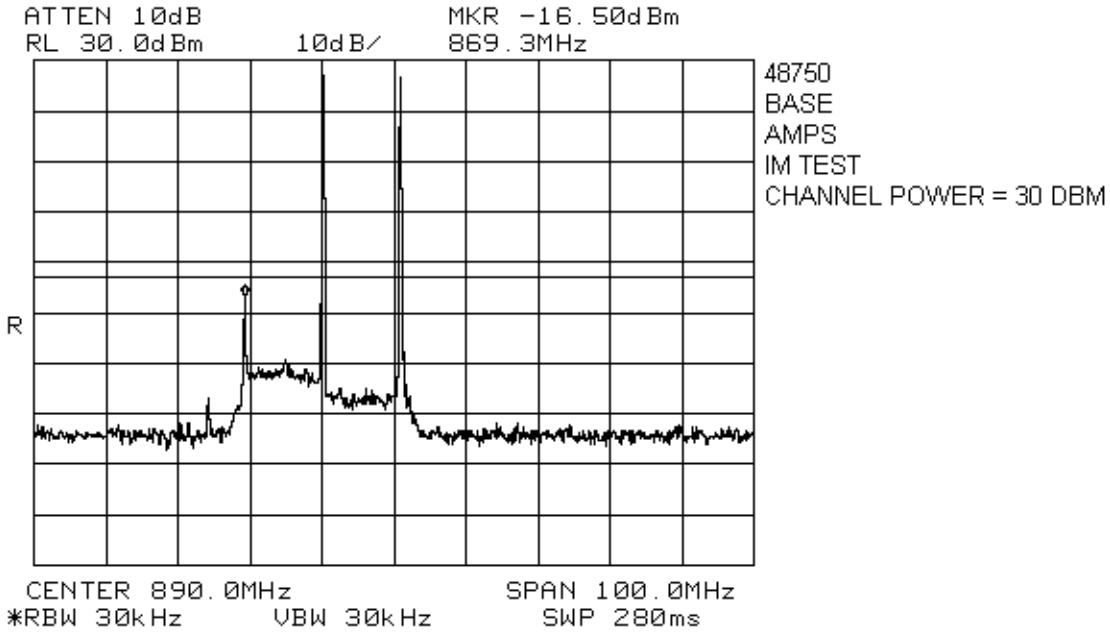
Tx = 834.300 MHz
Tx = 845.790 MHz



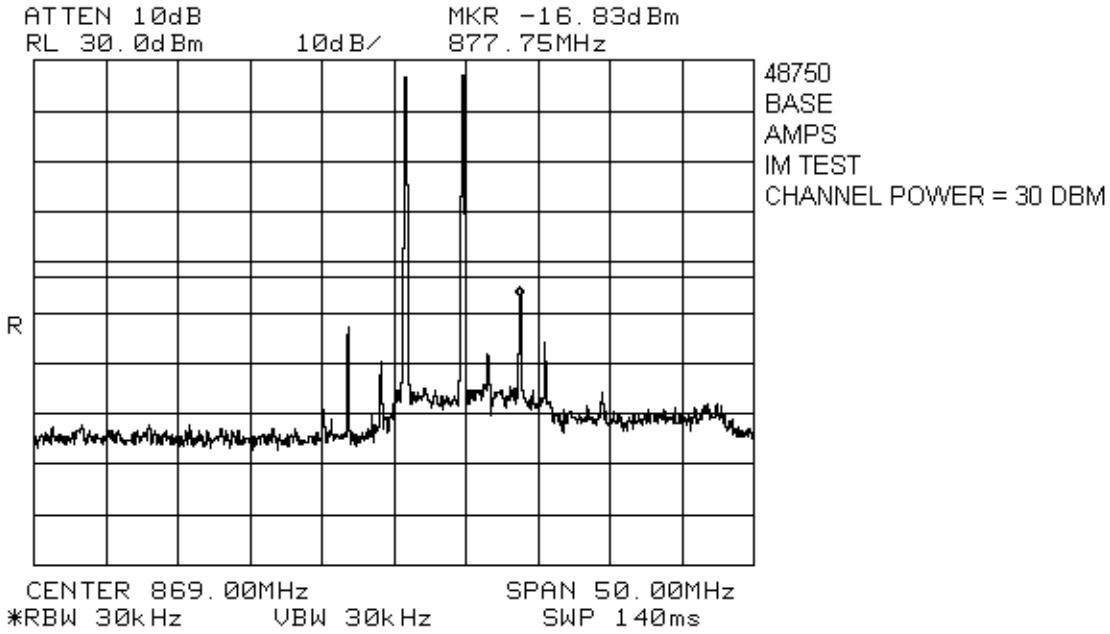
Tx = 824.730 MHz
Tx = 828.720 MHz



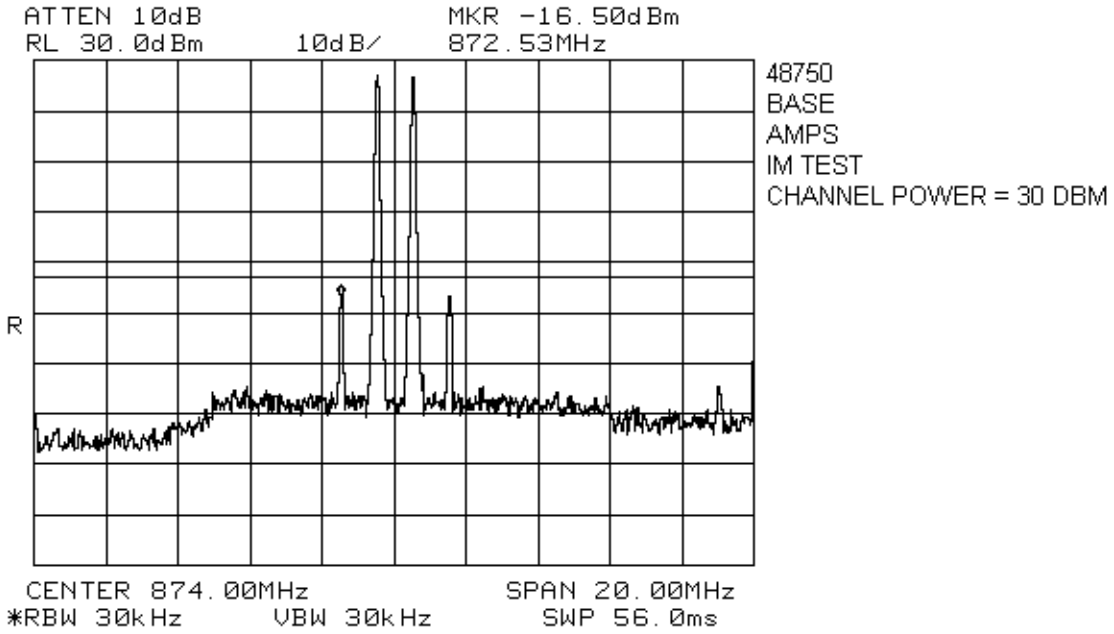
Tx = 829 MHz
Tx = 831 MHz



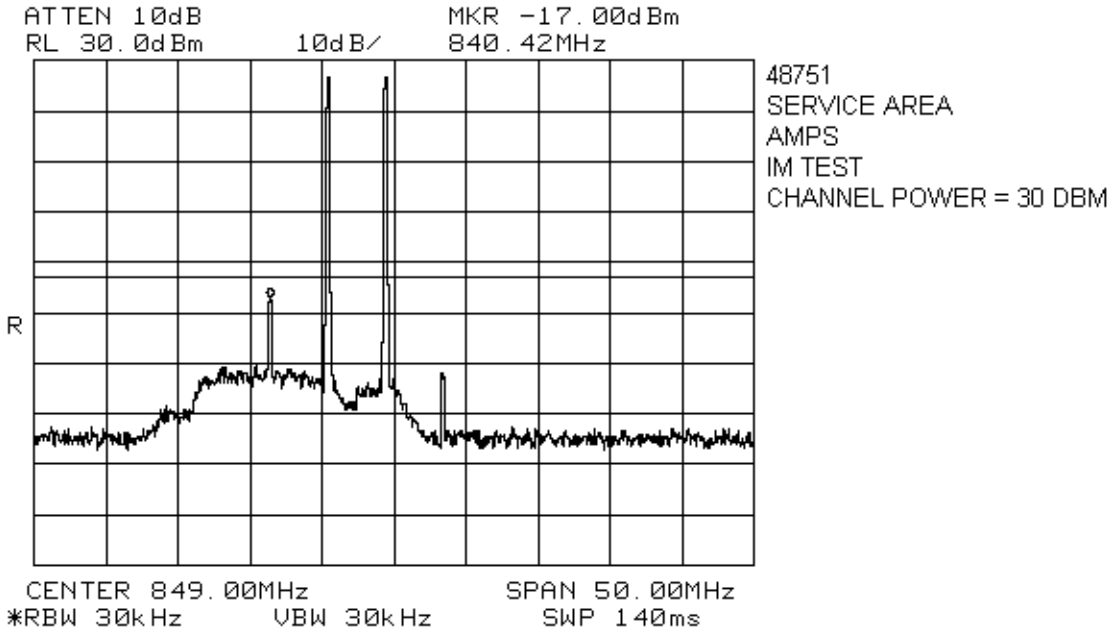
Tx = 879.300 MHz
Tx = 890.790 MHz



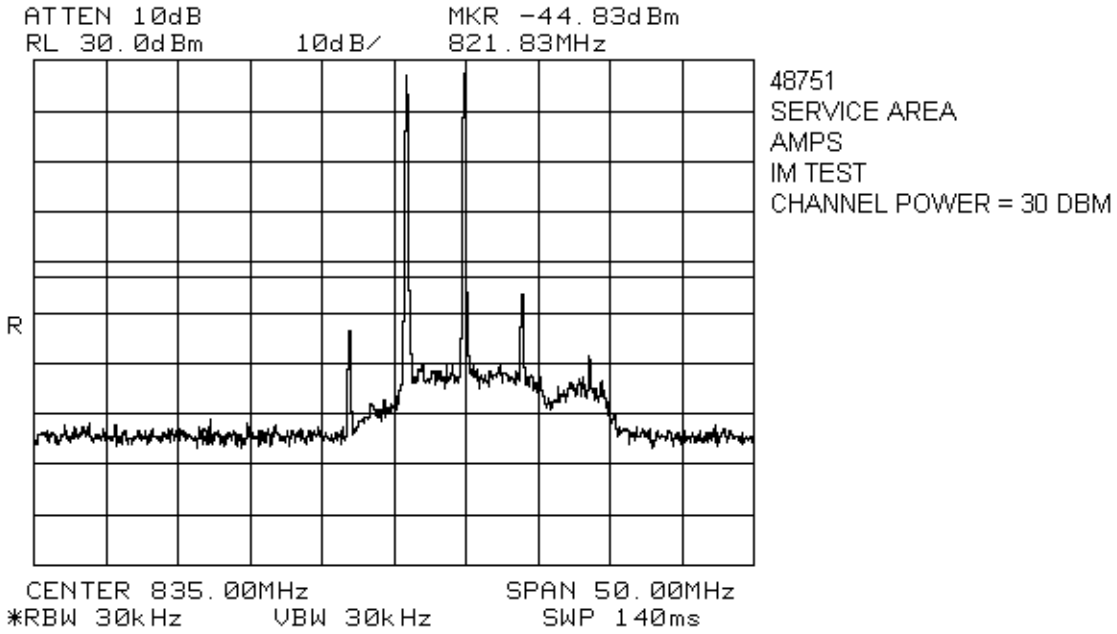
Tx = 869.730 MHz
Tx = 873.720 MHz



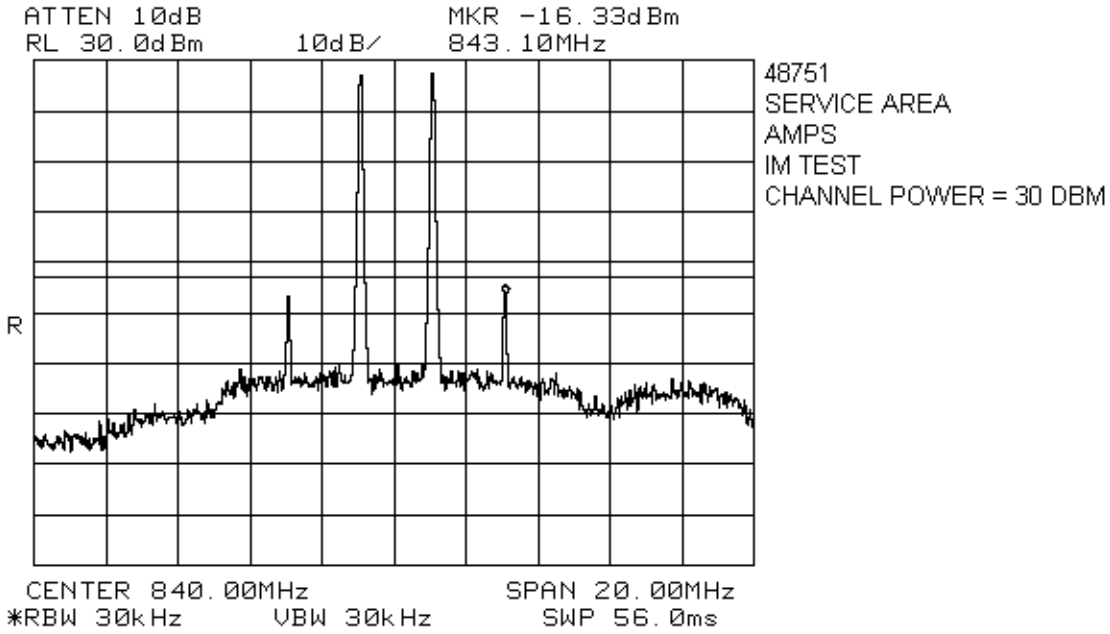
Tx = 873.5 MHz
Tx = 875.5 MHz



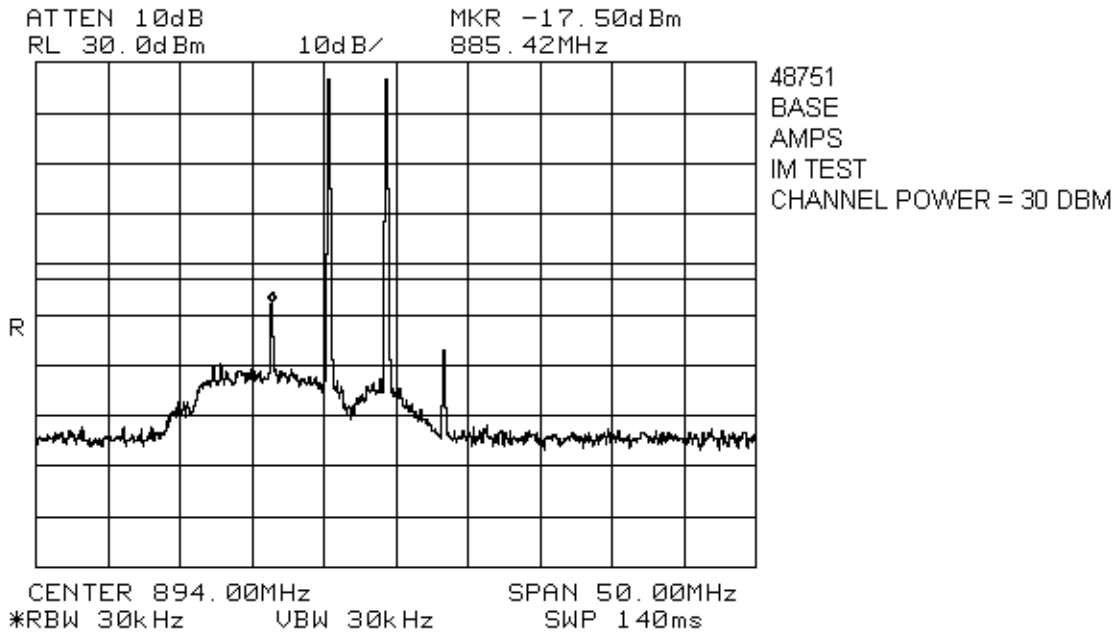
Tx = 844.290 MHz
Tx = 848.280 MHz



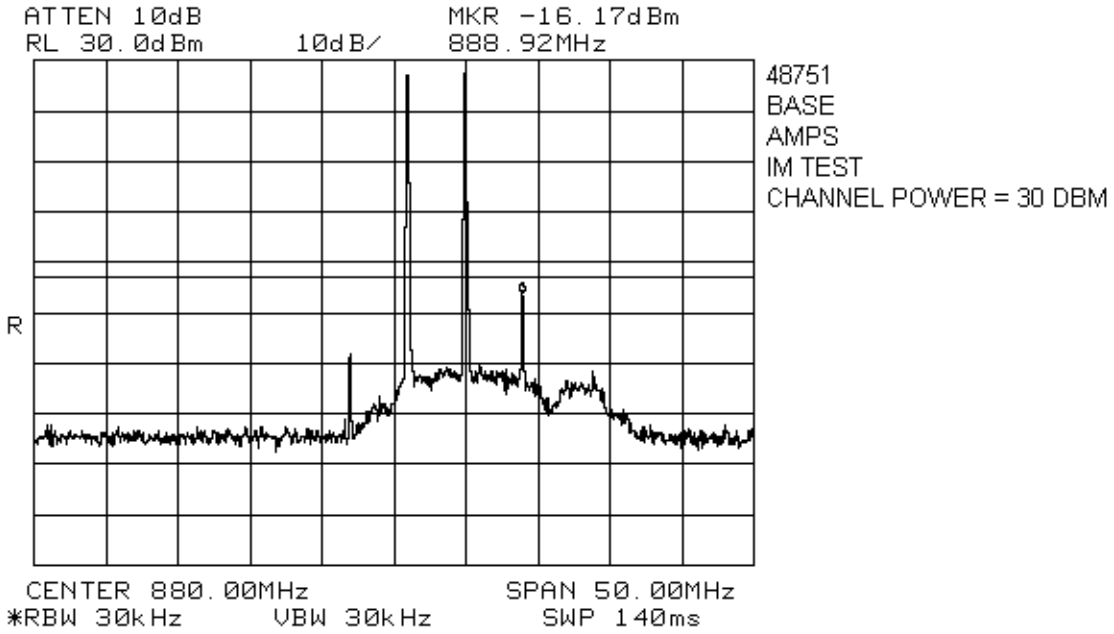
Tx = 835.710 MHz
Tx = 839.700 MHz



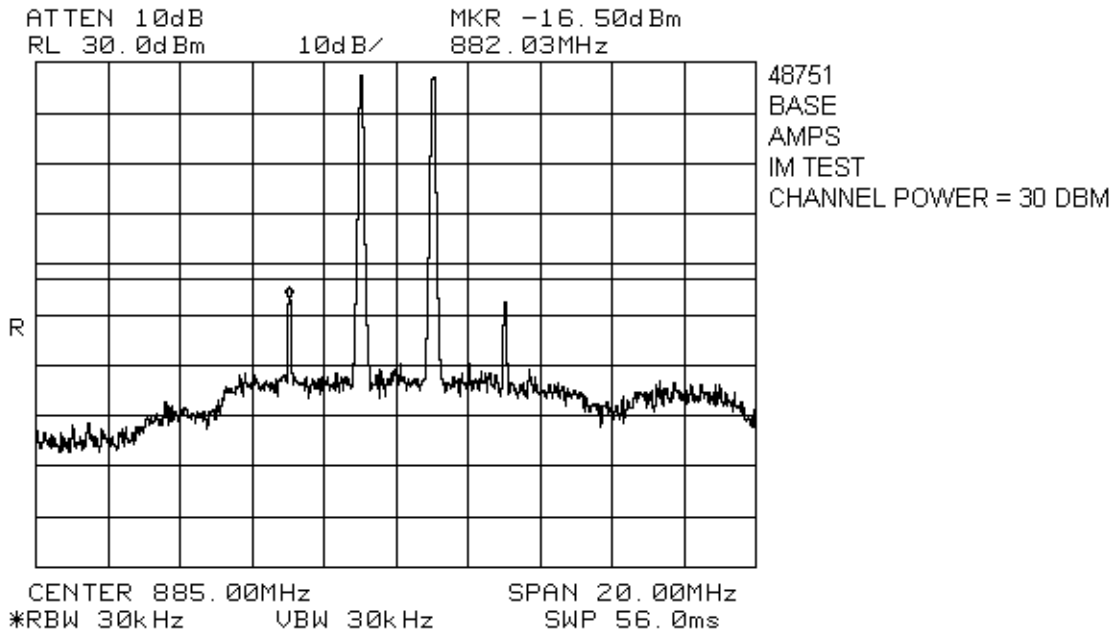
Tx = 839 MHz
Tx = 841 MHz



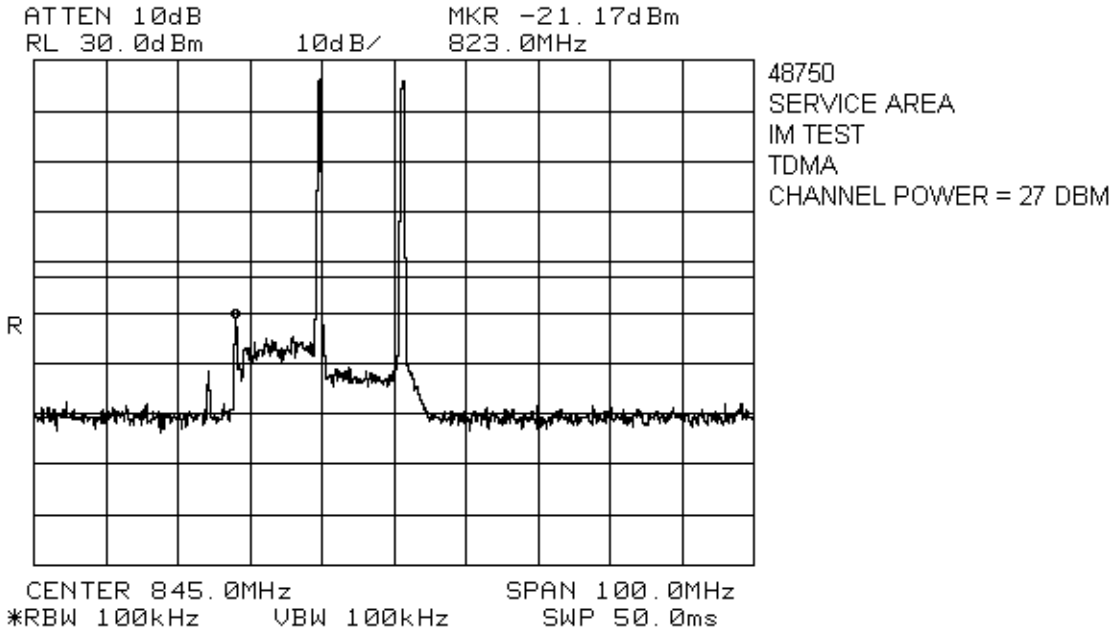
Tx = 889.290 MHz
Tx = 893.280 MHz



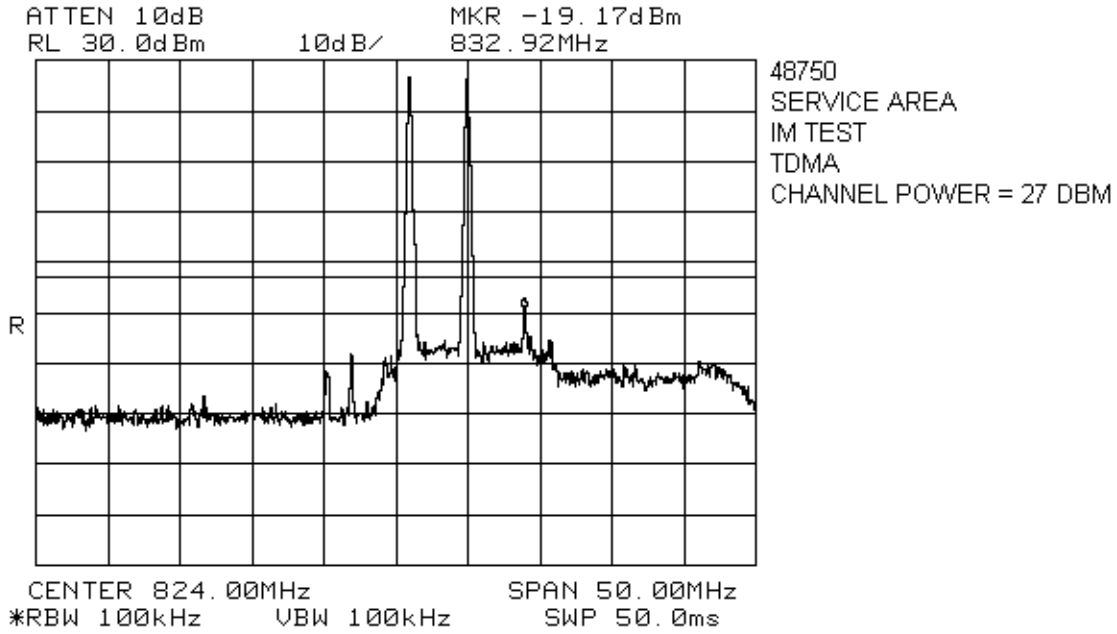
Tx = 880.890 MHz
Tx 884.880 MHz



Tx = 884 MHz
Tx = 886 MHz



Tx = 834.300 MHz
Tx = 845.790 MHz



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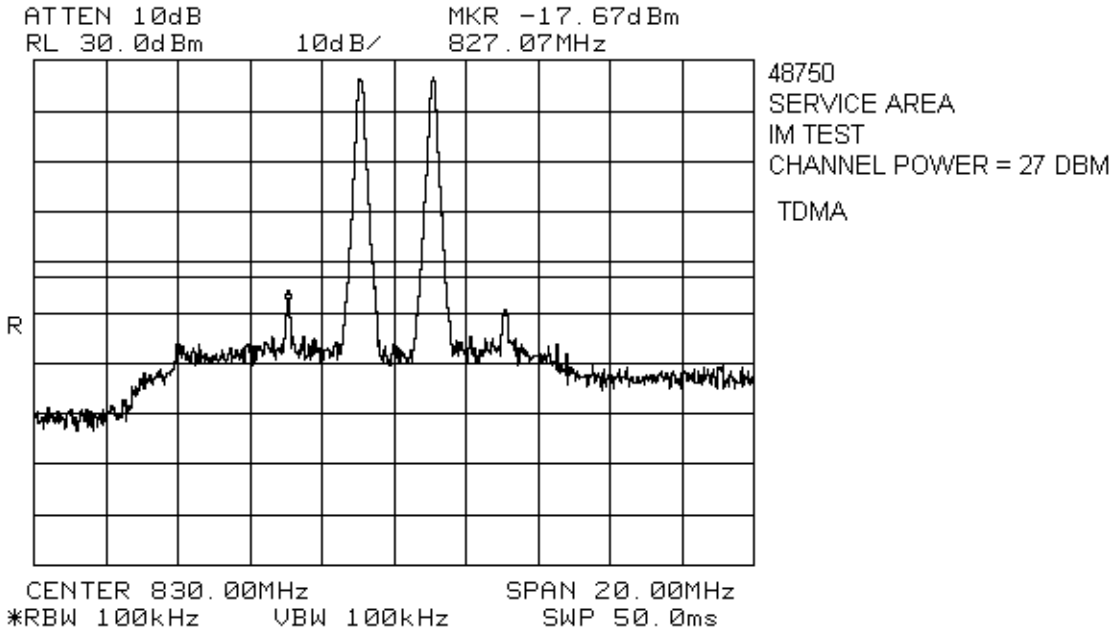
Tx = 828.720 MHz



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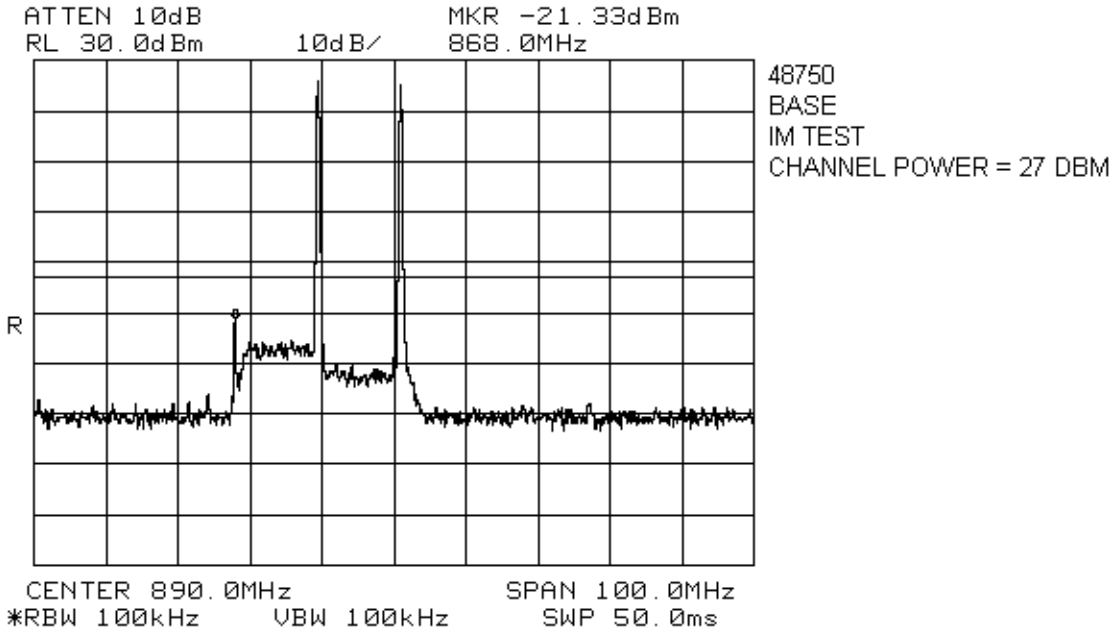
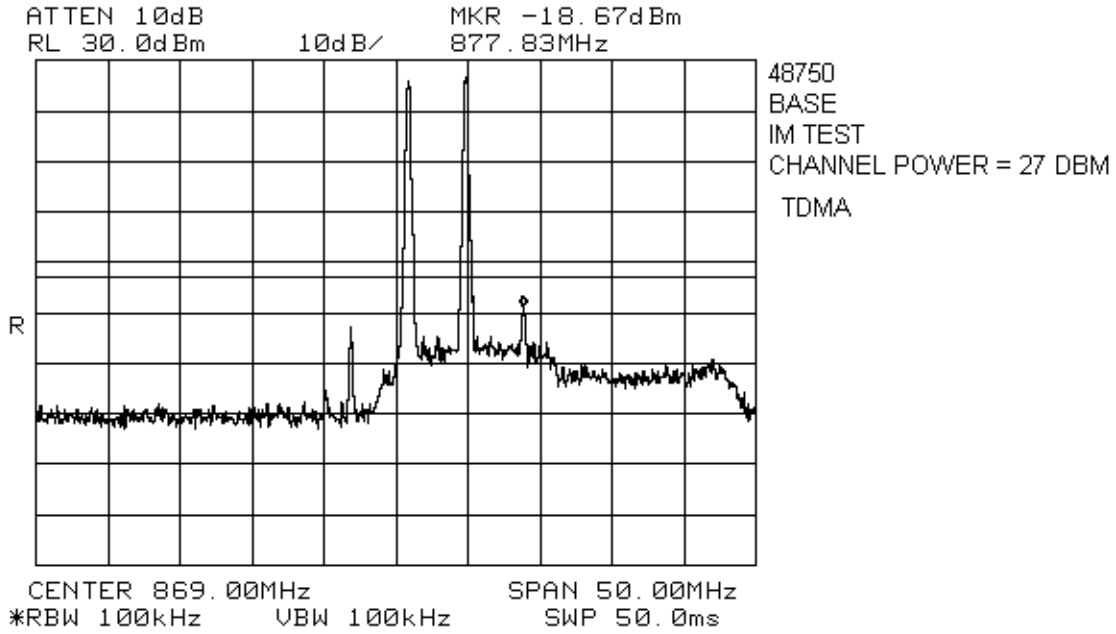
Tx = 831 MHz



TDMA
Tx = 879.300 MHz
Tx = 890.790 MHz



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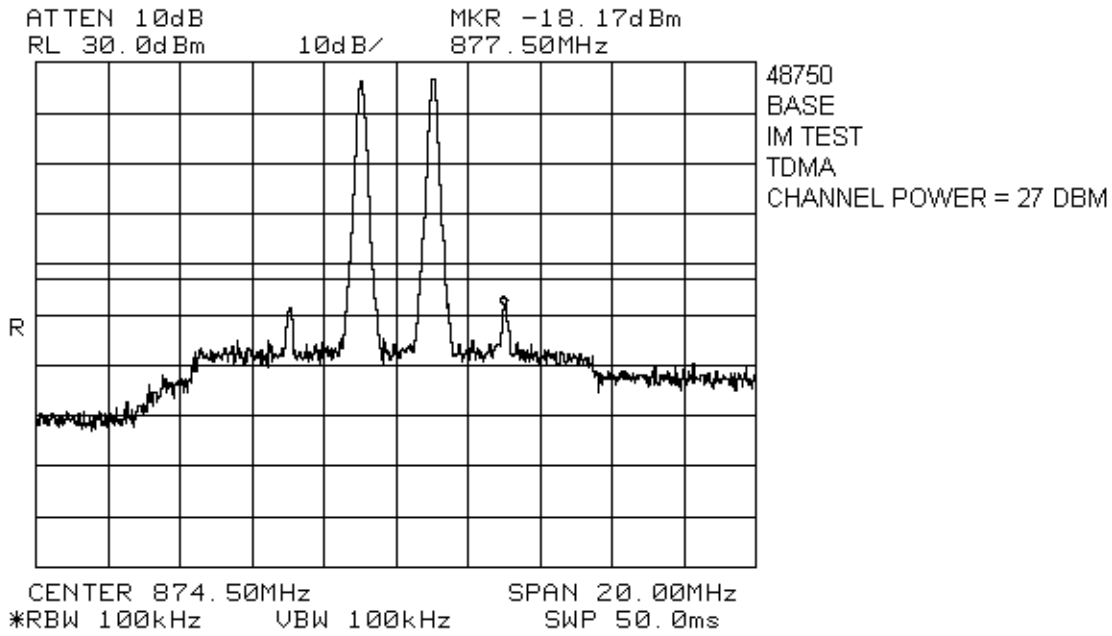
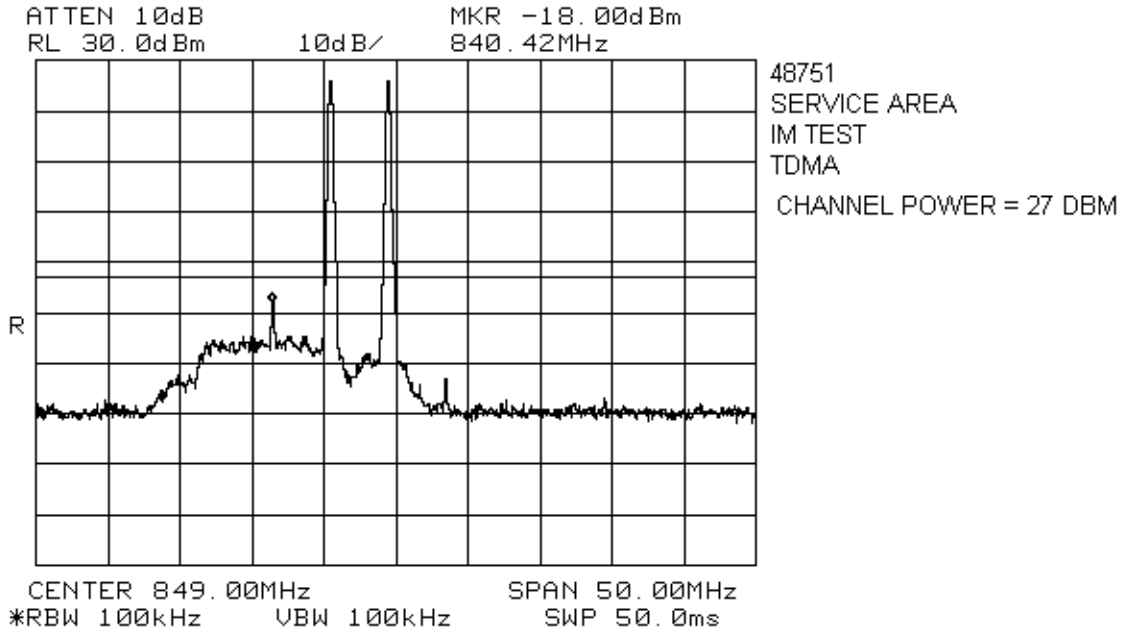
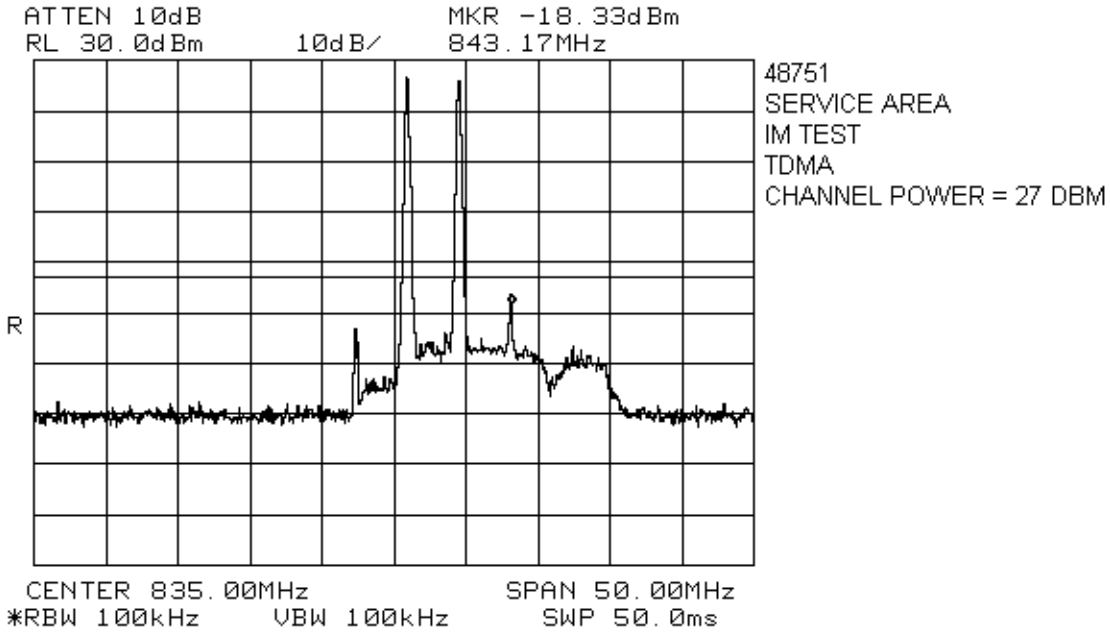
Tx = 873.720 MHz



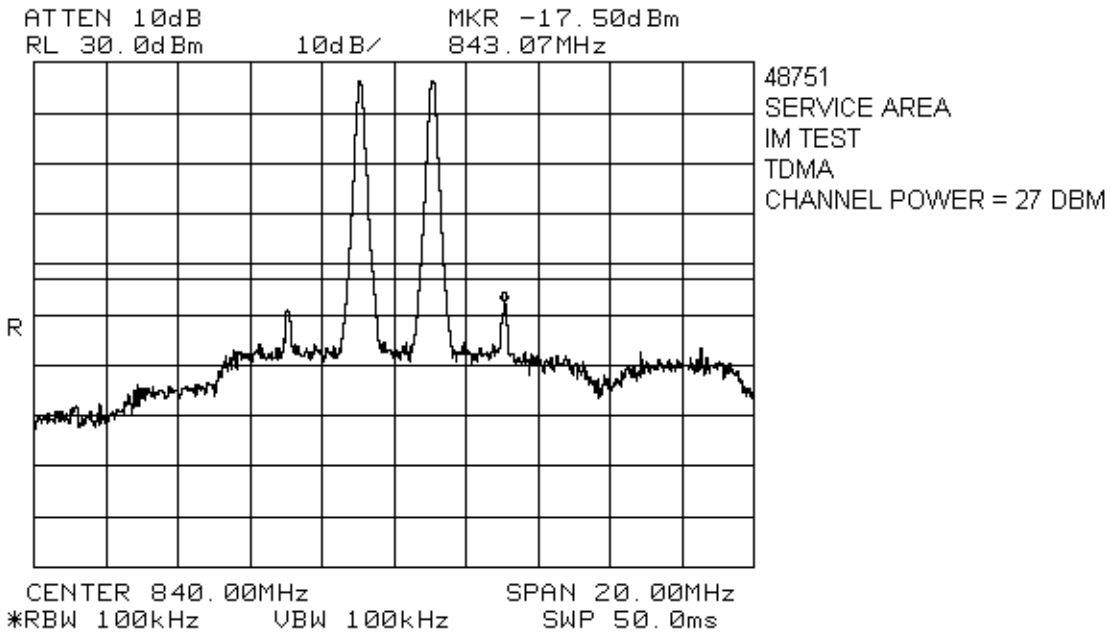
Tx = 873.5 MHz
Tx = 875.5 MHz



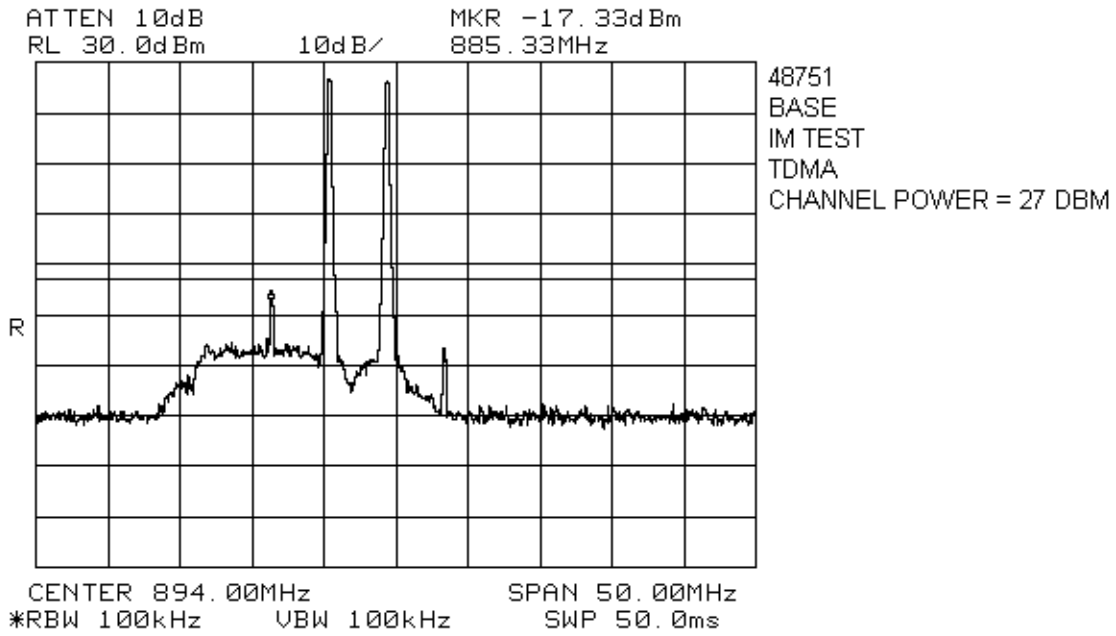
Tx = 844.290 MHz
Tx = 848.280 MHz



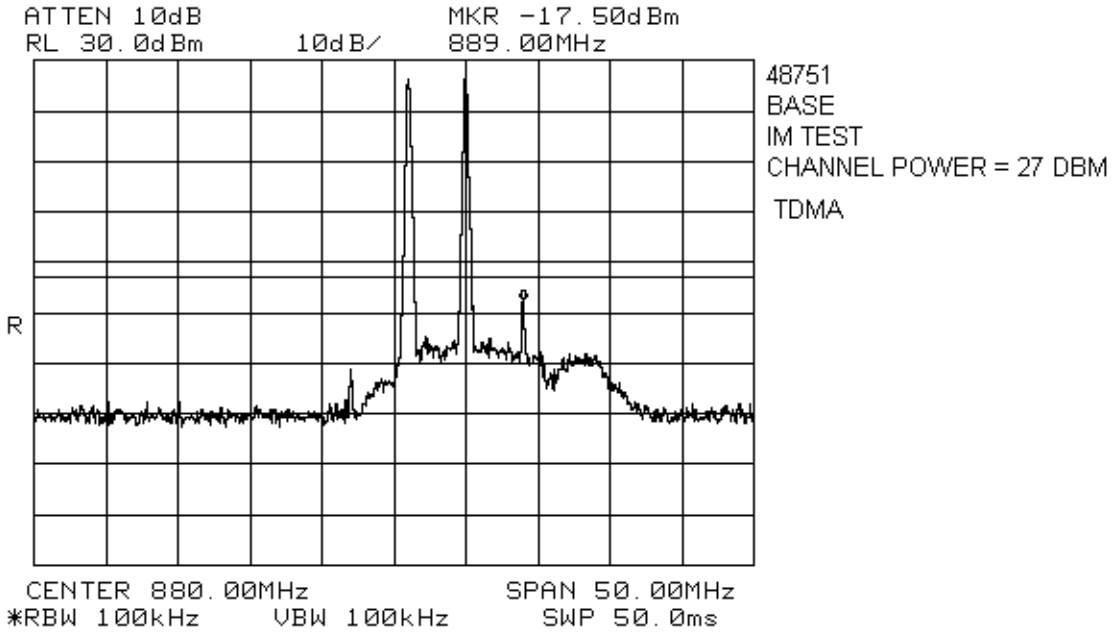
Tx = 835.710 MHz
Tx = 839.700 MHz



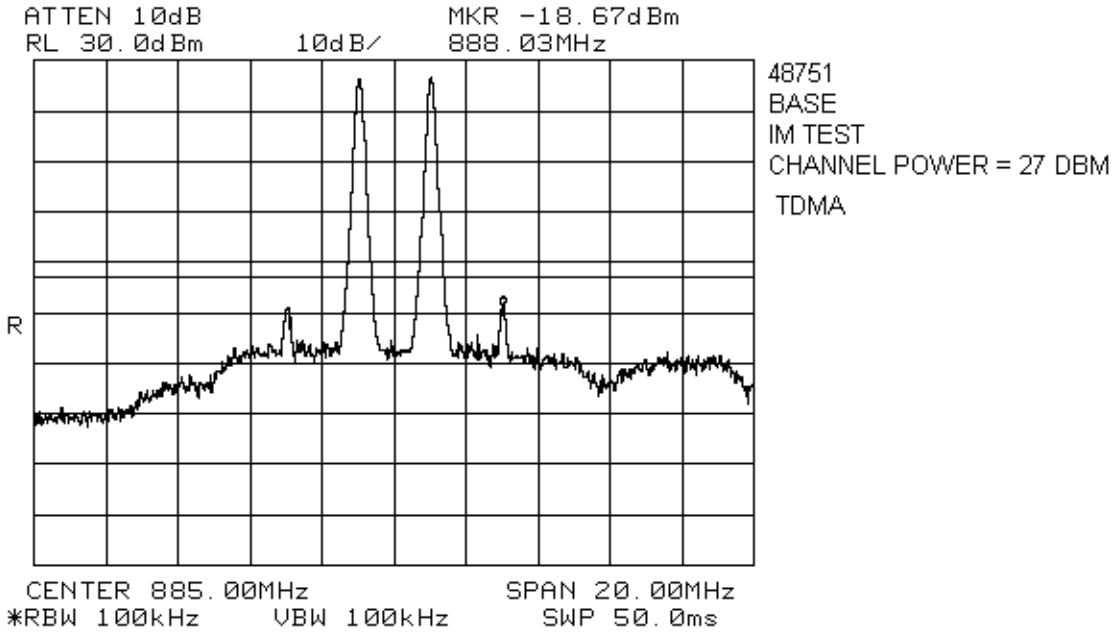
Tx = 839 MHz
Tx = 841 MHz



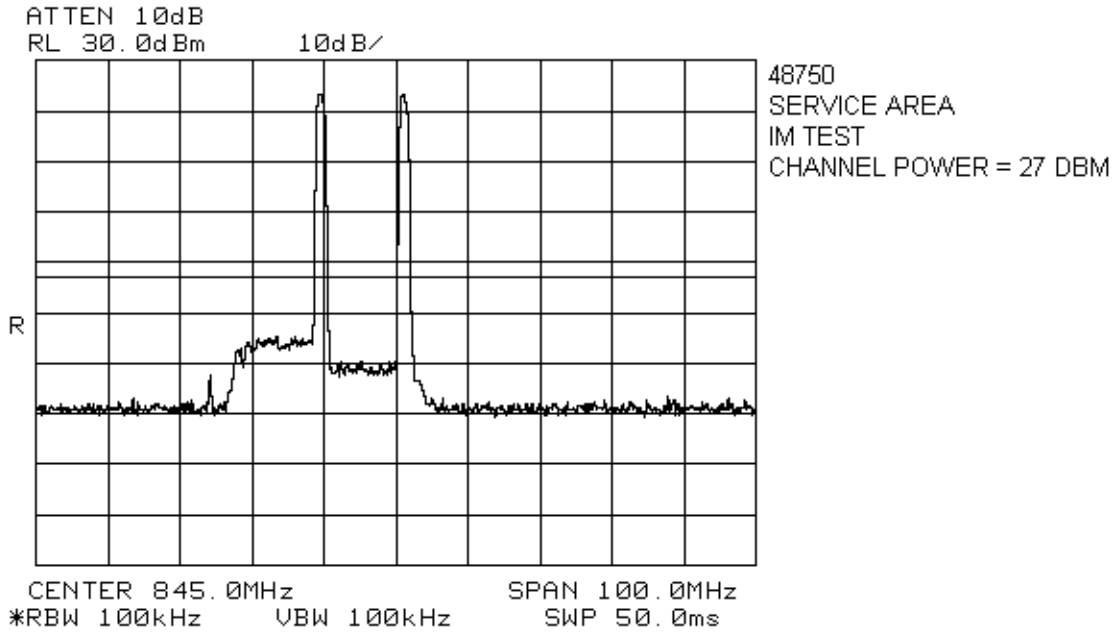
Tx = 889.290 MHz
Tx = 893.280 MHz



Tx = 880.890 MHz
Tx = 884.880 MHz



Tx = 884 MHz
Tx = 886 MHz



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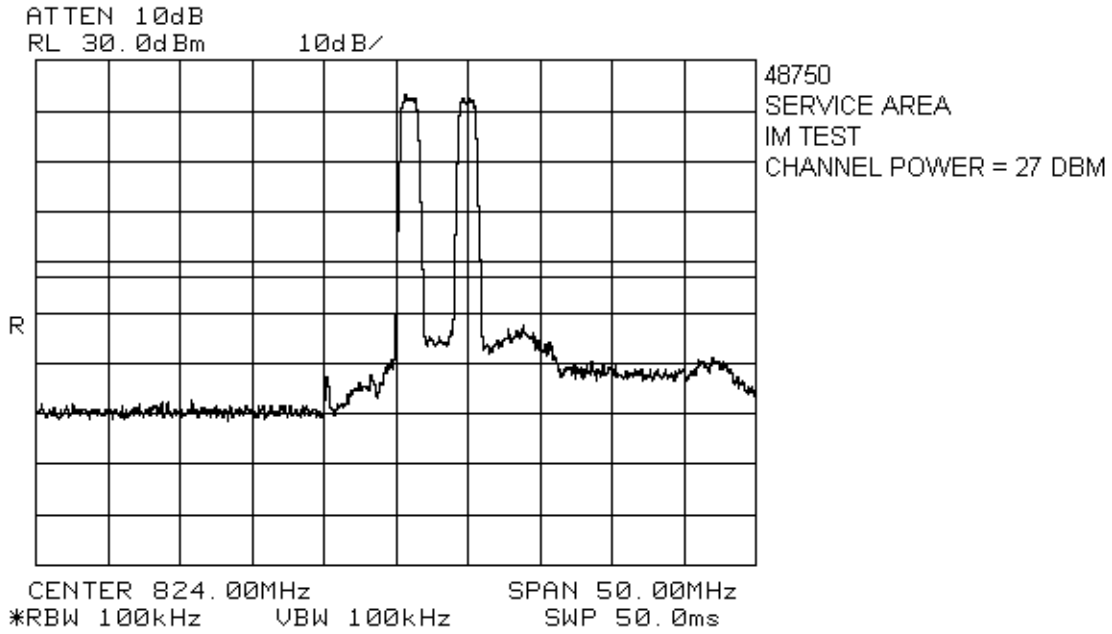
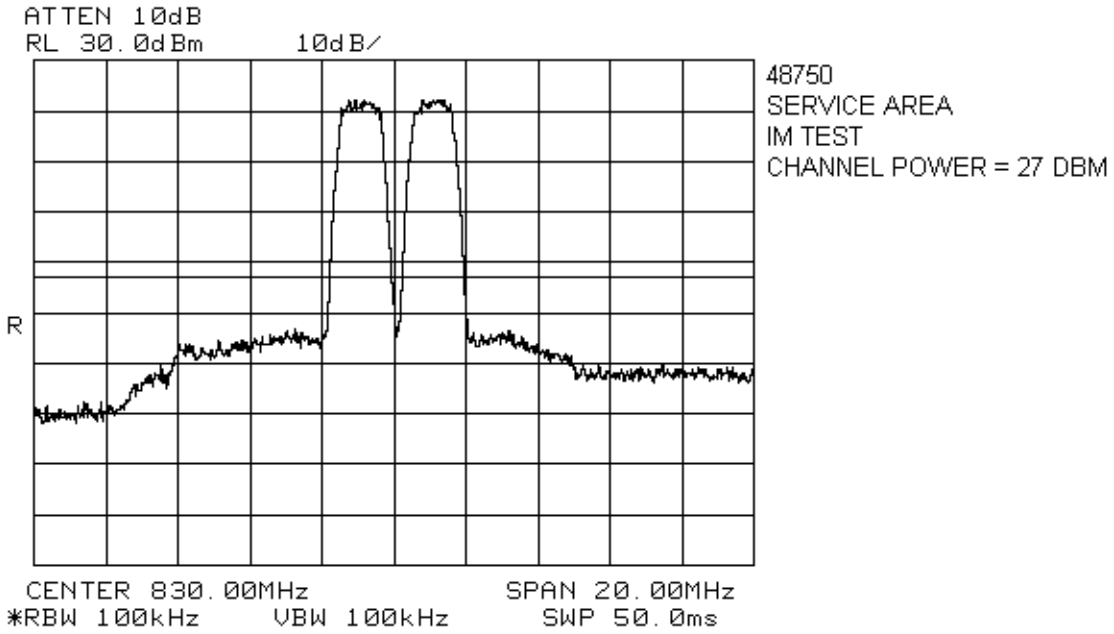
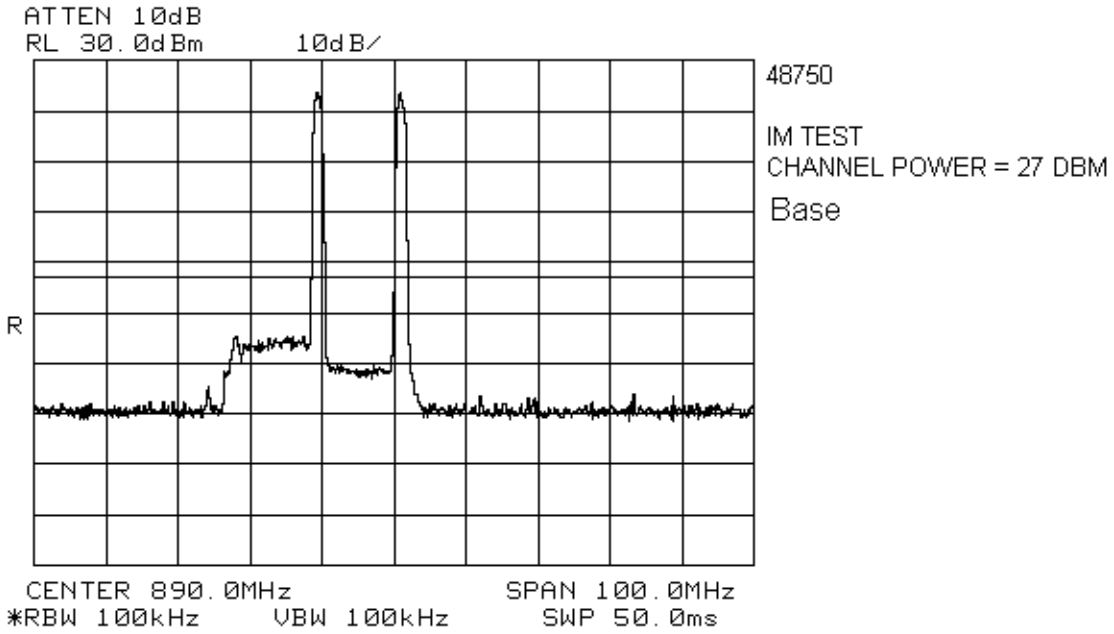
Tx = 834.300 MHz
Tx = 845.790 MHz



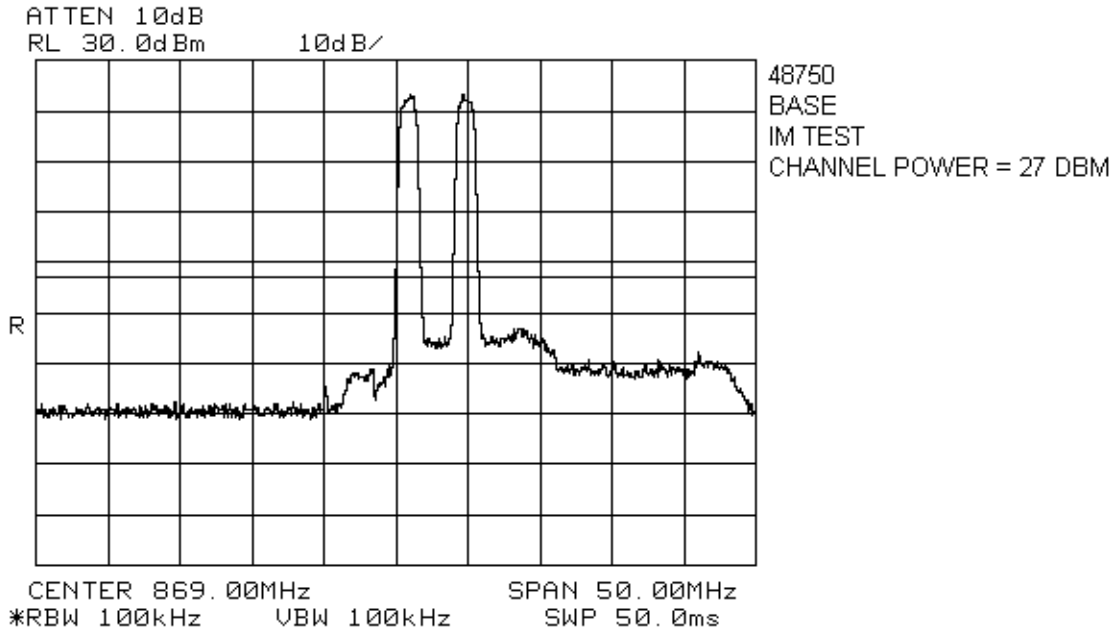
CDMA
Tx = 824.730 MHz
Tx = 828.720 MHz



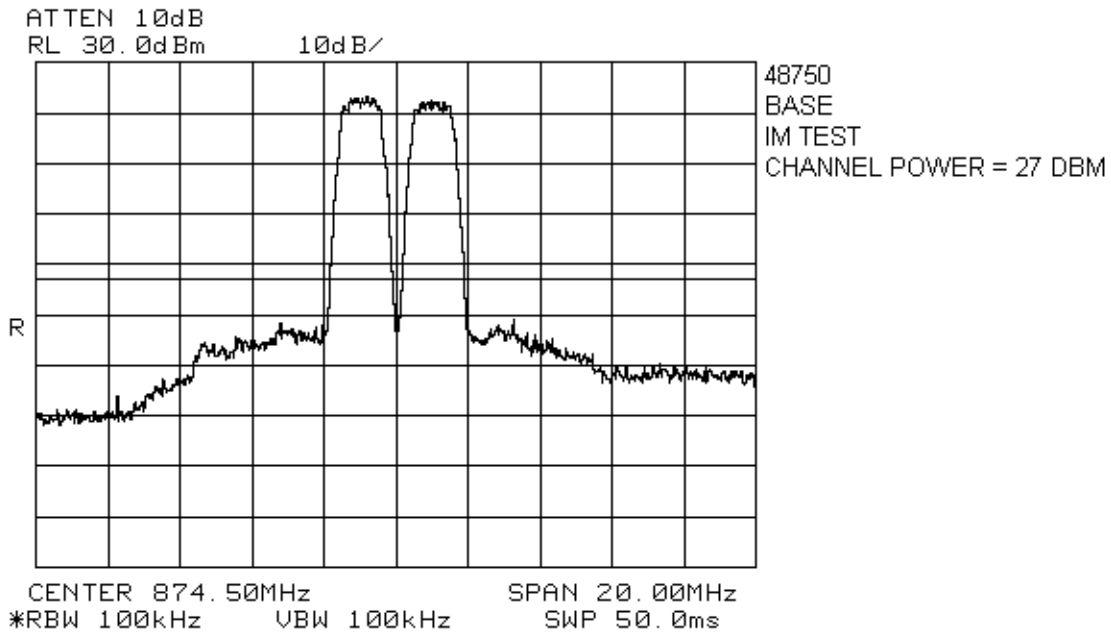
CMDA
Tx 829 MHz
Tx 831 MHz



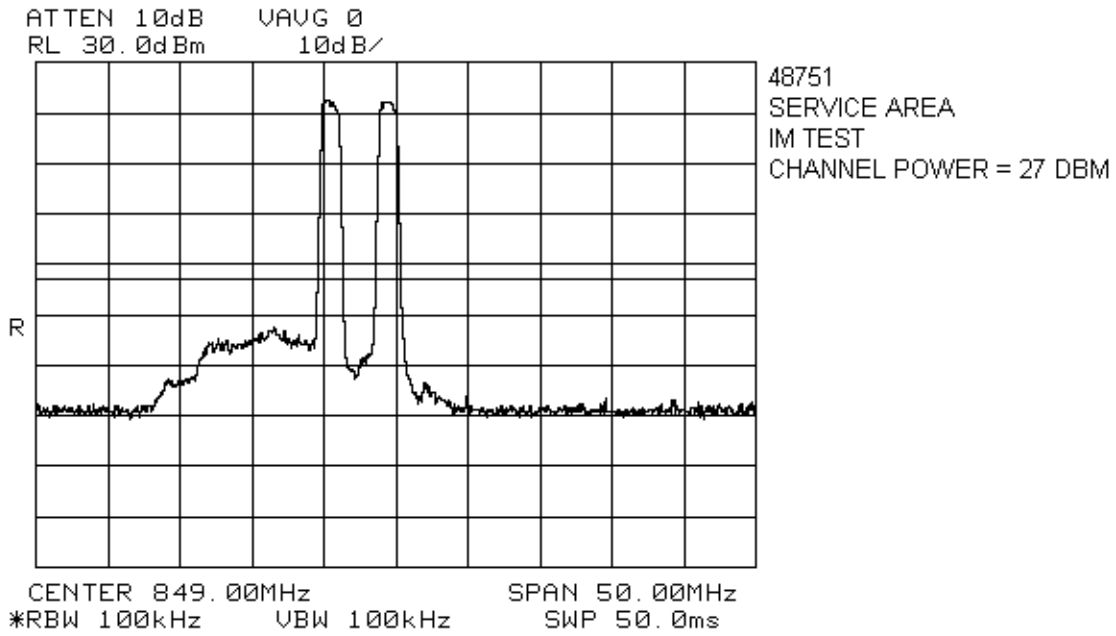
CDMA
Tx = 879.300 MHz
Tx = 890.790 MHz



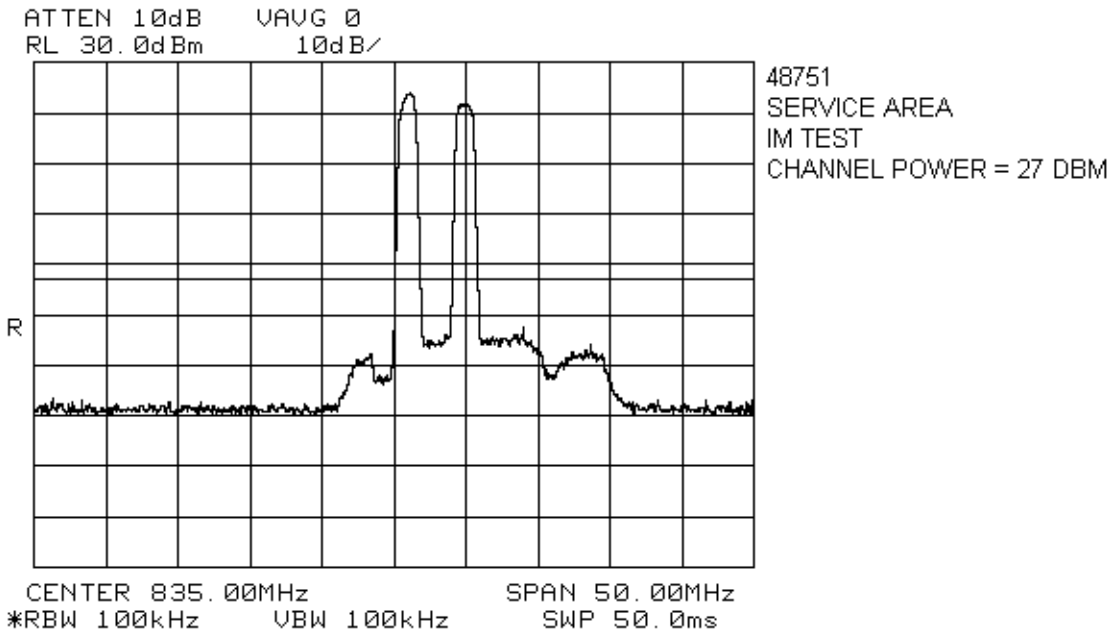
CMDA
Tx = 869.730 MHz
Tx = 873.720 MHz



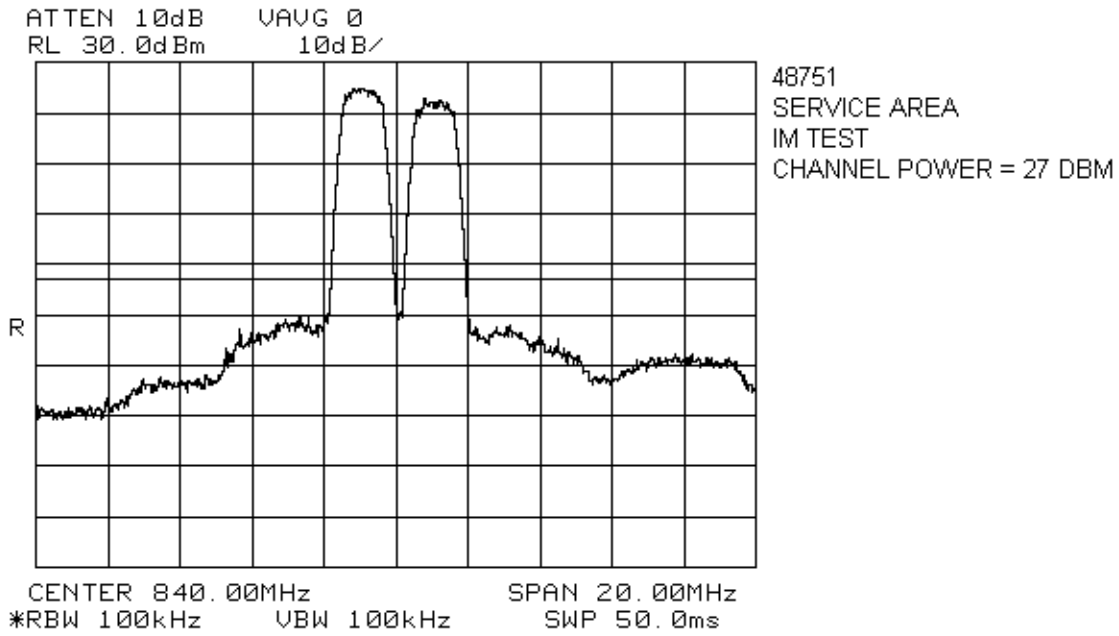
CMDA
Tx = 873.5 MHz
Tx = 875.5 MHz



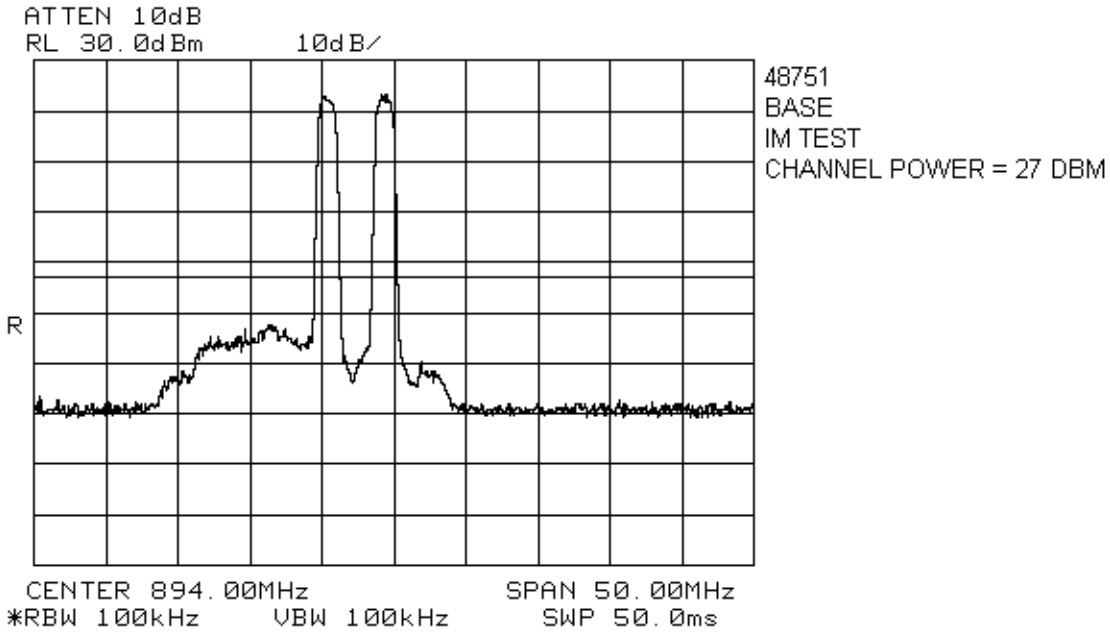
CDMA
Tx = 844.290 MHz
Tx = 848.280 MHz



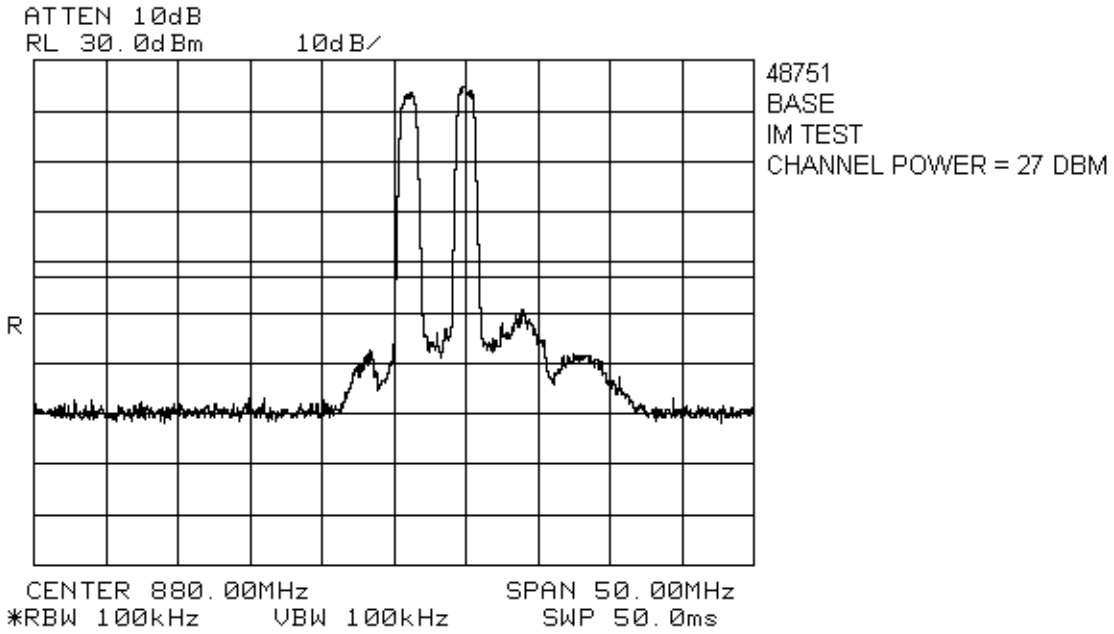
CDMA
Tx = 835.710 MHz
Tx = 839.700 MHz



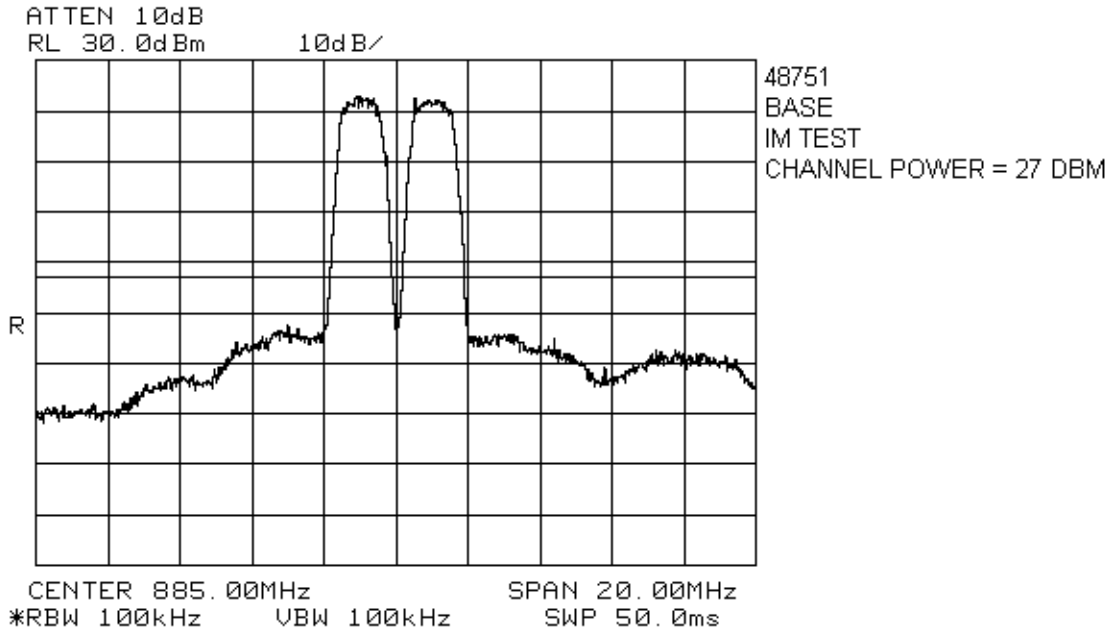
CDMA
Tx = 839 MHz
Tx = 841 MHz



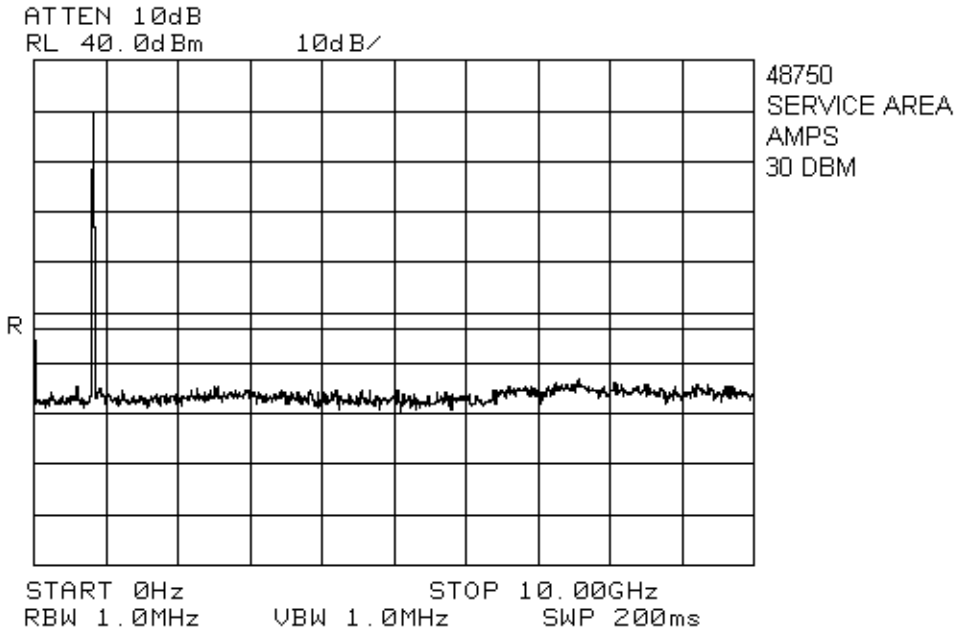
CDMA
Tx = 889.290 MHz
Tx = 893.280 MHz



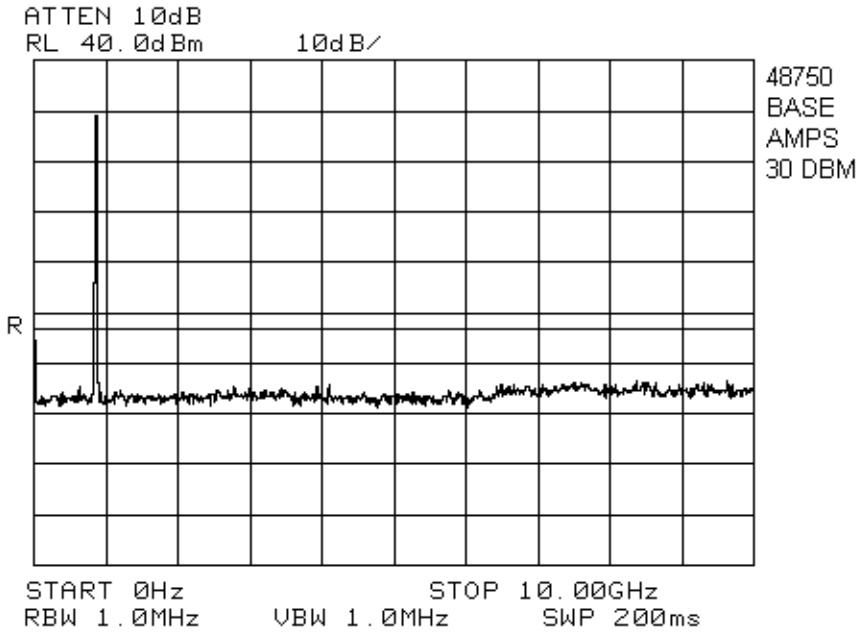
CDMA
Tx = 880.890 MHz
Tx 884.880 MHz



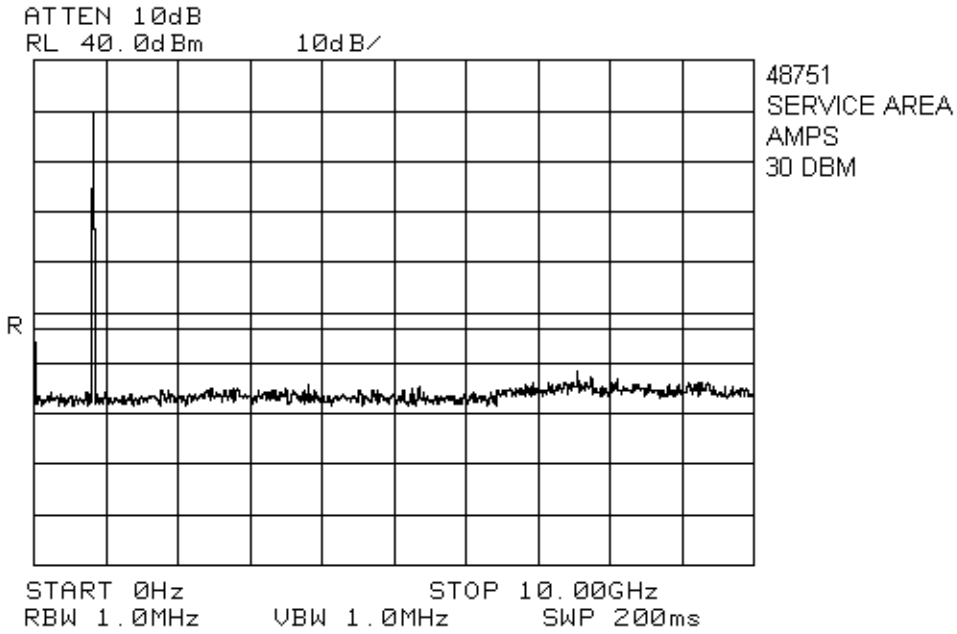
CDMA
Tx = 884 MHz
Tx = 886 MHz


ATTEN 10dB
RL 40.0dBm
10dB/
48750
SERVICE AREA
AMPS
30 DBM
R
START 0Hz
STOP 10.00GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 200ms

Tx = 830 MHz


ATTEN 10dB
RL 40.0dBm
10dB/
48750
BASE
AMPS
30 DBM
R
START 0Hz
STOP 10.00GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 200ms

Tx = 874.5 MHz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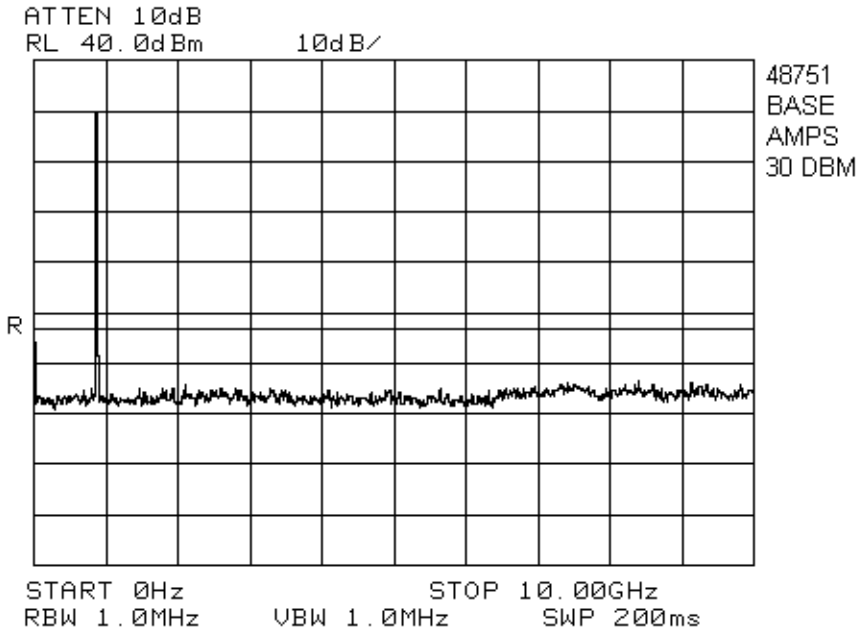
RL 40.0dBm
10dB/
R
48751
SERVICE AREA
AMPS
30 DBM
START 0Hz
STOP 10.00GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 200ms

Tx = 840 MHz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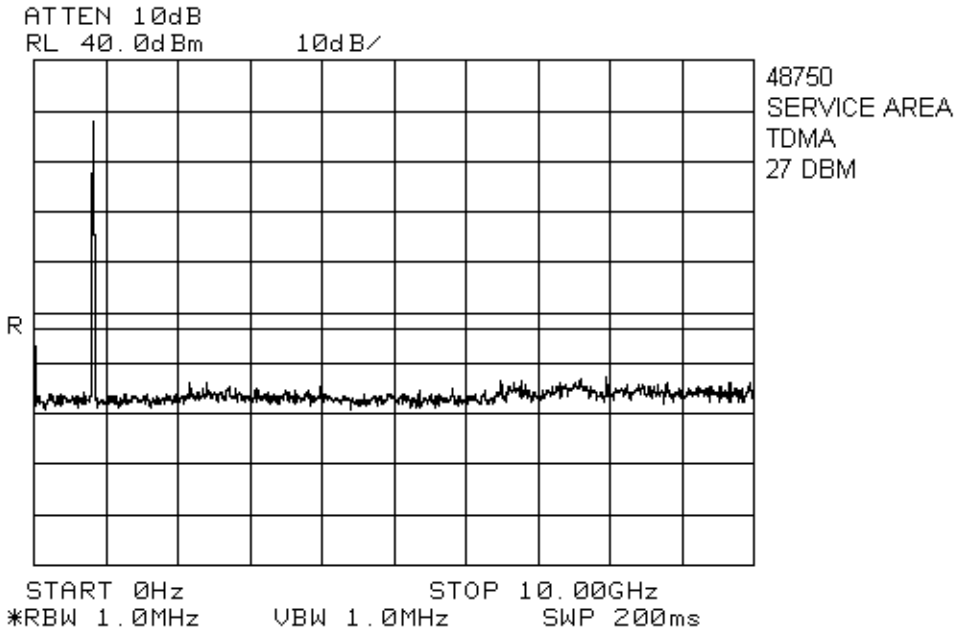
RL 40.0dBm
10dB/
48751
BASE
AMPS
30 DBM
R
START 0Hz
STOP 10.00GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 200ms

Tx = 885 MHz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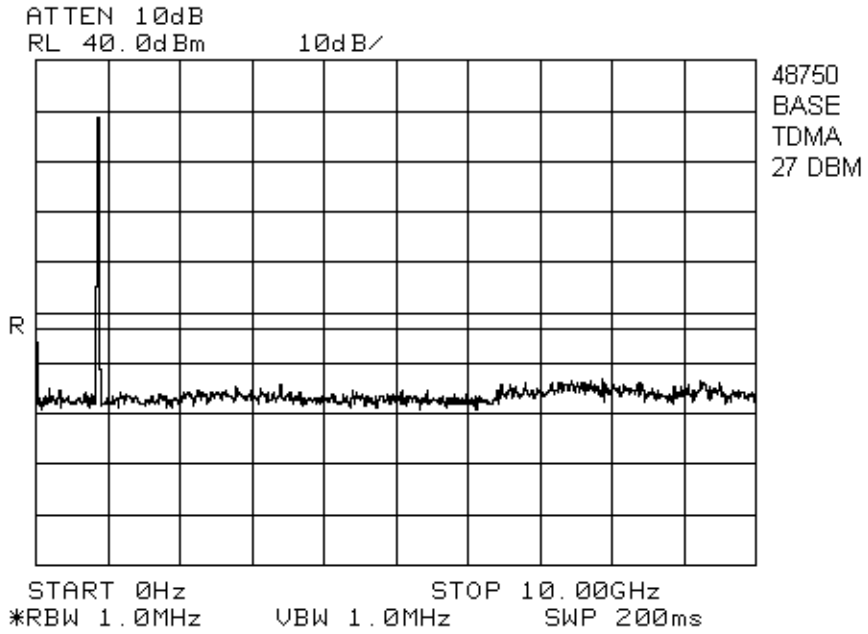
RL 40.0dBm
10dB/
48750
SERVICE AREA
TDMA
27 DBM
R
START 0Hz
STOP 10.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 200ms

Tx = 830 MHz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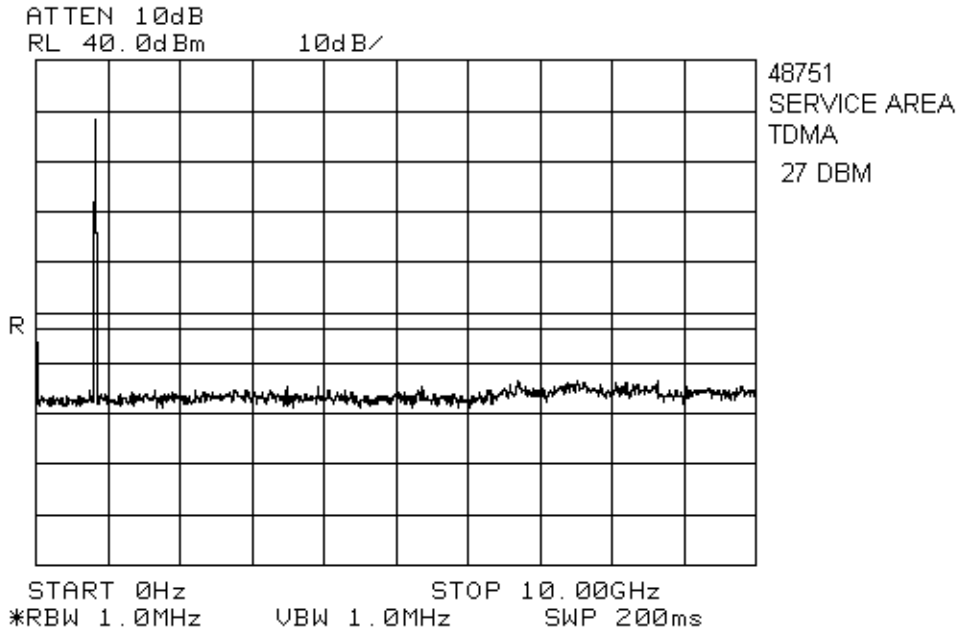
RL 40.0dBm
10dB/
48750
BASE
TDMA
27 DBM
R
START 0Hz
STOP 10.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 200ms

Tx = 874.5 MHz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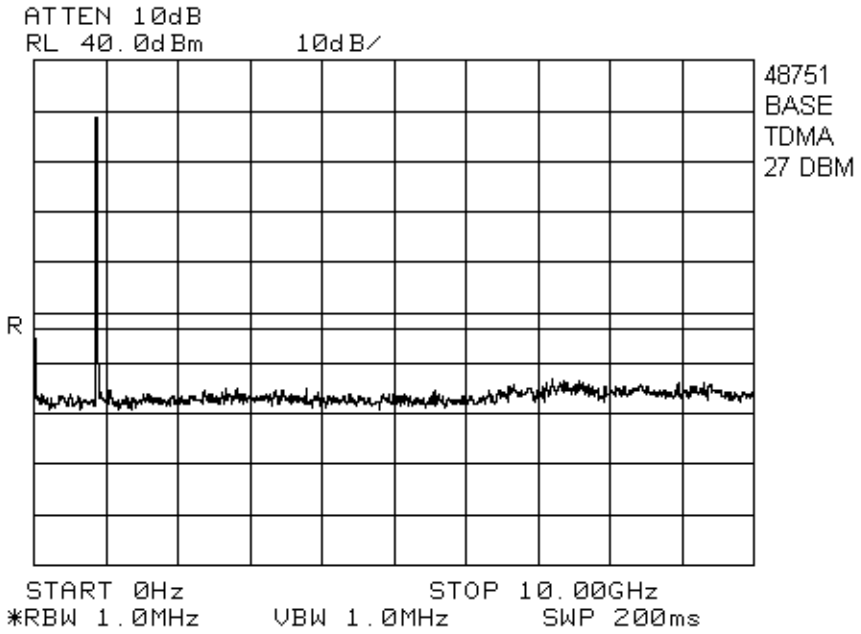
RL 40.0dBm
10dB/
48751
SERVICE AREA
TDMA
27 DBM
R
START 0Hz
STOP 10.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 200ms

Tx = 840 MHz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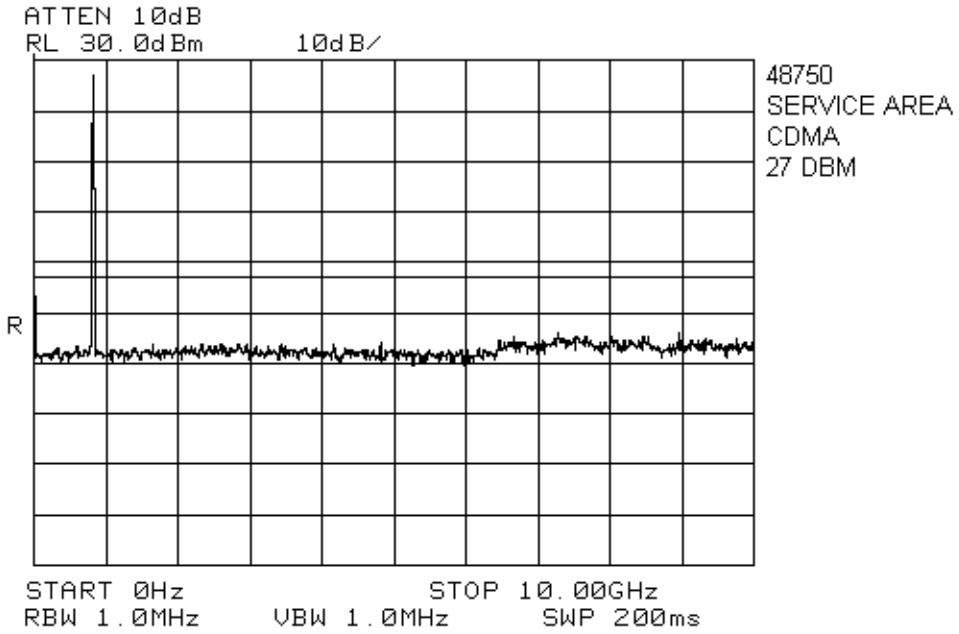
RL 40.0dBm
10dB/
48751
BASE
TDMA
27 DBM
R
START 0Hz
STOP 10.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 200ms

Tx = 885 MHz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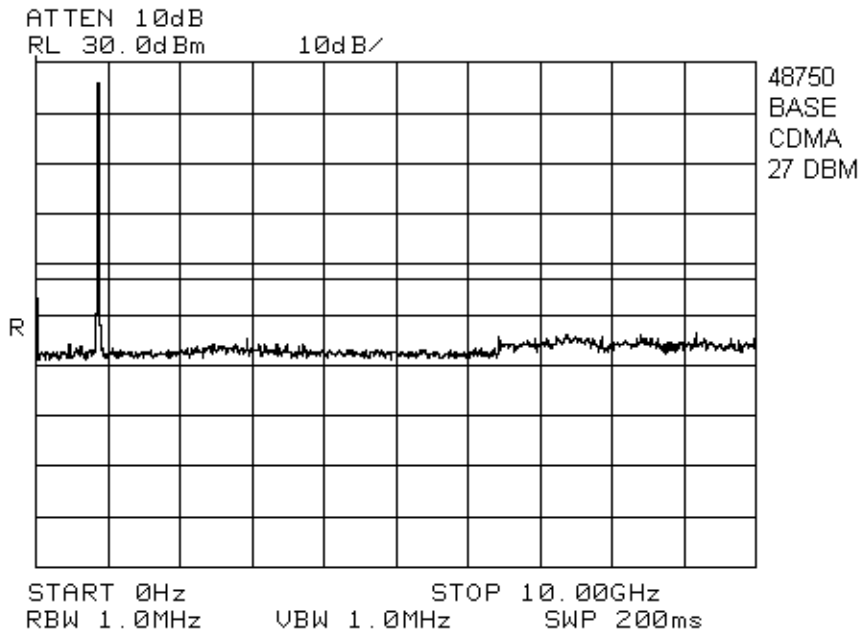
RL 30.0dBm
10dB/
48750
SERVICE AREA
CDMA
27 DBM
R
START 0Hz
STOP 10.00GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 200ms

Tx = 830 MHz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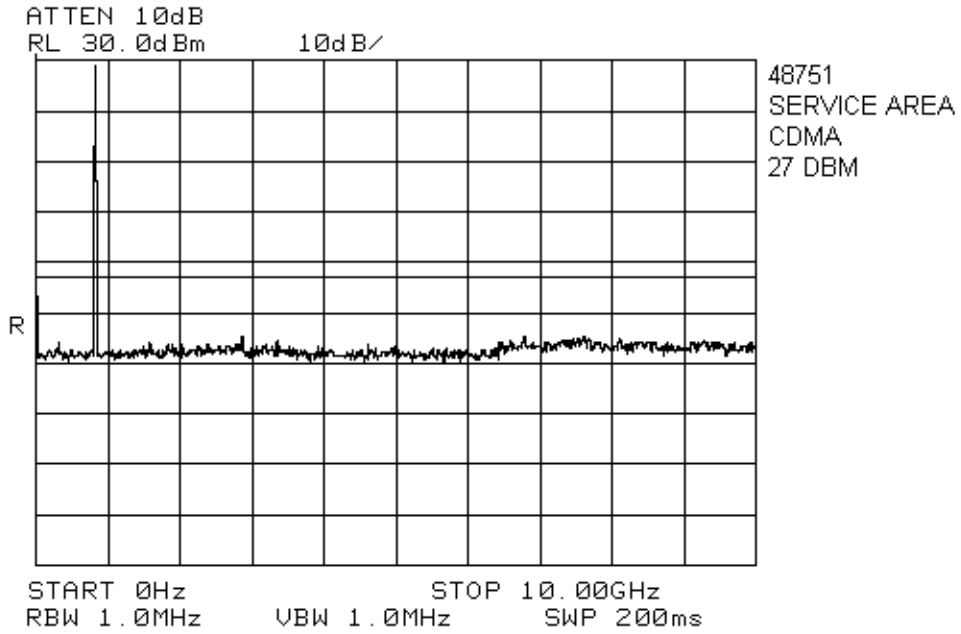
RL 30.0dBm
10dB/
48750
BASE
CDMA
27 DBM
R
START 0Hz
STOP 10.00GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 200ms

Tx = 874.5 MHz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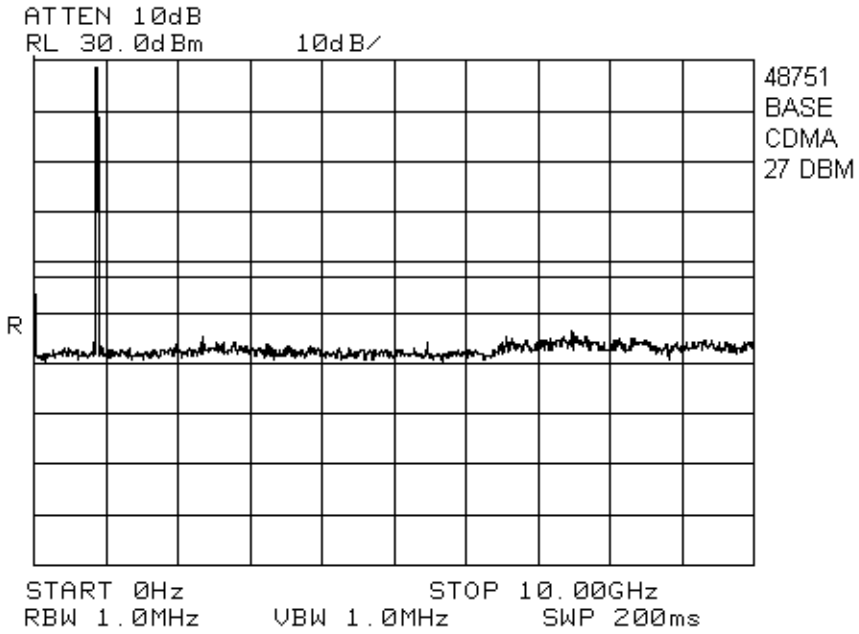
RL 30.0dBm
10dB/
48751
SERVICE AREA
CDMA
27 DBM
R
START 0Hz
STOP 10.00GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 200ms

Tx = 840 MHz


ATTEN 10dB
RL 30.0dBm
10dB/
48751
BASE
CDMA
27 DBM
R
START 0Hz
STOP 10.00GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 200ms

Tx = 885 MHz

Section 6. Field Strength of Spurious

Test Performed By: Russell Grant	**Date of Test:** September 22, 2000

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.

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

Section 7. Frequency Stability

Para. No.: 22.355

Test Performed By: Russell Grant	**Date of Test:** October 2, 2000

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.

Section 8. Test Equipment List

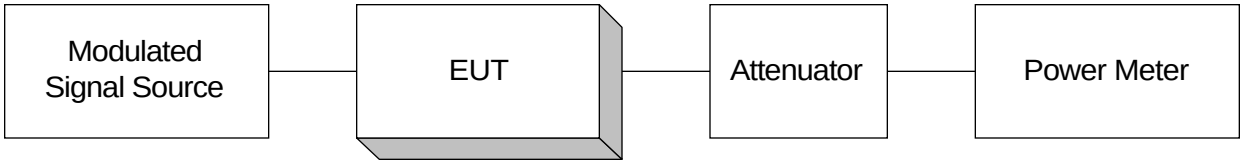
CAL CYCLE	EQUIPMENT	MANUFACTURER	MODEL	SERIAL	LAST CAL.	NEXT CAL.
1 Year	Spectrum Analyzer	Hewlett Packard	8565E	FA000981	June 16/00	June 16/01
1 Year	Climate Chamber	Thermotron	SM-16C	15649-S	COU	COU
1 Year	Attenuator	Narda	768-10	9707	Aug. 23/99	Aug. 23/00
1 Year	Attenuator	Narda	768-10	9709	Oct. 8/99	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

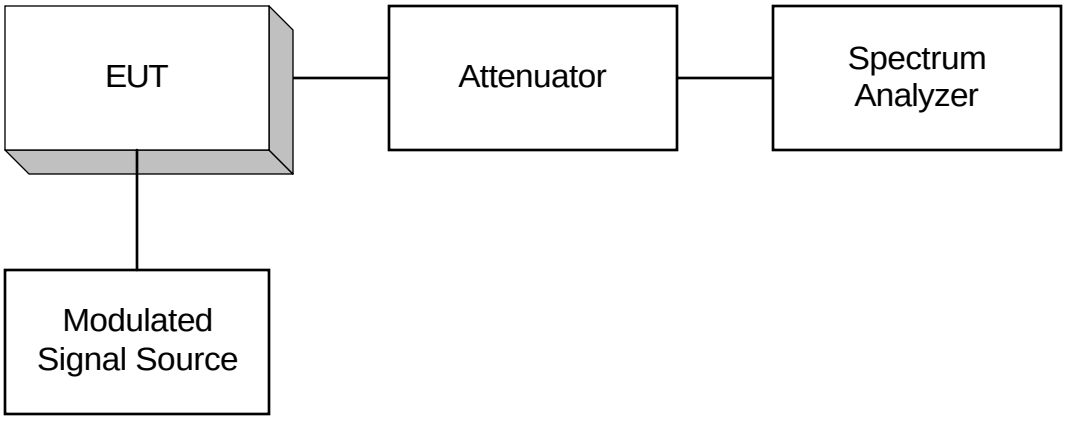
Annex A

Test Diagrams

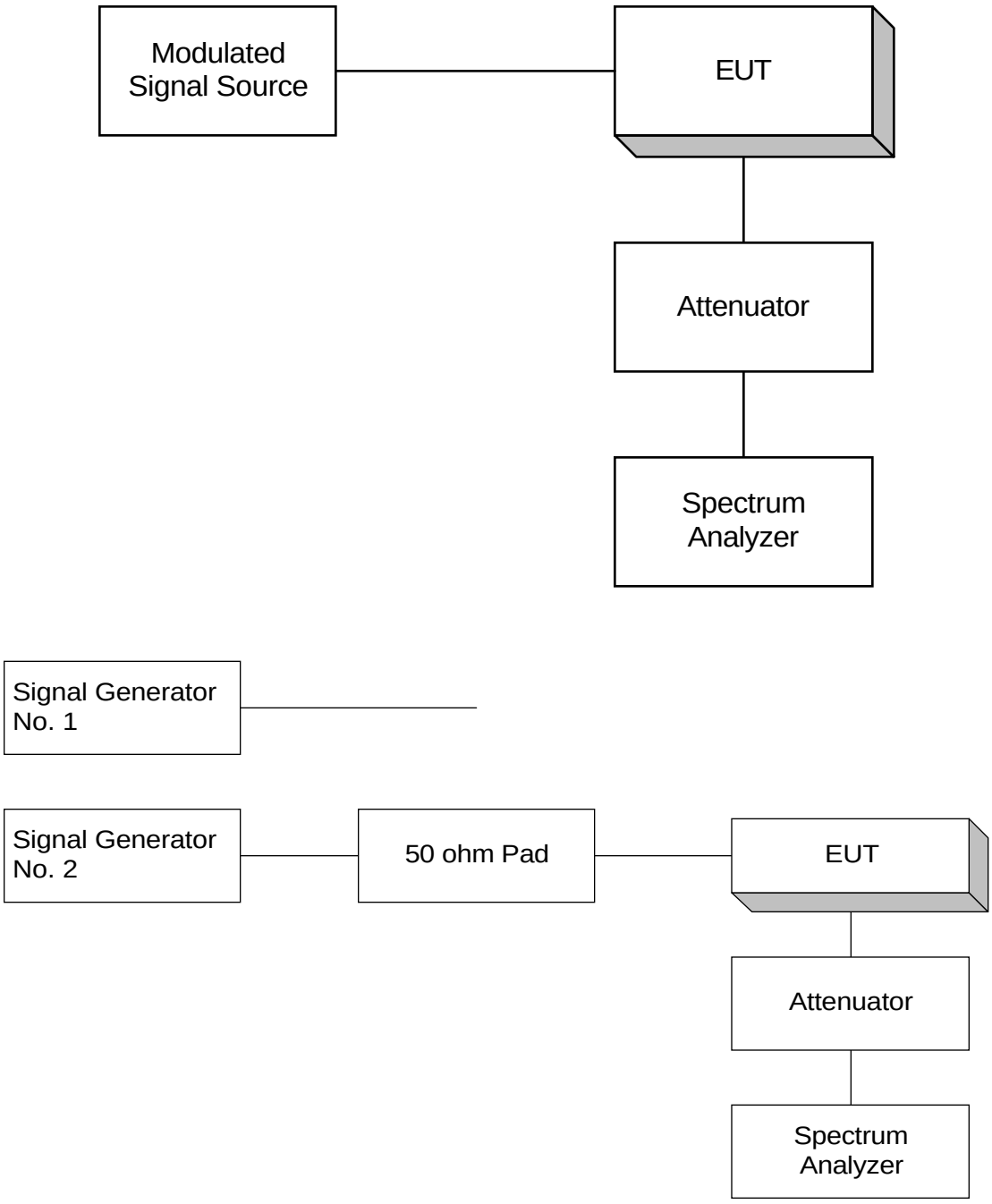
R.F. Power Output



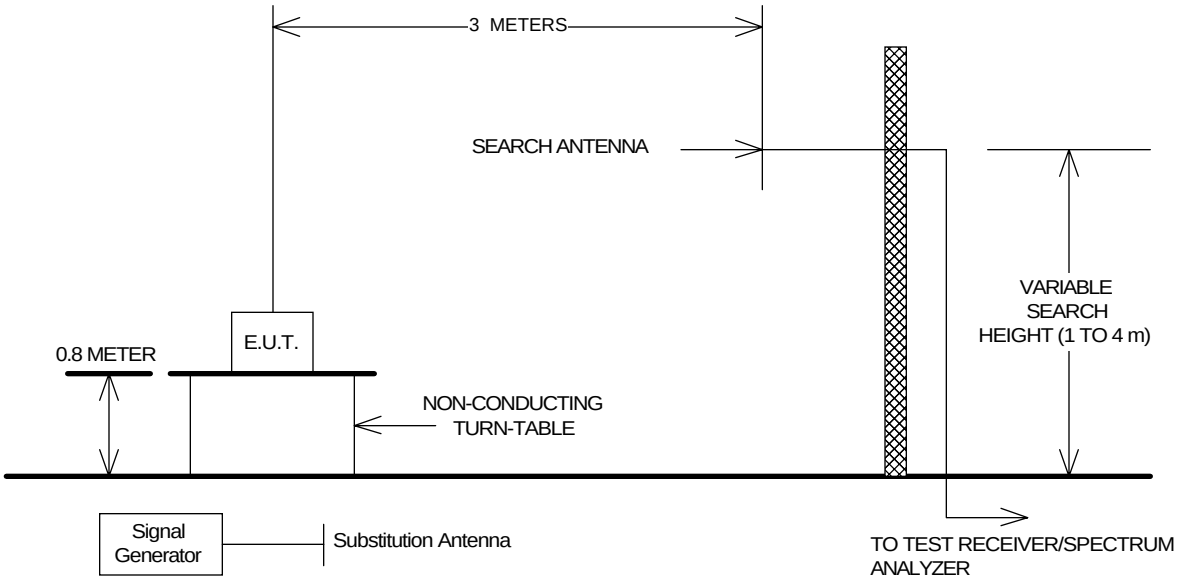
Occupied Bandwidth



Spurious Emissions at Antenna Terminals



Field Strength of Spurious Radiation



Frequency Stability