



KTL Ottawa

Safety - EMI - Telecom - ISO Guide 25

ENGINEERING TEST REPORT

**ON:
ALLEN TELECOM GROUP, SYSTEMS DIVISION
"MICROAMP 50, TPA 850 REPEATER"**

FCC ID: BCR9GBMA50C

**IN ACCORDANCE WITH:
FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS**

PROJECT NO.: 8R00131

TESTED FOR:

**ALLEN TELECOM GROUP, SYSTEMS DIVISION
30500 BRUCE INDUSTRIAL PARKWAY
CLEVELAND, OHIO 44139-3996**

TESTED BY:

**KTL OTTAWA INC.
3325 RIVER ROAD, R.R. 5
OTTAWA, ONTARIO K1V 1H2**



NVLAP LAB CODE: 100351-0

AUGUST 1998

This document contains 136 pages including this one.

KTL Ottawa Inc. authorizes the above named company to reproduce this report provided it is reproduced in its entirety and for use by the company's employees only.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. KTL Ottawa Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

This report applies only to the items tested.

EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

Table of Contents

Section 1. Summary of Test Results

- General
- Summary of Test Data

Section 2. General Equipment Specification

- Specifications
- Description of Modifications for Class II Permissive Change
- Modifications Made During Testing
- Theory of Operation
- System Diagram

Section 3. RF Power Output

- Test Results
- Measurement Data
- Power Over Bandwidth Graphs

Section 4. Occupied Bandwidth

- Occupied Bandwidth (Voice + SAT)
 - Test Results
 - Test Data
 - Voice + SAT Input and Output Graphs
- Occupied Bandwidth (WB Data)
 - Test Results
 - Test Data
 - Wideband Data Input and Output Graphs
- Occupied Bandwidth (ST)
 - Test Results
 - Test Data
 - ST Input and Output Graphs
- Occupied Bandwidth (Digital Mod.)
 - Test Results
 - Test Data
 - Digital Mod. Input and Output Graphs

Section 5. Spurious Emissions at Antenna Terminals

- Test Results
- Test Data
- Graphs

EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

Table of Contents, continued

Section 6. Field Strength of Spurious

- Test Results
- Test Data
- Test Data - Radiated Emissions - Uplink
- Test Data - Radiated Emissions - Downlink
- Photographs of Test Setup
- Pre-Scan Data

Section 7. Frequency Stability

- Test Results
- Measurement Data
- Graphs

Section 8. Test Equipment List

Annex A - Test Methodologies

- RF Power Output
- Occupied Bandwidth (Voice & SAT)
- Occupied Bandwidth (WB Data)
- Occupied Bandwidth (ST)
- Occupied Bandwidth (Digital Modulation)
- Spurious Emission at Antenna Terminals
- Field Strength of Spurious Radiation
- Frequency Stability

Annex B - Test Diagrams

- R.F. Power Output
- Occupied Bandwidth
- Spurious Emissions at Antenna Terminals
- Field Strength of Spurious Radiation
- Frequency Stability

EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

Section 1. Summary of Test Results

Manufacturer: Allen Telecom Group, Systems Division

Model No.: MICROAMP 50, TPA 850

Serial No.: 003 and 002

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

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

NVLAP LAB CODE: 100351-0

TESTED BY: Kevin Carr
Kevin Carr, Technologist

DATE: 14 Sept 98

TECHNICAL REVIEW: Tom Tidwell
Tom Tidwell, Senior Technologist

DATE: 14 Sept. 1998

APPROVED BY: W. Waterhouse
W. Waterhouse, RF Engineering Lab Manager

DATE: 15th Sept 1998

EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	MEAS.	RESULT
RF Power Output	22.913(a)	500W ERP	Plot	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	Plot	Complies
Field Strength of Spurious Emissions	22.917	-13 dBm E.I.R.P.	Chart	Complies
Frequency Stability	22.355	1.5 ppm	N/A	N/A

Footnotes For N/A's:

Test Conditions: Temperature: 23 °C
 Humidity: 55 %

EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

Section 2. General Equipment Specification

Supply Voltage Input:	120 VAC, 60 Hz				
Frequency Range:	Downlink:	869.0 MHz to 894.0 MHz			
Frequency Range:	Uplink:	824.0 MHz to 849.0 MHz			
Type of Modulation and Designator:	CDMA (F9W)	GSM (GXW)	TDMA (DXW)	CDPD (F9W)	AMPS (F8W, F1D)
	☒	☒	☒	☒	☒
Output Impedance:	50 ohm				
Gain:	50 dB Nominal				
Max Input Power:	Not Applicable				
RF Output (Rated):	Uplink		Downlink		
	Single:	20.0 dBm	10.0 dBm		
	Composite:	15.2 dBm / 3 Carriers	5.2 dBm / 3 Carriers		
Frequency Translation:		F1-F1	F1-F2	N/A	
		☒	☐	☐	
Band Selection:		Software	Duplexer Change	Fullband Coverage	
		☐	☒	☒	

KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

Description of Modifications For Class II Permissive Change

NOT APPLICABLE

EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

Modifications Made During Testing

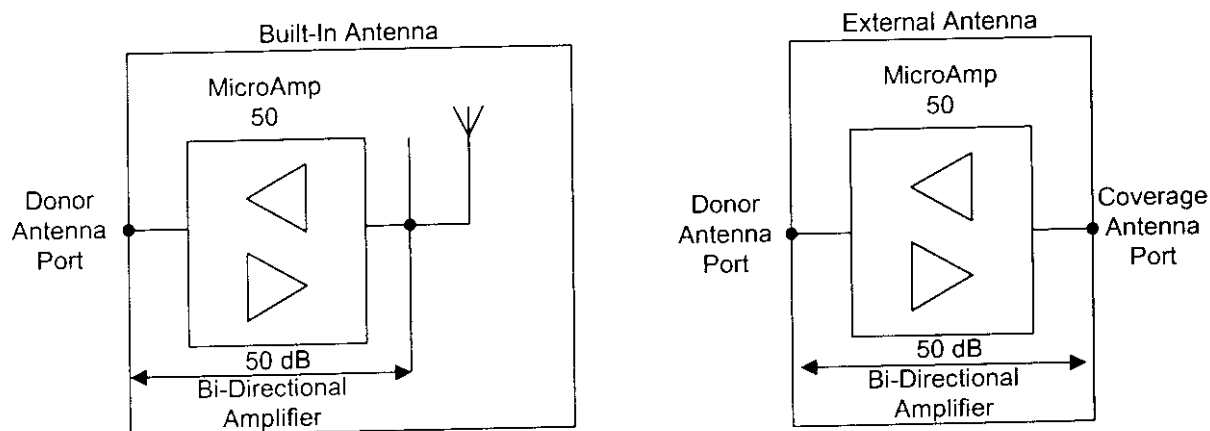
The first sample failed Spurious Emissions. A second sample was supplied and 2 CW Intermodulation Products and 2 CW Intermodulation Spurious Emissions were repeated. Two 1pF capacitors were added to the downlink path at each end of the stripline to ground near DP1. The stripline trace beside C78 is opened and a series inductor is inserted.

EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

Theory of Operation

The mircoamp50 model TPA 850 is a bi-directional amplifier designed for small area indoor coverage in the 800 MHz cellular band. The unit can either use a built-in antenna or an external antenna for maximum coverage.

System Diagram



EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 2.985
TESTED BY: Kevin Carr	DATE: June 24, 1998

Test Results: Complies.

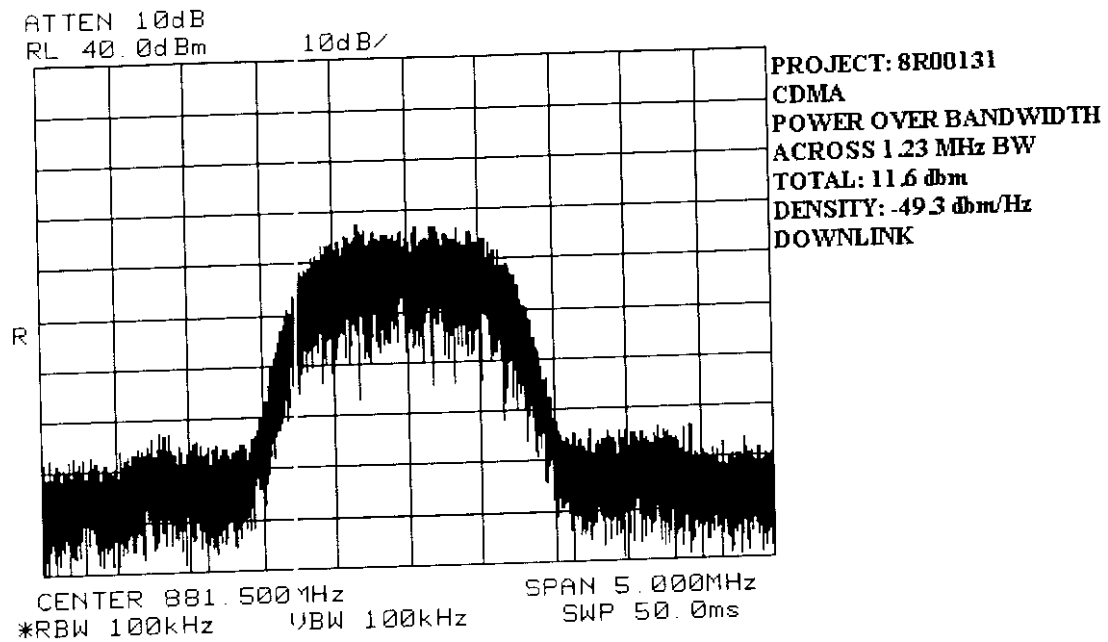
Measurement Data:

	Modulation Type	Per Channel Power Output (dBm)	Composite Power Output (dBm)
Uplink	AMPS	18.5 / 2 Channel	21.5
Downlink	AMPS	10.1 / 2 Channel	13.1
Uplink	CDMA	18.3 / 2 Channel	21.3
Downlink	CDMA	8.6 / 2 Channel	11.6
Uplink	GSM	18.4 / 2 Channel	21.4
Downlink	GSM	9.8 / 2 Channel	12.8
Uplink	NADC	17.9 / 2 Channel	20.9
Downlink	NADC	7.0 / 2 Channel	10.0
Uplink	CDPD	18.4 / 2 Channel	21.4
Downlink	CDPD	9.5 / 2 Channel	12.5

KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

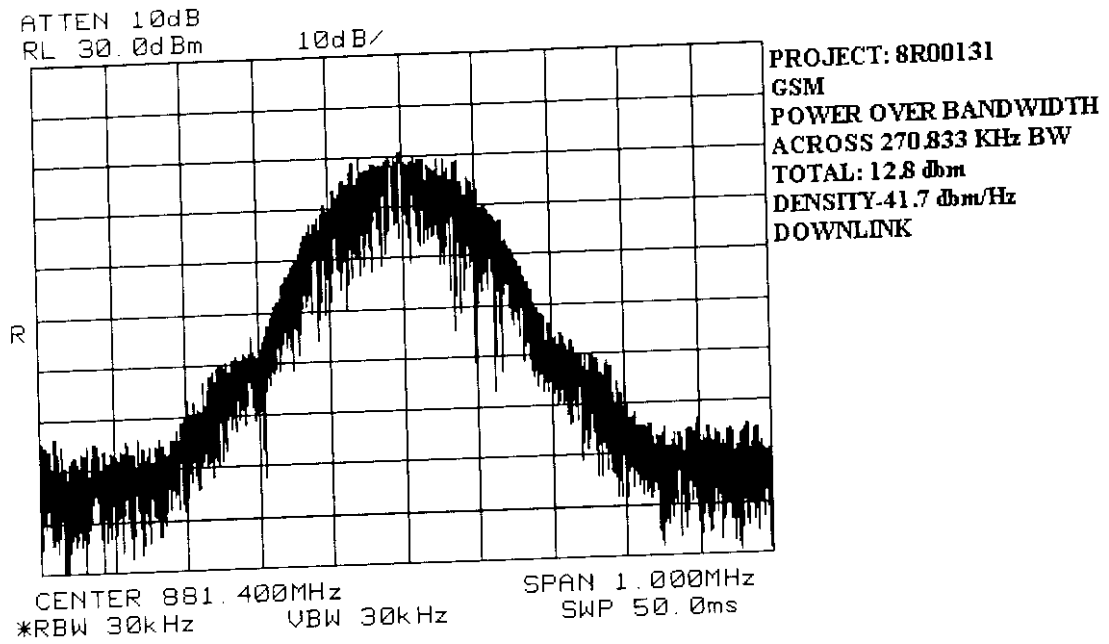
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

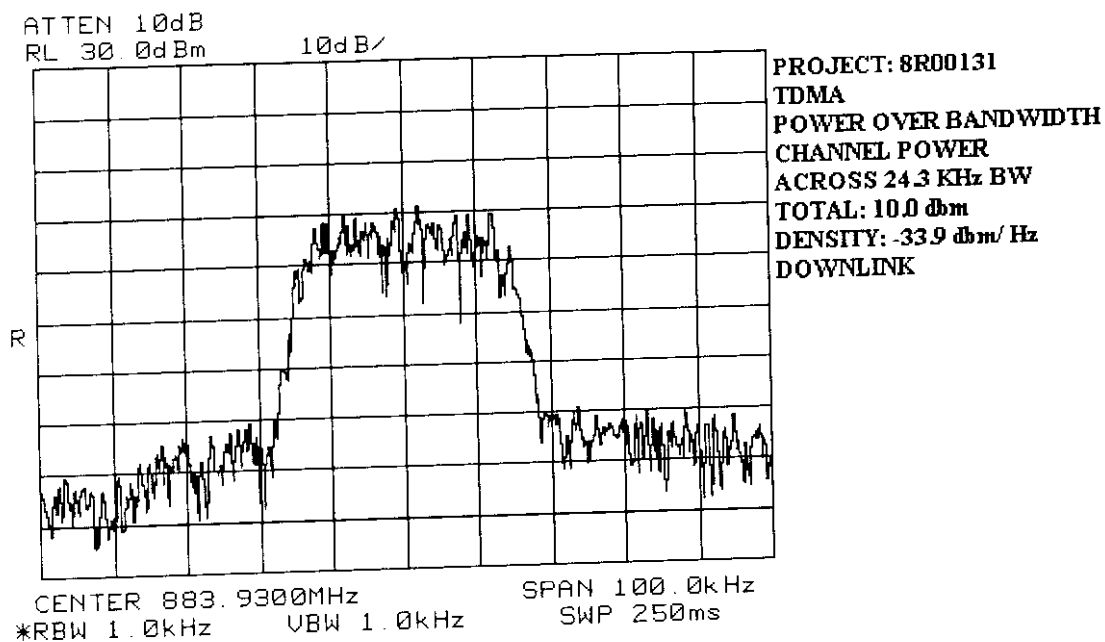
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



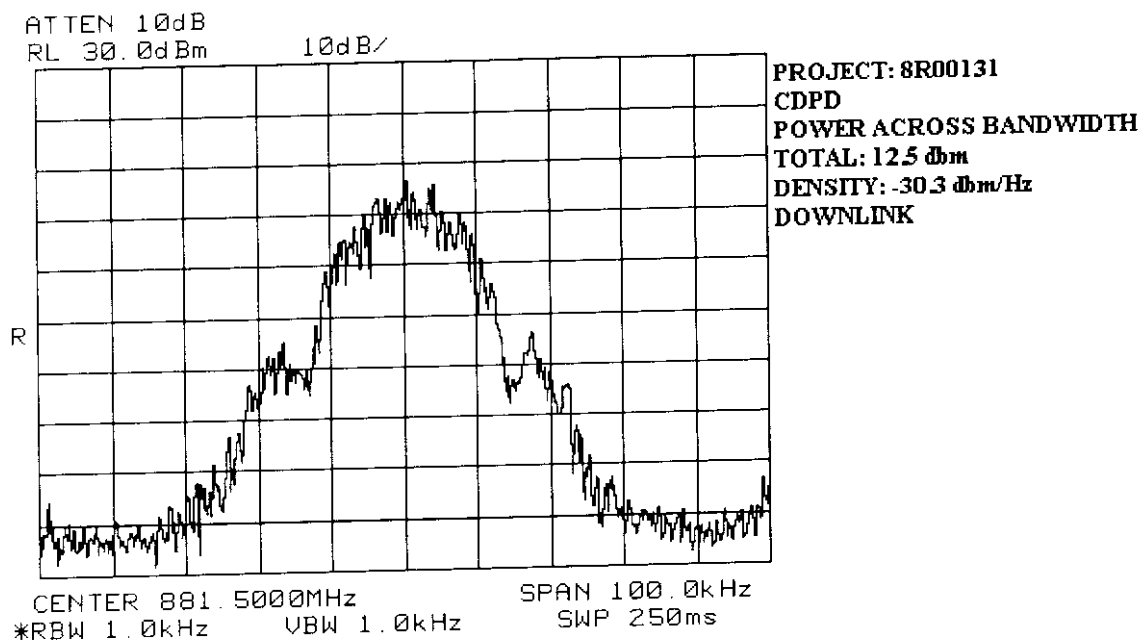
KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



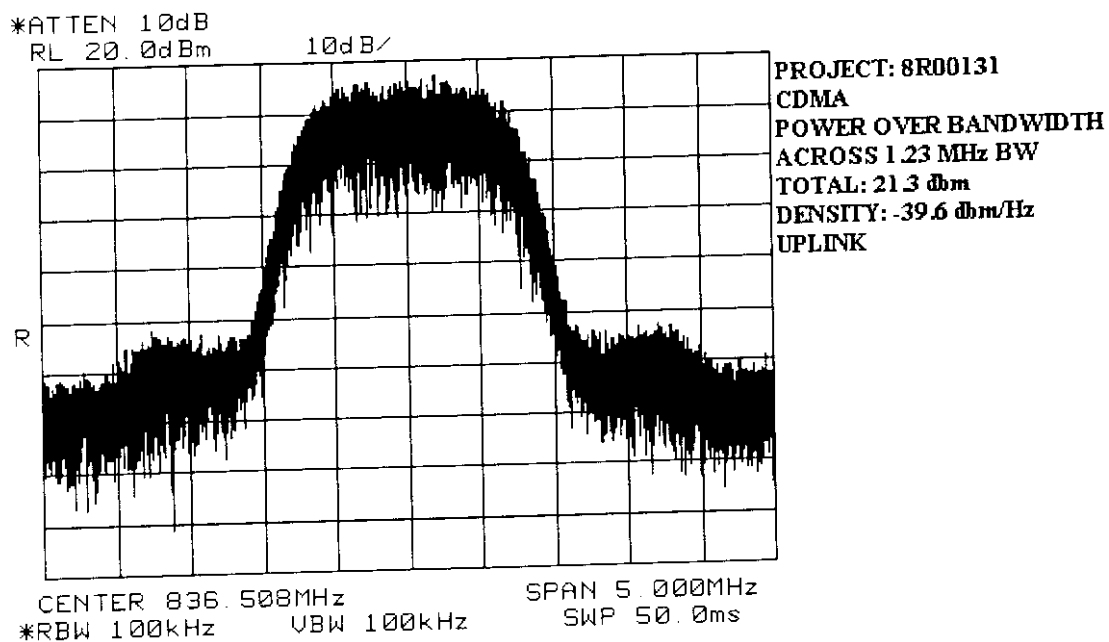
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



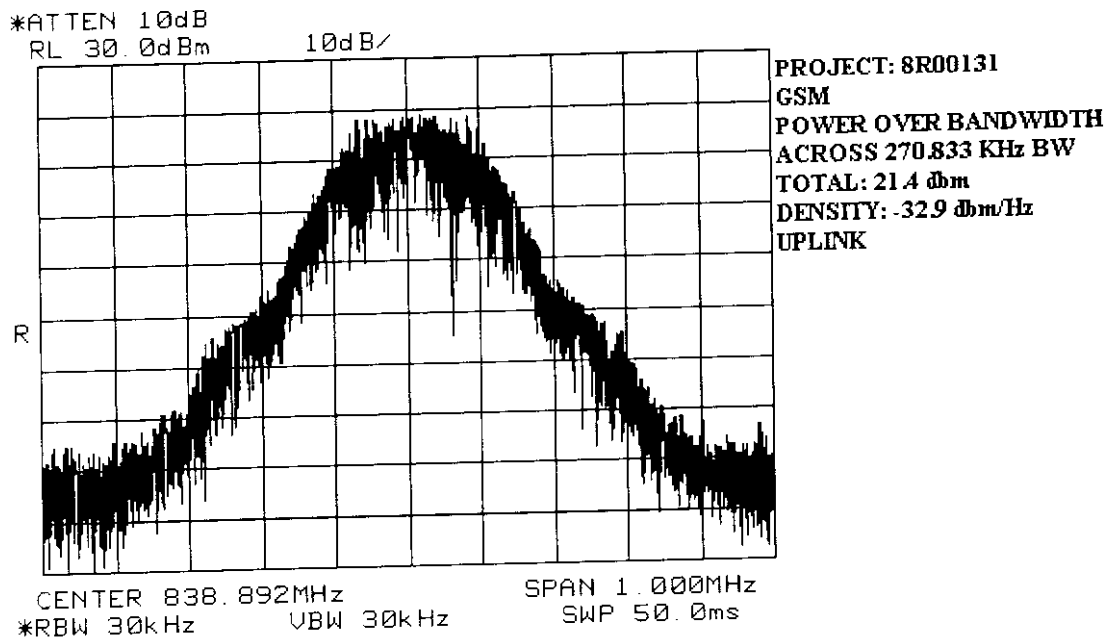
KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

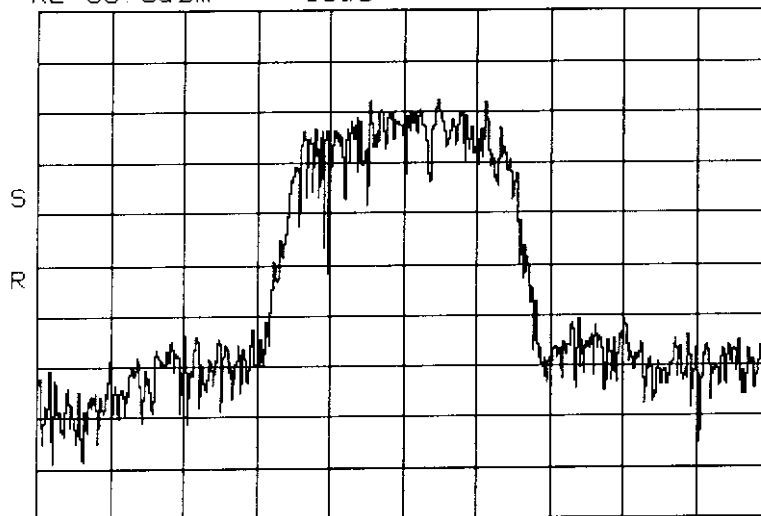


EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

*ATTEN 10dB
RL 30.0dBm 10dB/



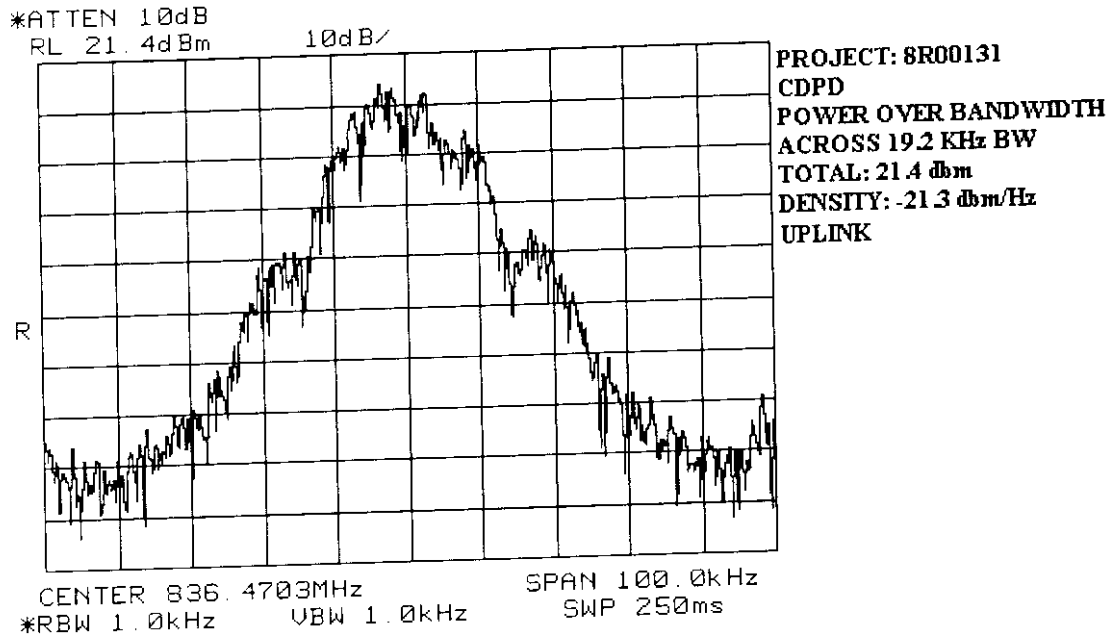
CENTER 836.2005MHz SPAN 100.0kHz
*RBW 1.0kHz VBW 1.0kHz SWP 250ms

PROJECT: 8R00131
TDMA
POWER OVER BANDWIDTH
ACROSS 24.3kHz BW
TOTAL: 20.9 dBm
DENSITY: -23.0 dBm
UPLINK

KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth (Voice + SAT)	PARA. NO.: 2.917(c)
TESTED BY: Kevin Carr	DATE: June 23, 1998

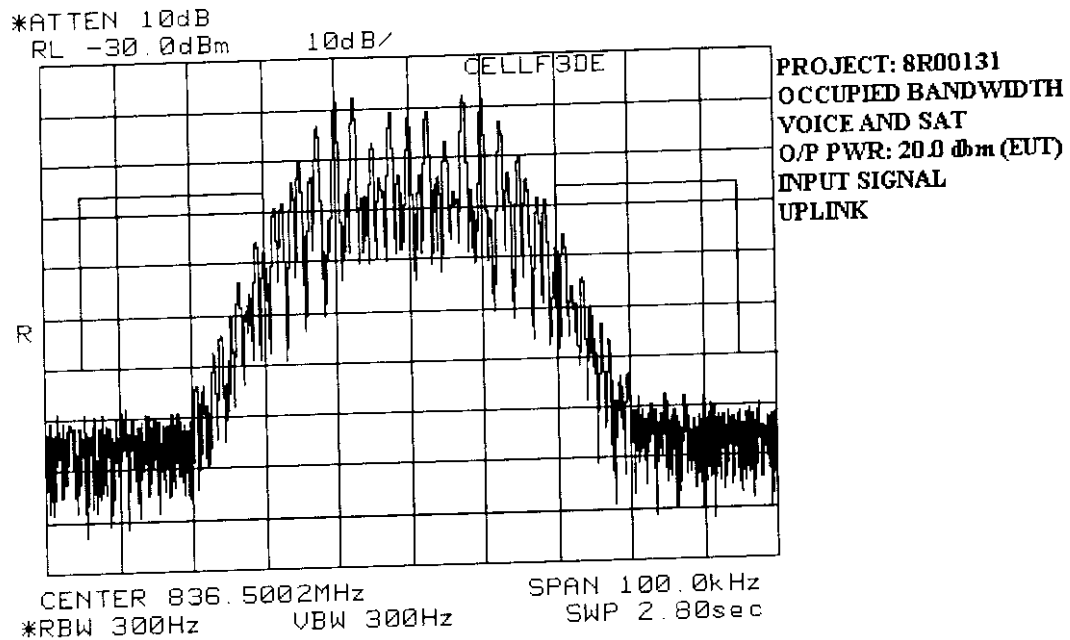
Test Results: Complies.

Test Data: See attached graph(s).

KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

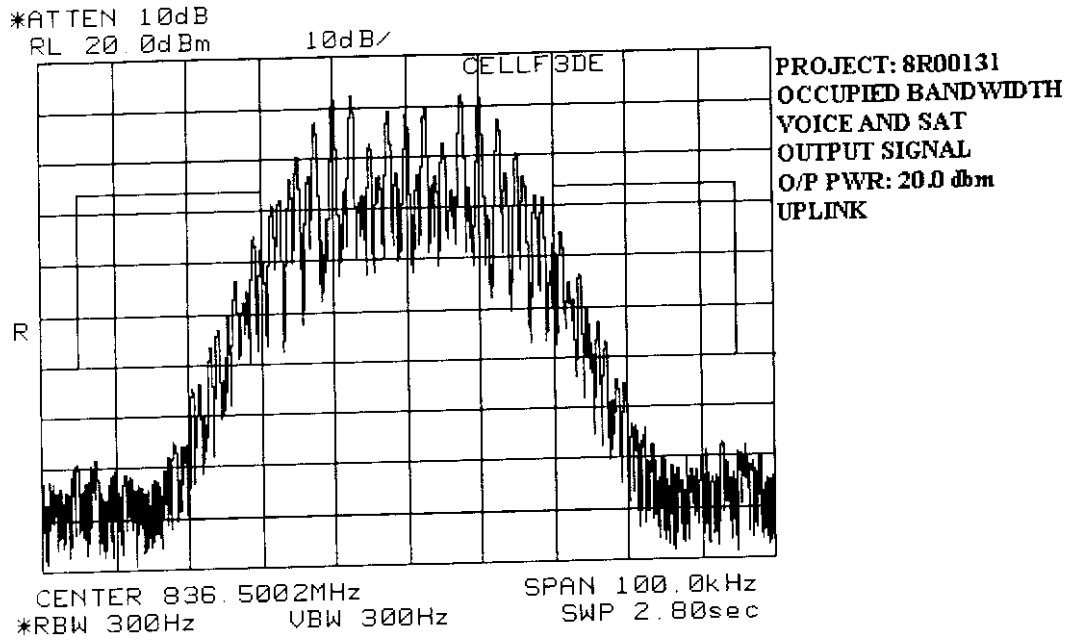
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

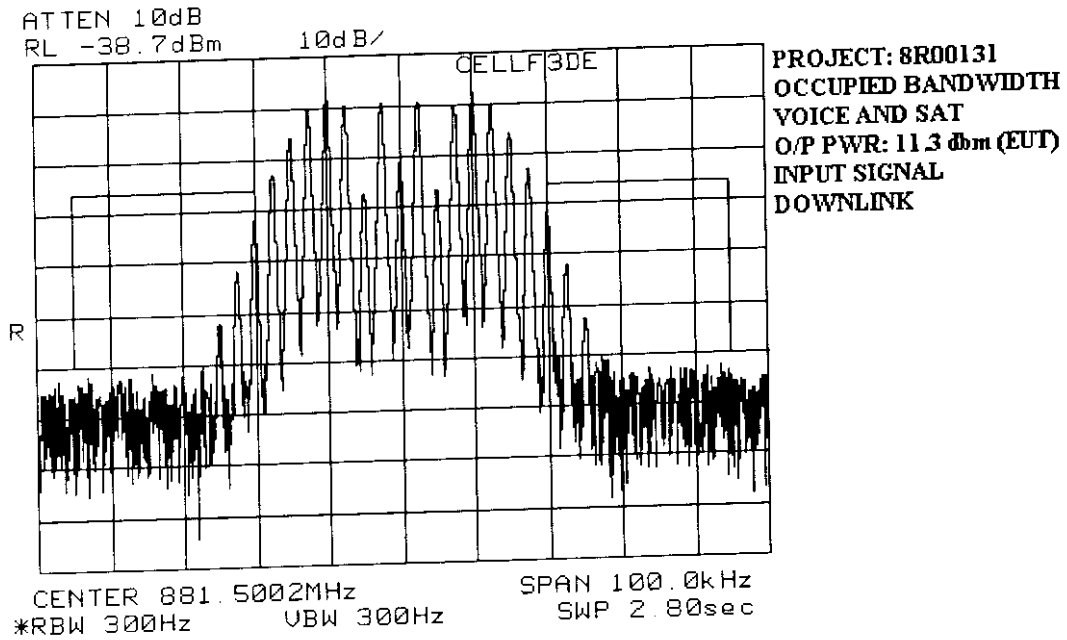
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

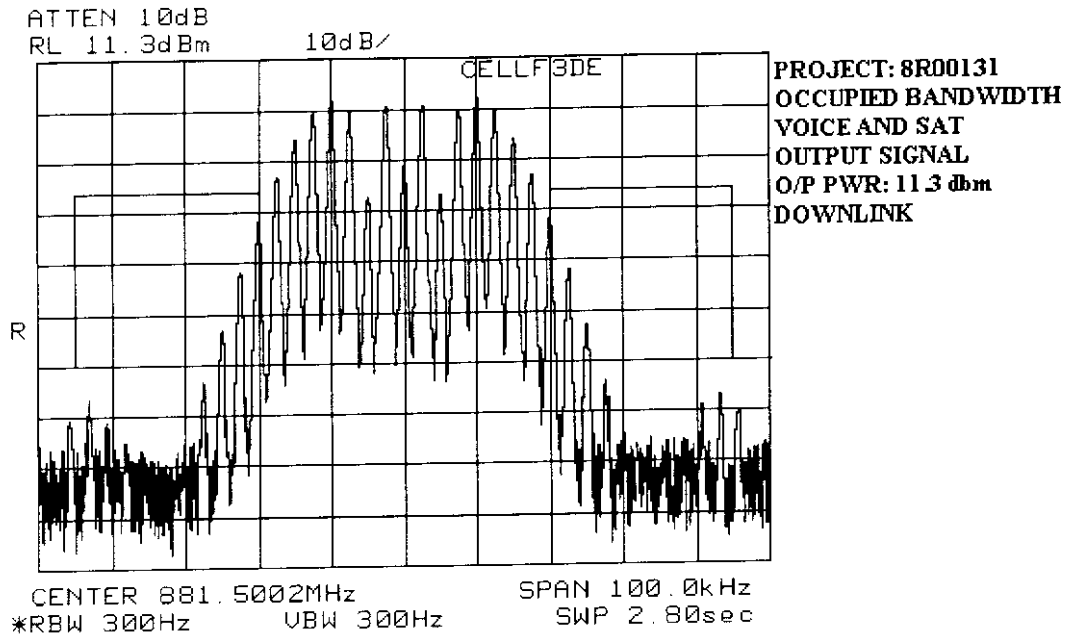
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

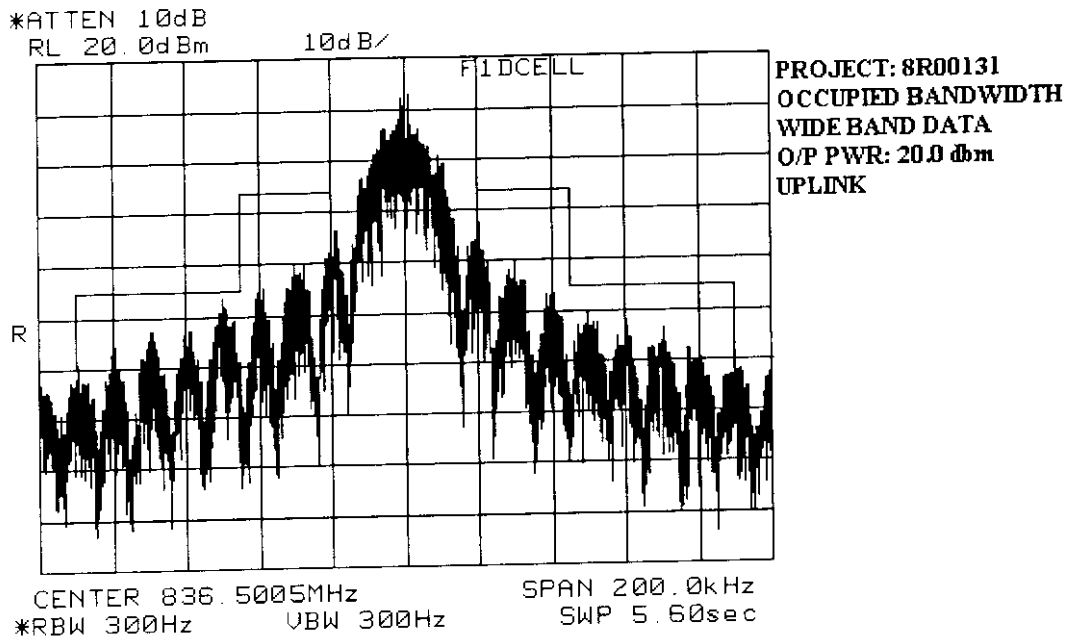
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

NAME OF TEST: Occupied Bandwidth (WB Data)	PARA. NO.: 2.917 (d)
TESTED BY: Kevin Carr	DATE: June 23, 1998

Test Results: Complies.

Test Data: See attached graph(s).

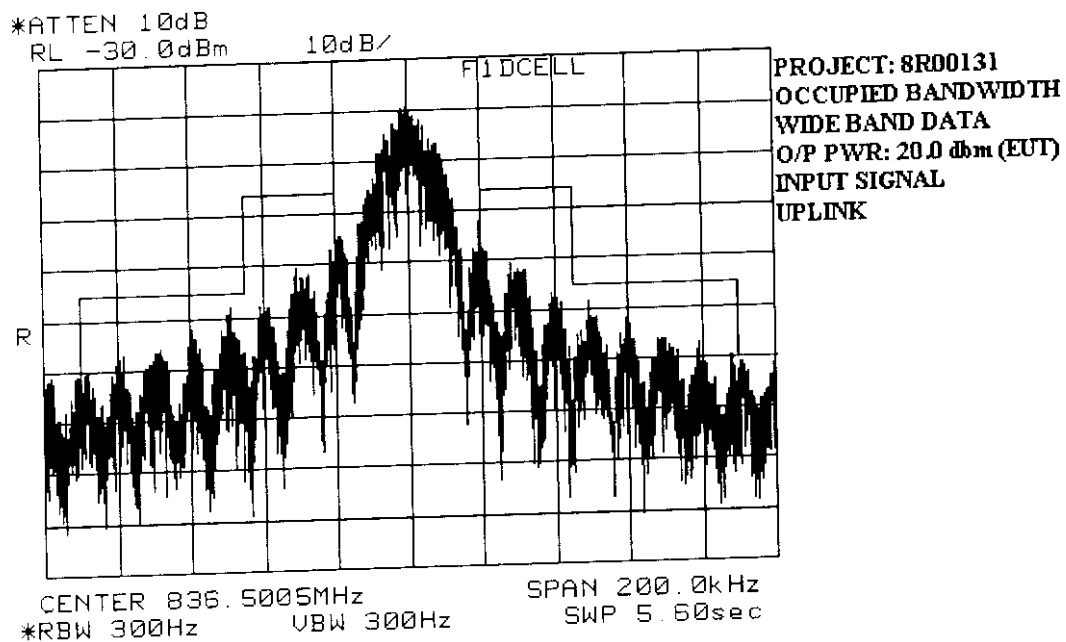
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



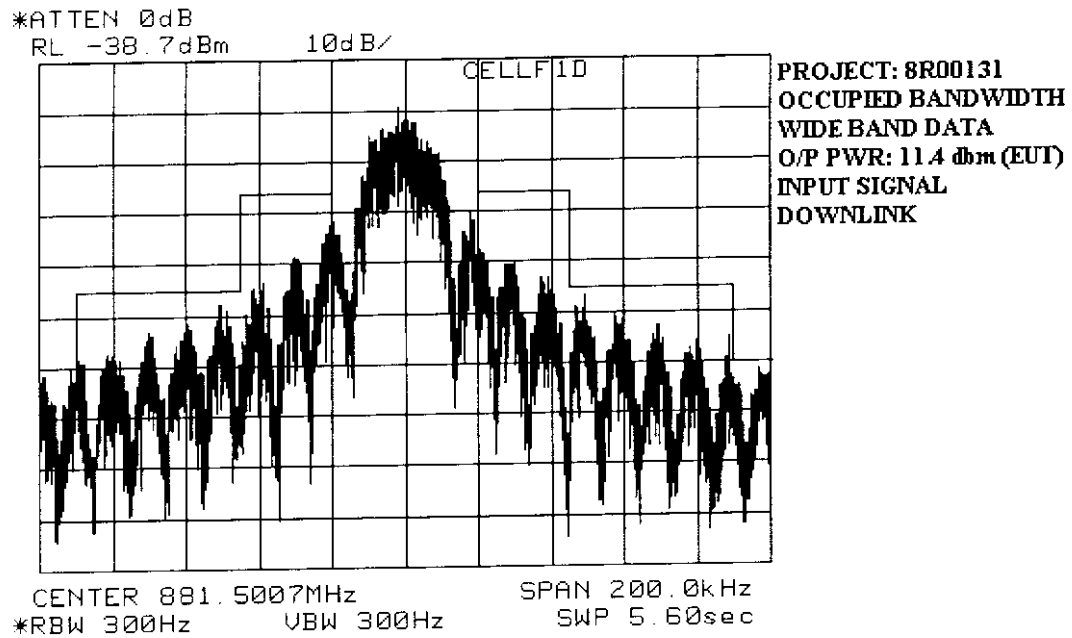
KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

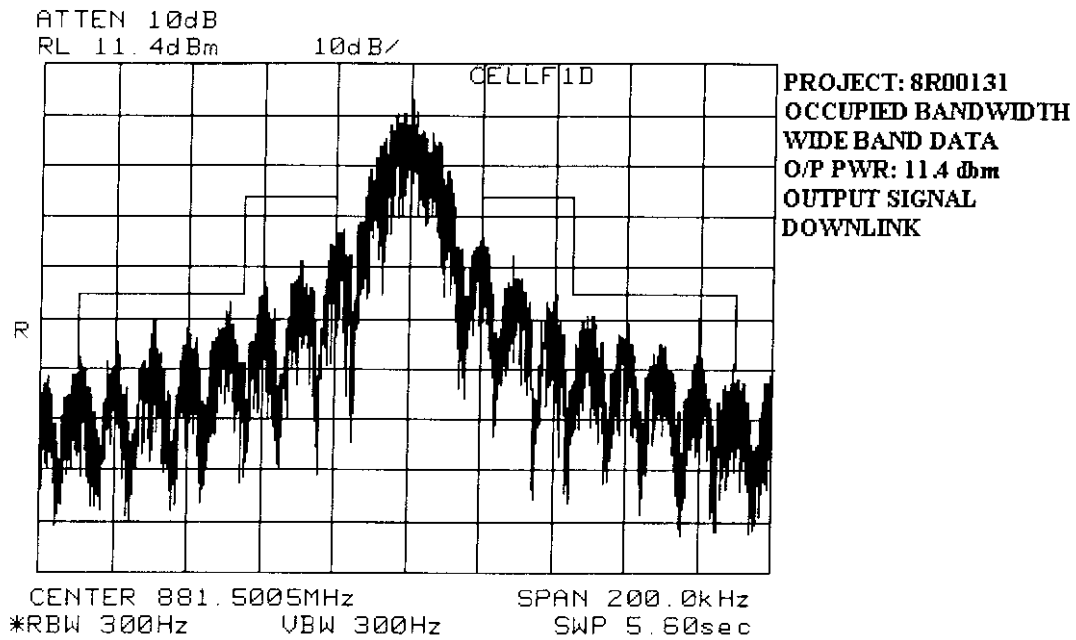
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

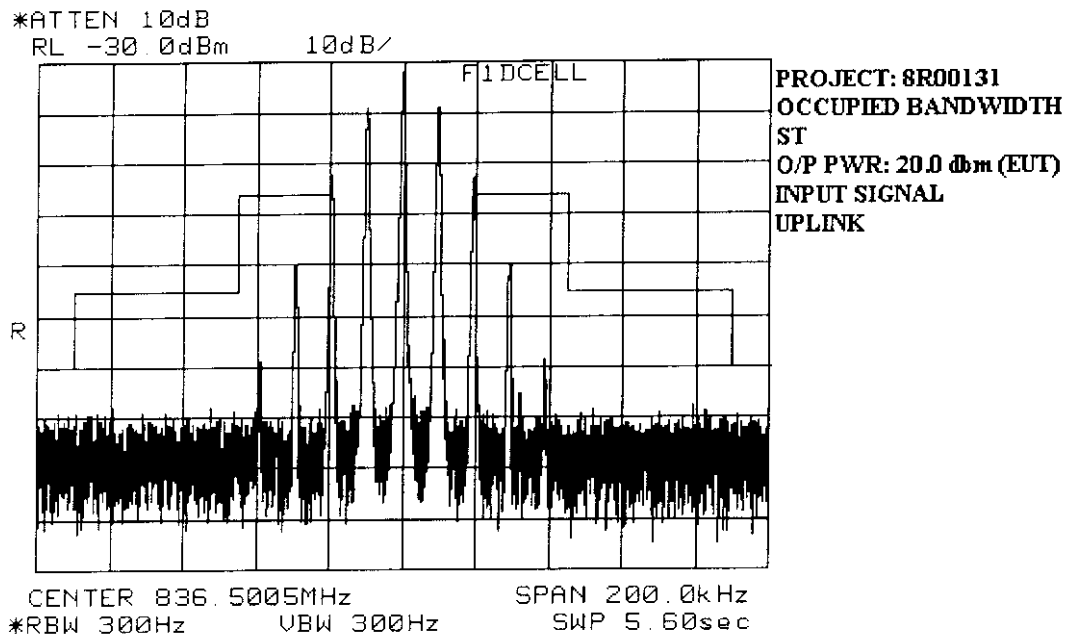
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

NAME OF TEST: Occupied Bandwidth (ST)	PARA. NO.: 2.917(d)
TESTED BY: Kevin Carr	DATE: June 23, 1998

Test Results: Complies.

Test Data: See attached graph(s).

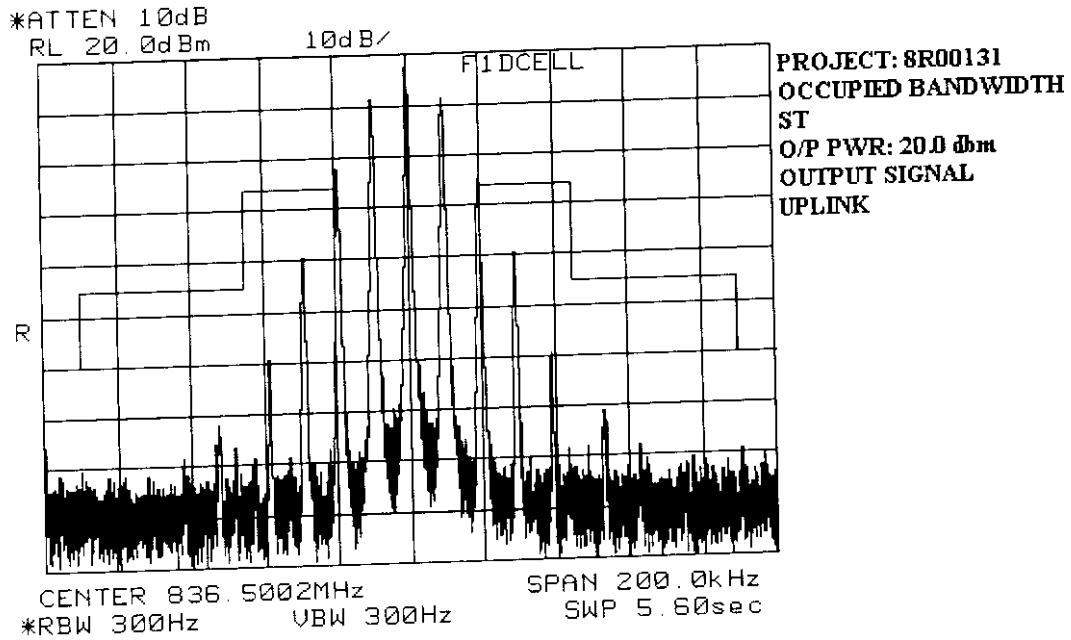
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



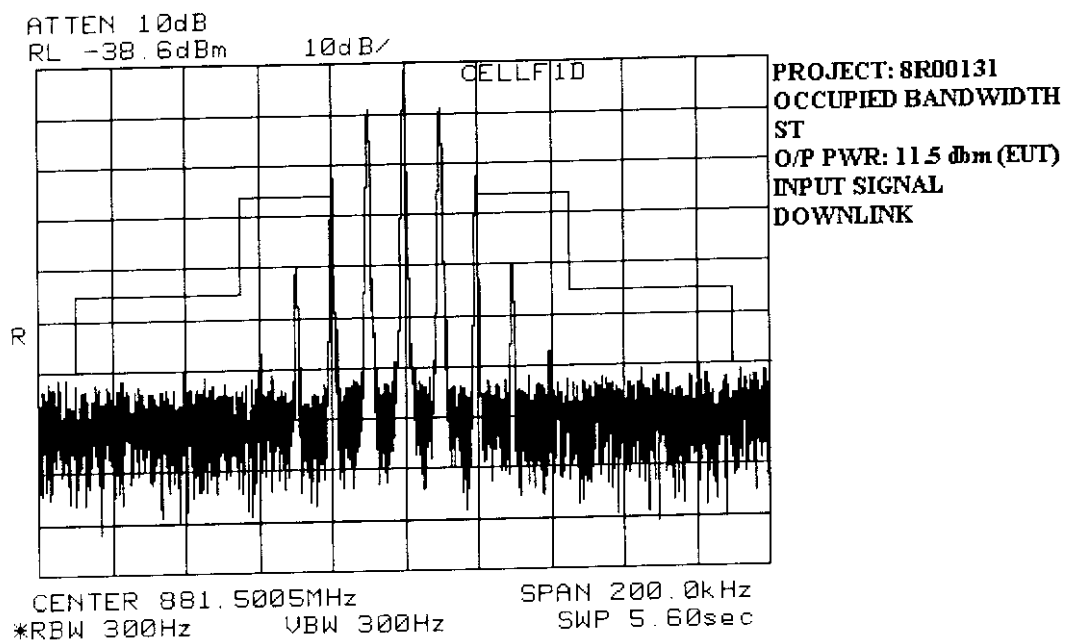
KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

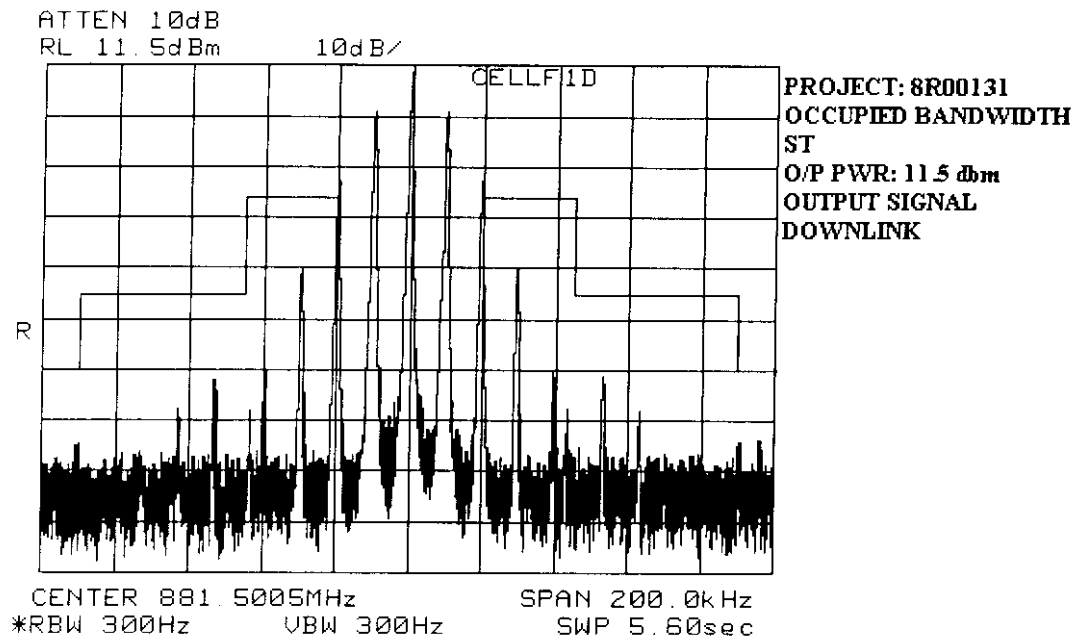
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

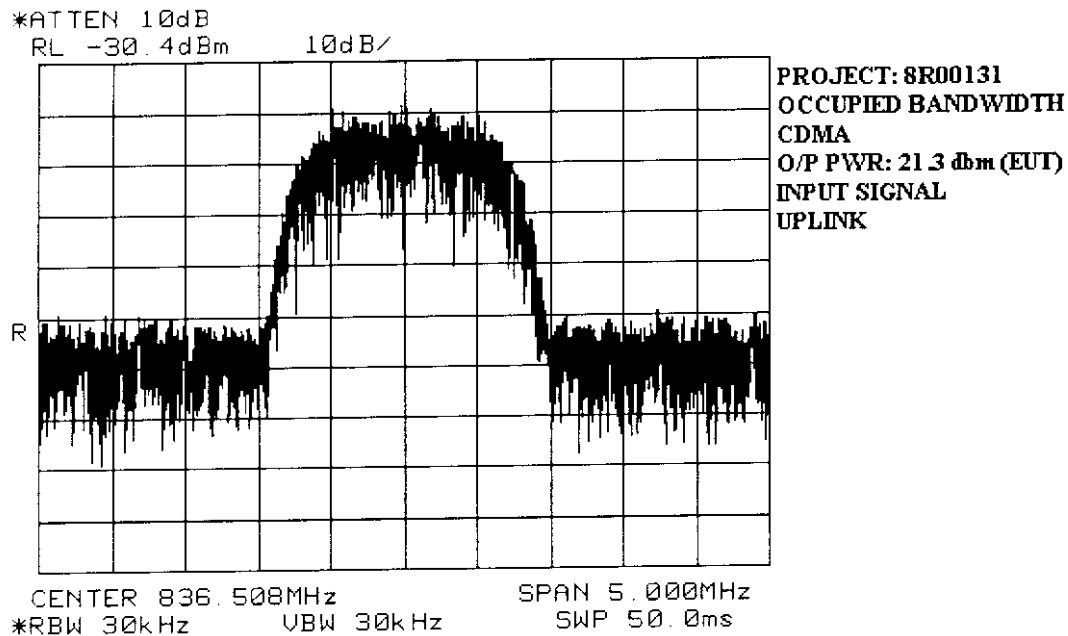
NAME OF TEST: Occupied Bandwidth (Digital Mod.)	PARA. NO.: 2.917(e)
TESTED BY: Kevin Carr	DATE: June 23, 1998

Test Results: Complies.

Test Data: See attached graph(s).

EQUIPMENT: MICROAMP 50, TPA 850 Repeater

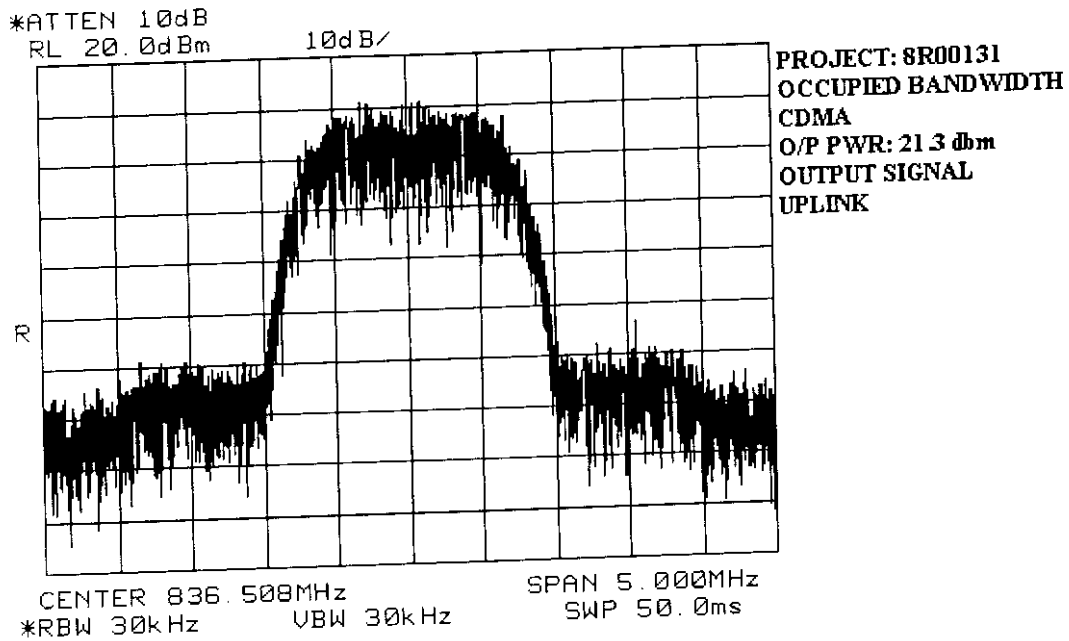
FCC ID: BCR9GBMA50C



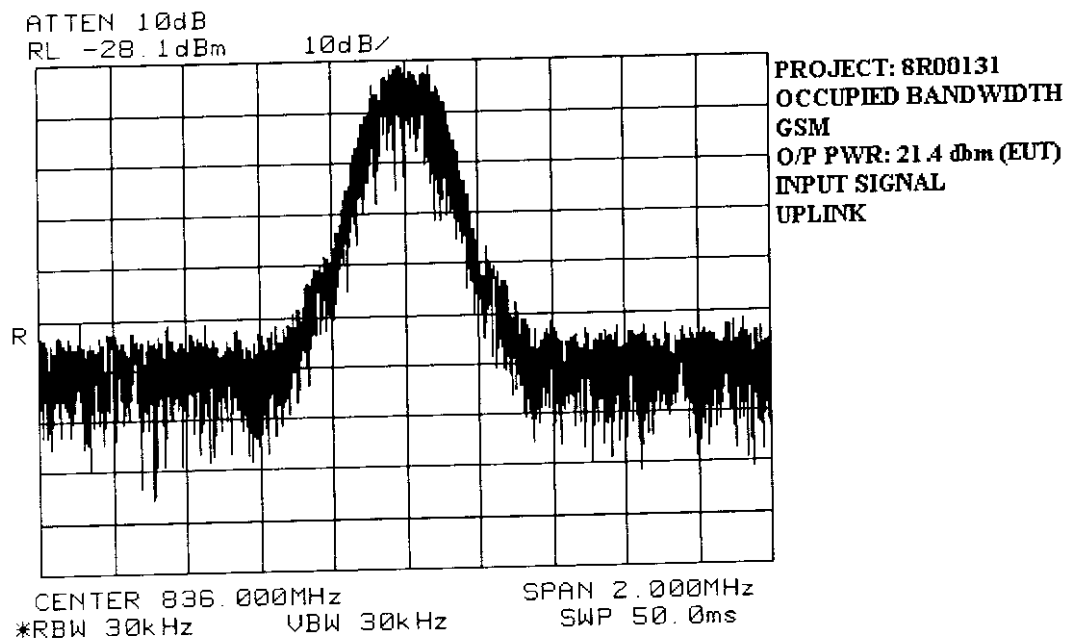
KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

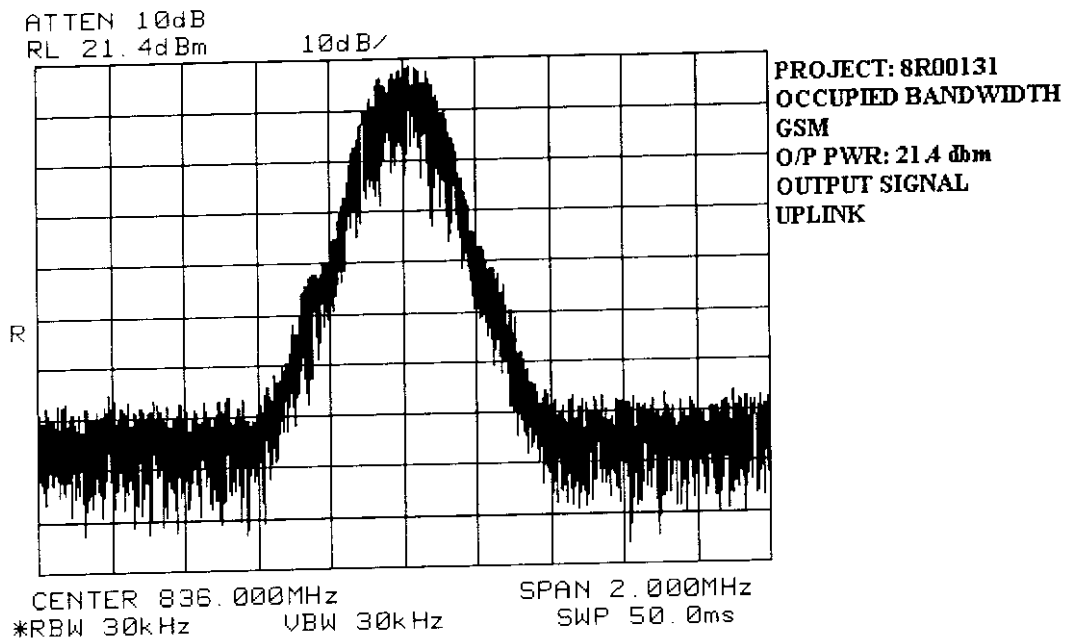
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



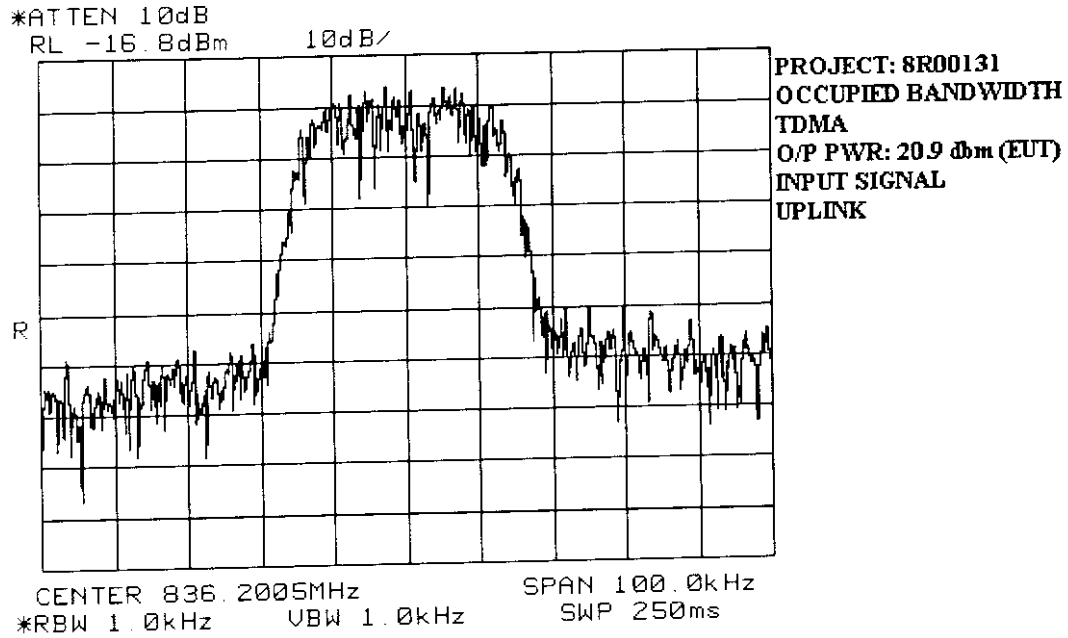
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



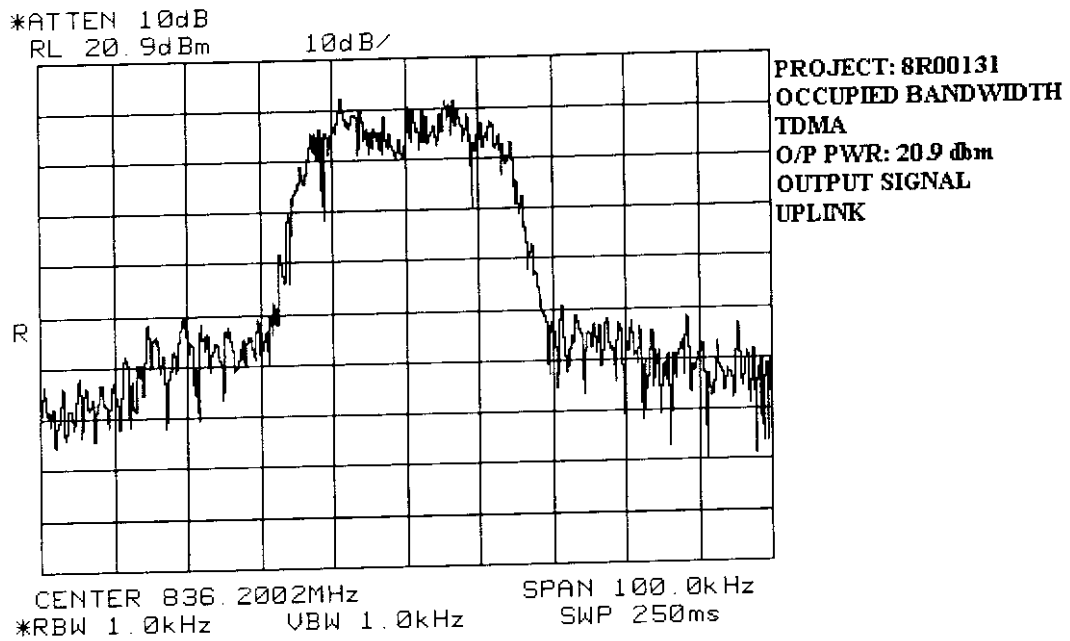
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

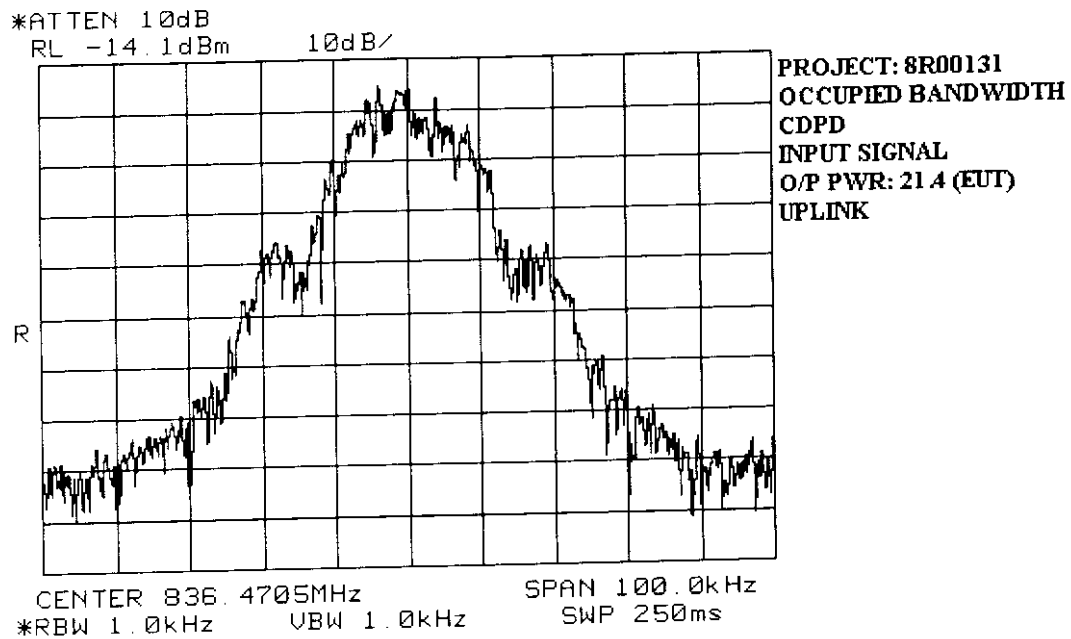
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

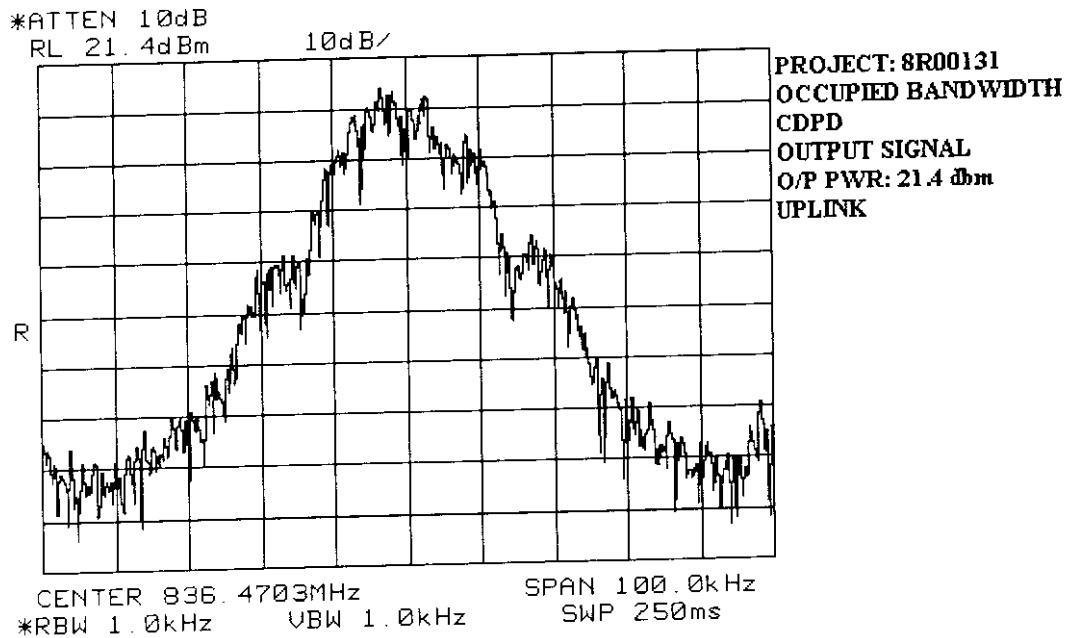
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



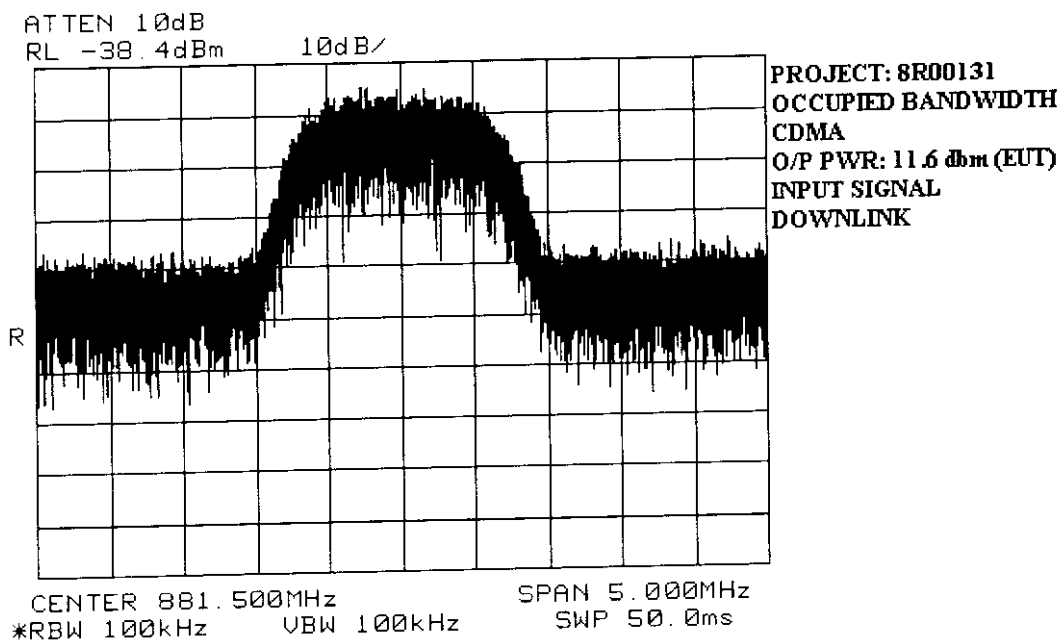
KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

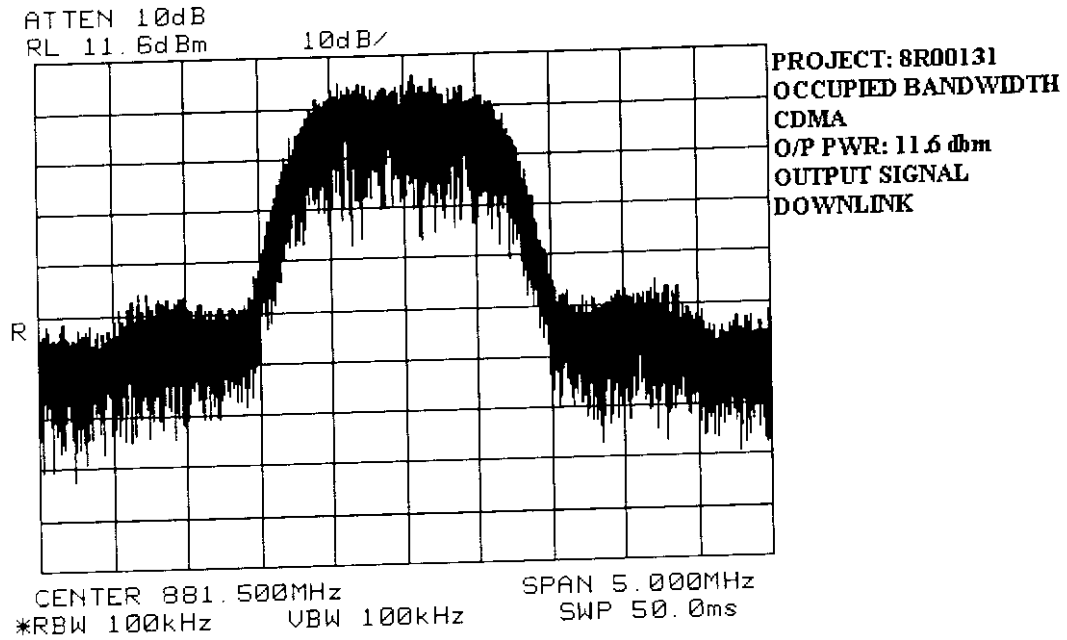
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



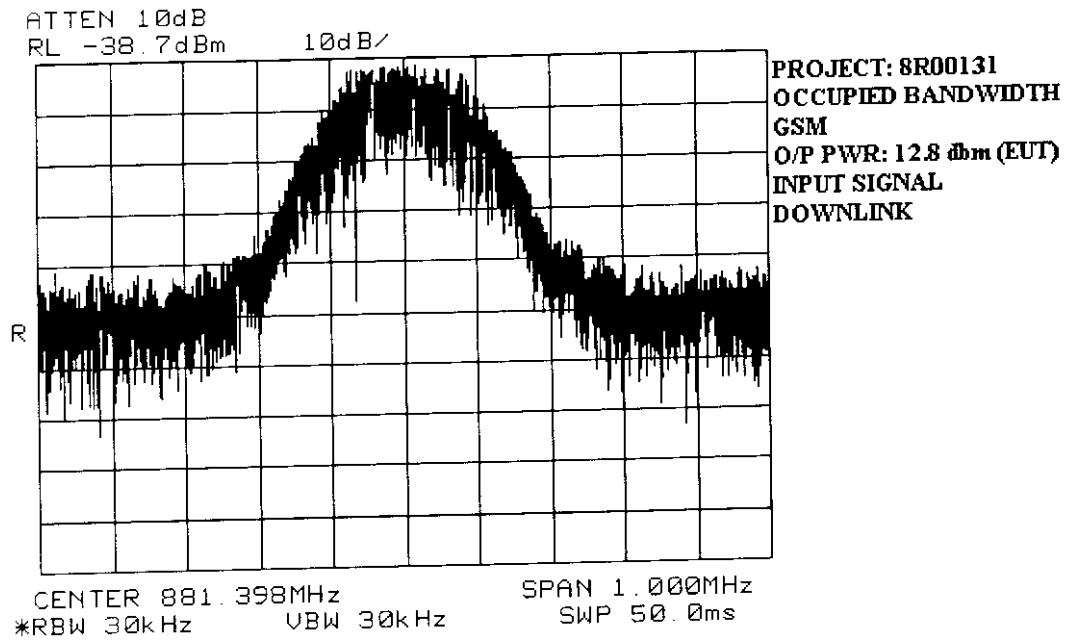
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



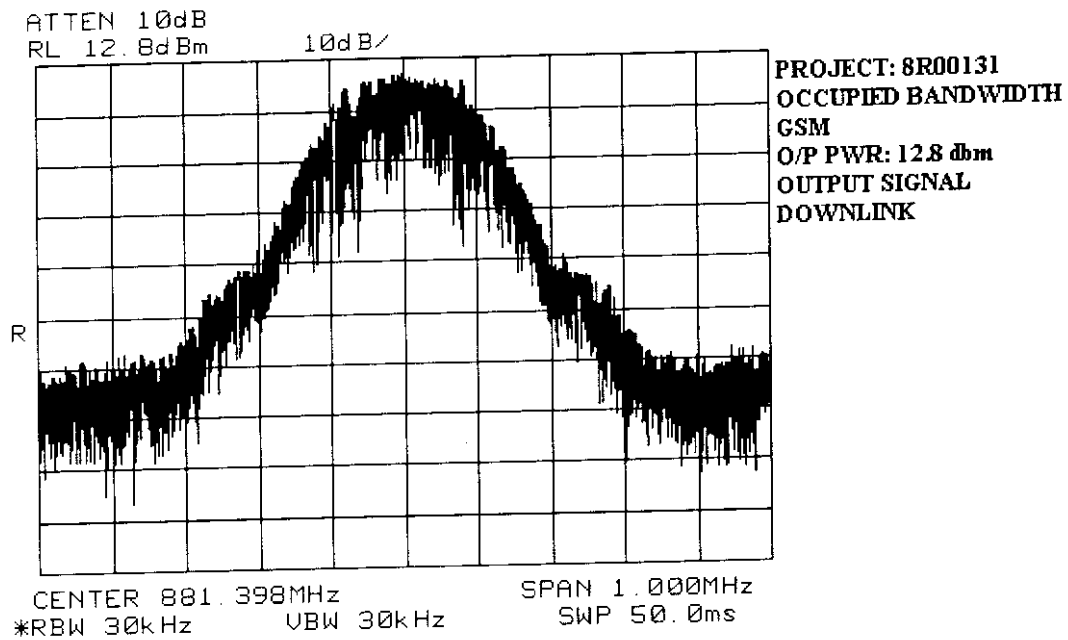
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



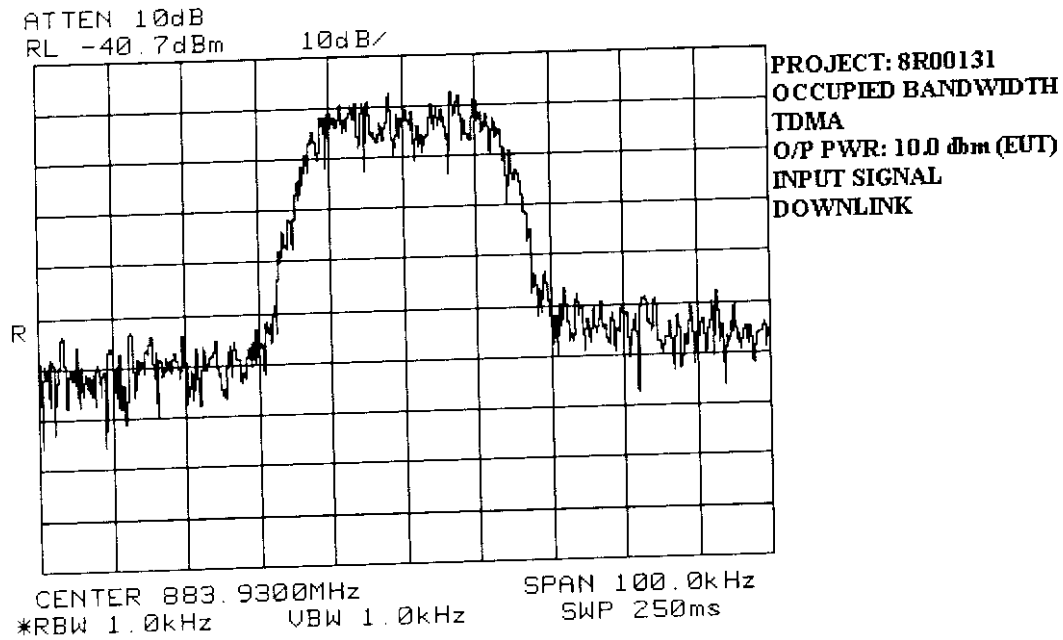
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

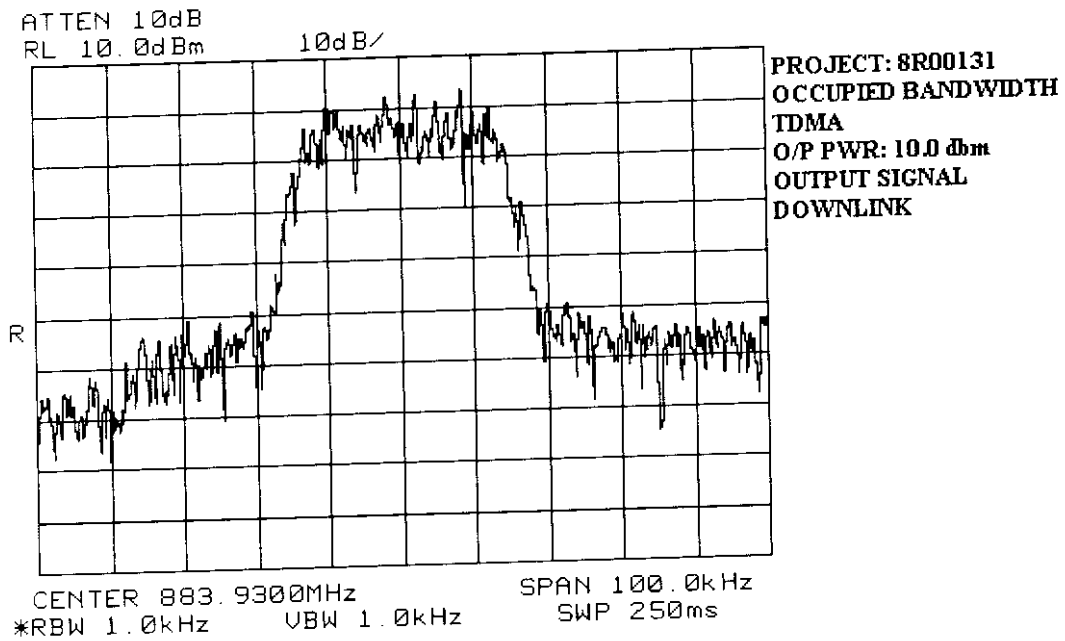
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

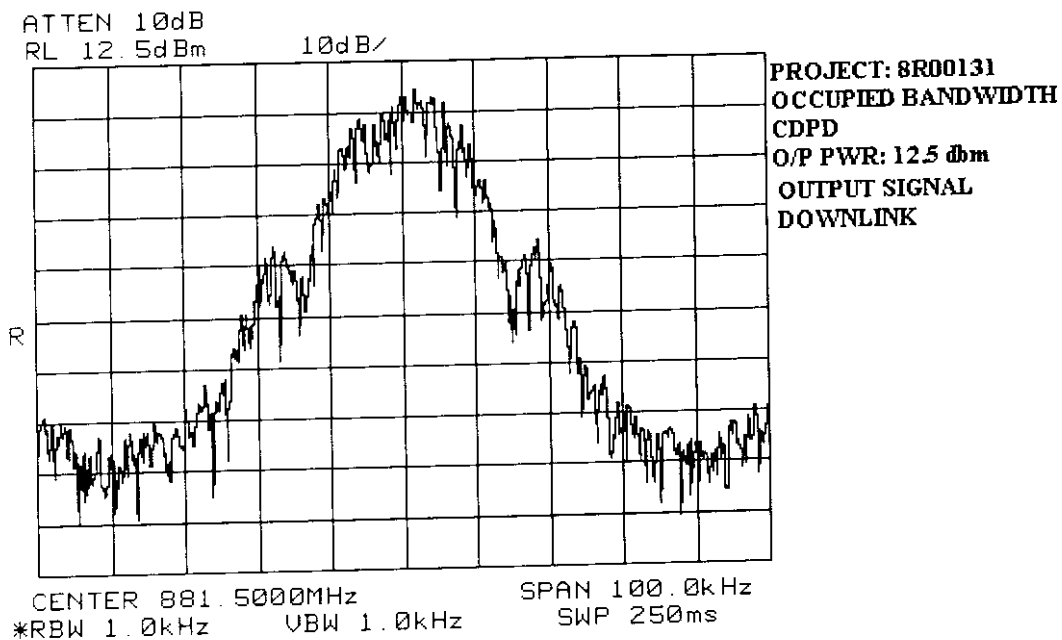
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

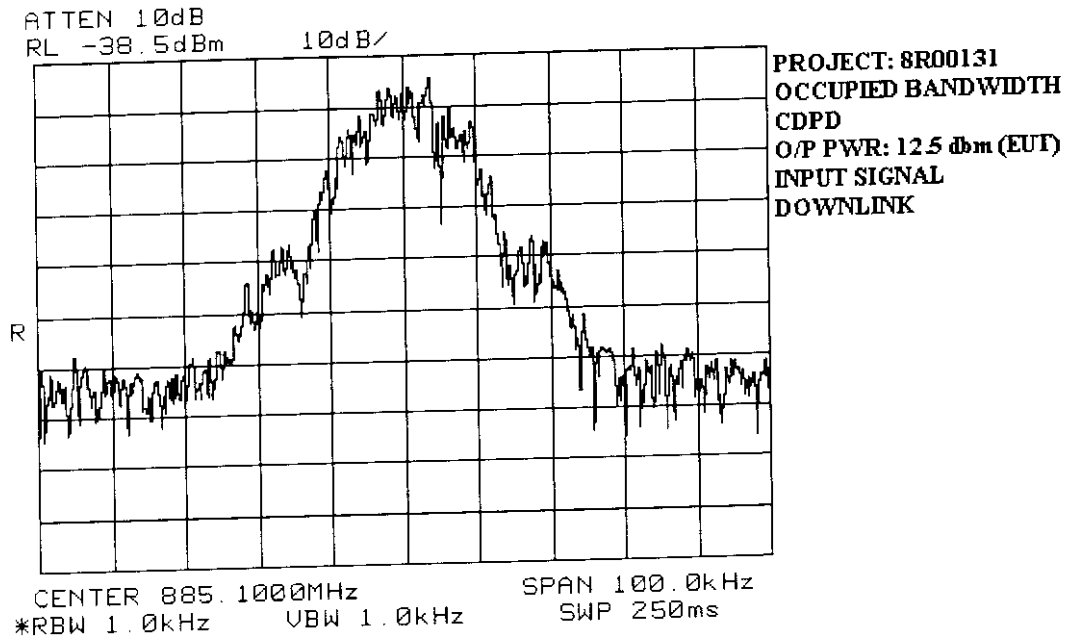
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.917(e)
TESTED BY: Kevin Carr	DATE: June 23, 1998

Test Results: Complies.

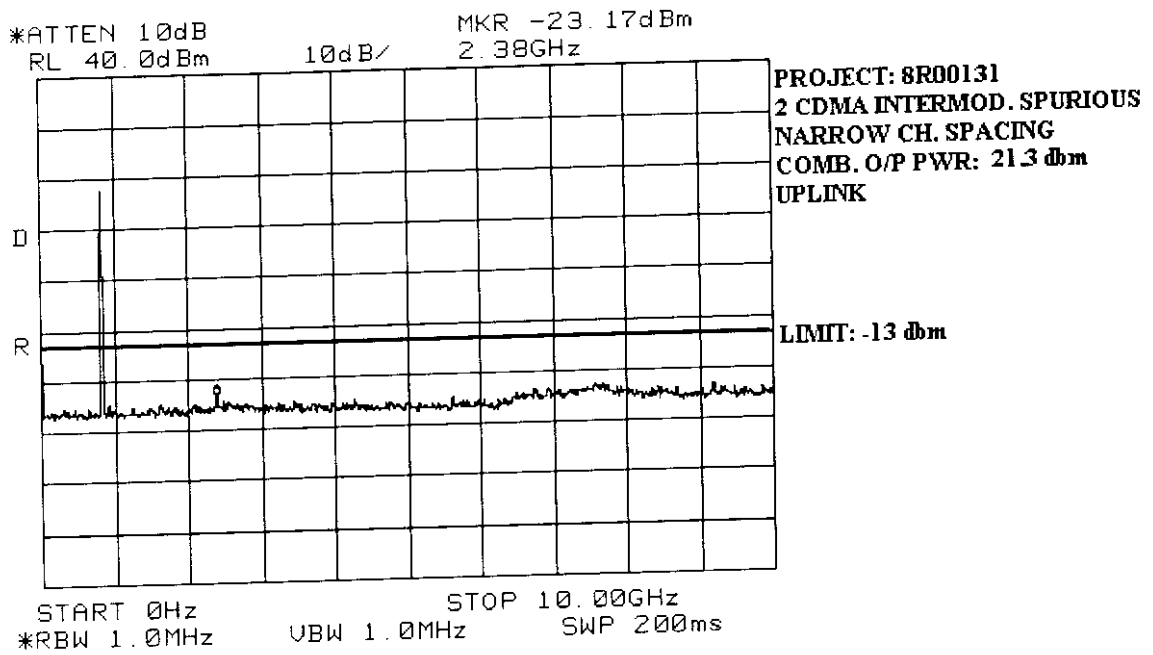
Test Data:

NAME OF TEST	WORST-CASE SPURIOUS LEVEL(dBm)
0 to 10 GHz spurious (Uplink)	-23.17
0 to 10 GHz spurious (Downlink)	-19.33
2 - signal intermodulation (Uplink)	-13.0
2 - signal intermodulation (Downlink)	-13.23
Lower band edge spurious (Uplink)	-14.17
Lower band edge spurious (Downlink)	-23.0
Upper band edge spurious (Uplink)	-20.5
Upper band edge spurious (Downlink)	-26.5

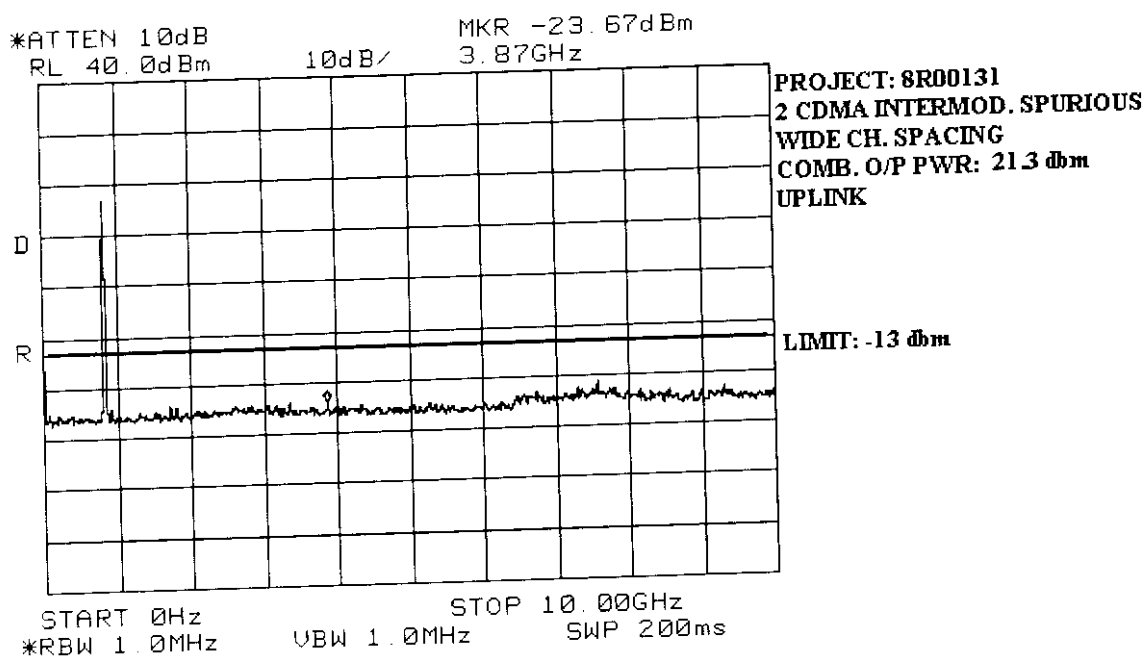
KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



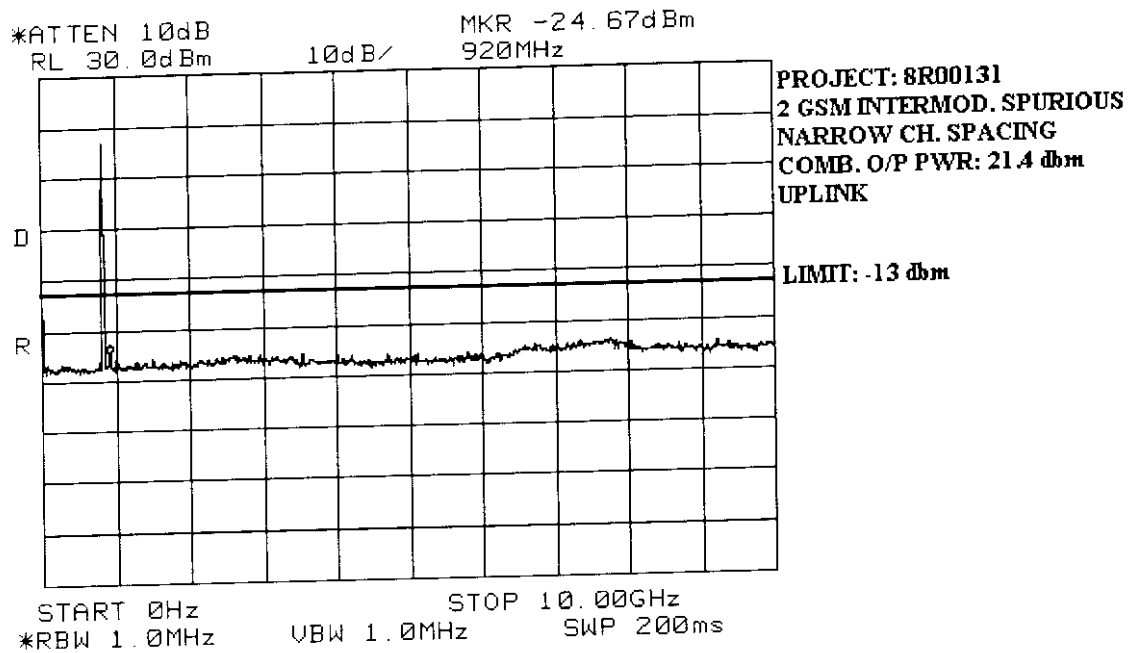
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



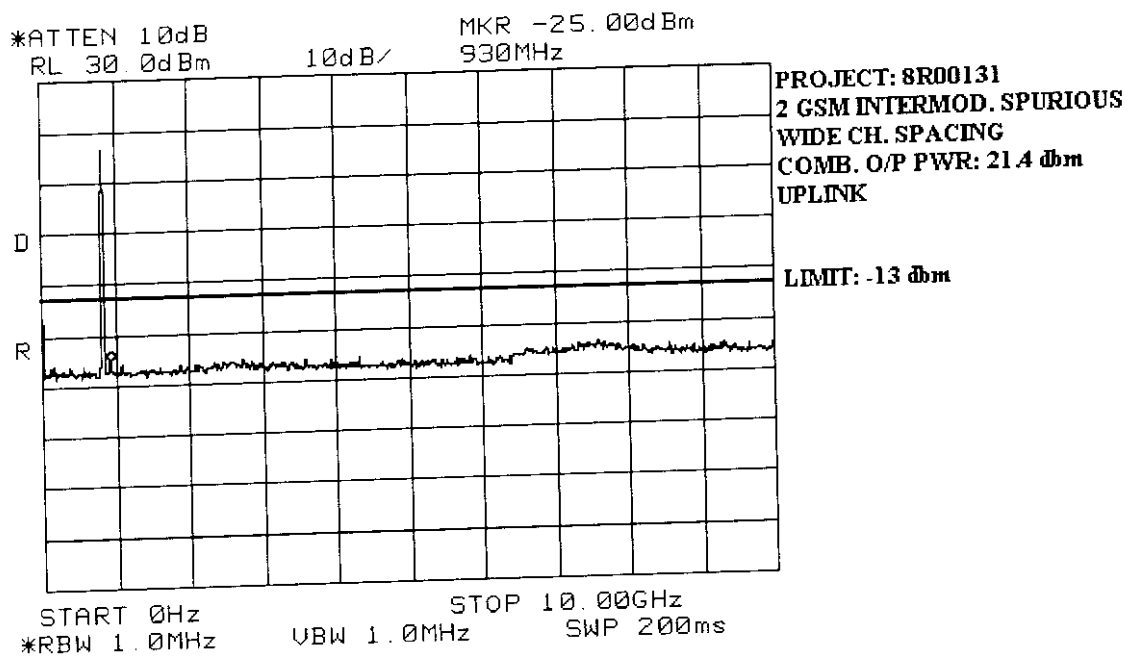
KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



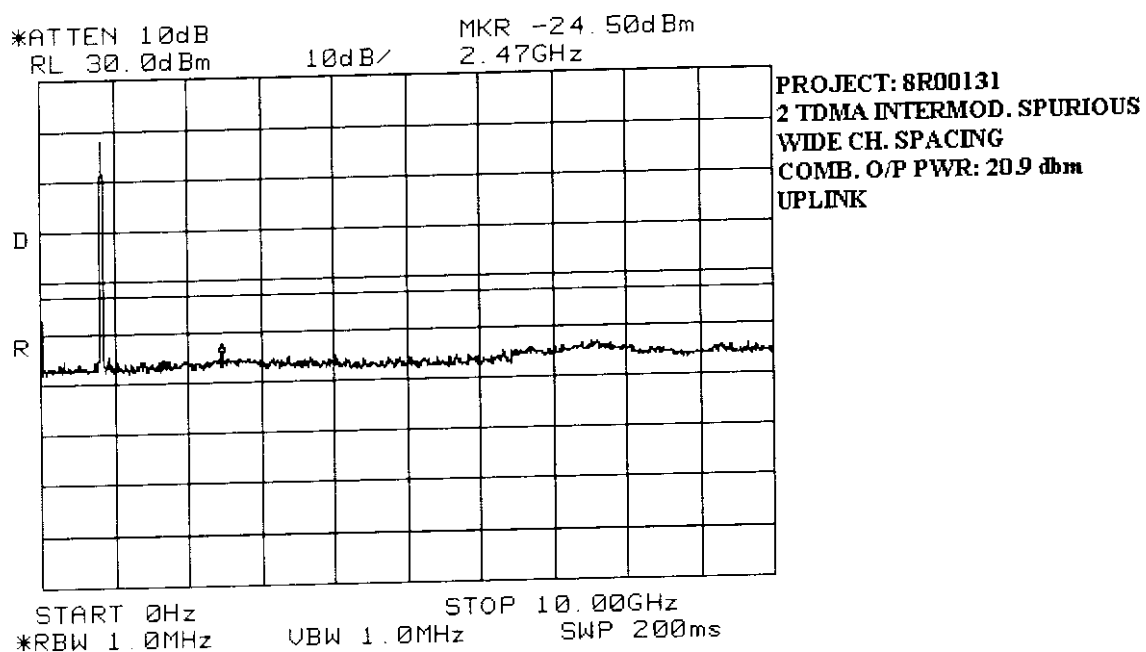
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

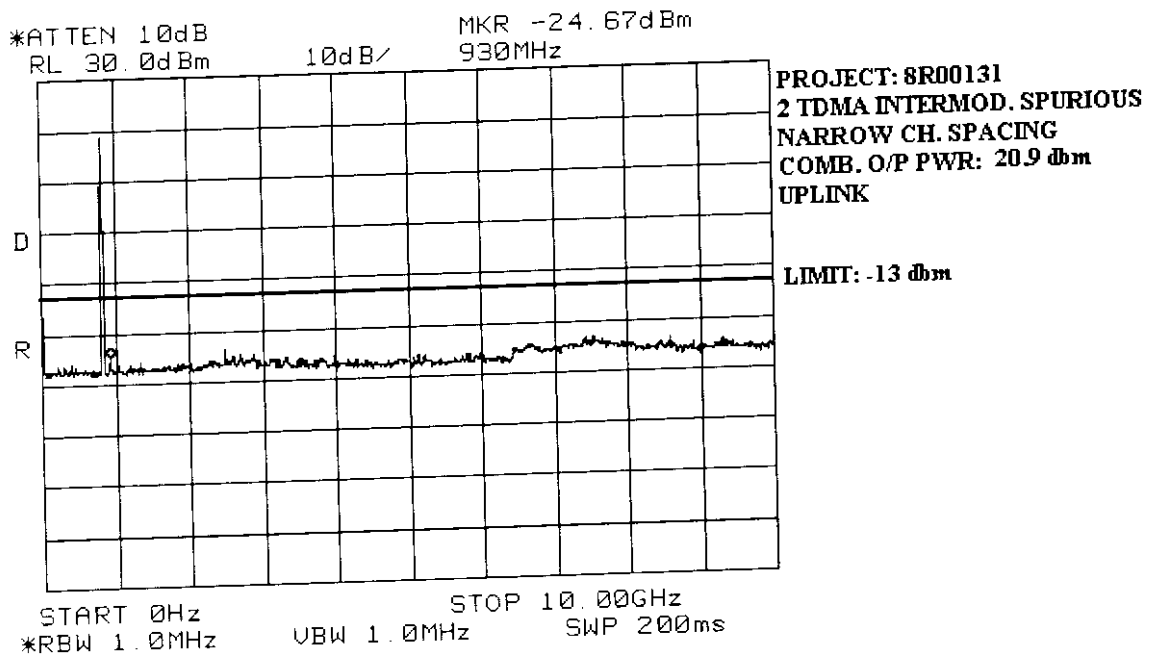
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



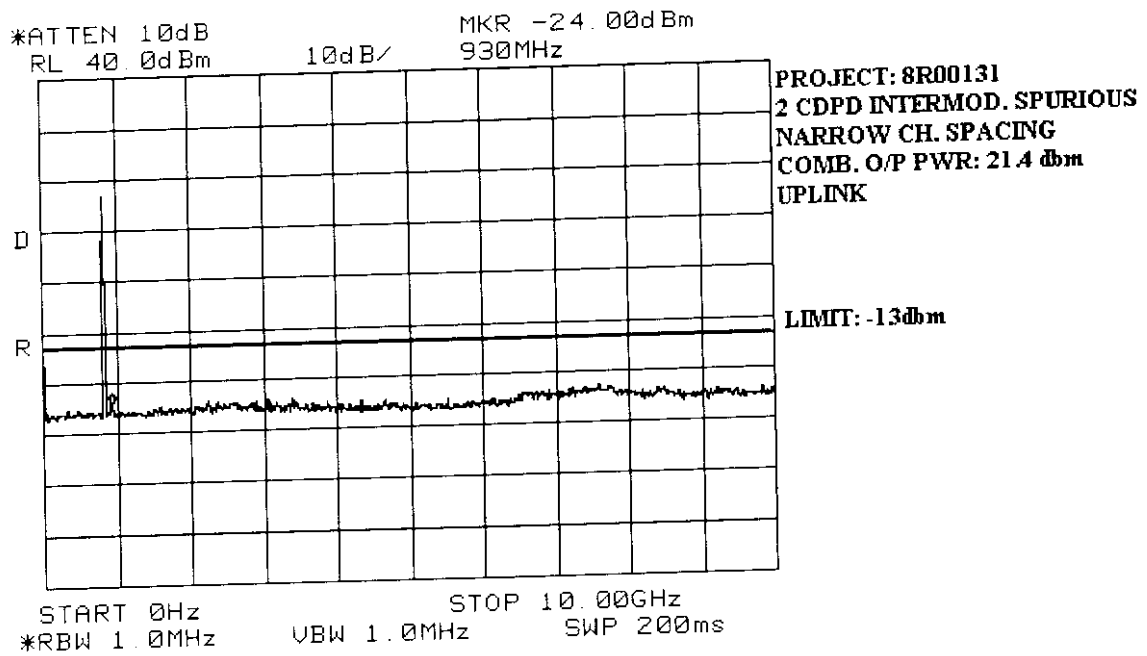
KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

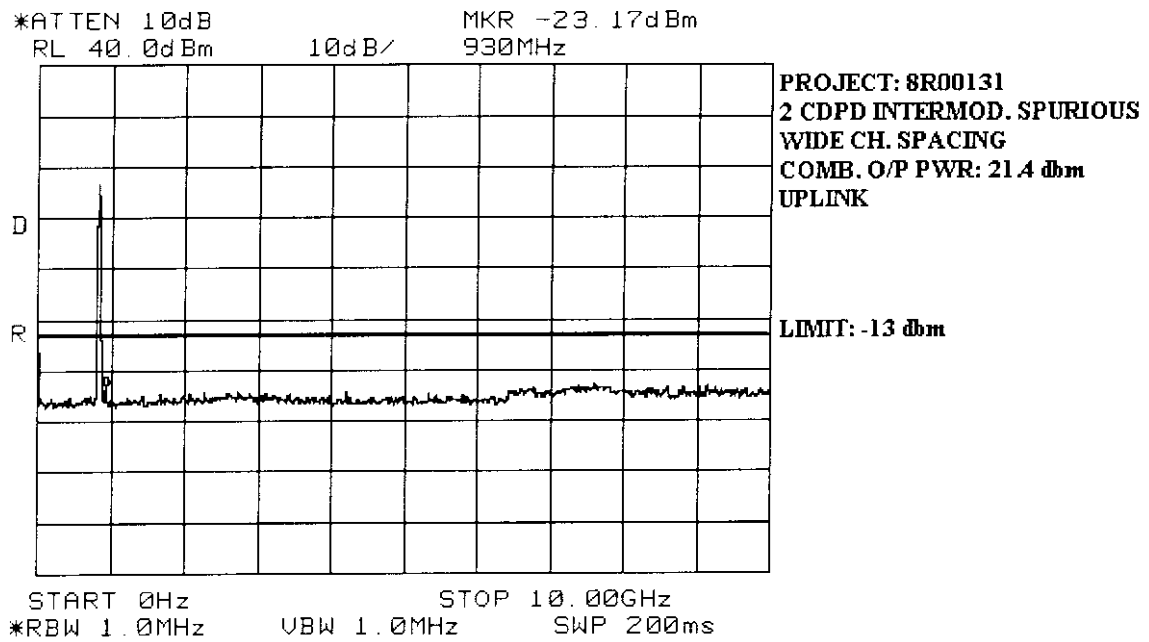
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



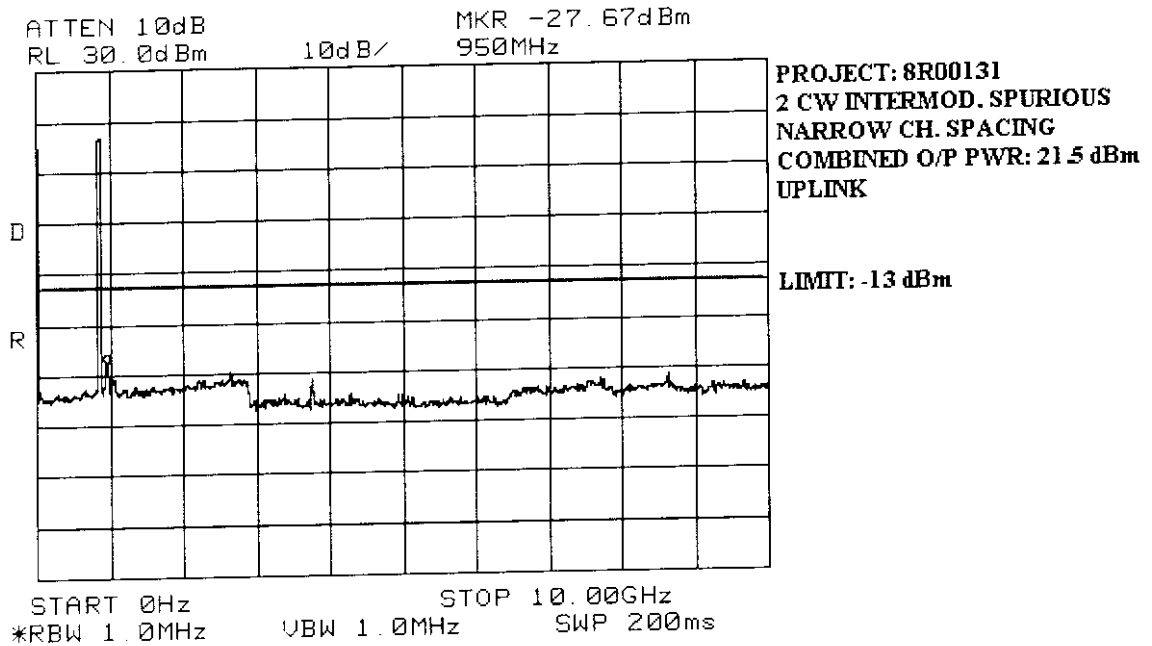
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



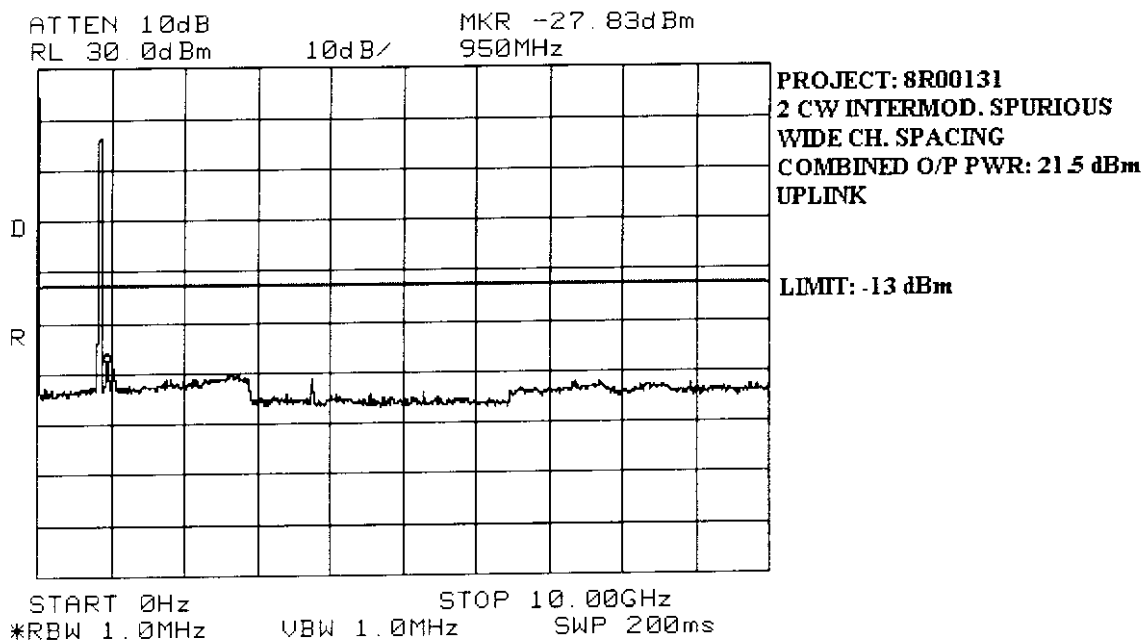
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



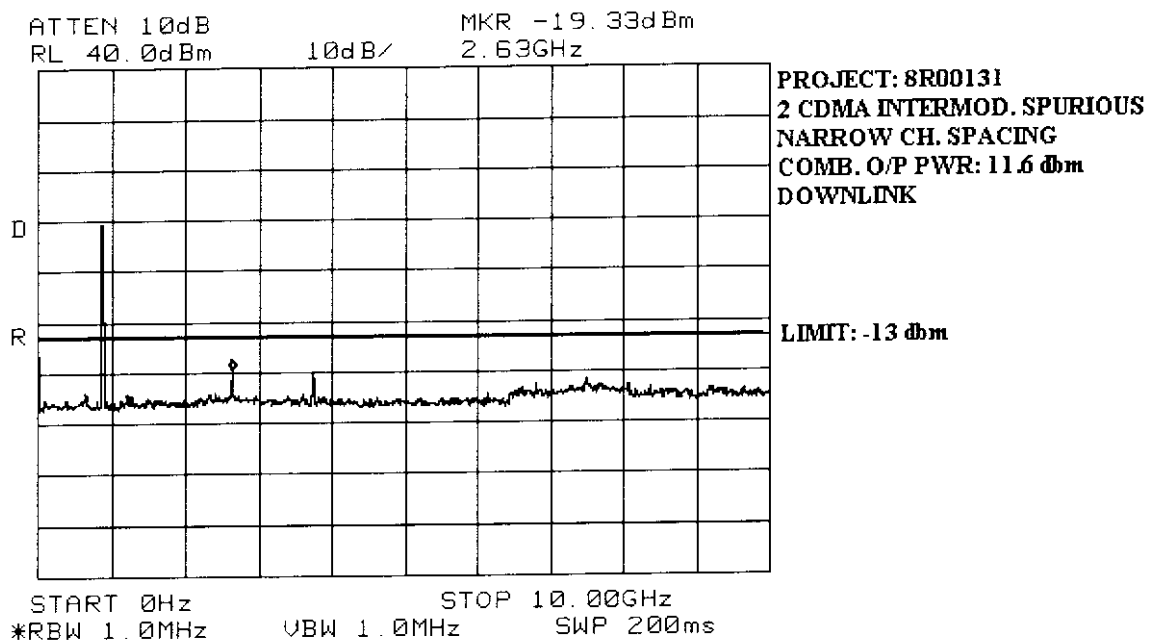
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



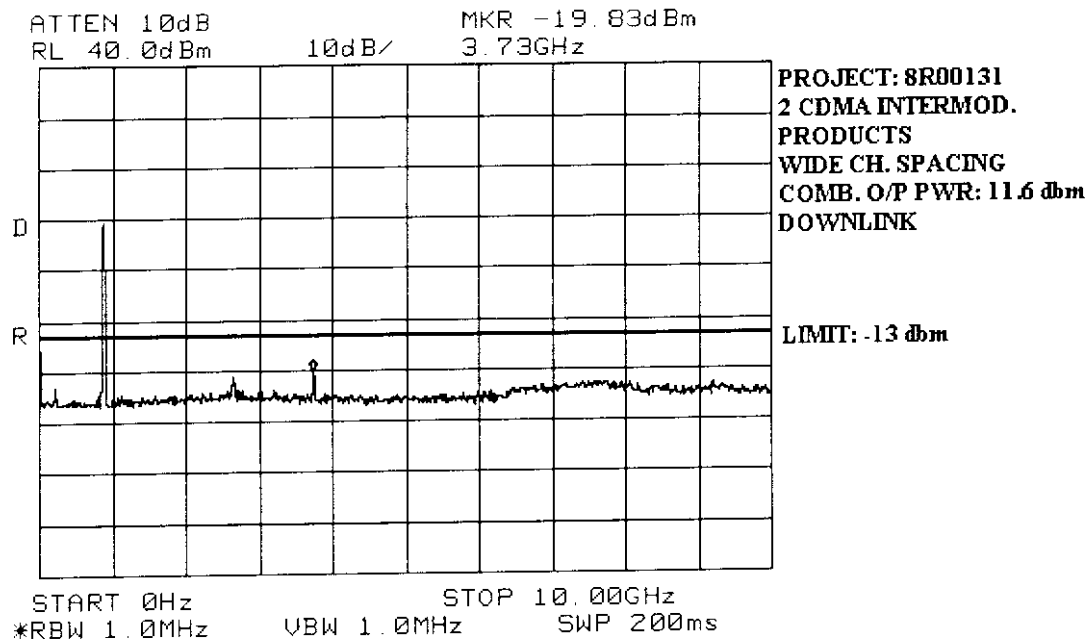
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



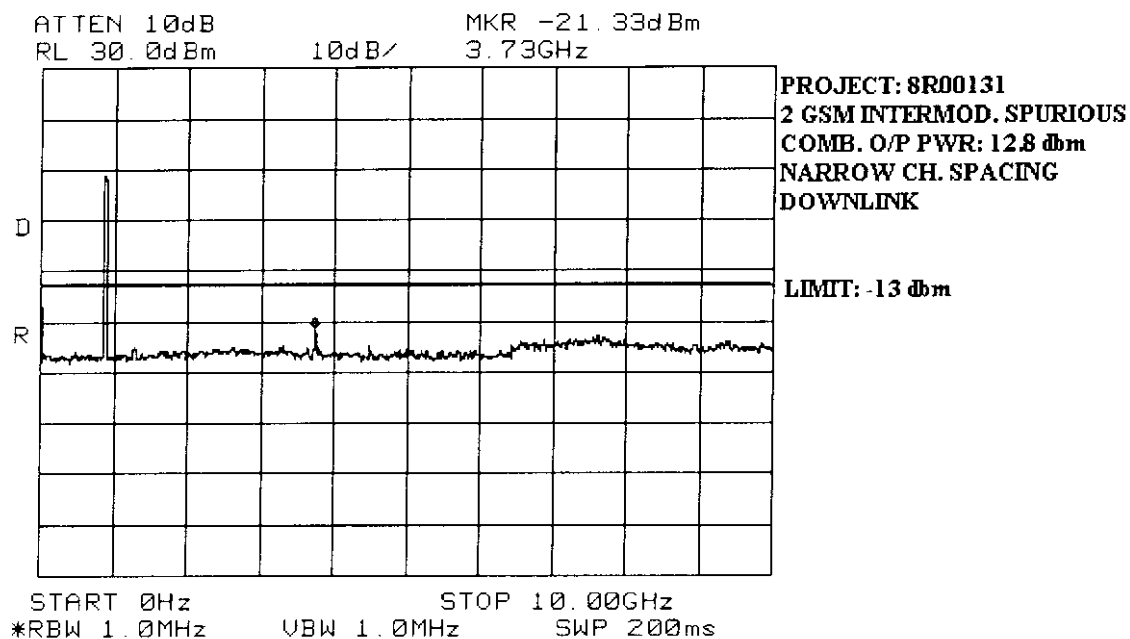
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



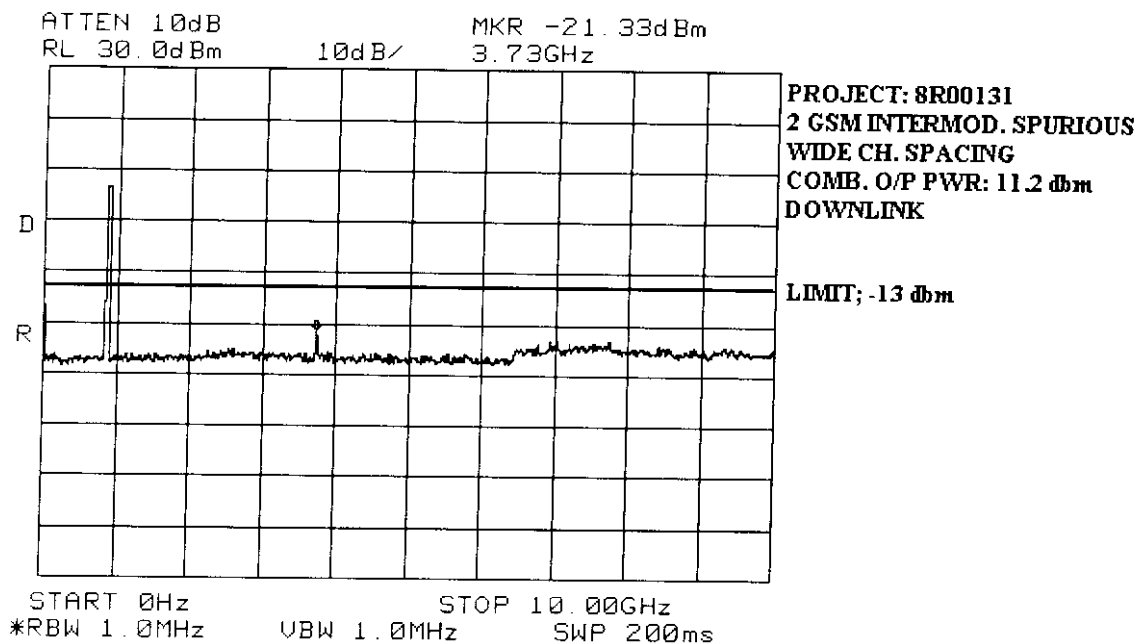
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



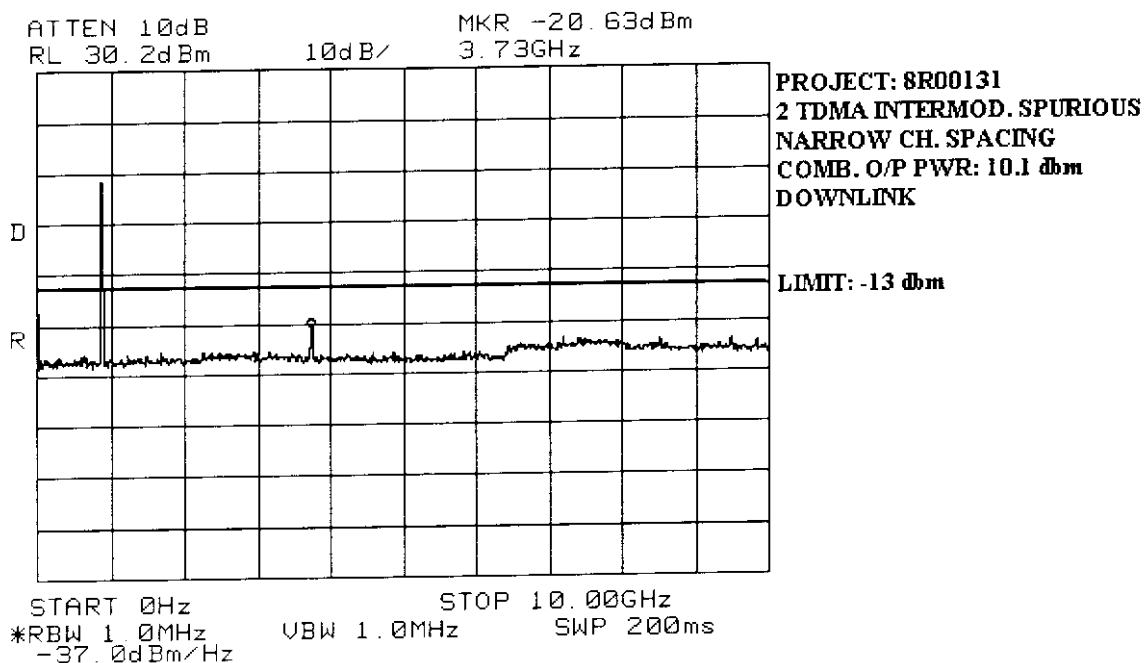
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



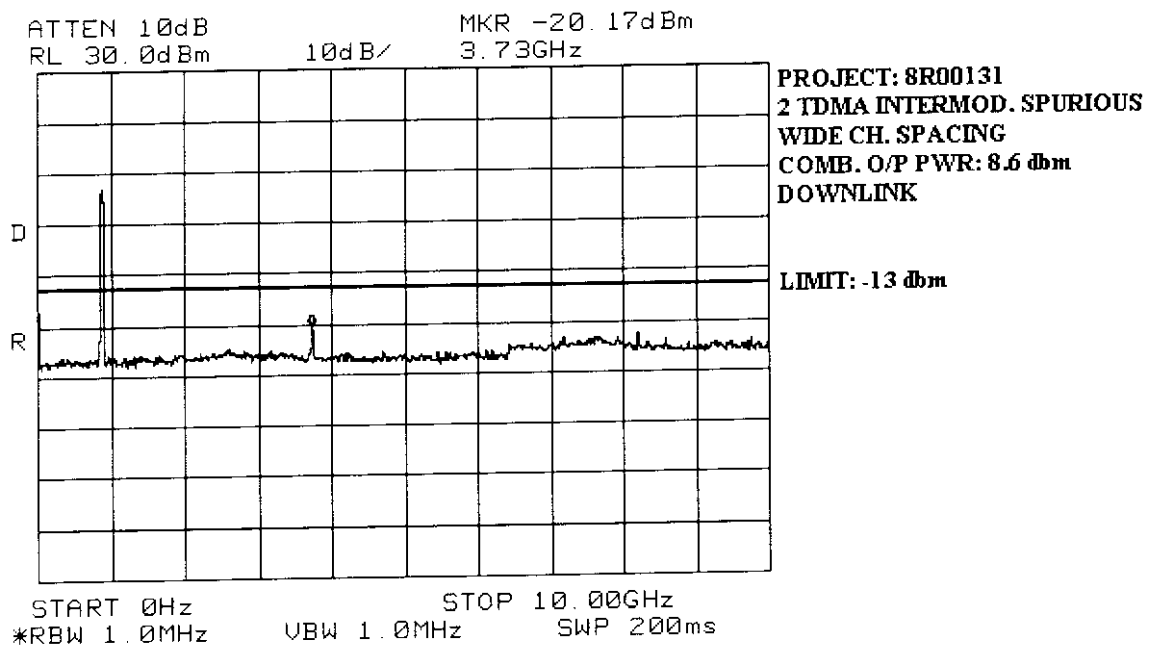
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

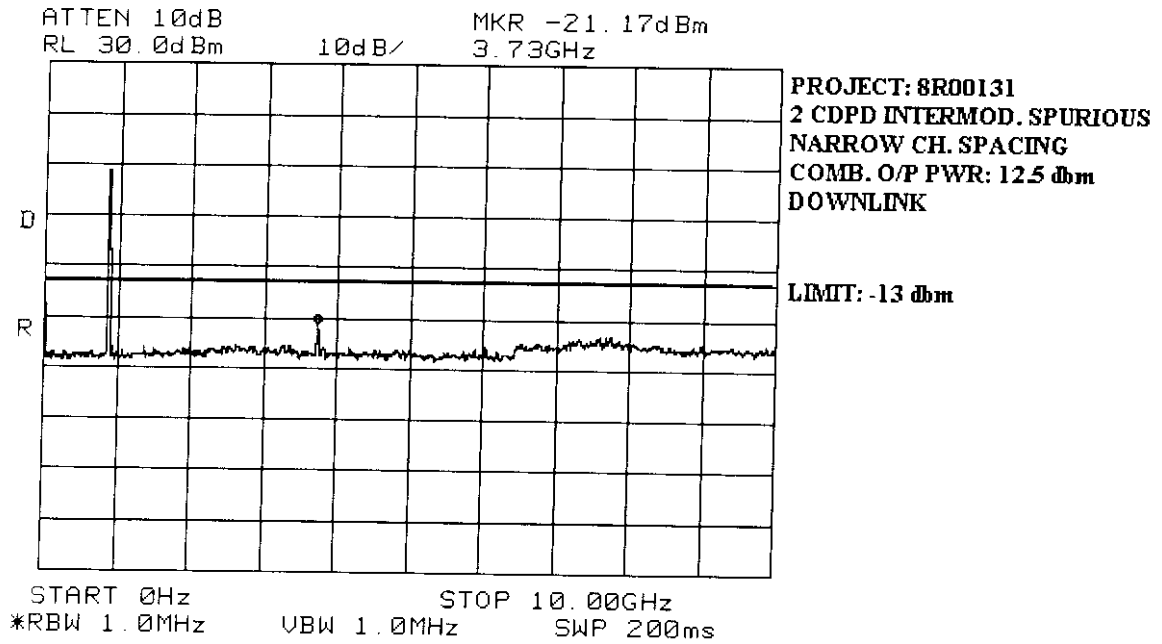
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

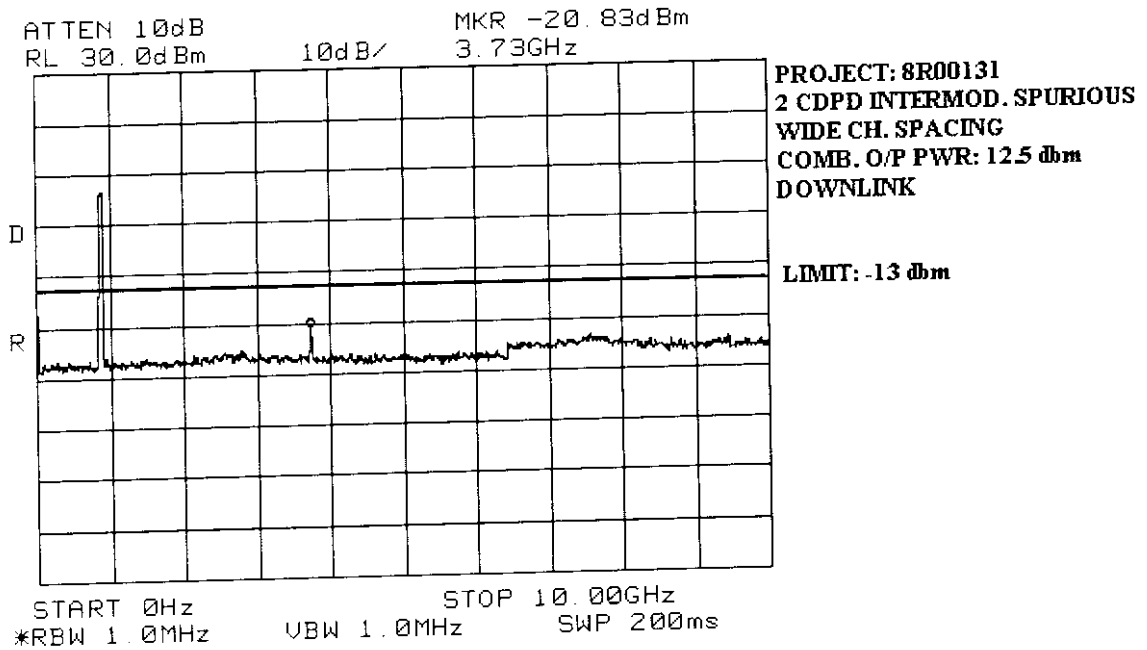
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



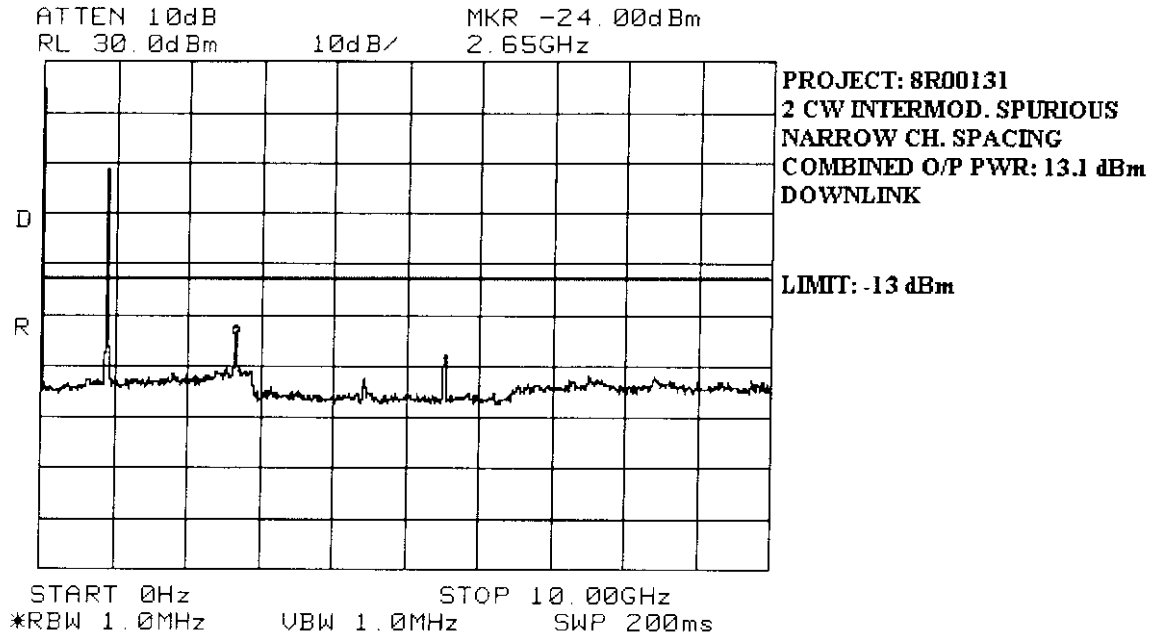
KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

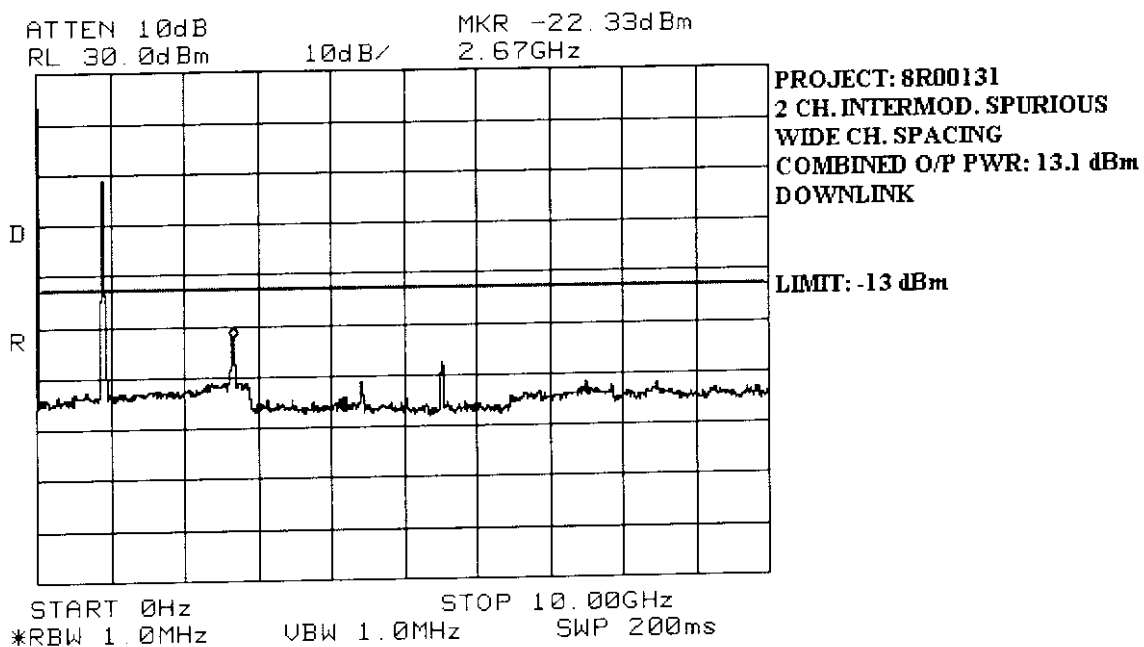
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



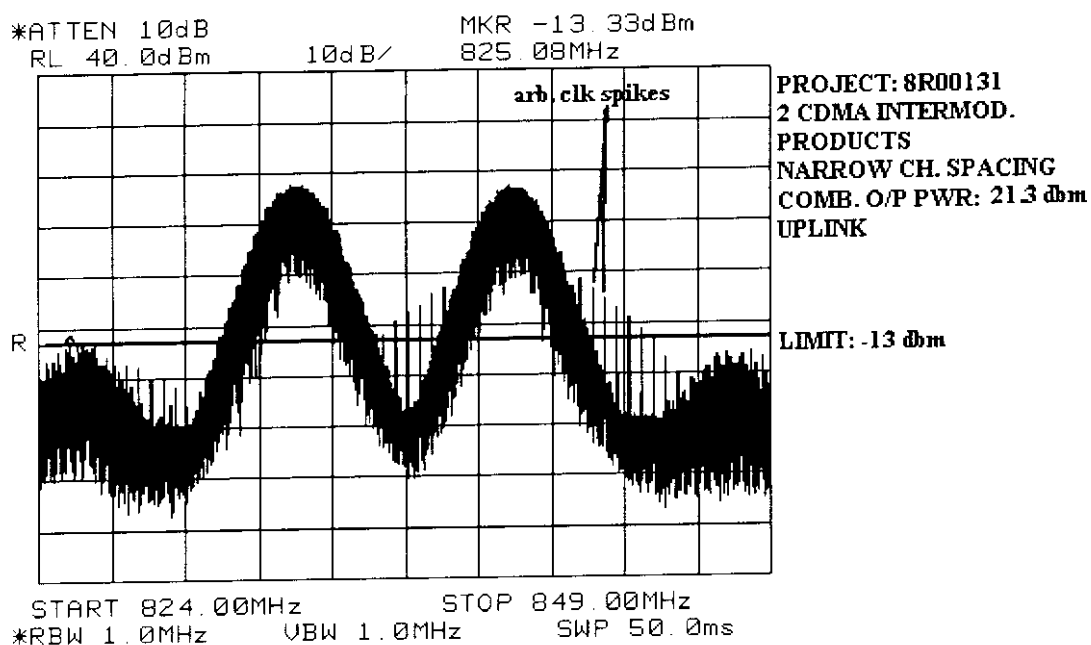
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



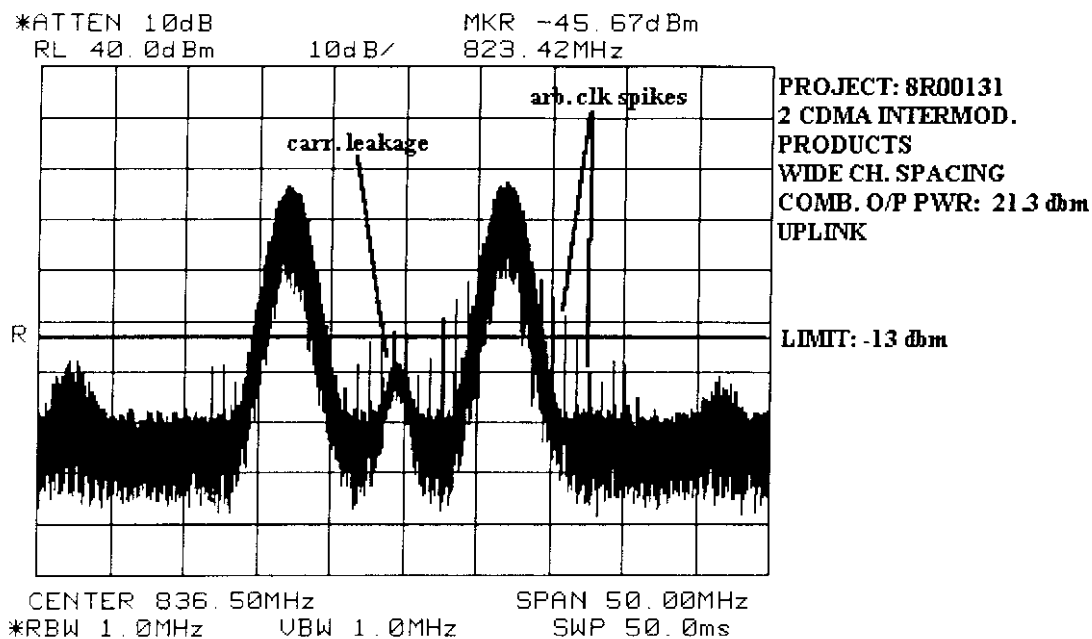
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

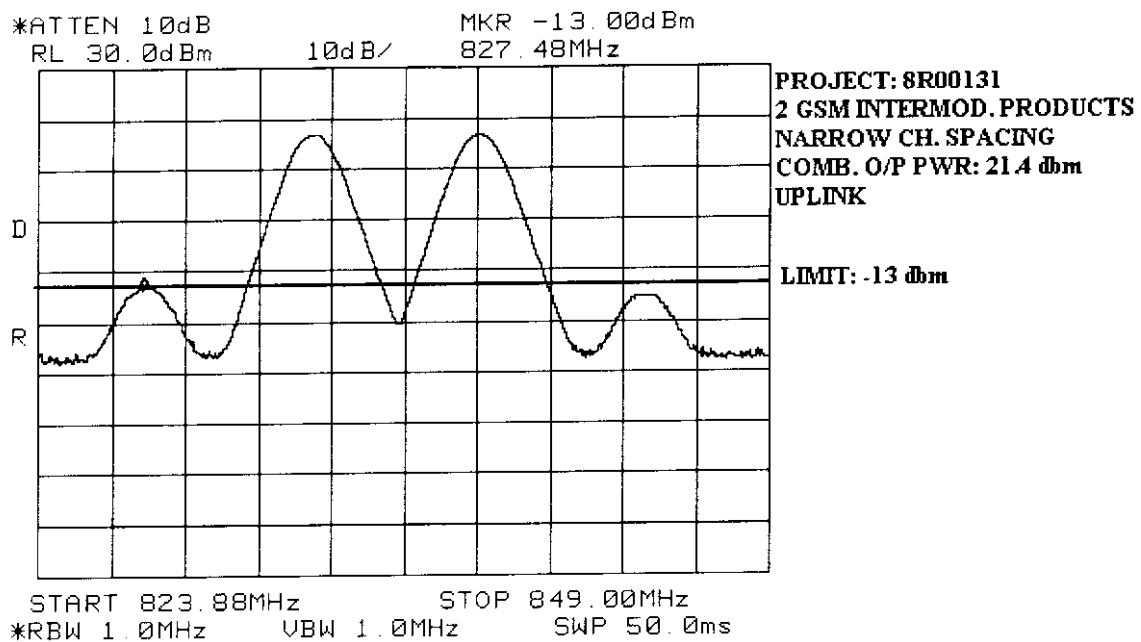


EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

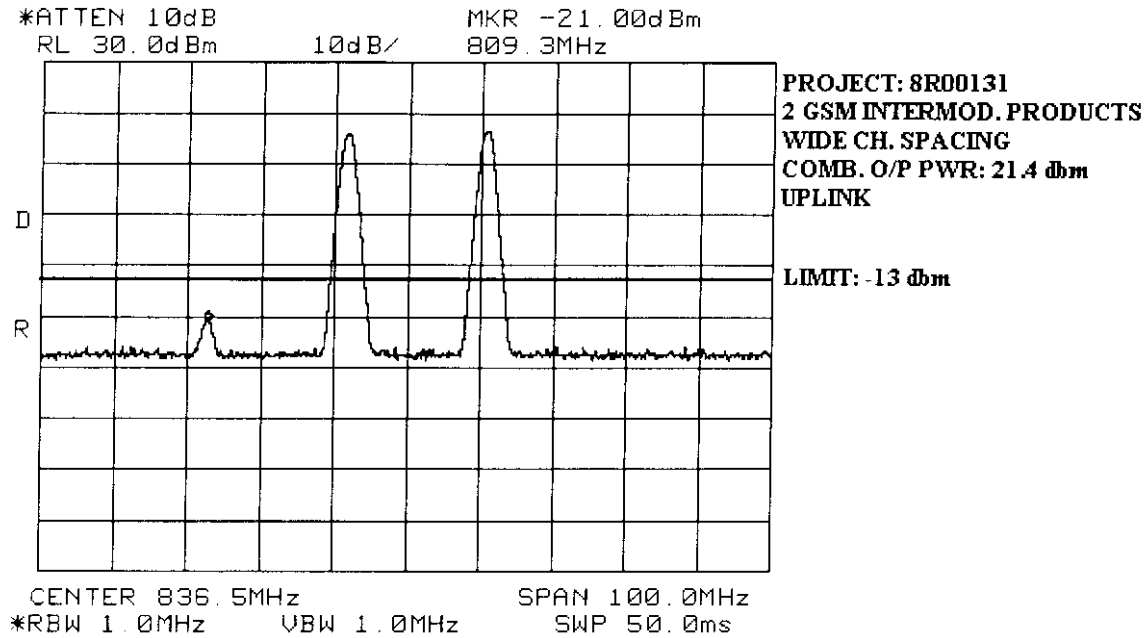


EQUIPMENT: MICROAMP 50, TPA 850 Repeater

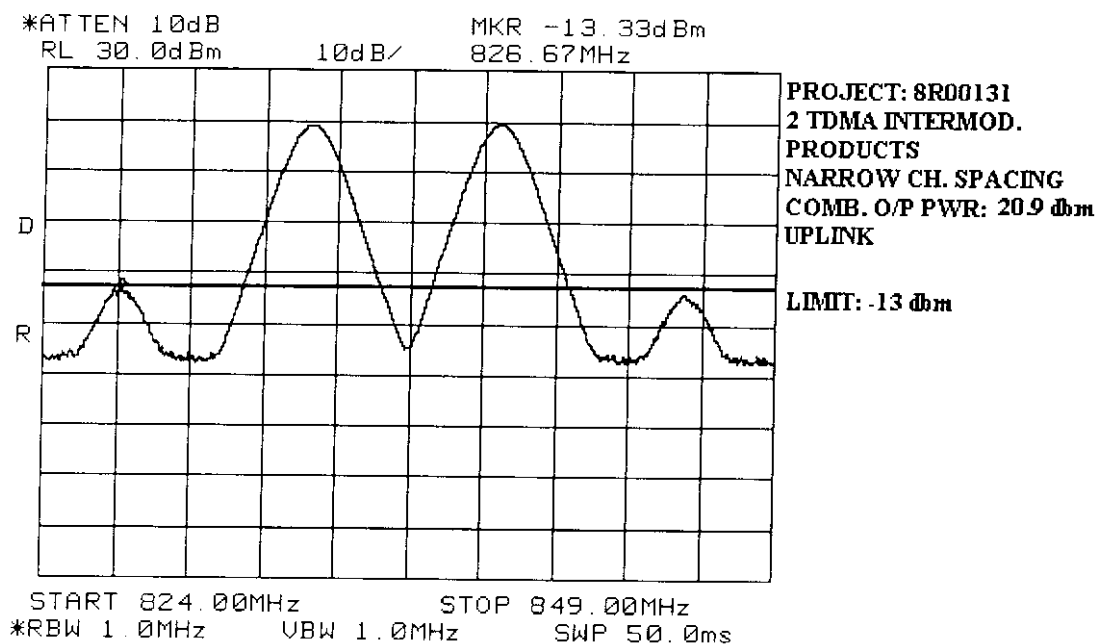
FCC ID: BCR9GBMA50C



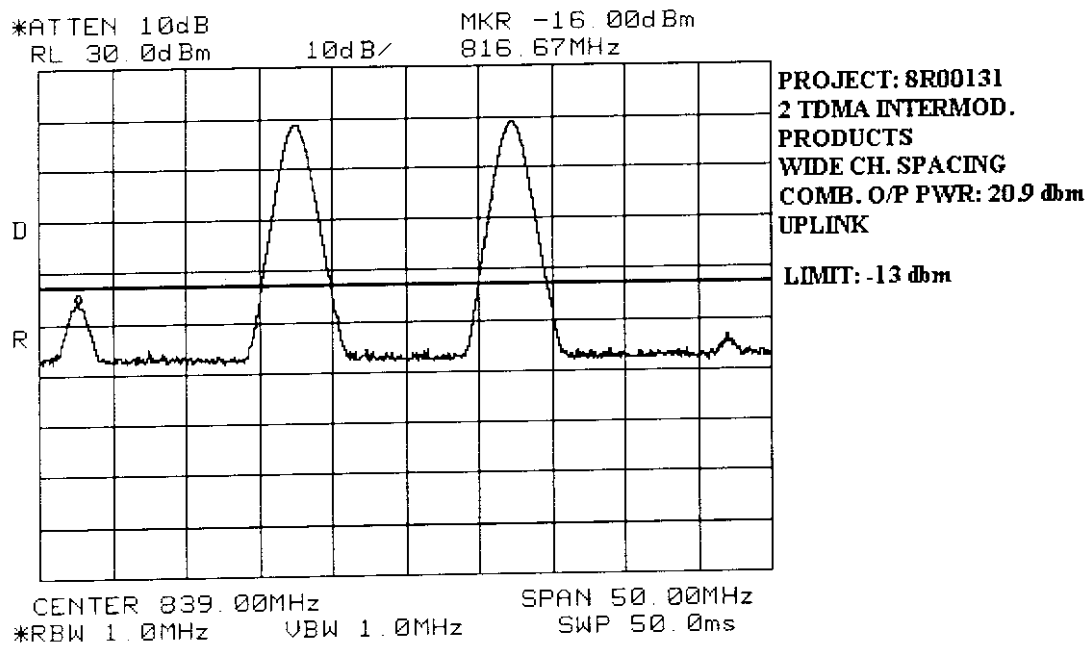
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



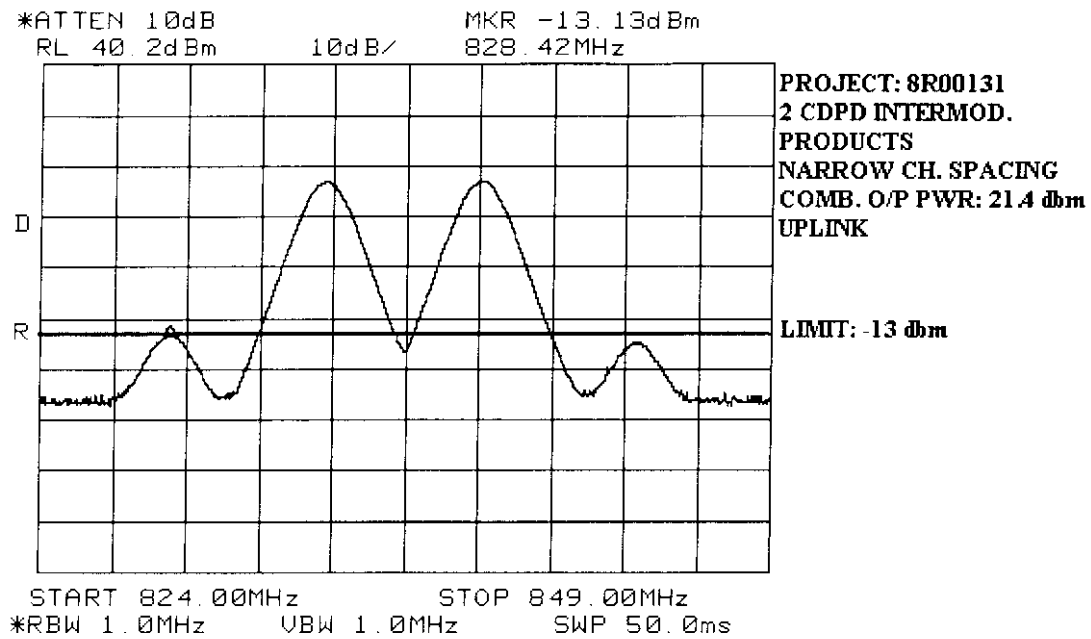
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



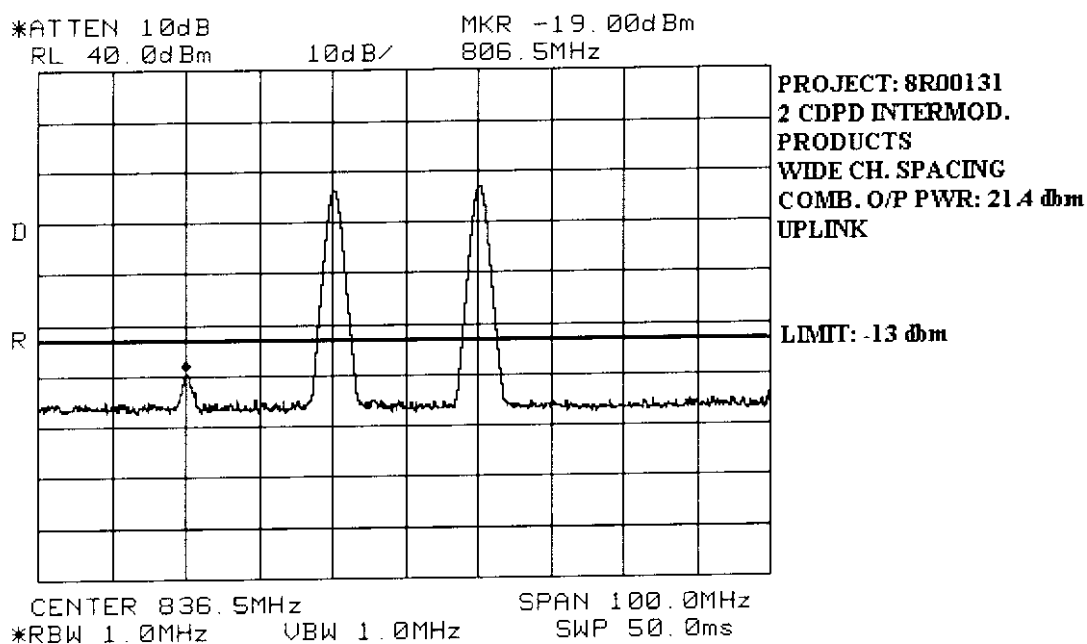
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



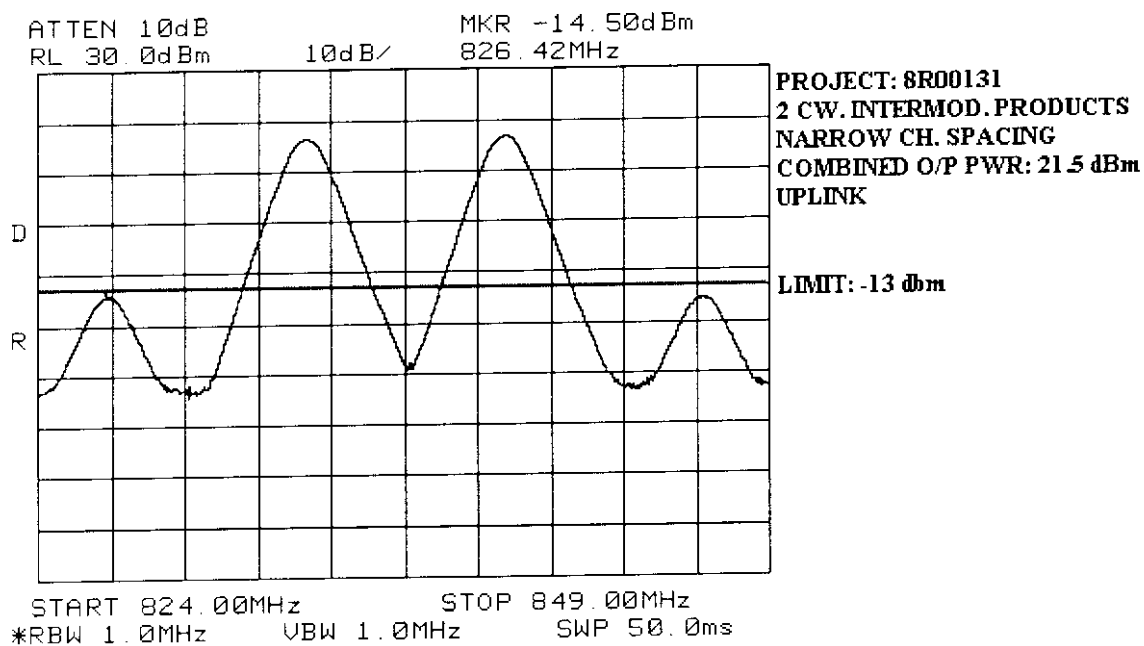
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



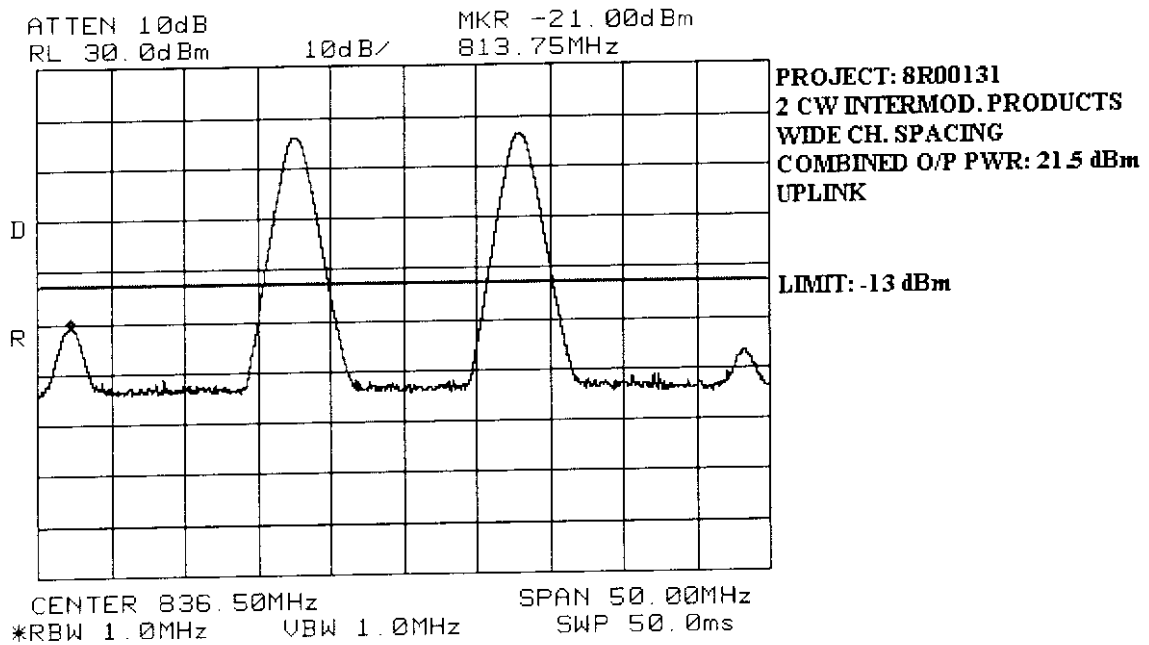
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



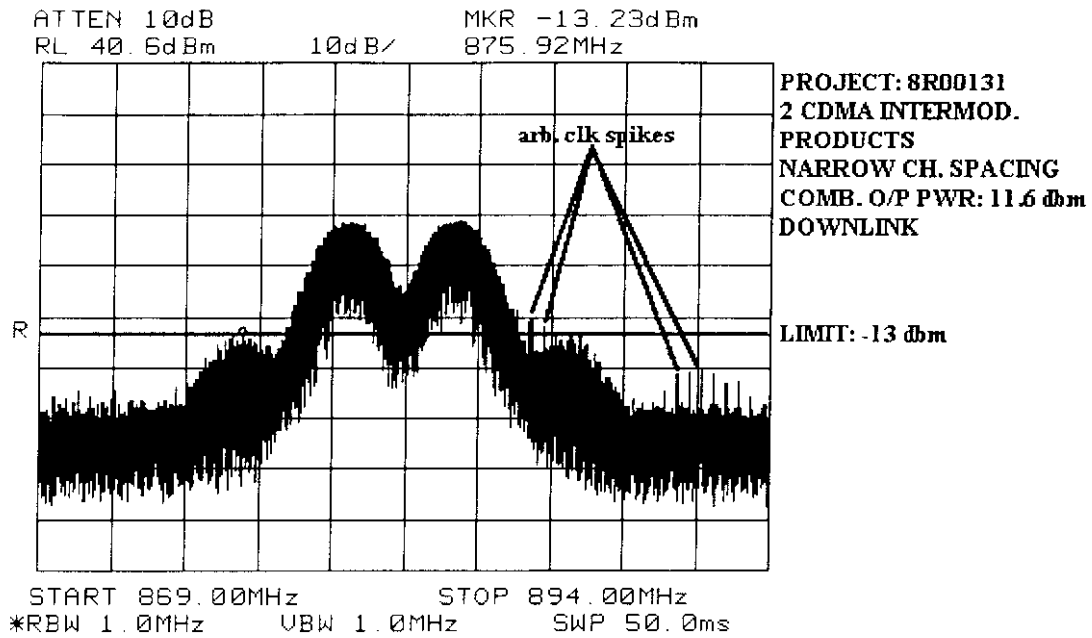
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



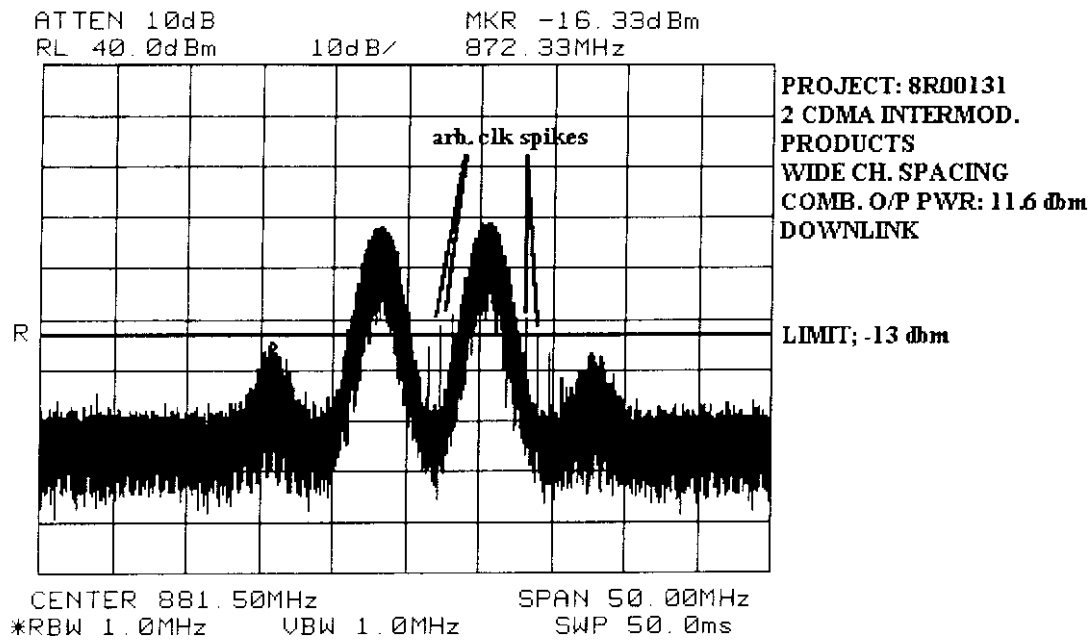
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



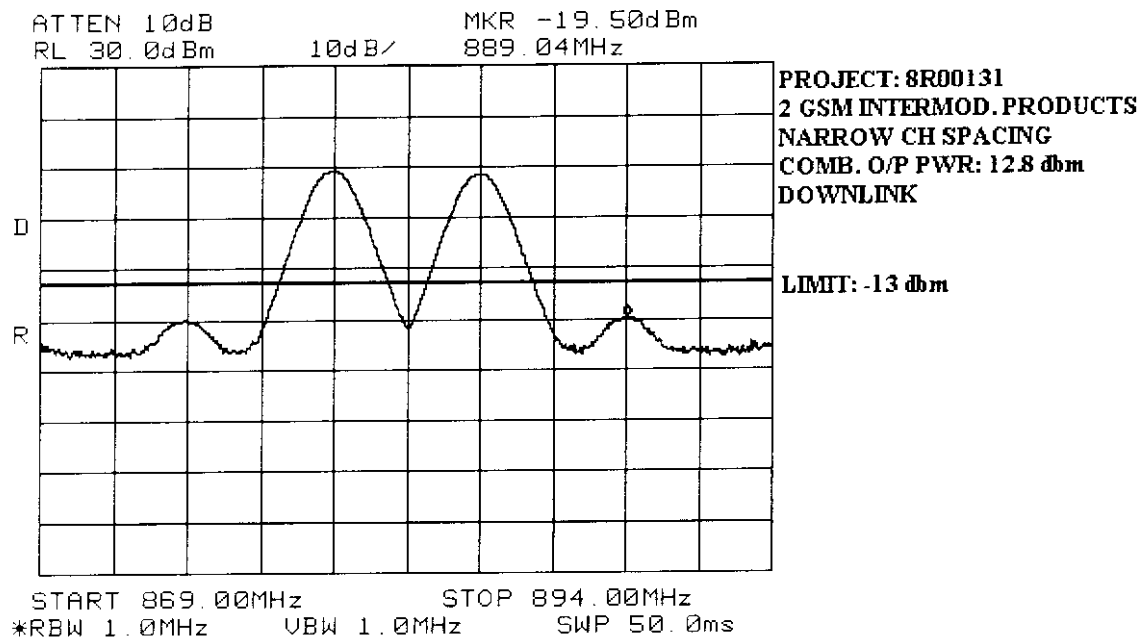
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



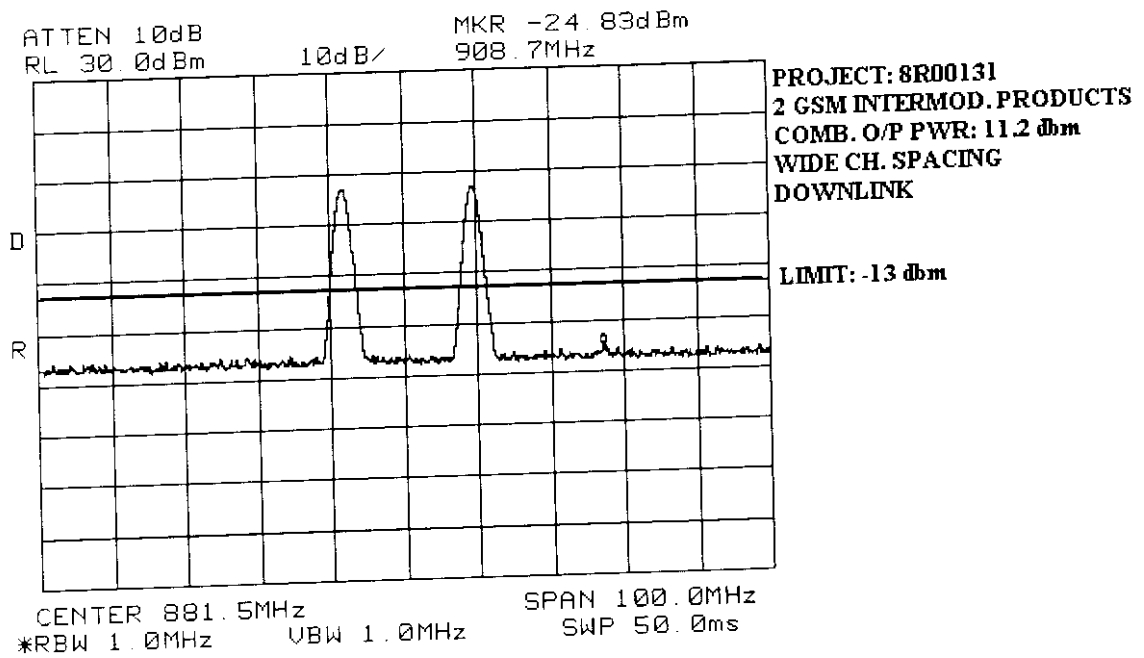
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



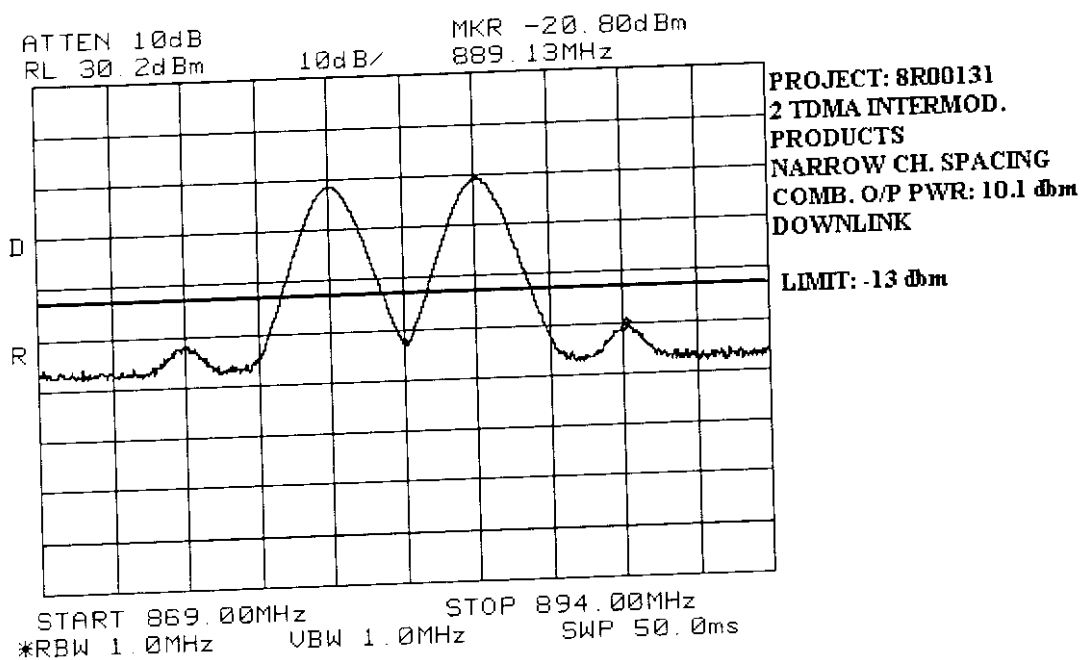
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



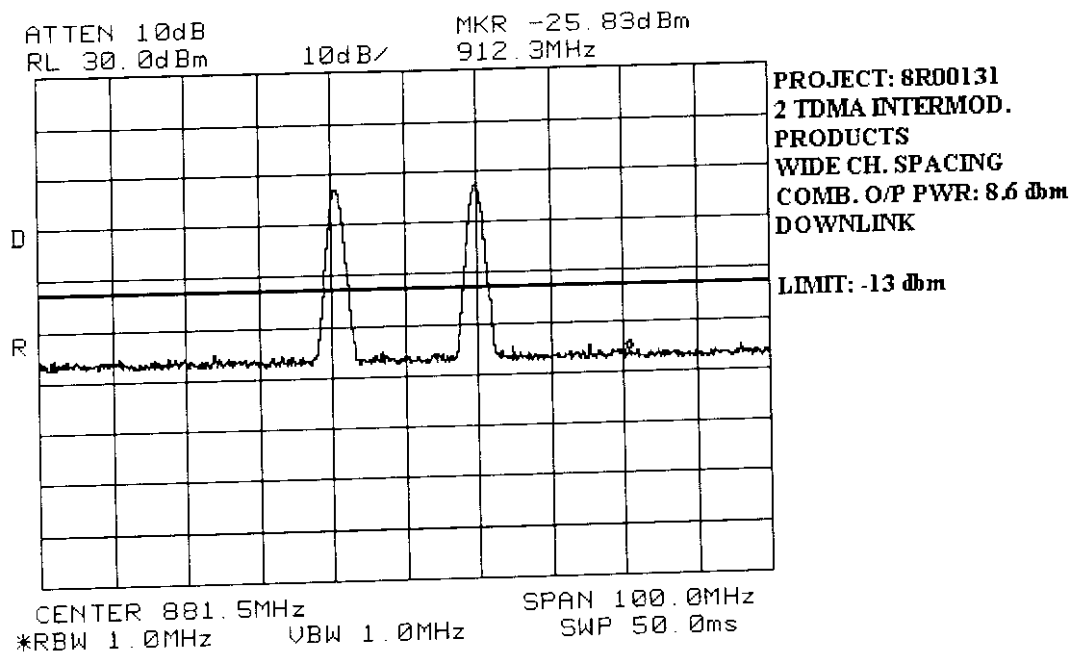
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



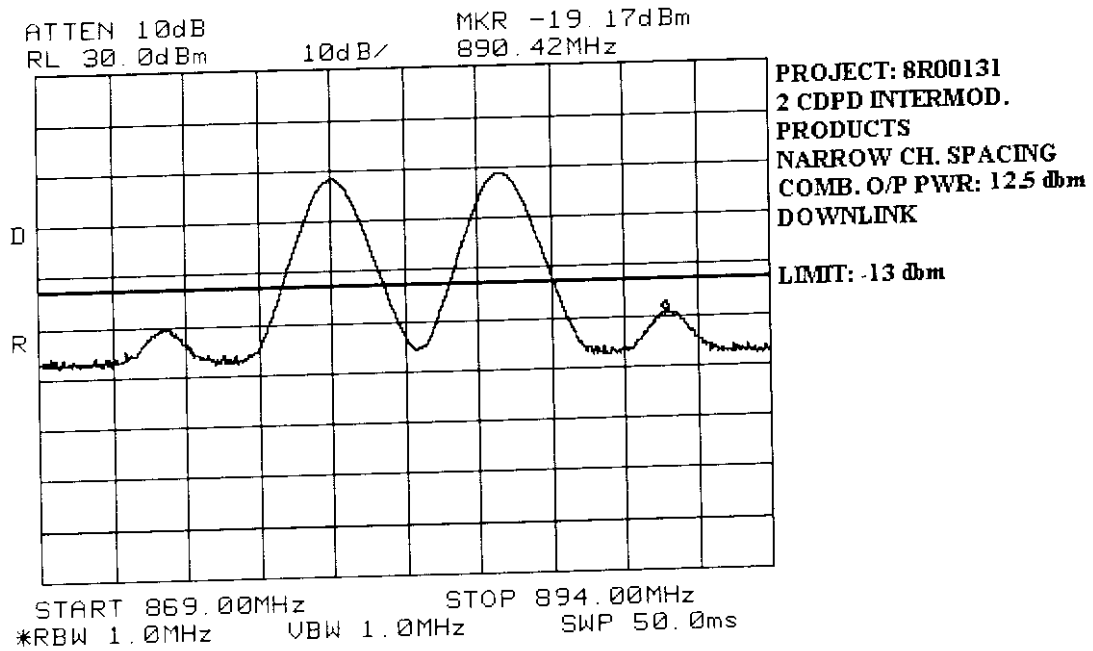
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

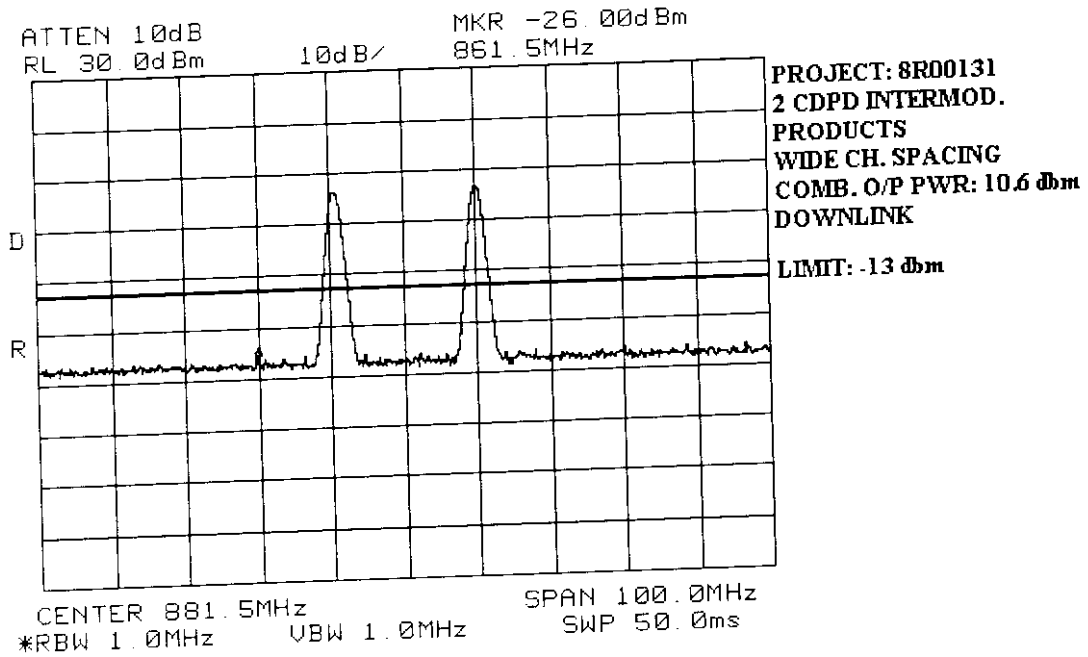
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



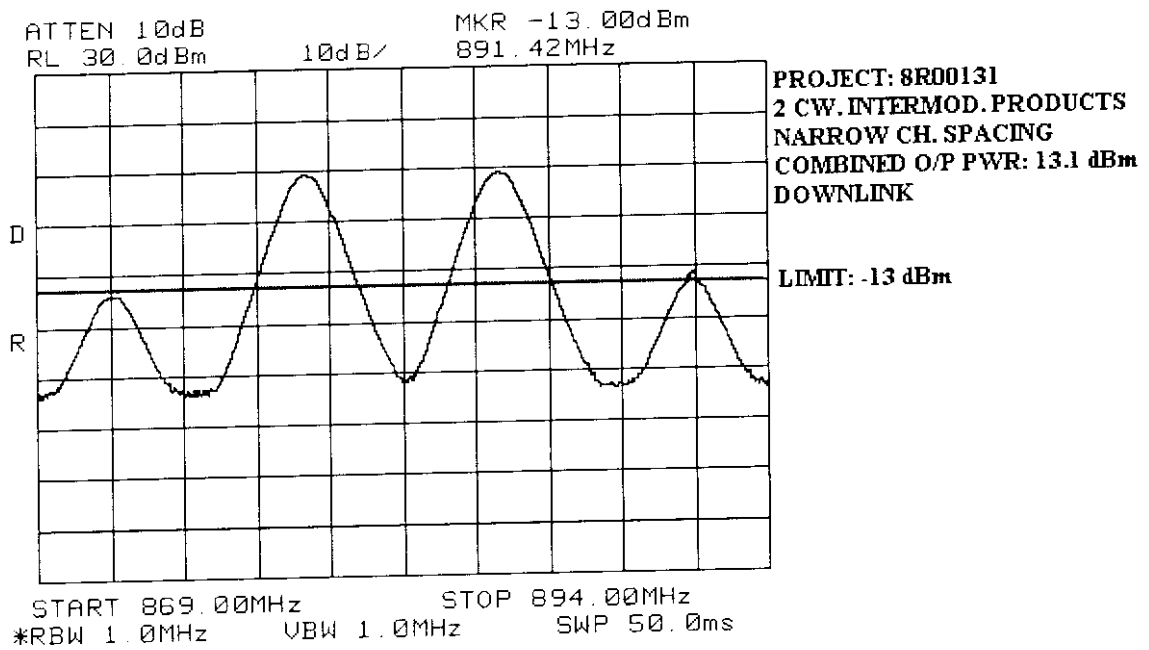
KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

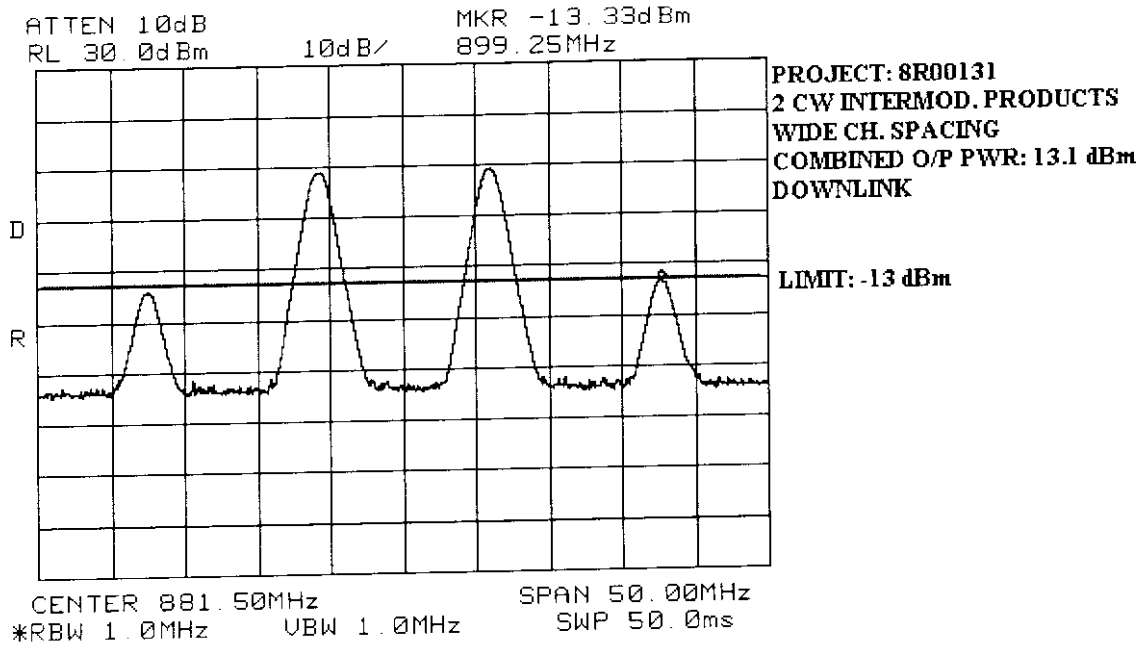
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



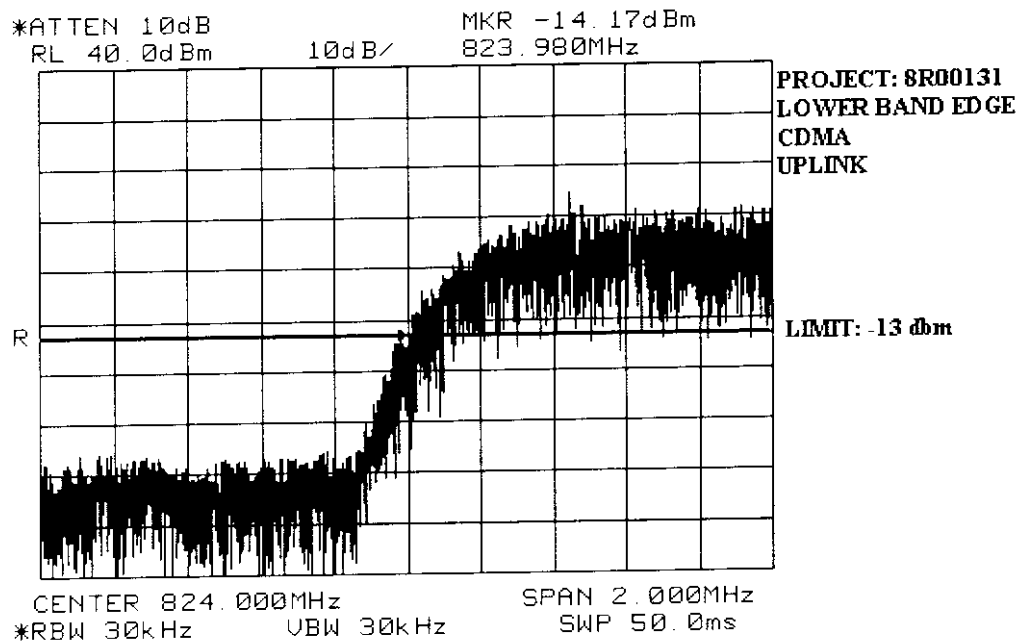
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



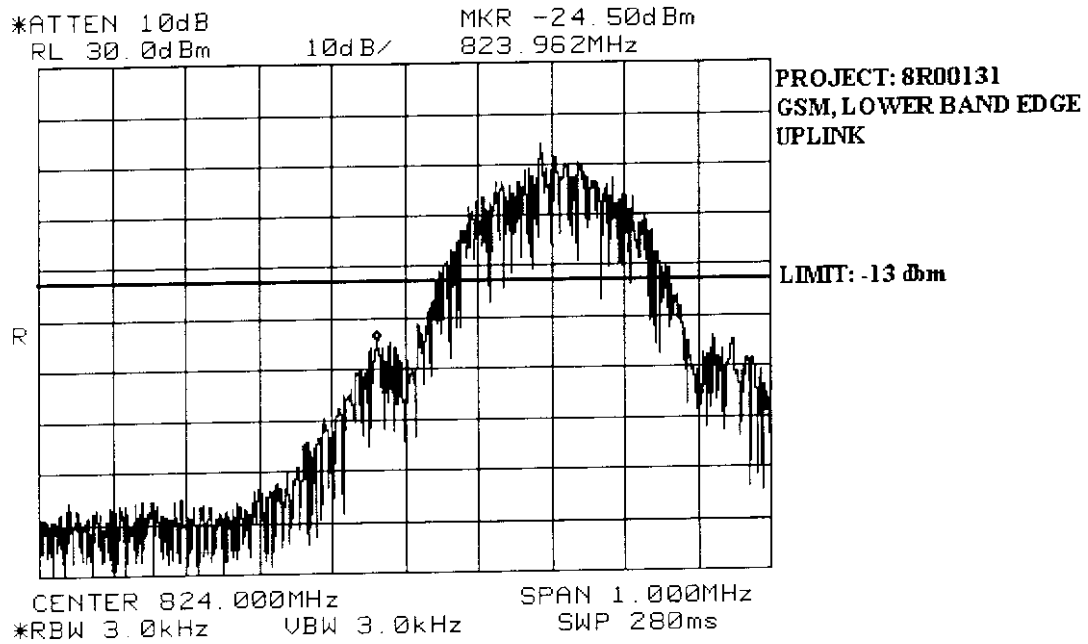
KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

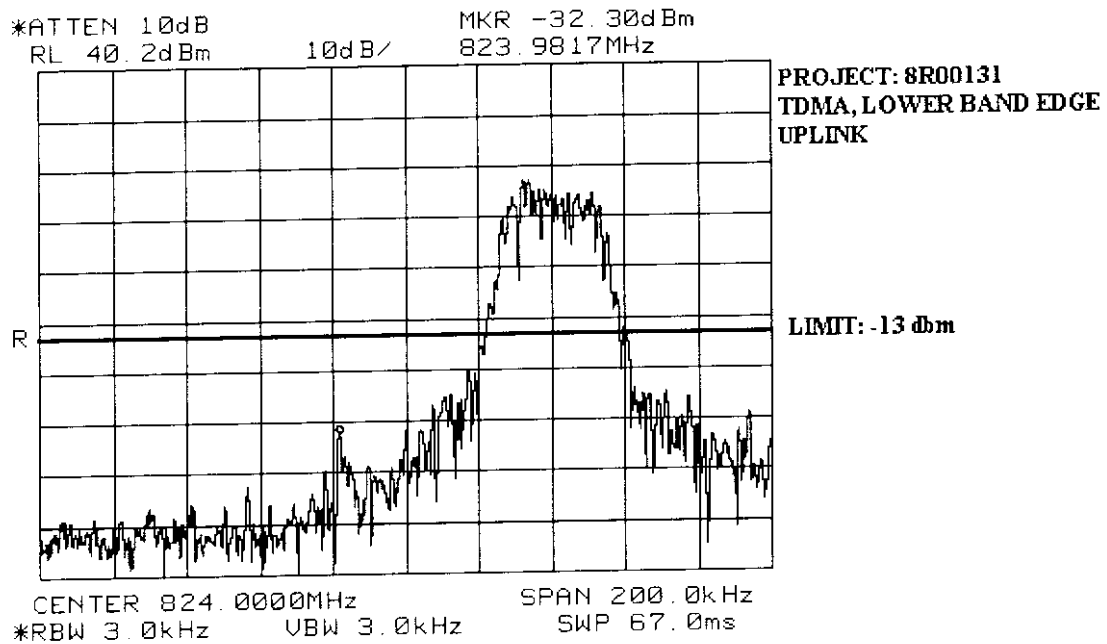
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



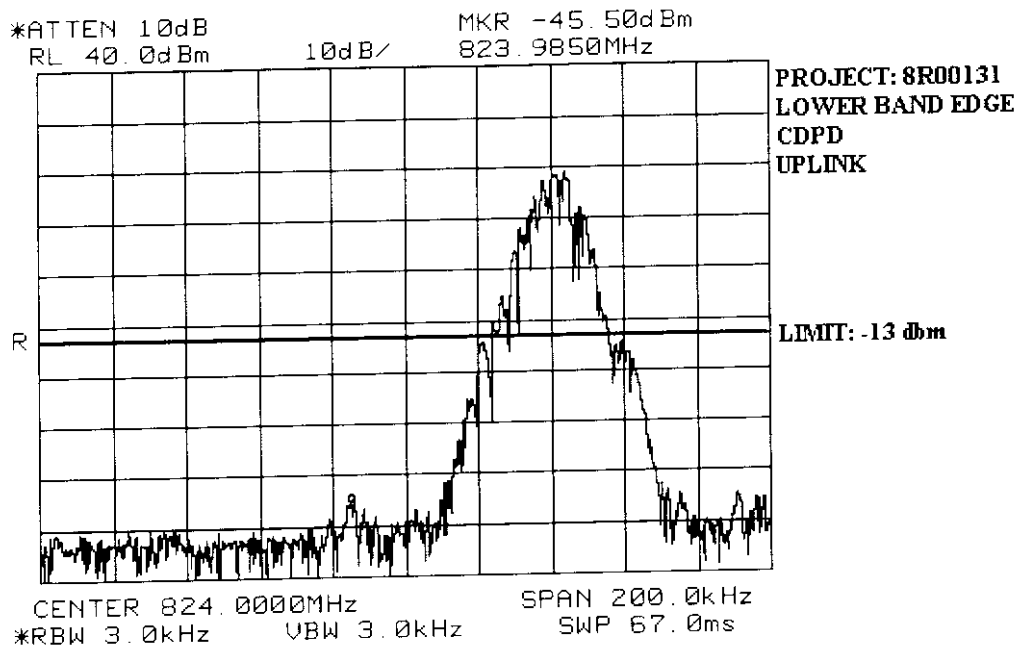
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



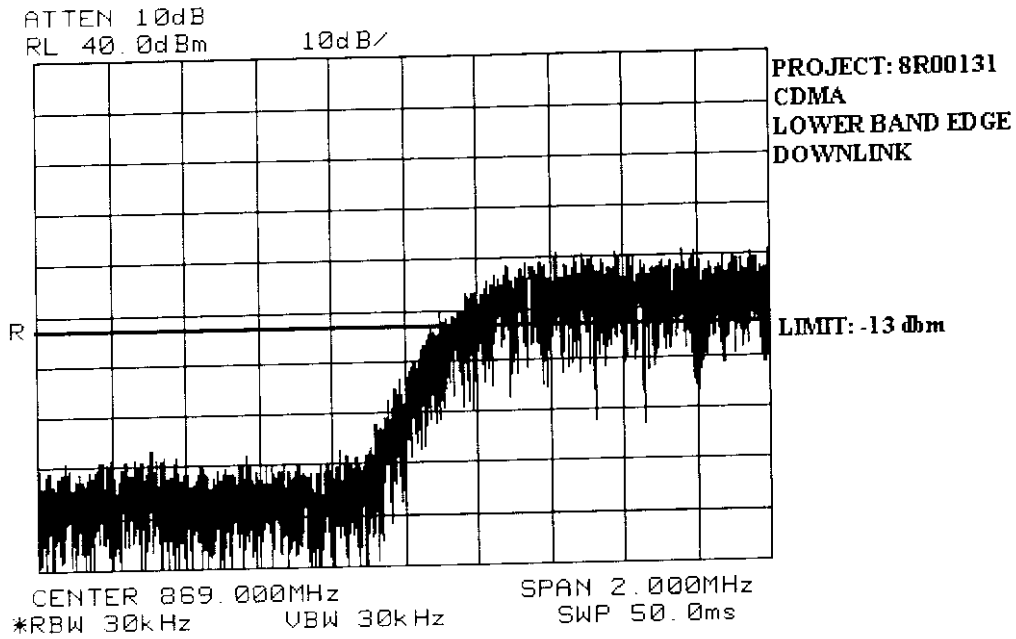
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



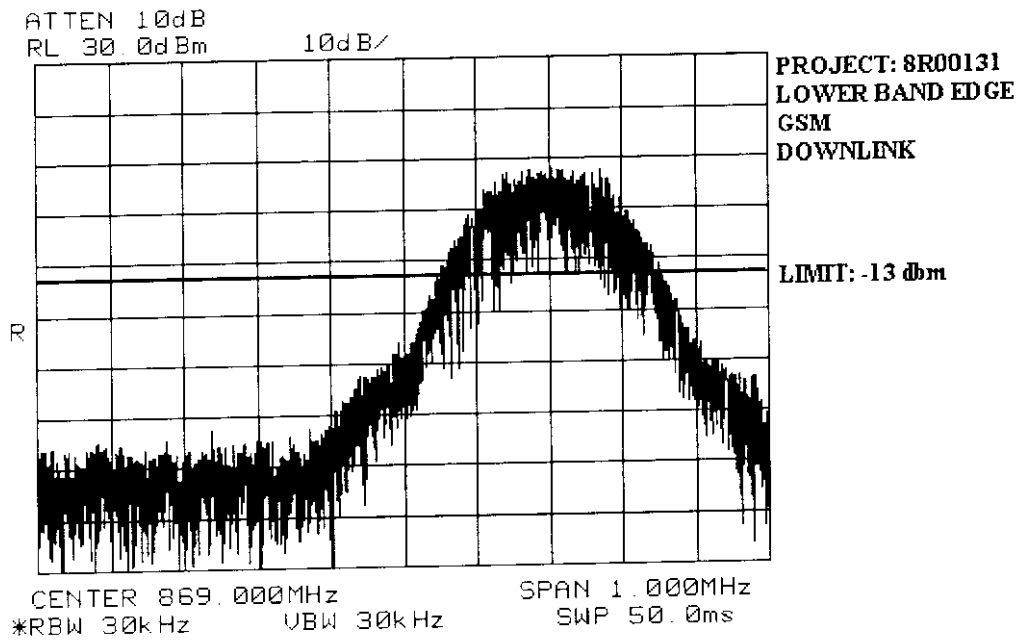
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



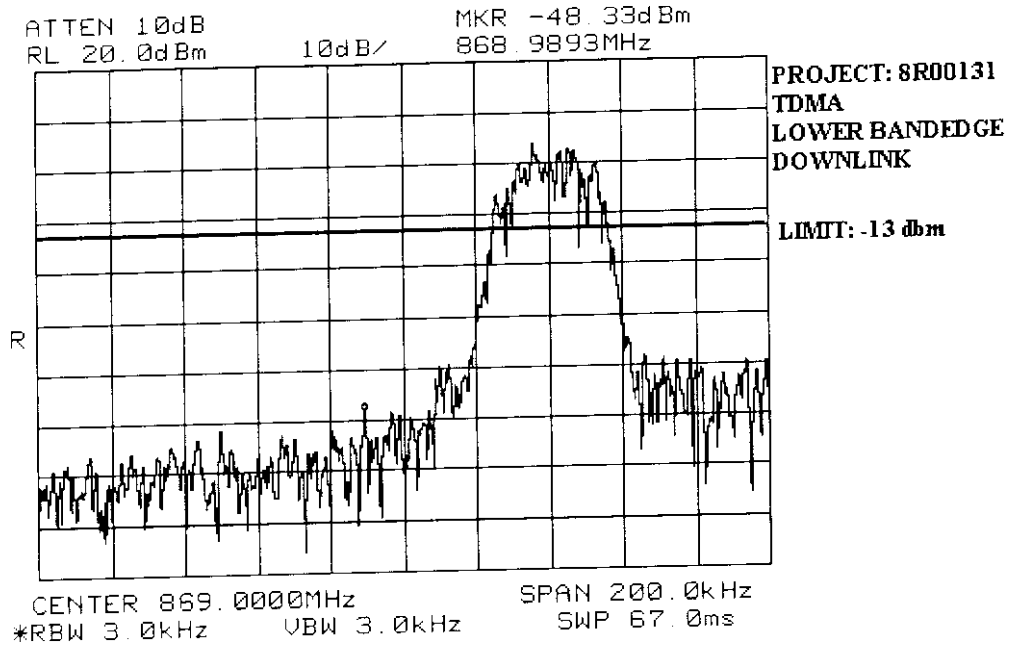
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



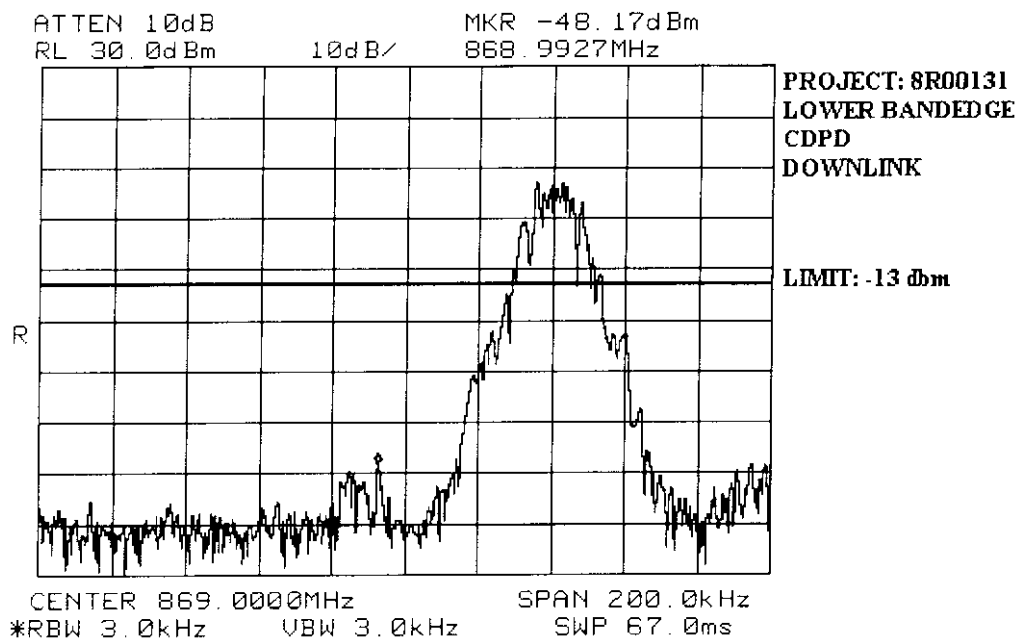
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



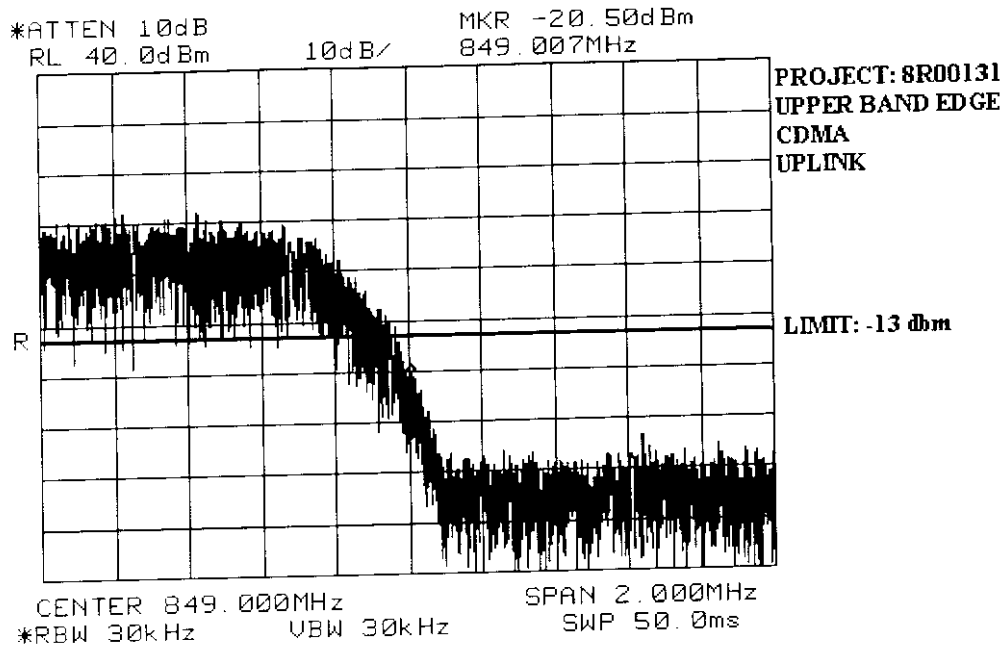
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



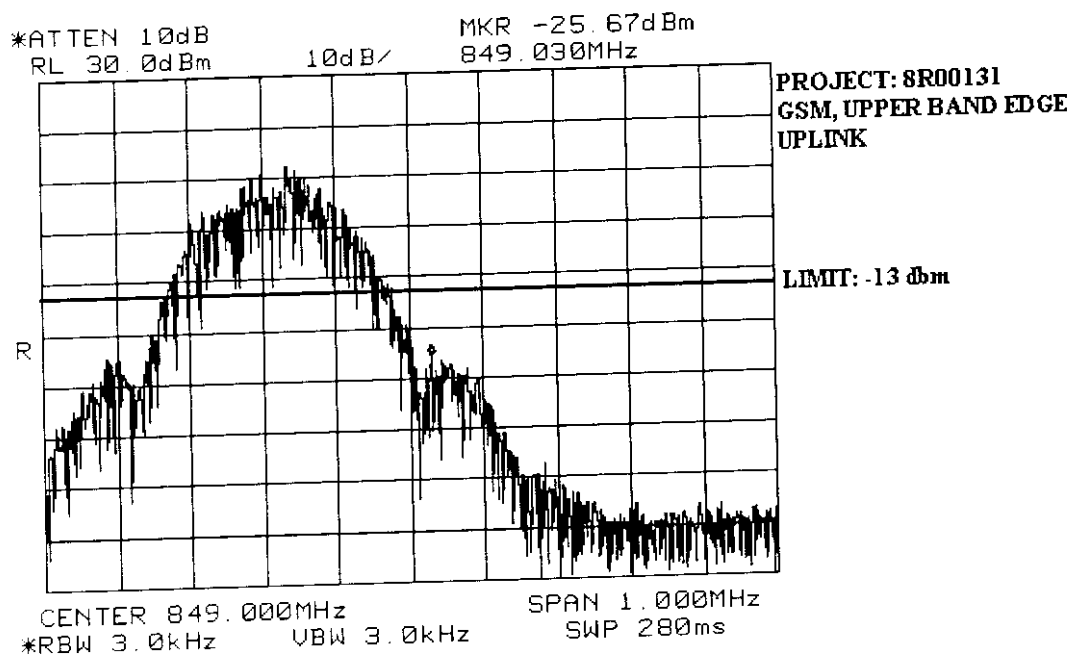
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



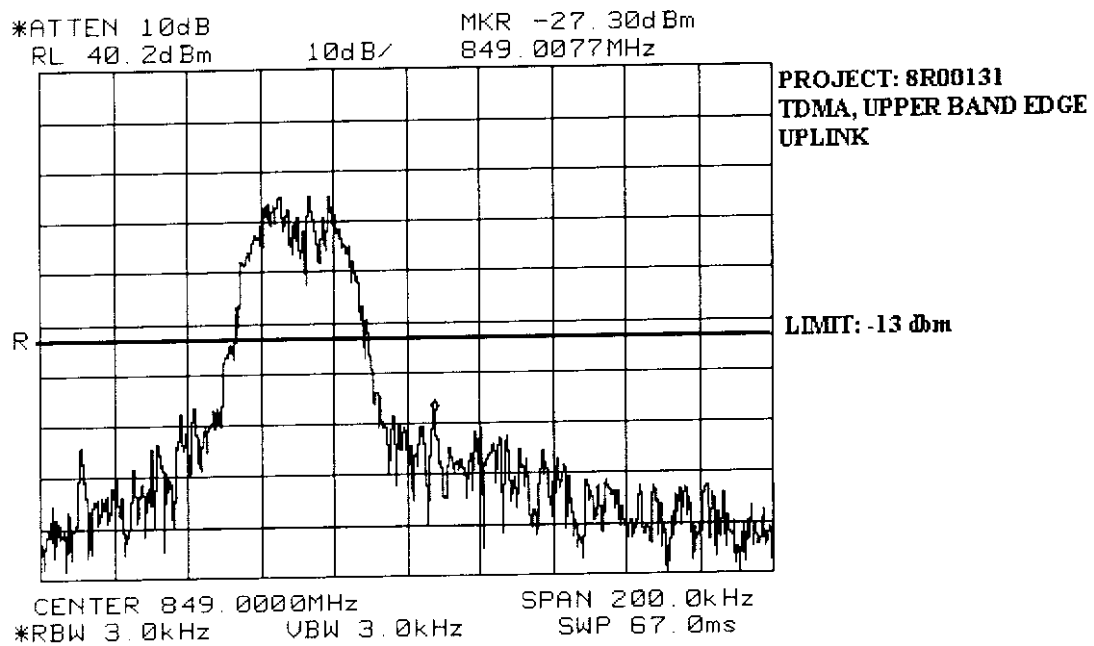
KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

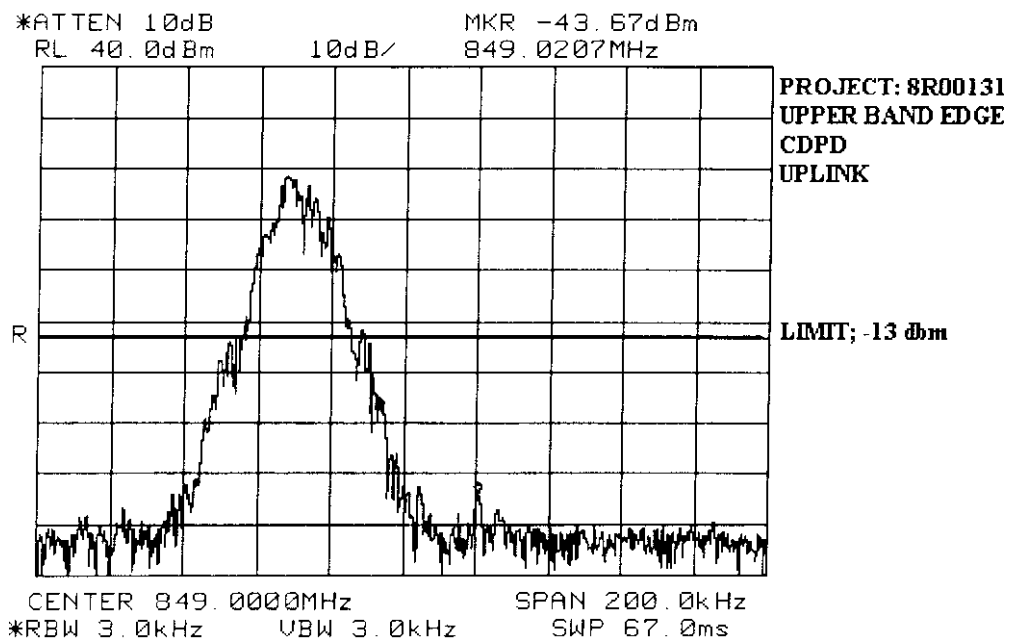
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



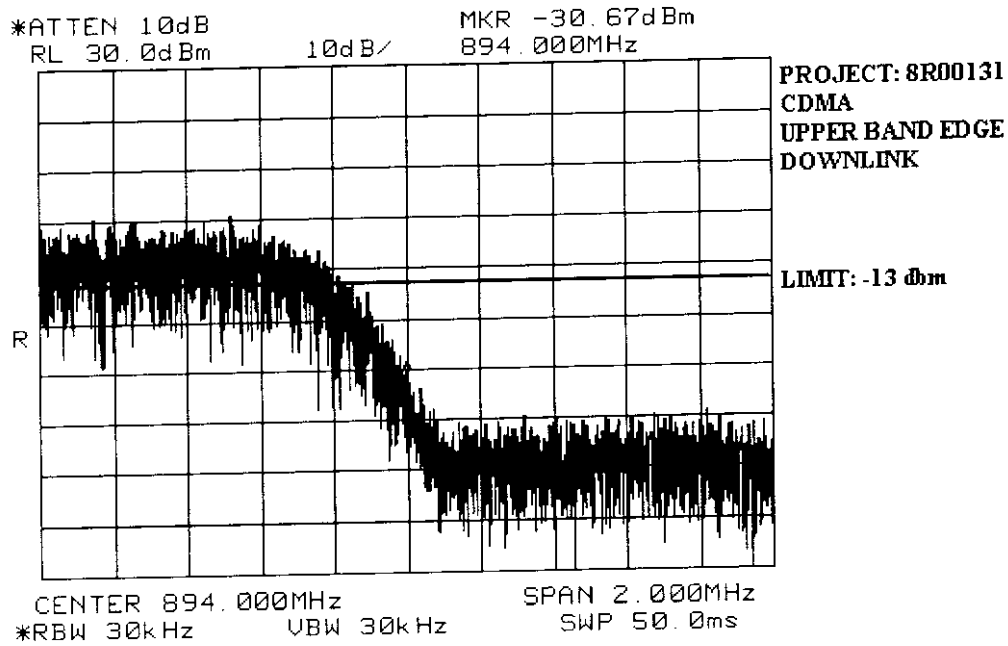
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



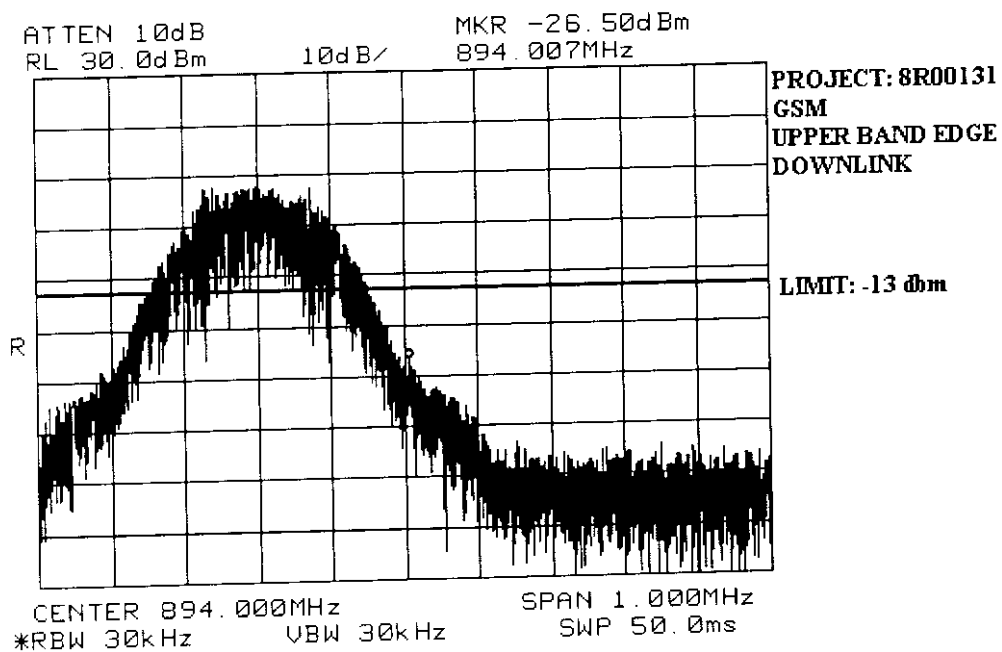
KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

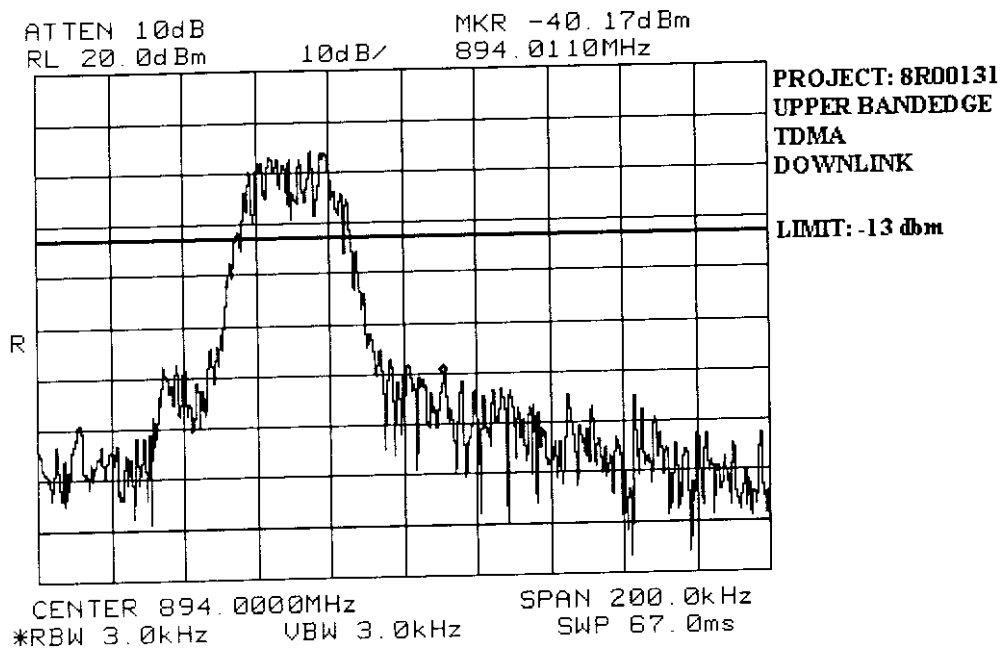
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



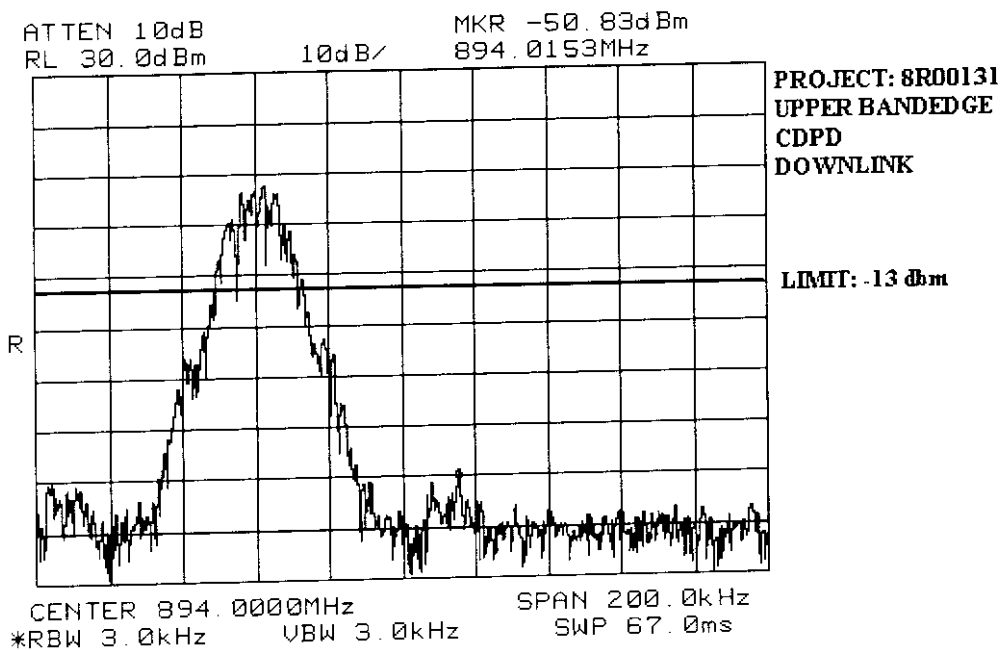
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C



EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 2.917(e)
TESTED BY: Kevin Carr	DATE: August 10, 1998

Test Results:

Complies.
The maximum field strength is 76.9 dB μ V/m @ 3m.

Test Data:

EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

Test Data - Radiated Emissions - Downlink

Distance: 3m		A tower		Receiver: 014		Detector: (S) 1 MHz RBW		3 MHz VBW			
Freq. (MHz)	Ant. *	Pol. (V/H)	Ant. HGT. (m)	Table (deg.)	RCVD Signal (dBµV/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Dist. Corr. (dB)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
40.8	B/C1	V			16.7	12.9			29.6	84.4	54.8
40.8	B/C2	H			18.0	12.9			30.9	84.4	53.5
96.9	B/C1	V			34.3	11.2			45.5	84.4	38.9
96.9	B/C2	H			36.0	11.2			47.2	84.4	37.2
935.7	L/P	V			45.8	30.8			76.6	84.4	7.8
935.7	L/P	H			41.8	30.8			72.6	84.4	11.8
1760.0	Hrn2	V			87.4	30.5	-45.5		72.4	82.3	9.9
1760.0	Hrn2	H			90.5	30.5	-45.5		75.5	82.3	6.8
2640.0	Hrn2	V			75.8	33.6	-46.1		63.3	82.3	19.0
2640.0	Hrn2	H			75.9	33.6	-46.1		63.4	82.3	18.9
3520.0	Hrn2	V			59.7	40.1	-45.2		54.6	82.3	27.7
3520.0	Hrn2	H			64.6	40.1	-45.2		59.5	82.3	22.8
4400.0	Hrn2	V			70.0	39.5	-45.4		64.1	82.3	18.2
4400.0	Hrn2	H			68.4	39.5	-45.4		62.5	82.3	19.8
5280.0	Hrn2	V			57.6	42.3	-45.8		54.1	82.3	28.2
5280.0	Hrn2	H			55.6	42.3	-45.8		52.1	82.3	30.2
6160.0	Hrn2	V			55.7	44.0	-45.1		54.6	82.3	27.7
6160.0	Hrn2	H			55.8	44.0	-45.1		54.7	82.3	27.6
7040.0	Hrn2	V			54.0	46.1	-46.1		54.0	82.3	28.3
7040.0	Hrn2	H			50.8	46.1	-46.1		50.8	82.3	31.5
7920.0	Hrn2	V			48.6	47.2	-45.6		50.2	82.3	32.1
7920.0	Hrn2	H			48.6	47.2	-45.6		50.2	82.3	32.1
8800.0	Hrn2	V			45.6	49.9	-43.1		52.4	82.3	29.9
8800.0	Hrn2	H			46.0	49.9	-43.1		52.8	82.3	29.5

Notes:

The spectrum was search up to the 10th harmonic of the fundamental frequency.

B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole

* Includes cable loss when amplifier is not used.

** Includes cable loss.

() Denotes failing emission level.

EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

Test Data - Radiated Emissions - Uplink

Distance: 3m		A tower		Receiver: 014		Detector: (5) 1 MHz RBW		3 MHz VBW			
Freq. (MHz)	Ant. *	Pol. (V/H)	Ant. HGT. (m)	Table (deg.)	RCVD Signal (dBµV/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Dist. Corr. (dB)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1670.0	Hrn2	V			83.0	29.8	-44.6		68.2	82.3	14.1
1670.0	Hrn2	H			91.7	29.8	-44.6		76.9	82.3	5.4
2505.0	Hrn2	V			60.9	33.2	-46.4		47.7	82.3	34.6
2505.0	Hrn2	H			64.7	33.2	-46.4		51.5	82.3	30.8
3340.0	Hrn2	V			48.1	39.3	-45.3		42.1	82.3	40.2
3340.0	Hrn2	H			47.0	39.3	-45.3		41.0	82.3	41.3
4175.0	Hrn2	V			46.4	39.1	-45.1		40.4	82.3	41.9
4175.0	Hrn2	H			45.5	39.1	-45.1		39.5	82.3	42.8
5010.0	Hrn2	V			45.2	41.6	-46.0		40.8	82.3	41.5
5010.0	Hrn2	H			45.0	41.6	-46.0		40.6	82.3	41.7
5845.0	Hrn2	V			45.9	43.4	-45.3		44.0	82.3	38.3
5845.0	Hrn2	H			46.2	43.4	-45.3		44.3	82.3	38.0
6680.0	Hrn2	V			45.7	45.2	-46.0		44.9	82.3	37.4
6680.0	Hrn2	H			46.0	45.2	-46.0		45.2	82.3	37.1
7515.0	Hrn2	V			45.1	46.7	-45.6		46.2	82.3	36.1
7515.0	Hrn2	H			45.0	46.7	-45.6		46.1	82.3	36.2
8350.0	Hrn2	V			45.0	49.2	-44.0		50.2	82.3	32.1
8350.0	Hrn2	H			44.9	49.2	-44.0		50.1	82.3	32.2

Notes:

The spectrum was search up to the 10th harmonic of the fundamental frequency.

B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole

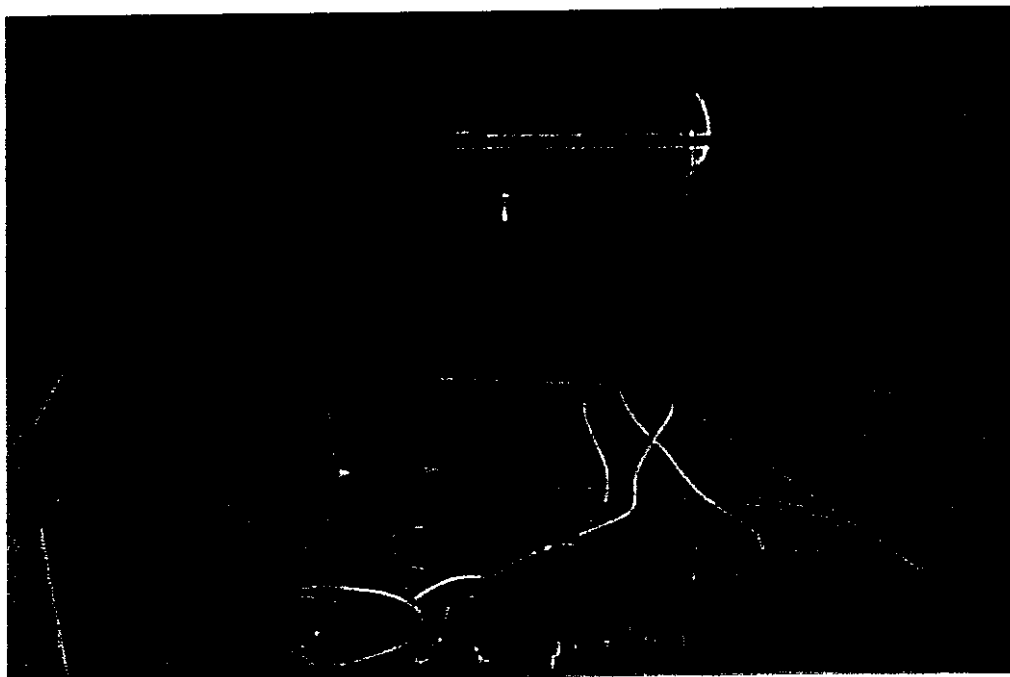
* Includes cable loss when amplifier is not used.

** Includes cable loss.

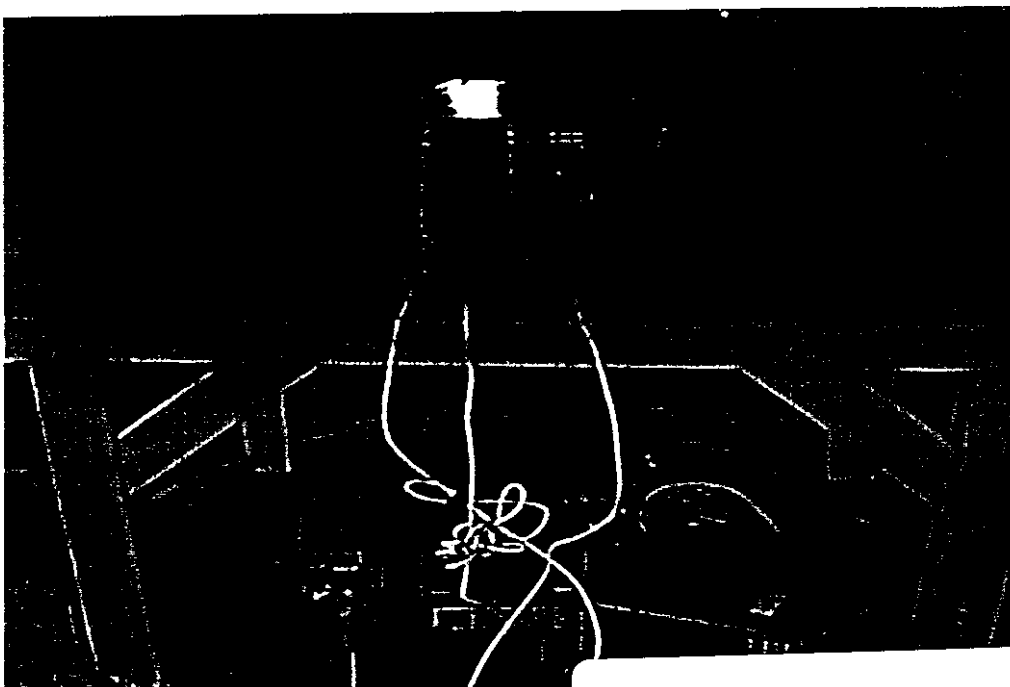
() Denotes failing emission level.

RADIATED PHOTOGRAPHS (Worst Case)

FRONT VIEW



BACK VIEW



8r00131 August 11, 1998 Horizontal Prescan

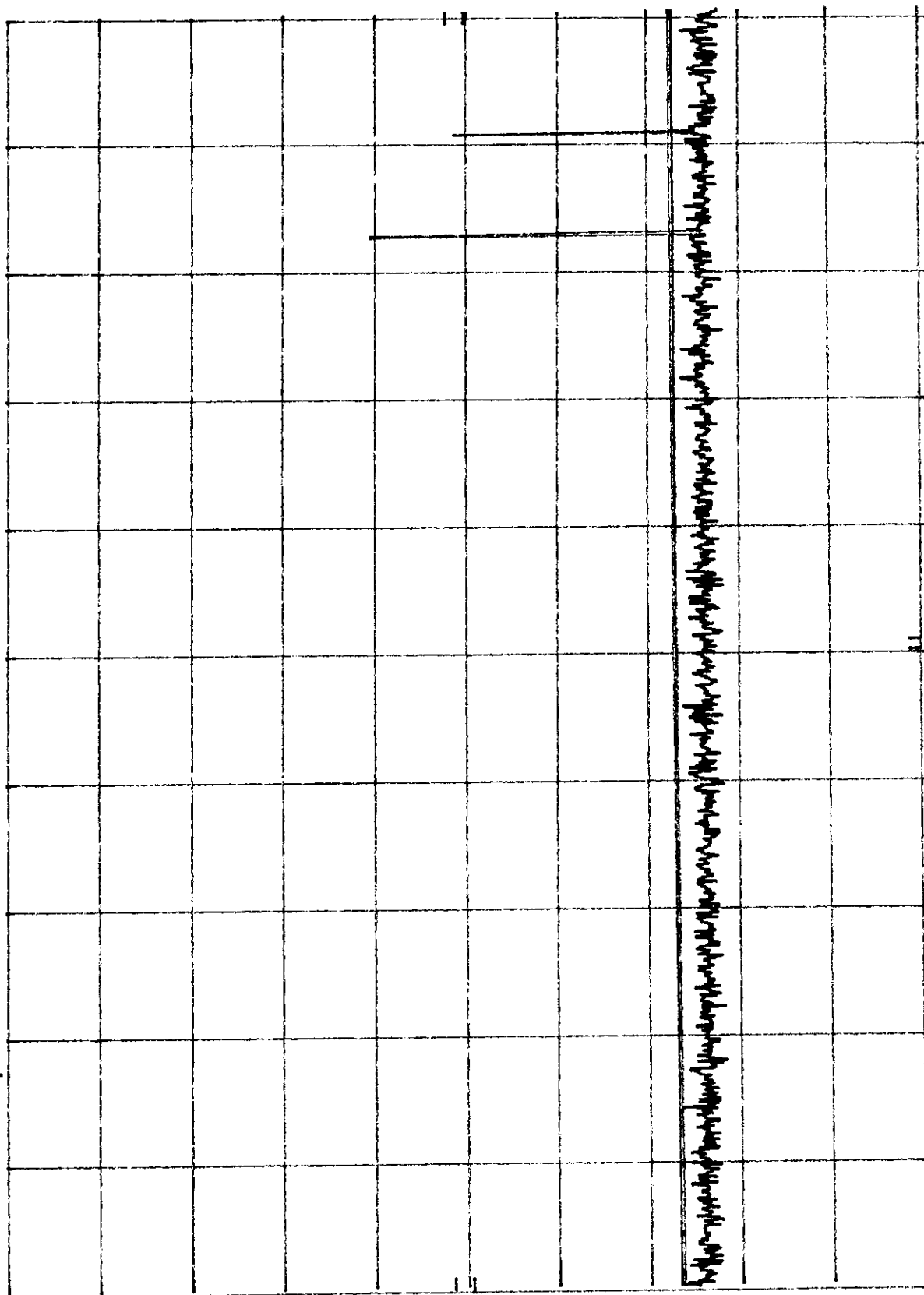
REF 90.0 dBμV ATTEN 0 dB

h/p

10 dB/

DL
16.0
dBμV

Project No.: 8R00131
Radiated Emissions
Prescans - Downlink
Page No: 112 of 123

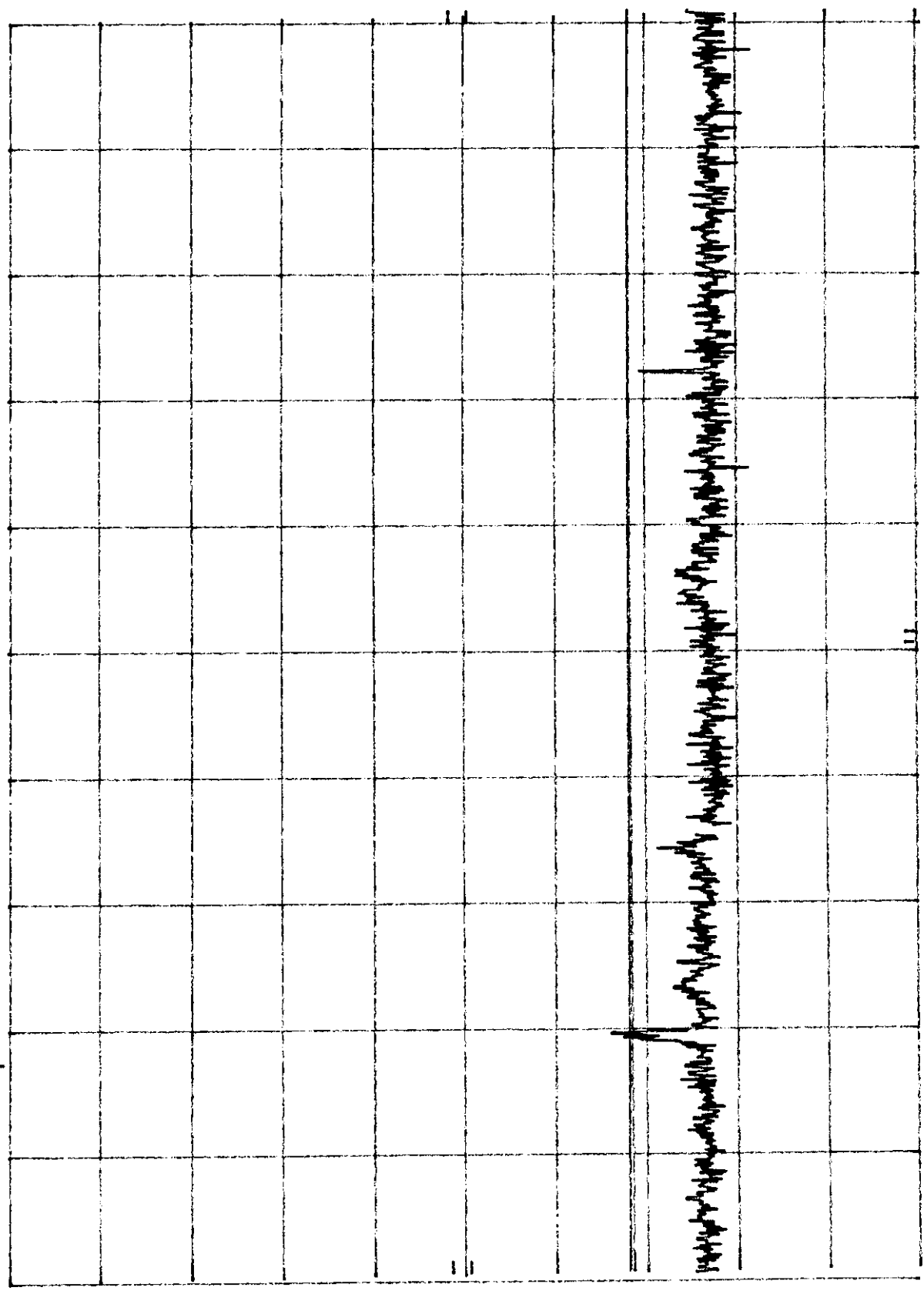


START 300 MHz RES BW 30 KHz VBW 100 KHz STOP 1.000 GHz SWP 2.10 sec

8r00131 August 11, 1998 Horizontal Prescan
hp REF 90.0 dBμV ATTN 0 dB
10 dB/

DL
21.0
dBμV

Project No.: 8R00131
Radiated Emissions
Prescans - Downlink
Page No.: 113 of 123



START 30 MHz RES BW 30 kHz VBW 100 kHz STOP 300 MHz
SWP 810 msec

8r131

August 11, 1998

Vertical Prescan

REF 90.0 dBμV ATTN 0 dB

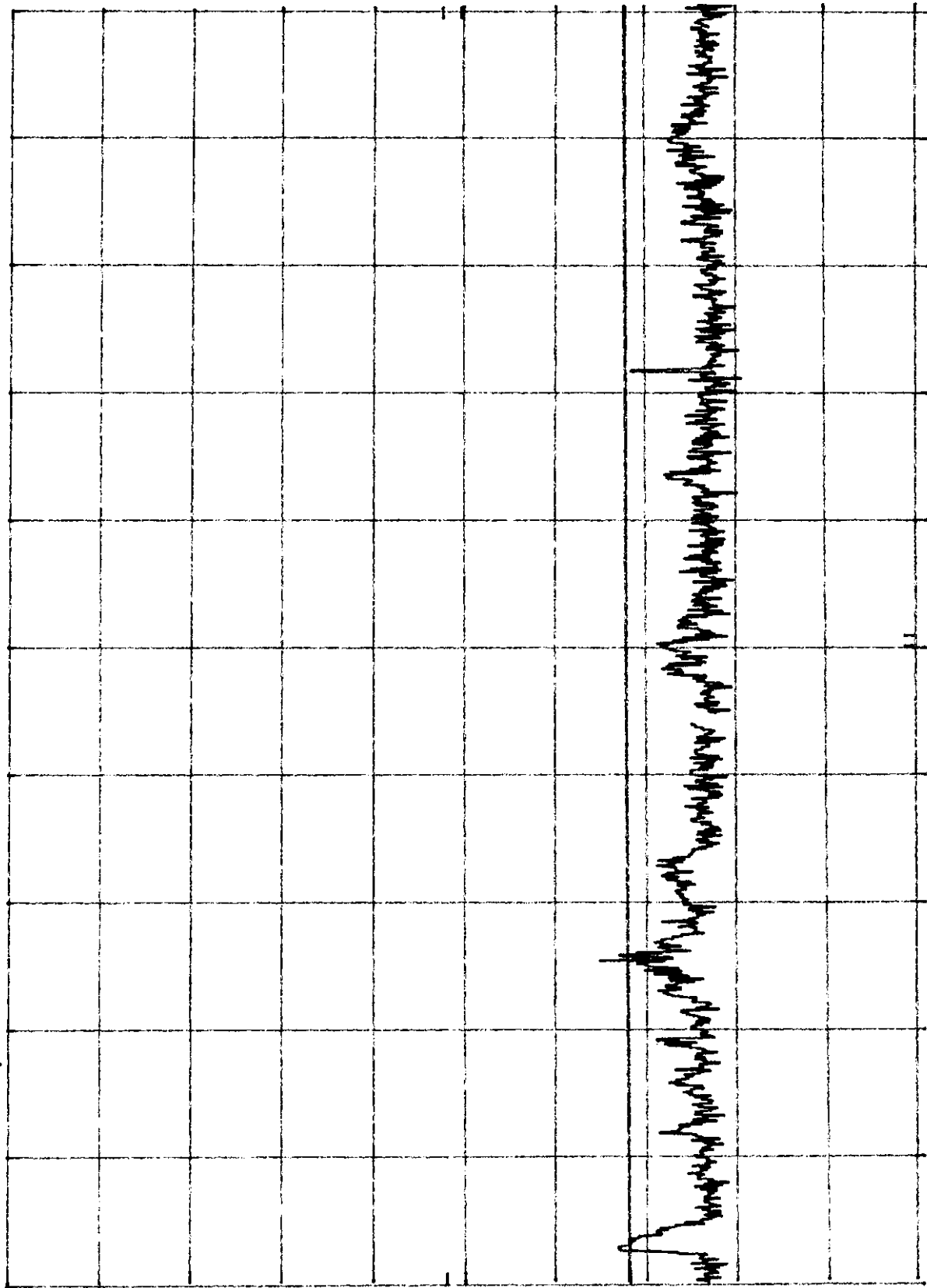
h₀

10 dB/

DL

21.0
dBμV

Project No.: 8R00131
Radiated Emissions
Prescans - Downlink
Page No.: 114 of 123



START 30 MHz
RES BW 30 KHz

VBW 100 KHz

STOP 300 MHz
SWP 810 msec

8R00131

August 11, 1998

Vertical Prescan

ATTEN 0 dB

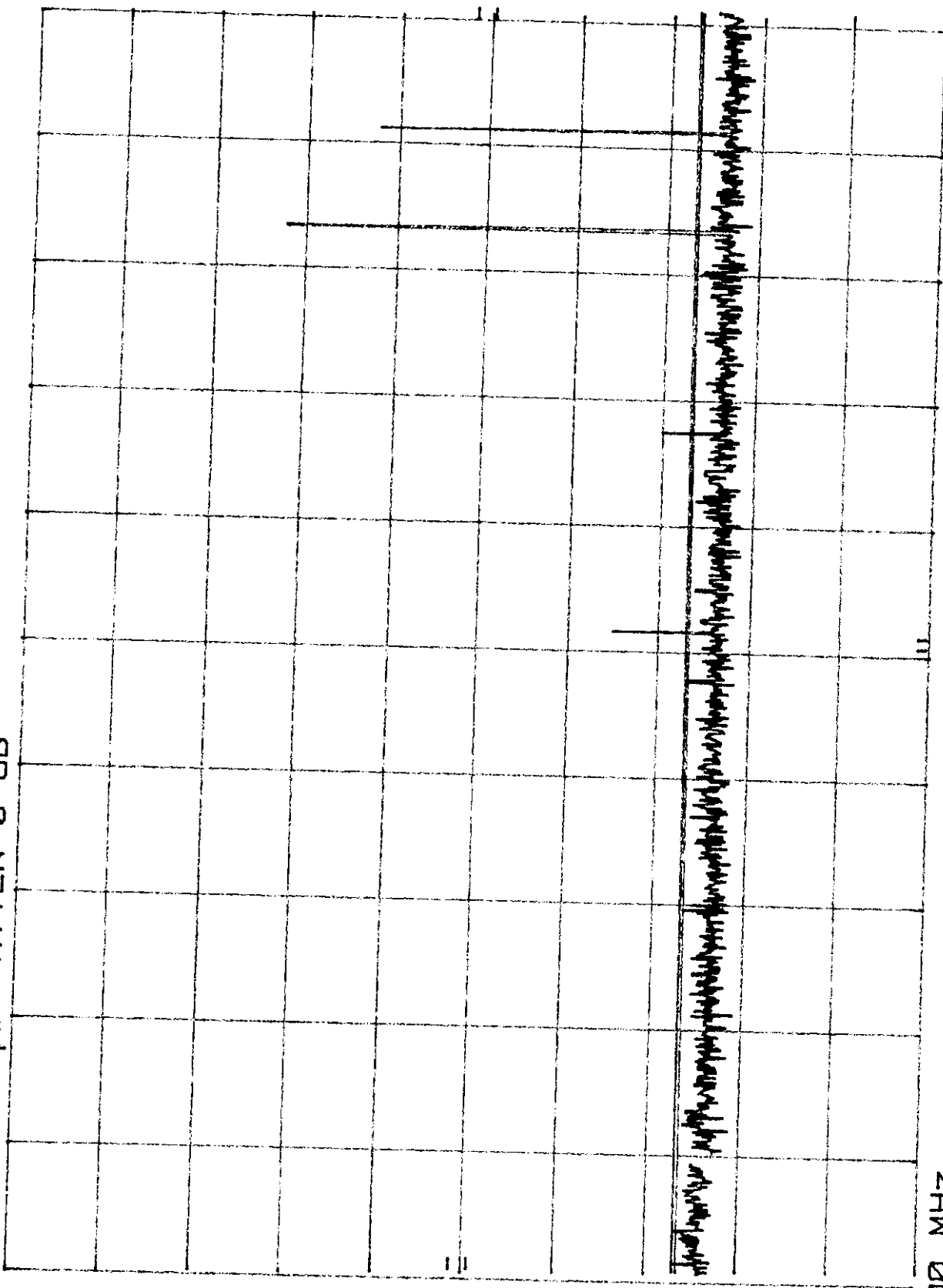
REF 90.0 dBμV

h/p

10 dB/

DL
16.0
dBμV

Project No.: 8R00131
Radiated Emissions
Prescans - Downlink
Page No.: 115 of 123



START 300 MHz

RES BW 30 kHz

VBW 100 kHz

STOP 1.000 GHz
SWP 2.10 sec

EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

Prescan Data - Downlink

Prescan Data

Project Number : 8r00131
Project Filename : 8R131B.LST
Date : August 11, 1998
Start Frequency : 30 MHz
Stop Frequency : 1000 MHz
Display Line Value: 21 dBuV

Vertical Prescan

Top Emissions below 300 MHz from the vertical prescan list:

Full Emission List below 300 MHz:

Top Emissions above 300 MHz from the vertical prescan list:

879.98 MHz, 48.2 dBuV.
935.79 MHz, 39.2 dBuV.

Full Emission List above 300 MHz:

879.98 MHz, 48.2 dBuV. Peak.
880 MHz, 48.2 dBuV. Peak.
935.79 MHz, 39.2 dBuV. Peak.

Horizontal Prescan

Top Emissions below 300 MHz from the horizontal prescan list:

Full Emission List below 300 MHz:

Top Emissions above 300 MHz from the horizontal prescan list:

880 MHz, 48.1 dBuV.
935.79 MHz, 39.3 dBuV.

Full Emission List above 300 MHz:

880 MHz, 48.1 dBuV. Peak.
935.79 MHz, 39.3 dBuV. Peak.

Vertical Prescan

August 10, 1998

8R00131.1

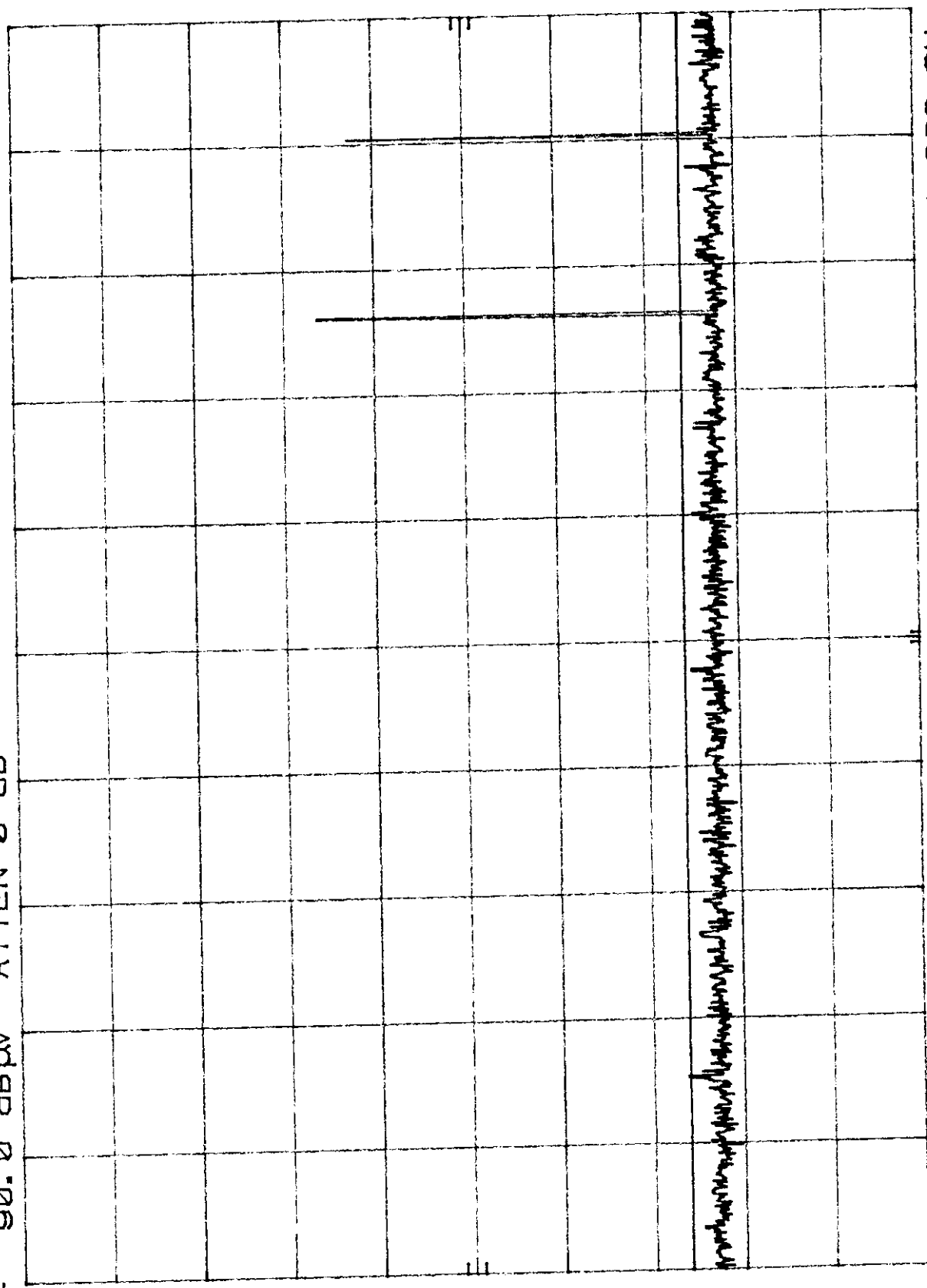
REF 90.0 dBμV ATTN 0 dB

h/p

10 dB/

DL
16.0

Project No.: 8R00131
Radiated Emissions
Prescans - Uplink
Page No.: 117 of 123



START 300 MHz RES BW 30 kHz VBW 100 kHz STOP 1.000 GHz
SWP 2.10 sec

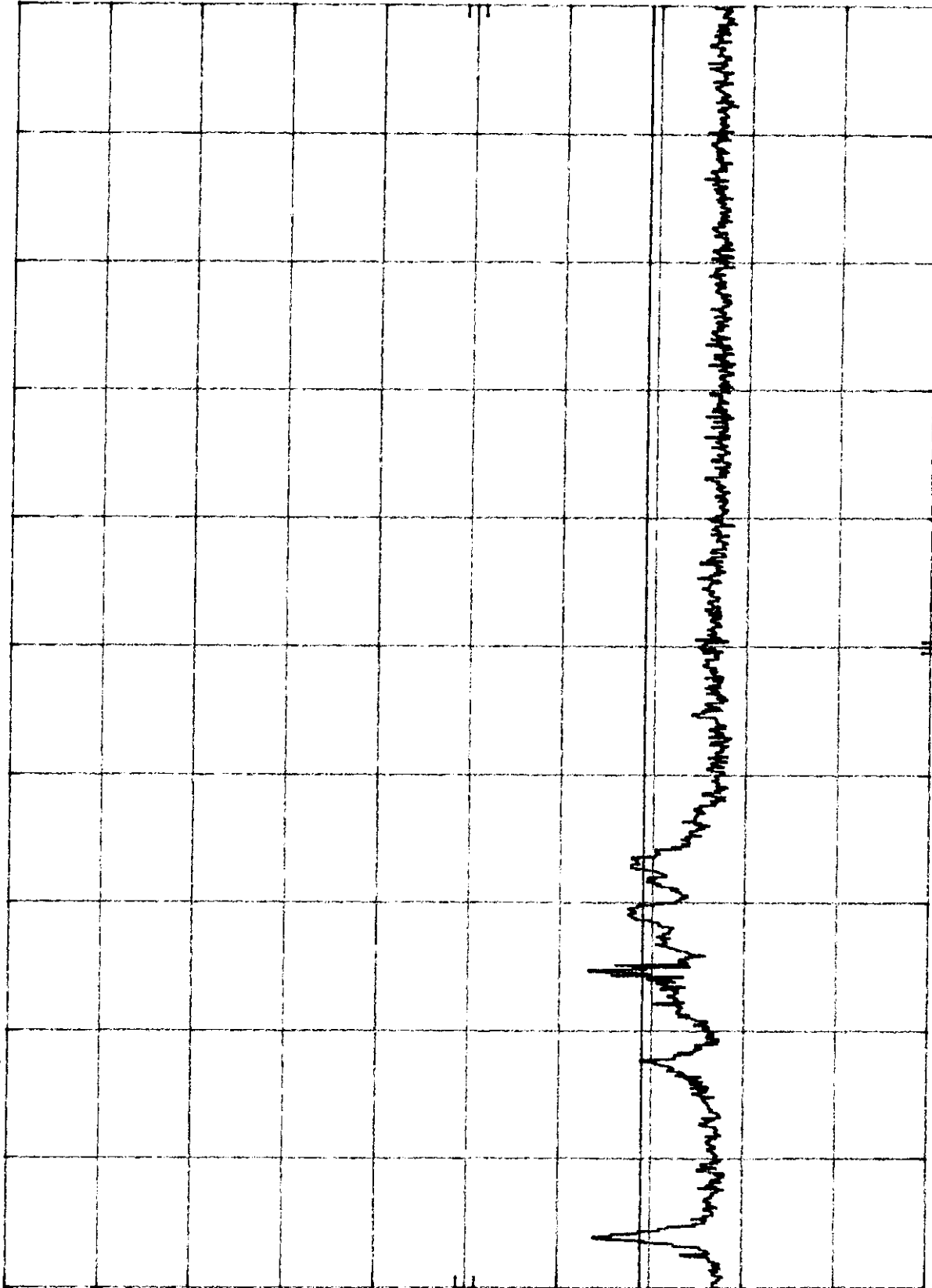
8R00131.1 August 10. 1998 Vertical Prescan
REF 90.0 dBμV ATTN 0 dB

h7D

10 dB/

DL
21.0
dBμV

Project No.: 8R00131
Radiated Emissions
Prescans - Uplink
Page No.: 118 of 123



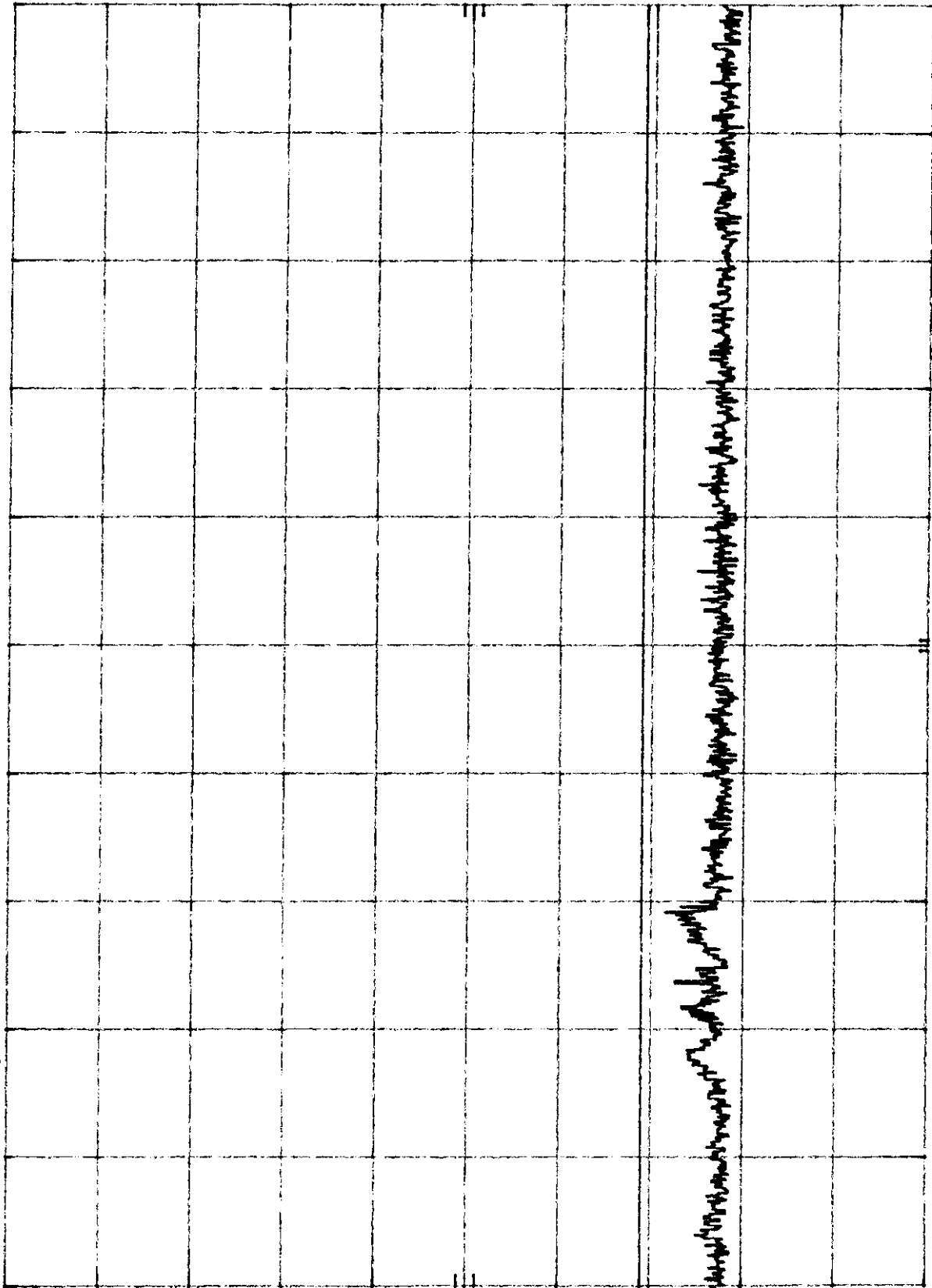
START 30 MHz RES BW 30 KHz STOP 300 MHz
VBW 100 KHz SWP 810 msec

8R00131.1 August 10, 1998 Horizontal Prescan
REF 90.0 dBμV ATTN 0 dB

h₁₀

10 dB/

DL
21.0
dBμV

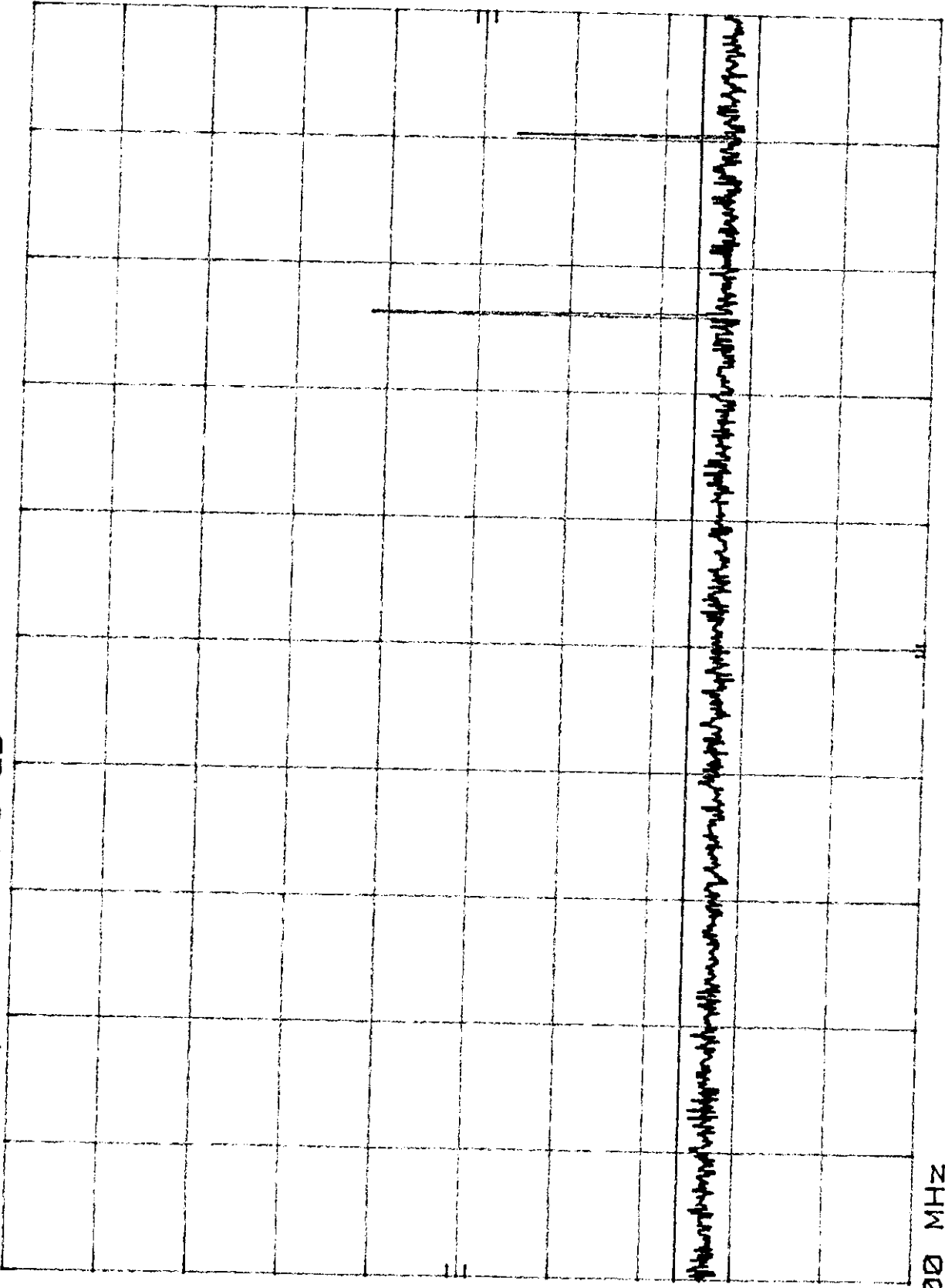


START 30 MHz RES BW 30 KHz STOP 300 MHz
VBW 100 KHz SWP 810 mhz

0R00131.1 August 10, 1998 Horizontal Prescan
h/p REF 90.0 dBμV ATTN 0 dB

10 dB/

DL
16.0
dBμV



Project No.: 8R00131
Radiated Emissions
Prescans - Uplink
Page No.: 120 of 123

START 300 MHz RES BW 30 KHZ VBW 100 KHZ STOP 1.000 GHz
SWP 2.10 sec

EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

Prescan Data - Uplink

Prescan Data	96.9 MHz, 23.8 dBuV. Peak.
Project Number : 8R00131.1 Project Filename : 8R1311A.LST Date : August 10, 1998 Start Frequency : 30 MHz Stop Frequency : 1000 MHz Display Line Value: 21 dBuV	Top Emissions above 300 MHz from the vertical prescan list: 835.02 MHz, 56.3 dBuV. 935.77 MHz, 52.8 dBuV.
Vertical Prescan	Full Emission List above 300 MHz: 835.02 MHz, 56.3 dBuV. Peak. 935.77 MHz, 52.8 dBuV. Peak.
Top 6 Emissions below 300 MHz from the vertical prescan list:	Horizontal Prescan
40.73 MHz, 25.4 dBuV. 40.85 MHz, 25 dBuV. 96.05 MHz, 24.5 dBuV. 96.9 MHz, 23.8 dBuV. 40.93 MHz, 22.9 dBuV. 40.64 MHz, 22.7 dBuV.	Top Emissions below 300 MHz from the horizontal prescan list:
Full Emission List below 300 MHz: 40.54 MHz, 21.5 dBuV. Peak. 40.64 MHz, 22.7 dBuV. Peak. 40.73 MHz, 25.4 dBuV. Peak. 40.85 MHz, 25 dBuV. Peak. 40.93 MHz, 22.9 dBuV. Peak. 41.23 MHz, 22.3 dBuV. Peak. 96.05 MHz, 24.5 dBuV. Peak. 96.7 MHz, 21.3 dBuV. Peak.	Full Emission List below 300 MHz: Top Emissions above 300 MHz from the horizontal prescan list: 835.02 MHz, 51.6 dBuV. 935.78 MHz, 36.4 dBuV. Full Emission List above 300 MHz: 835.02 MHz, 51.6 dBuV. Peak. 935.78 MHz, 36.4 dBuV. Peak.

KTL Ottawa

FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131

EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

Section 7. Frequency Stability

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

Test Results: Complies/Does Not Comply.

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

NOT APPLICABLE

EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

Section 8. Test Equipment List

CAL CYCLE	EQUIPMENT	MANUFACTURER	MODEL	SERIAL	LAST CAL.	NEXT CAL.	
1 Year	Spectrum Analyzer	Hewlett Packard	8565E	FA000981	May 20/98	May 20/99	
	Plotter	Hewlett Packard	7470A	2308A30807	NCR	NCR	
1 Year	Spectrum Analyzer-1	Hewlett Packard	8566B	2311A02238	Sept. 30/97	Sept. 30/98	
1 Year	Spectrum Analyzer Display-1	Hewlett Packard	8566B	2314A04759	Sept. 30/97	Sept. 30/98	
1 Year	Quasi-peak adapter-1	Hewlett-Packard	85650A	2043A00302	Sept. 30/97	Sept. 30/98	
1 Year	Radio Test Set	Rohde & Schwarz	CMS 52	840.0009.52	July 23/98	July 23/99	
1 Year	Attenuator	Narda	765-20	9510	July 24/98	July 24/99	
1 Year	RF Millivoltmeter	Rohde & Schwarz	URV5	FA000420	July 23/98	July 23/99	
1 Year	Insertion Unit	Rohde & Schwarz	URV5-Z4	FA000905	July 23/98	July 23/99	
1 Year	Power Sensor	Rohde & Schwarz	URV5-Z5	FA000419	July 23/98	July 23/99	
1 Year	LISN	Rohde & Schwarz	ESH2-Z5	890485/017	July 23/98	July 23/99	
	Biconilog Antenna	EMCO	3143	1038	NCR	NCR	
2 Year	Horn Antenna	EMCO #2	3115	4336	Oct. 30/97	Oct. 30/99	
1 Year	Log Periodic Antenna	EMCO	LPA-25	1141	July 27/98	July 27/99	
	50 Ω Termination	Wiltron	26N50	605248	N/A	N/A	
1 Year	50 ohm Combiner Pad	Mini Circuits	ZA3PD-2	9746	Dec. 12/97	Dec. 12/98	
1 Year	Low Noise Amplifier	Avantek	AWT-8035	1005	Aug. 4/98	Aug. 4/99	
1 Year	Low Noise Amplifier	DBS Microwave	DWT-13035	9623	Aug. 4/98	Aug. 4/99	
1 Year	Signal Generator	Rohde & Schwarz	SM1Q03	1084-8004-03	July 23/98	July 23/99	
1 Year	Arbitrary Waveform Gen.	Sony/Tektronix	AWG2021	J310495	NCR	NCR	
3 Year	RF Generator	Rohde & Schwarz	SME3	DE14439	June 29/96	June 29/99	

NA: Not Applicable
NCR: No Cal Required

EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

ANNEX A
TEST METHODOLOGIES

EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

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

Test Conditions: Standard Temperature & Humidity
Standard Test Voltage

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: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

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

Test Conditions: Standard Temperature & Humidity
Standard Test Voltage

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: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

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

Test Conditions: Standard Temperature & Humidity
Standard Test Voltage

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: MICROAMP 50, TPA 850 Repeater**FCC ID: BCR9GBMA50C*

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

Test Conditions: Standard Temperature & Humidity
Standard Test Voltage

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: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

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

Test Conditions: Standard Temperature & Humidity
 Standard Test Voltage

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: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

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

Test Conditions: Standard Temperature & Humidity
Standard Test Voltage

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: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

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

Test Conditions: Outdoor Range
Standard Test Voltage

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)

$R = 3$ 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)

$R = 3$ 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: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

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

Test Conditions: As per measurement data.

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

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

Table C-1

Method Of Measurement:Frequency Stability With Voltage Variation:

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

Frequency Stability With Temperature Variation:

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

KTL Ottawa

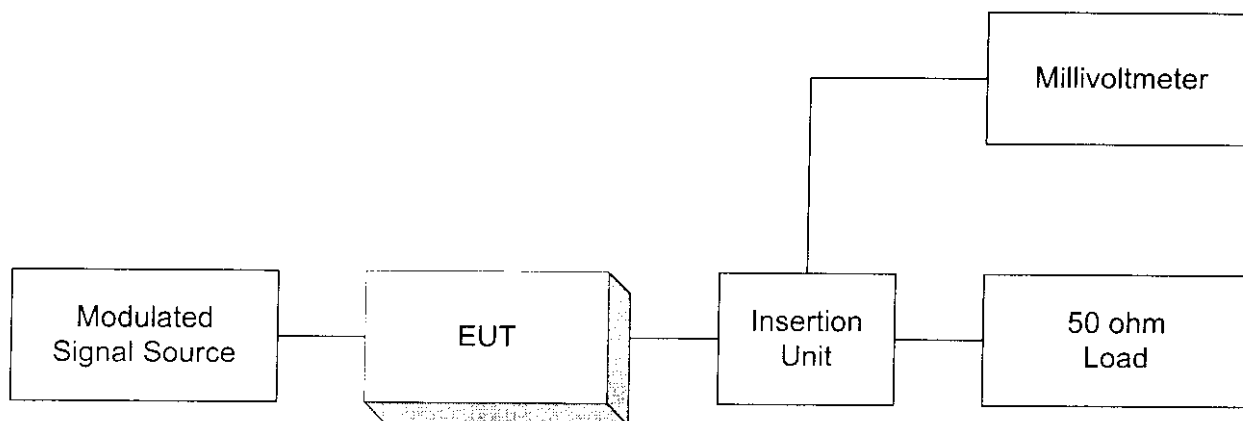
FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 8R00131
ANNEX B

EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

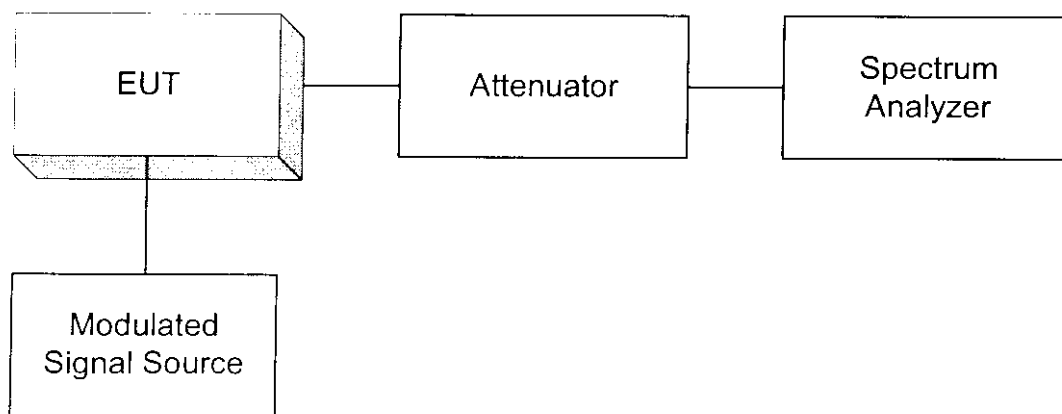
ANNEX B
TEST DIAGRAMS

EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

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

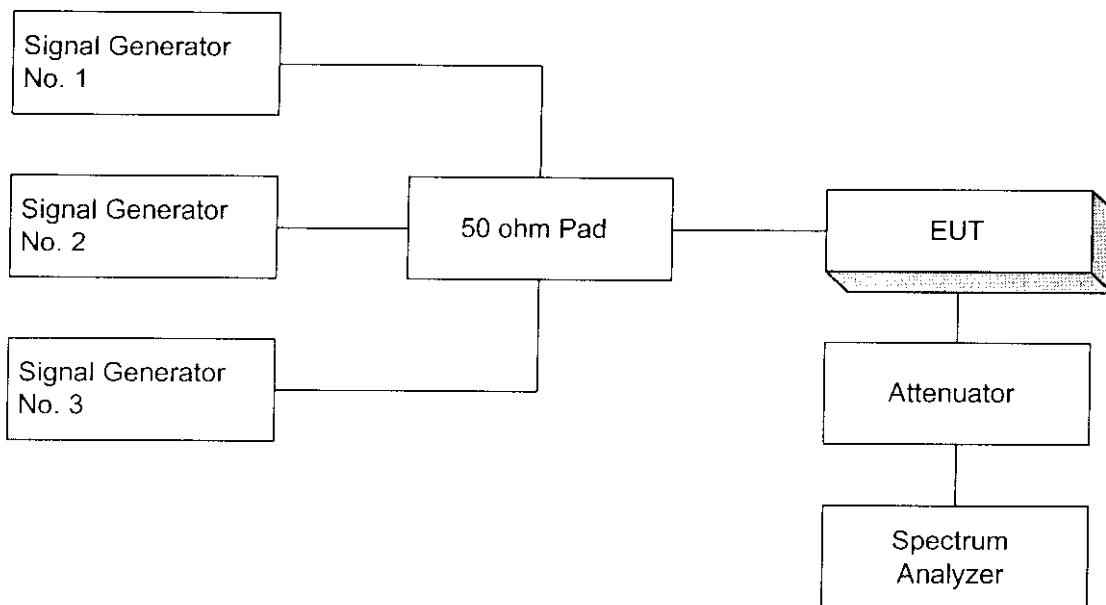
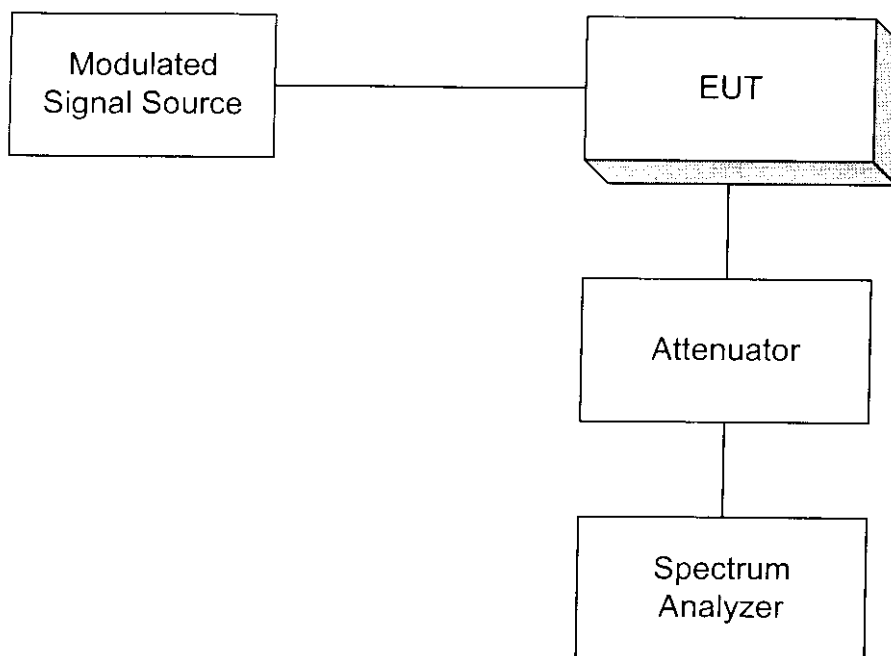


Para. No. 2.989 - Occupied Bandwidth



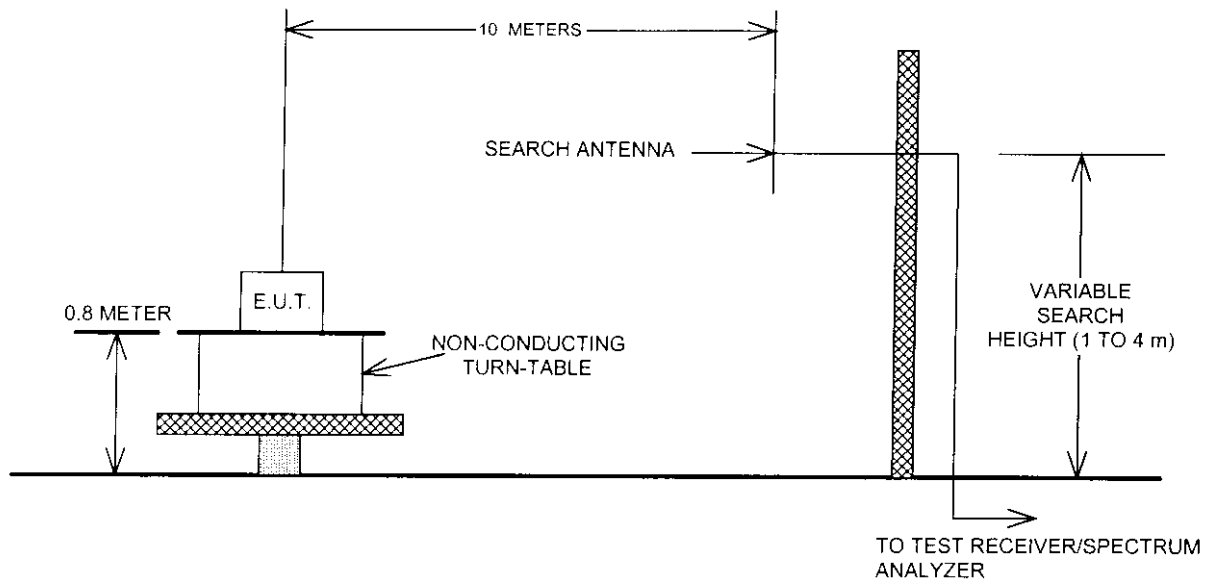
EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

Para. No. 2.991 Spurious Emissions at Antenna Terminals



EQUIPMENT: MICROAMP 50, TPA 850 Repeater
FCC ID: BCR9GBMA50C

Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability

