

KTL Test Report:	9R01581
Applicant:	Allen Telecom Inc. 140 Vista Centre Drive Forest, Virginia 24551
Equipment Under Test: (E.U.T.)	MR801 Cellular Repeater
FCC ID:	BCR-RPT-MR801
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:	R. Grant, Senior RF Specialist
Date:	
Total Number of Pages:	210

EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

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EQUIPMENT: MR801 Cellular Repeater
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Section 1. Summary of Test Results

Manufacturer: Allen Telecom Inc.

Model No.: MR801

Serial No.: 12

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



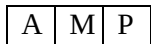
Production Unit



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: _____
Kevin Carr, Technologist

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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:**

Indoor Temperature: 24 °C
 Humidity: 60%

Outdoor Temperature: 27 °C
 Humidity: 60 %

.

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Section 2. General Equipment Specification

Supply Voltage Input:	120 VAC, 60 Hz				
Frequency Range:	Downlink:	869-894 MHz			
Frequency Range:	Uplink:	824-849 MHz			
Type of Modulation and Designator:	CDMA (F9W)	GSM (GXW)	TDMA (DXW)	CDPD (F9W)	AMPS (F8W, F1D)
	☒	☐	☒	☐	☒
AGC Threshold:	Not Applicable				
Output Impedance:	50 Ω				
Gain:	90 dB Nominal				
Max Input Power:	-50 dBm				
RF Output (Rated):	Single:	See Page 10			
	Composite:				
Frequency Translation:	F1-F1	F1-F2	N/A		
	☒	☐	☐		
Band Selection:	Software	Duplexer Change	Fullband Coverage		
	☐	☐	☒		

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Description of Modifications For Class II Permissive Change

NOT APPLICABLE

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Modifications Made During Testing

NOT APPLICABLE

EQUIPMENT: MR801 Cellular Repeater
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Theory of Operation

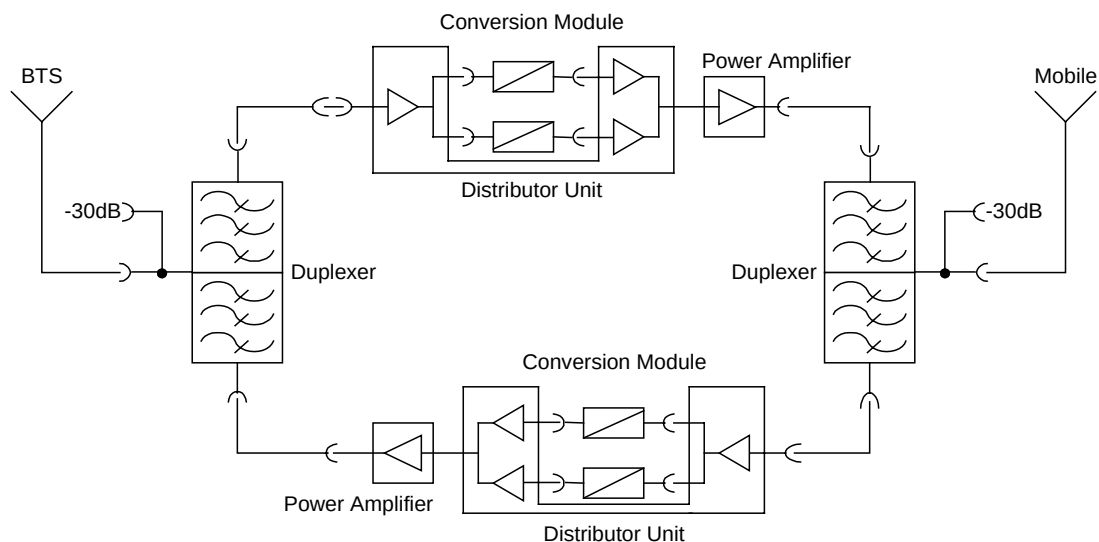
The E.U.T. is available as a variable band selective or channel selective repeater for CDMA, TDMA and Analog. As well, the unit is available in high and low power configurations.

This repeater bi-directionally amplifies signals between multiple mobiles and a single base station in the AMPS800 frequency band. It is employed where poor topological conditions cause weak field strengths. It can provide highly selective amplification of band segments or channels in the AMPS800 band.

The E.U.T.'s modules can be combined with other repeater modules in order to create a multi-band repeater system. Modules operating in the PCS1900, GSM1800, GSM900 or iDEN bands are available. When different modules are combined, a common antenna and control interface are available.

The E.U.T. can be set-up locally or remotely. A PCMCIA slot for modem operation is an available option. The repeater has a large number of functions that can be monitored and changed by the operators via a terminal emulation program or the MIKOM OMC software platform. An understandable communication language is available to aid the operator query status reports from the repeater or to change settings.

System Diagram



EQUIPMENT: MR801 Cellular Repeater
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Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 2.985
TESTED BY: Kevin Carr	DATE: August 11, 1999

Test Results: Complies.**Measurement Data:****2 Channel RF Power Composite:**

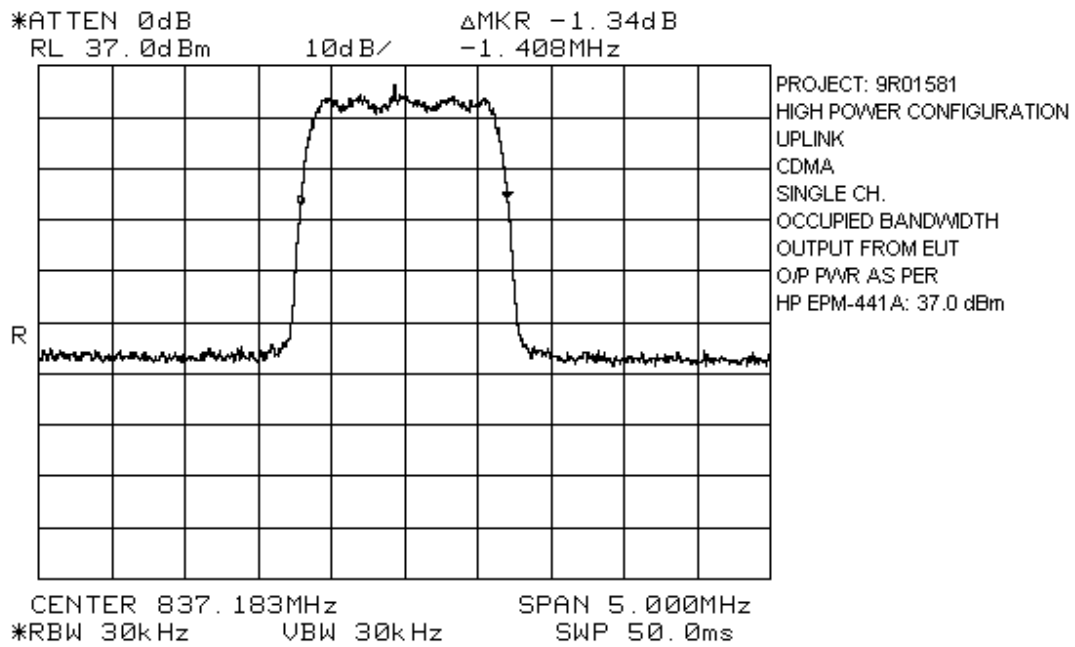
	Uplink				Downlink			
	High Power Configuration (dBm) (W)		Low Power Configuration (dBm) (W)		High Power Configuration (dBm) (W)		Low Power Configuration (dBm) (W)	
AMPS	40	10.0	32.1	1.62	40	10.0	30.9	1.23
CDMA	34	2.51	27.8	0.603	34	2.51	26.2	0.417
TDMA	37	5.01	28.9	0.776	37	5.01	27.9	0.617

Single Channel – Customer Specified:

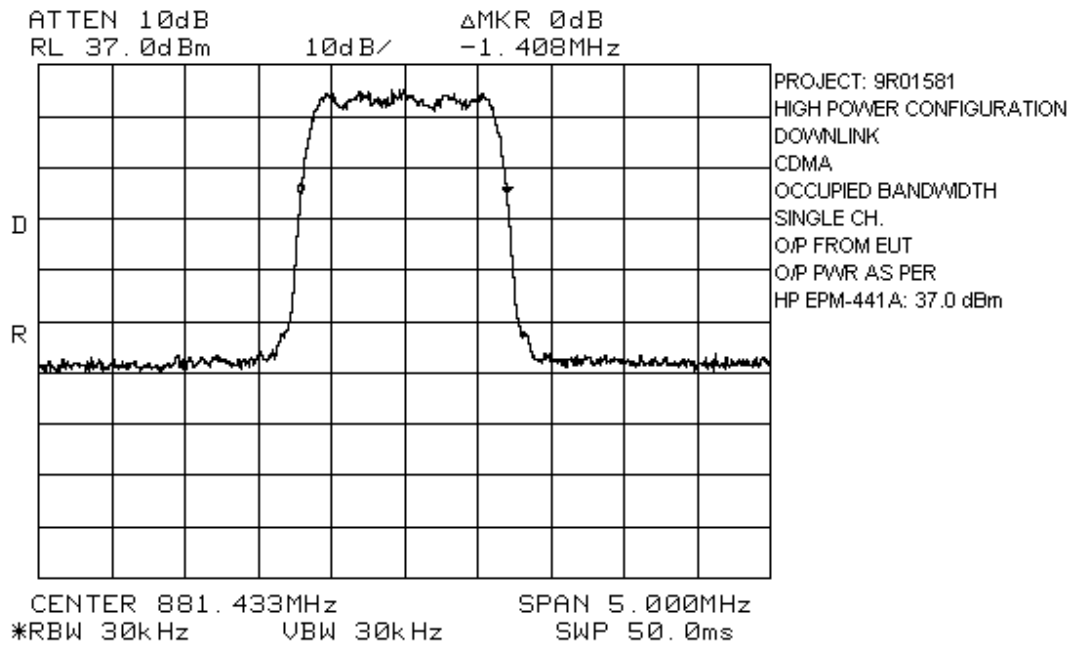
	Uplink				Downlink			
	High Power Configuration (dBm) (W)		Low Power Configuration (dBm) (W)		High Power Configuration (dBm) (W)		Low Power Configuration (dBm) (W)	
AMPS	40	10.0	37	5.01	40	10.0	37	5.01
CDMA	37	5.01	30	1.00	37	5.01	30	1.00
TDMA	40	10.0	34	2.51	40	10.0	34	2.51

EQUIPMENT: MR801 Cellular Repeater
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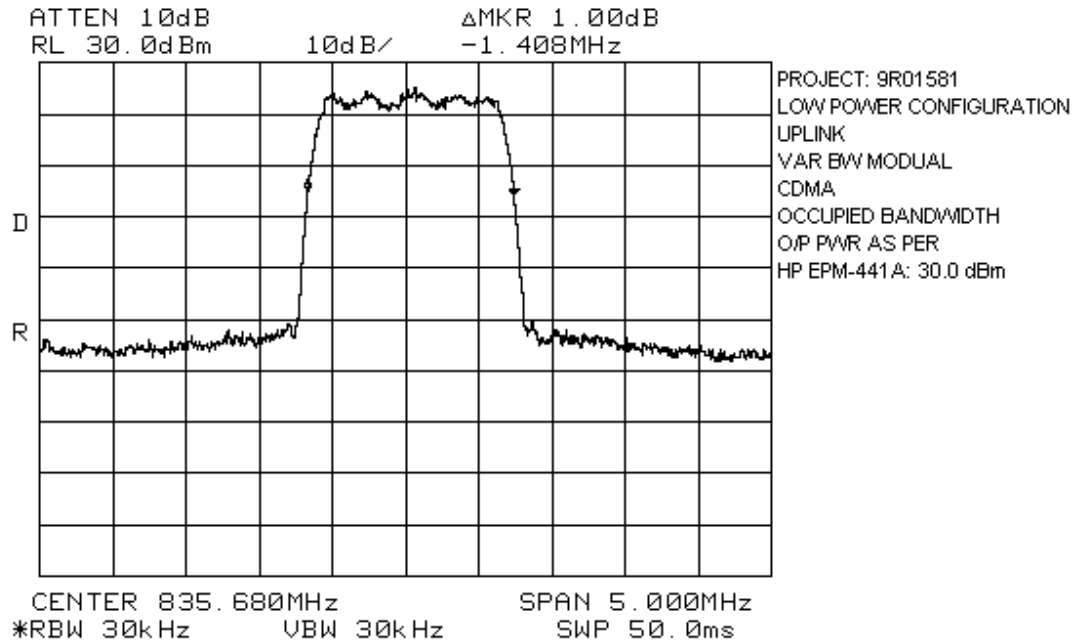
Variable Bandwidth Module



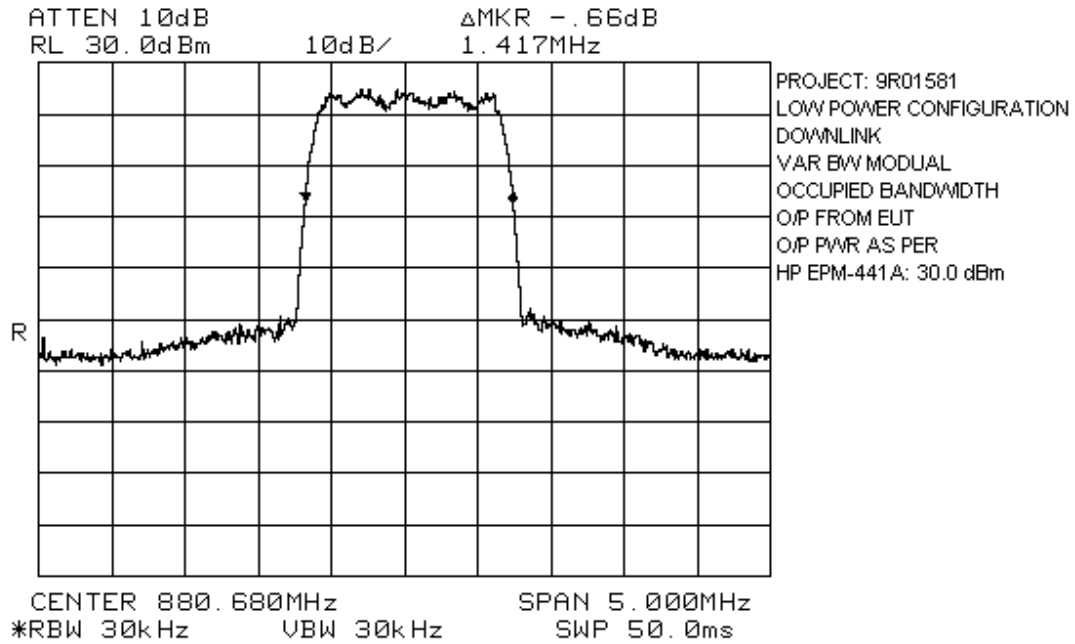
EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801



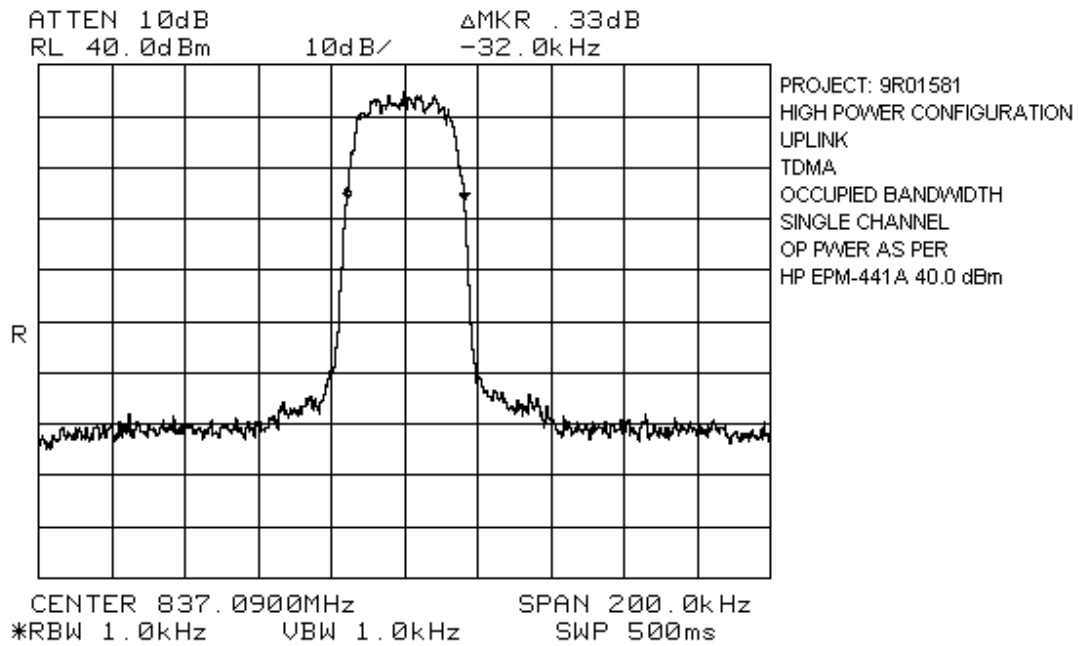
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FCC ID: BCR-RPT-MR801



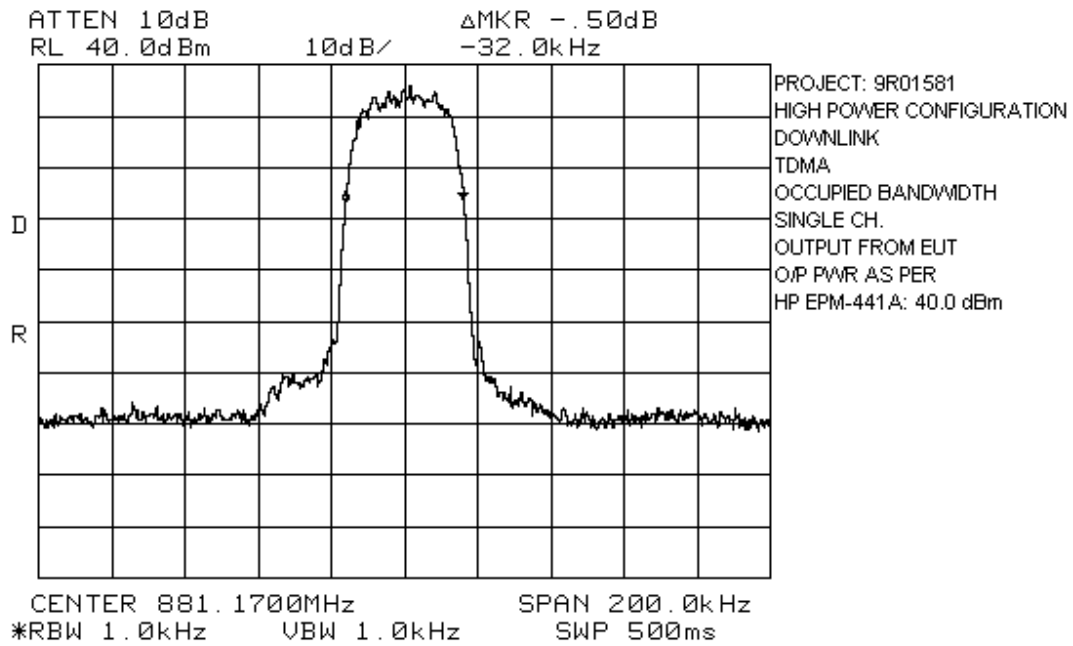
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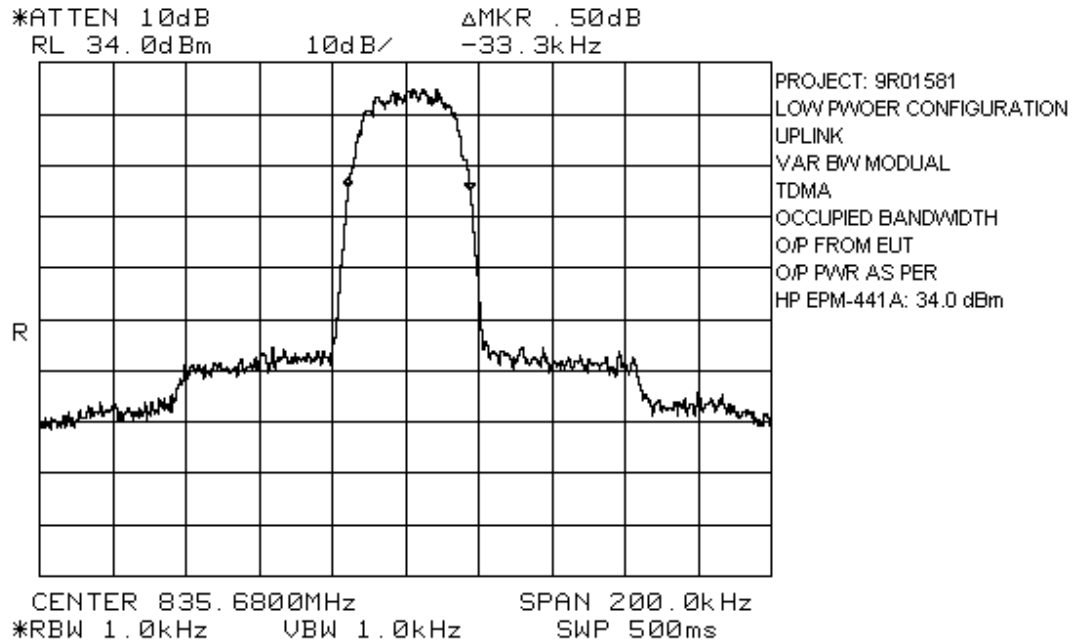
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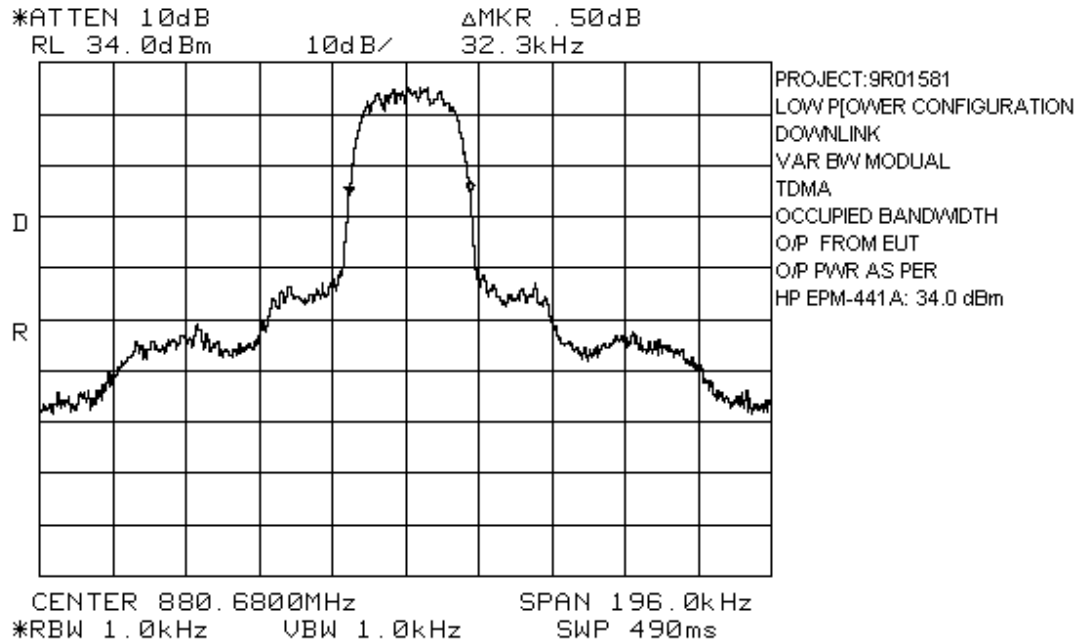
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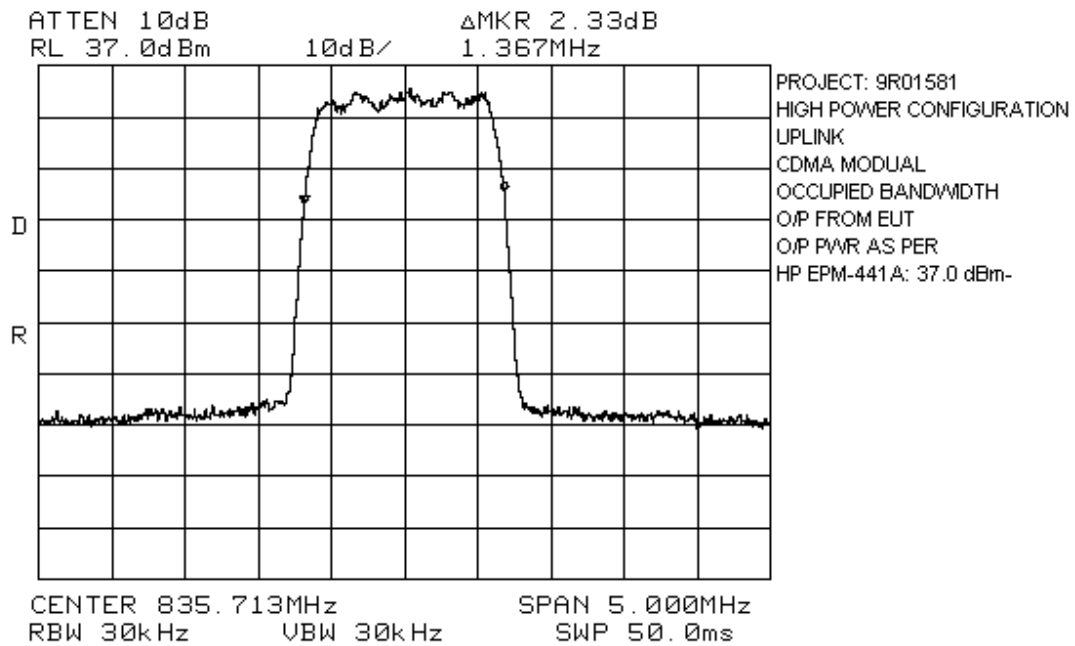


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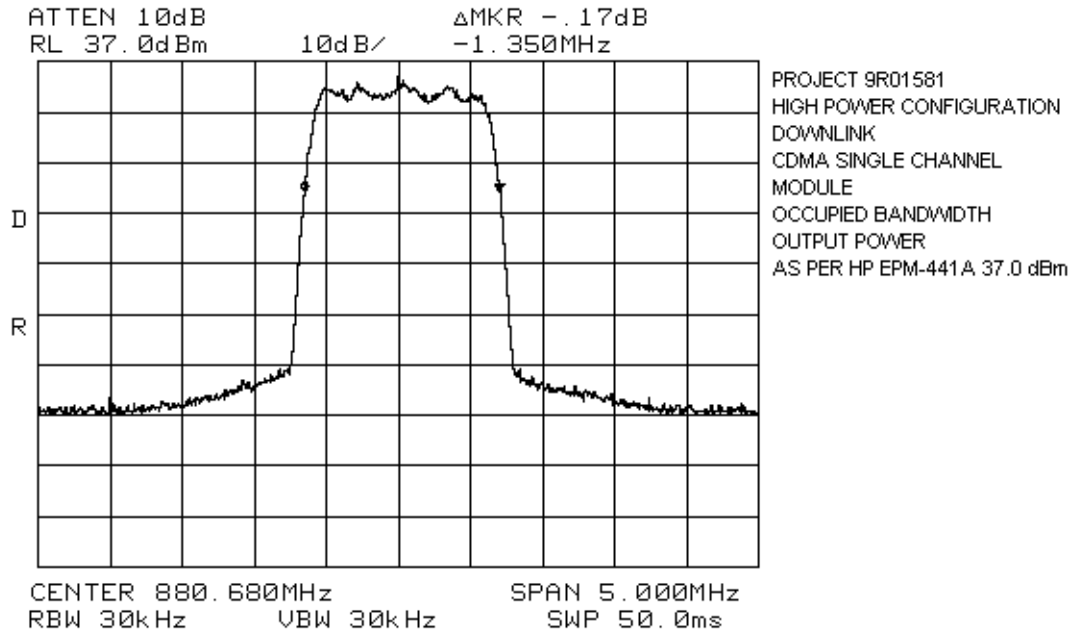


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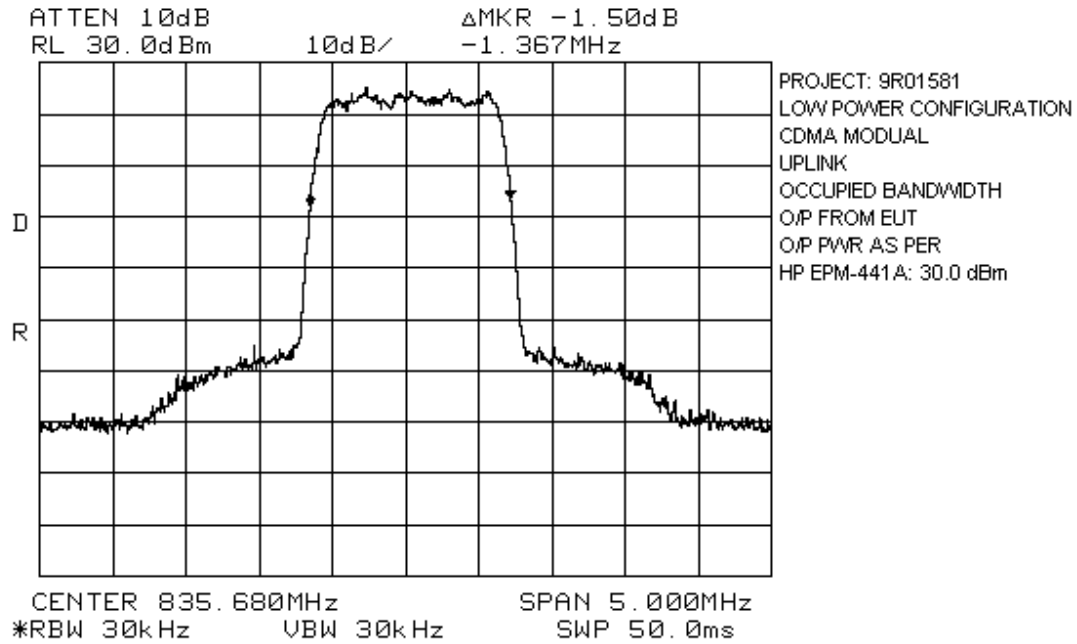
CDMA Module



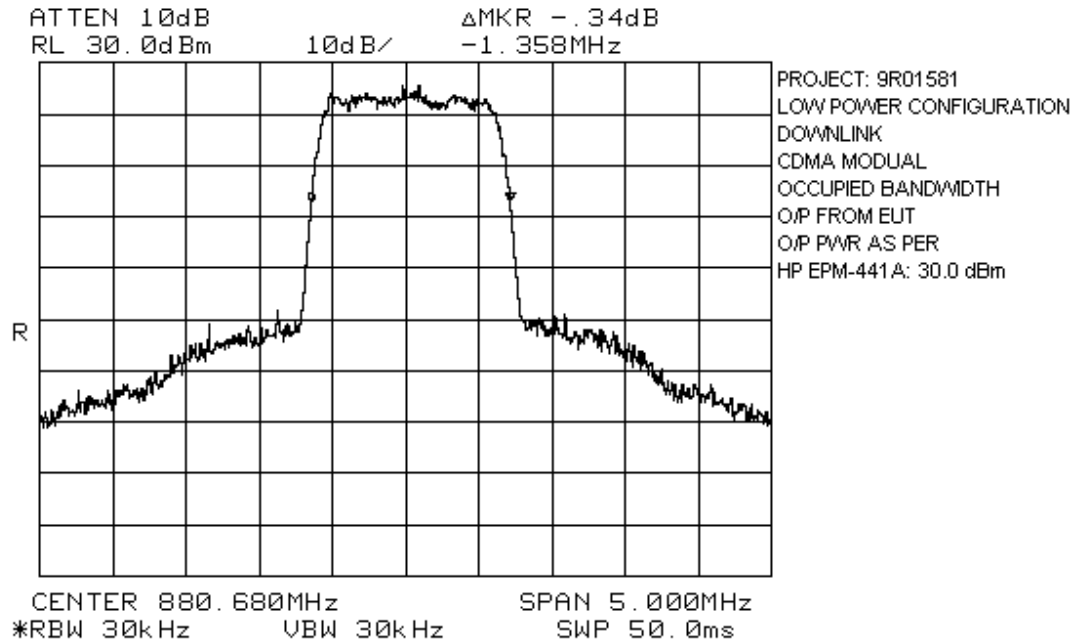
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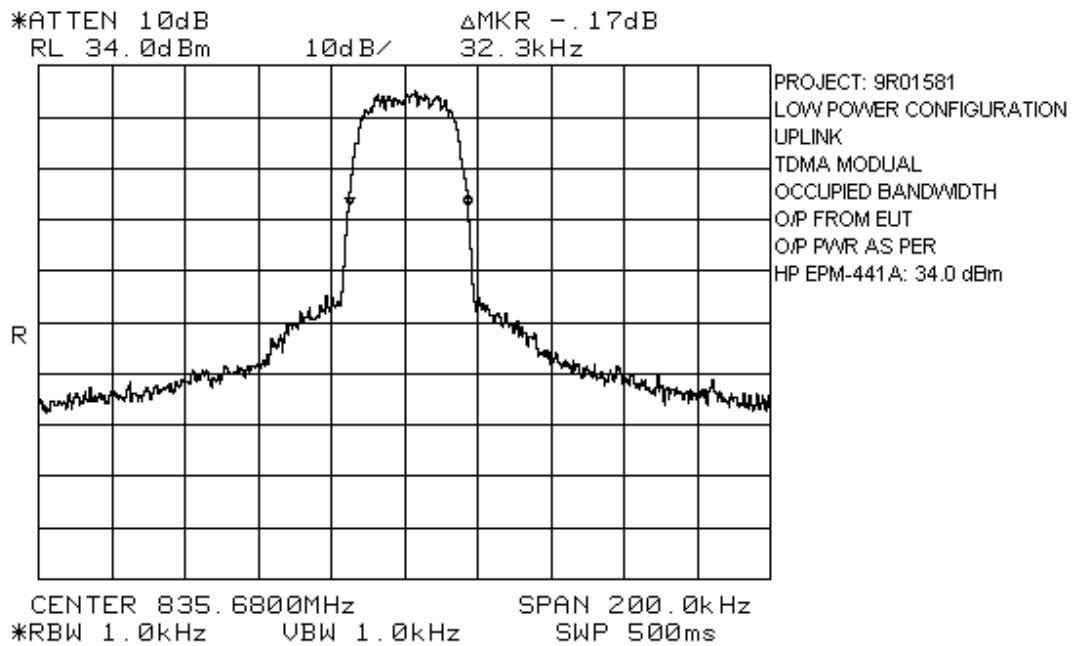


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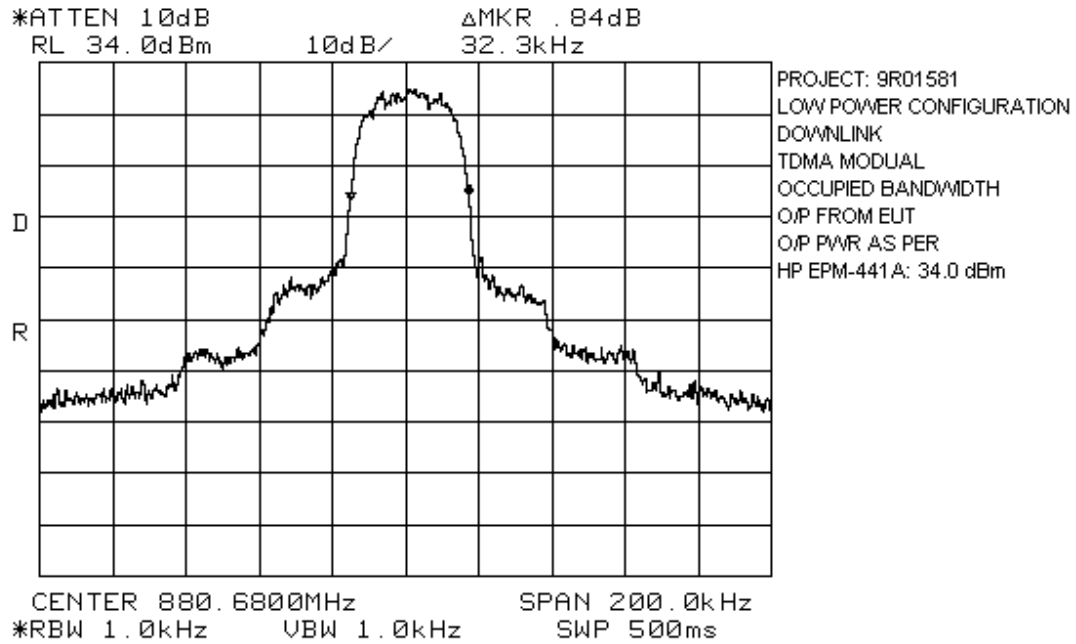


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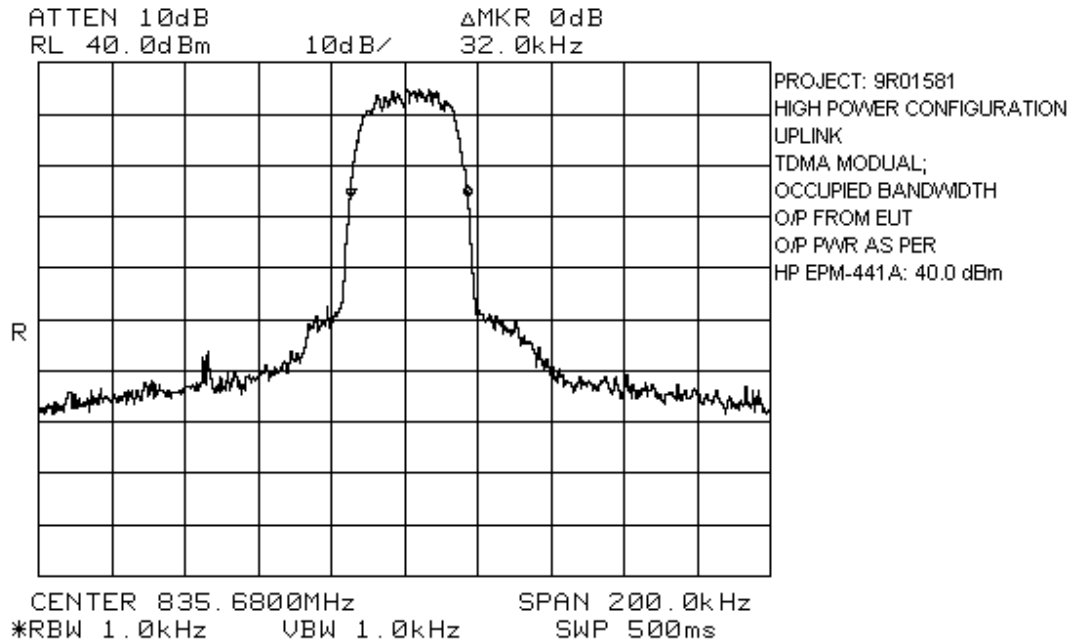
TDMA Module



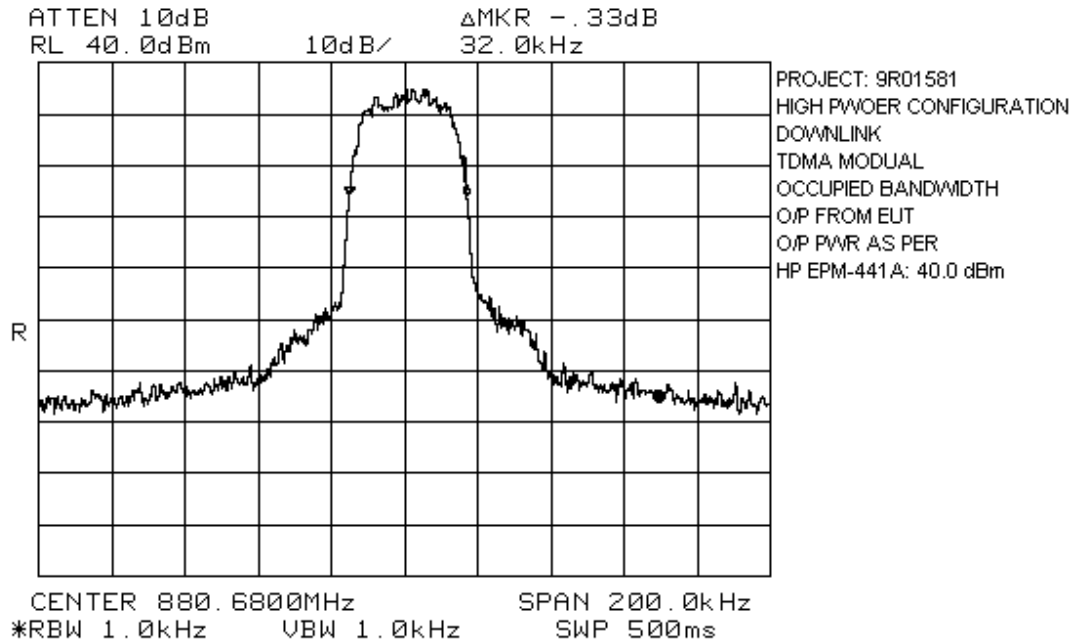
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FCC ID: BCR-RPT-MR801

Section 4. Occupied Bandwidth

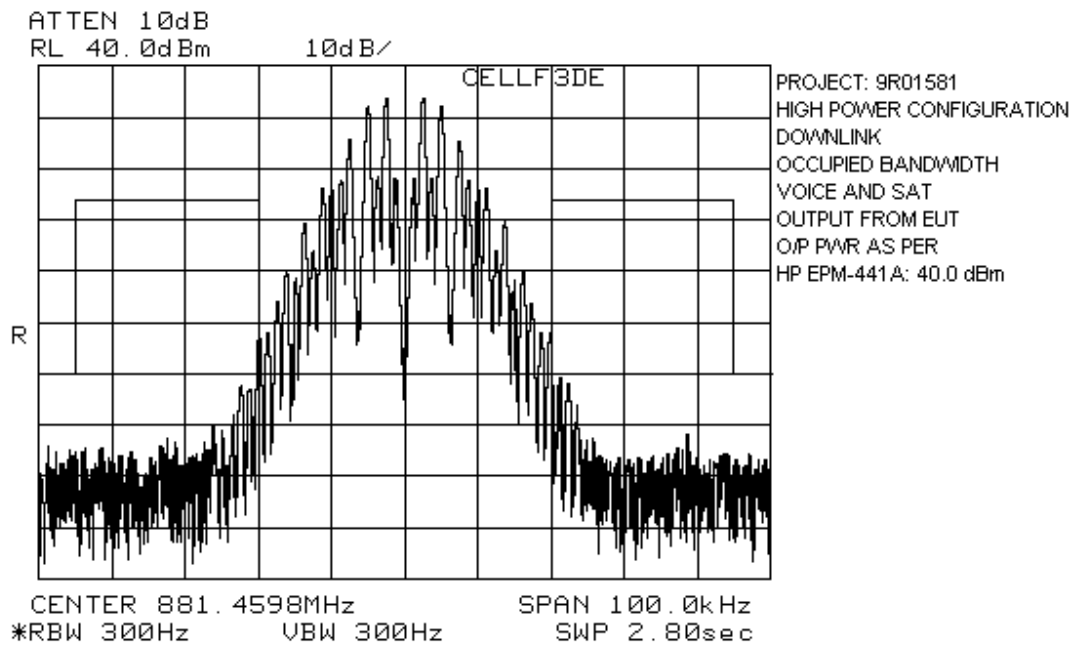
NAME OF TEST: Occupied Bandwidth (Voice + SAT)	PARA. NO.: 2.917(c)
TESTED BY: Kevin Carr	DATE: July 14, 1999

Test Results: Complies.

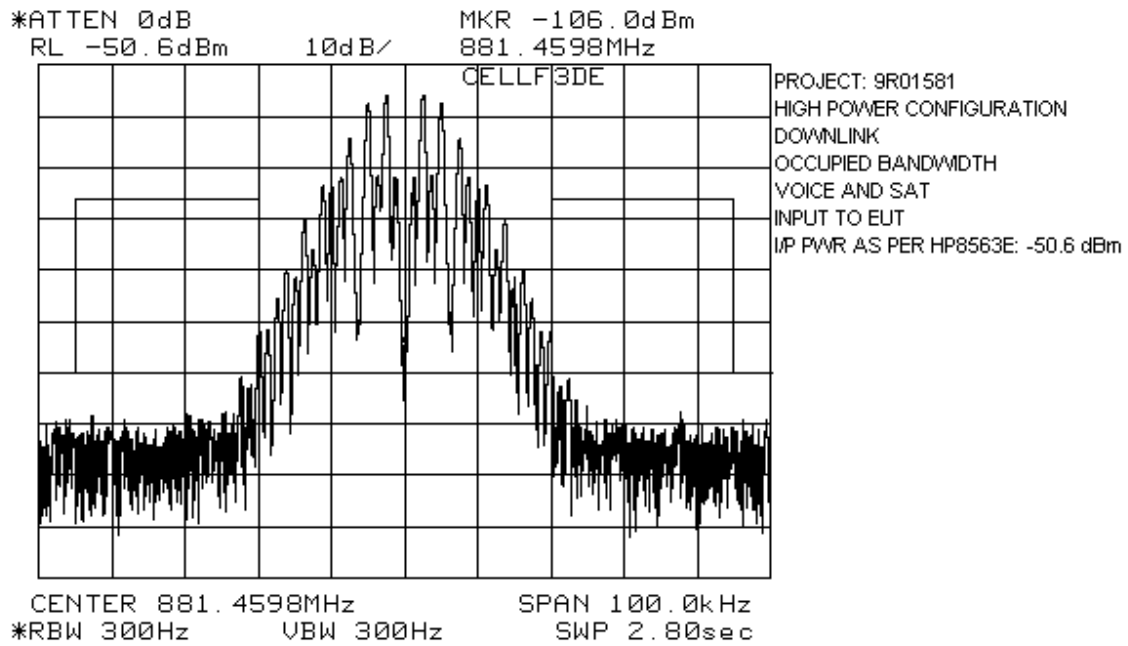
Test Data: See attached graph(s).

EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

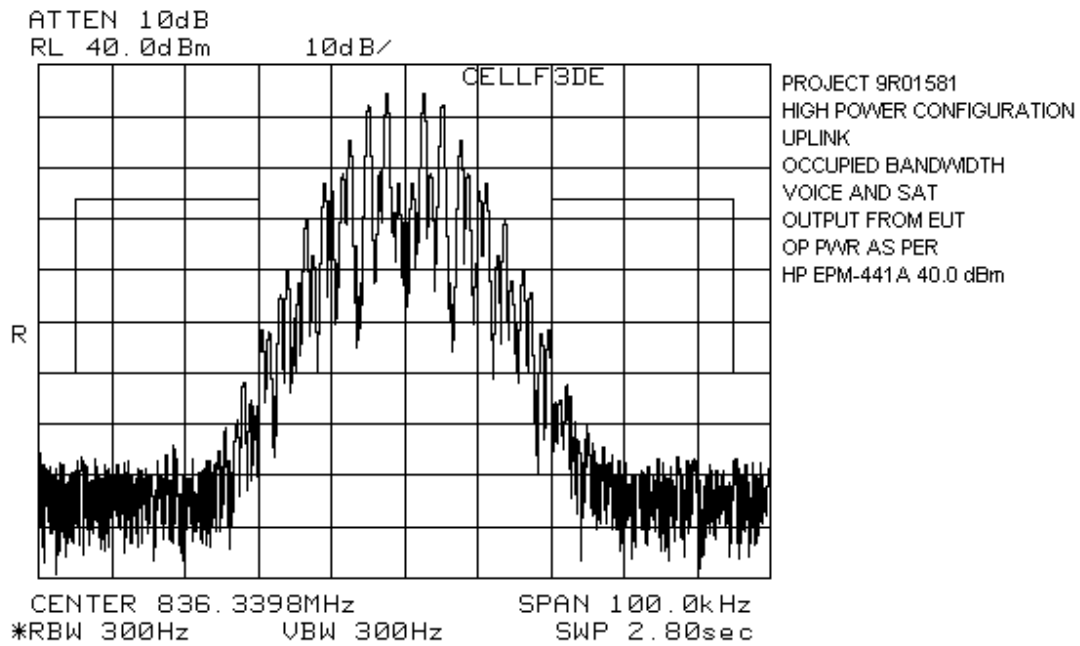
High Power – Variable Bandwidth Modules



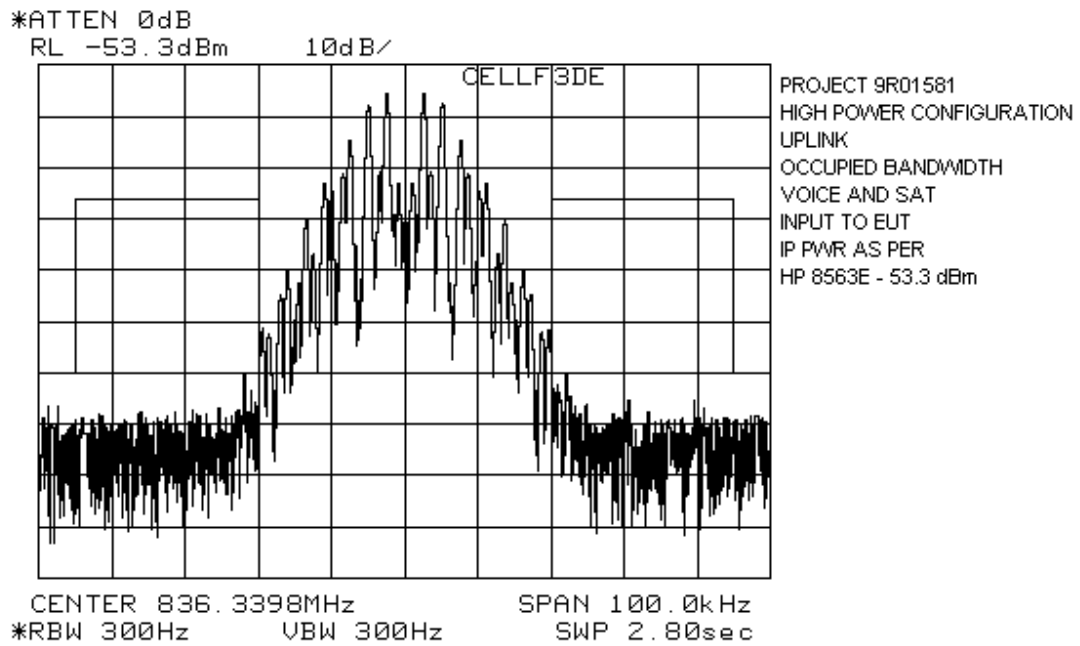
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FCC ID: BCR-RPT-MR801



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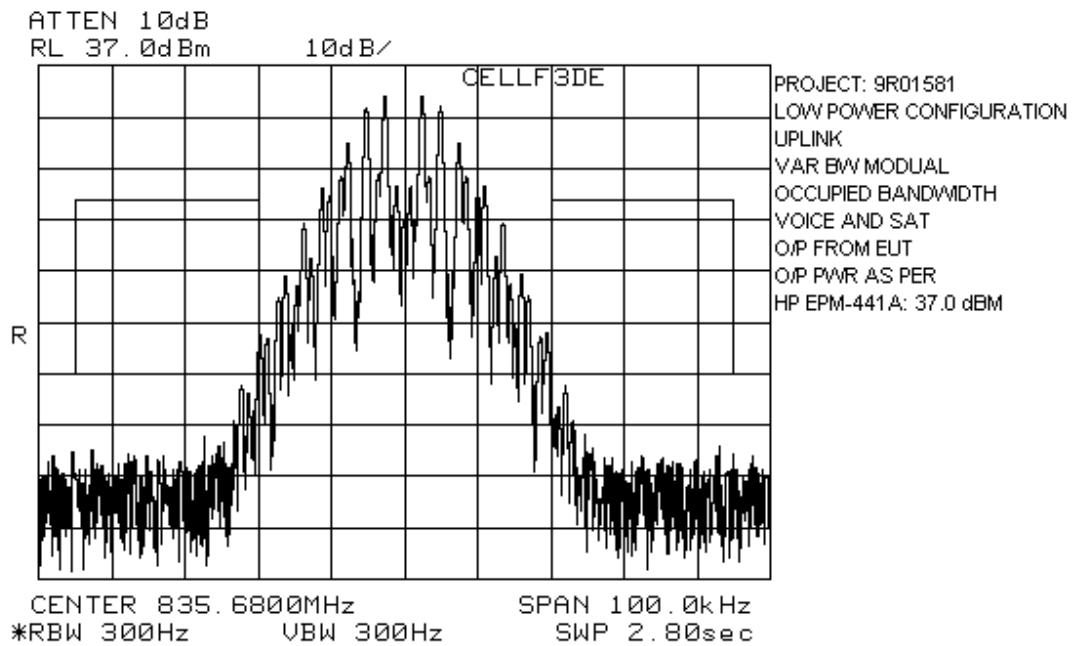


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FCC ID: BCR-RPT-MR801

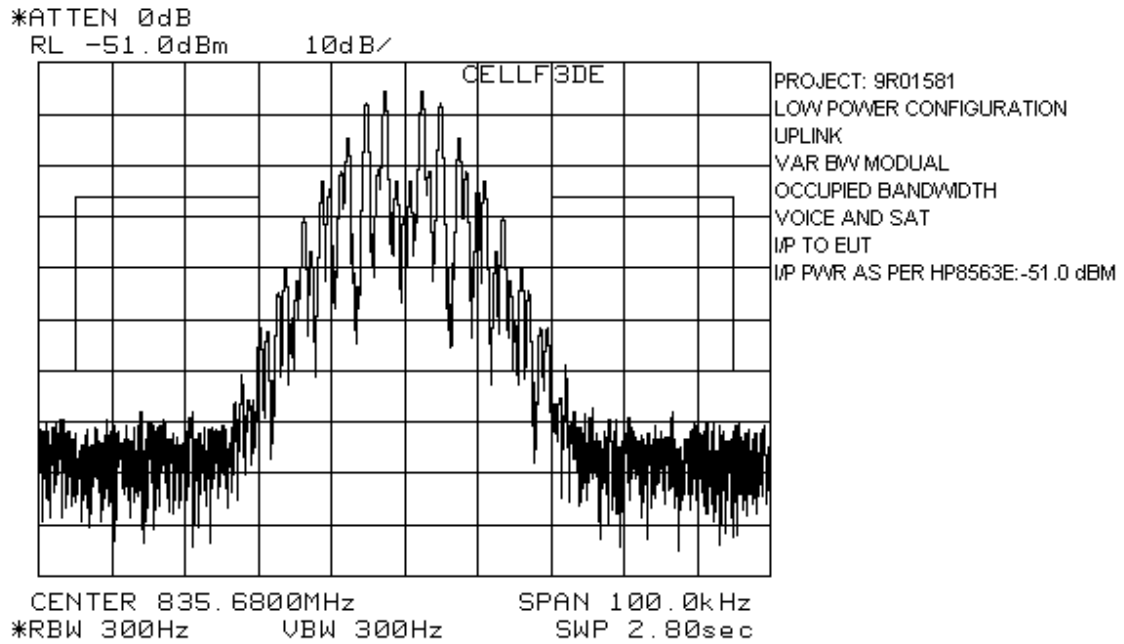


EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

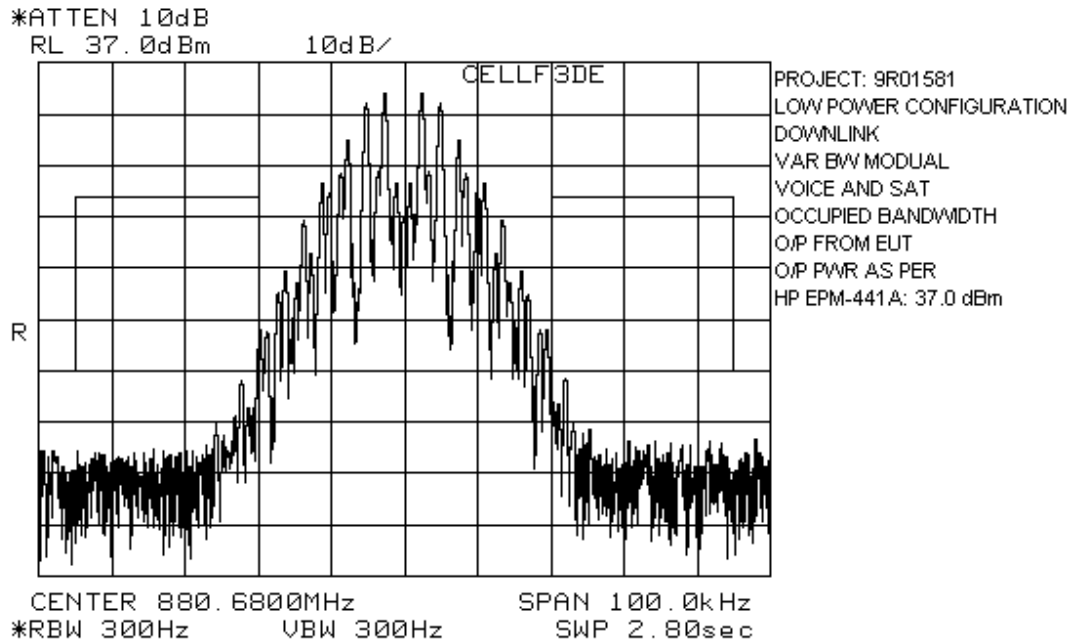
Low Power Variable Bandwidth Module



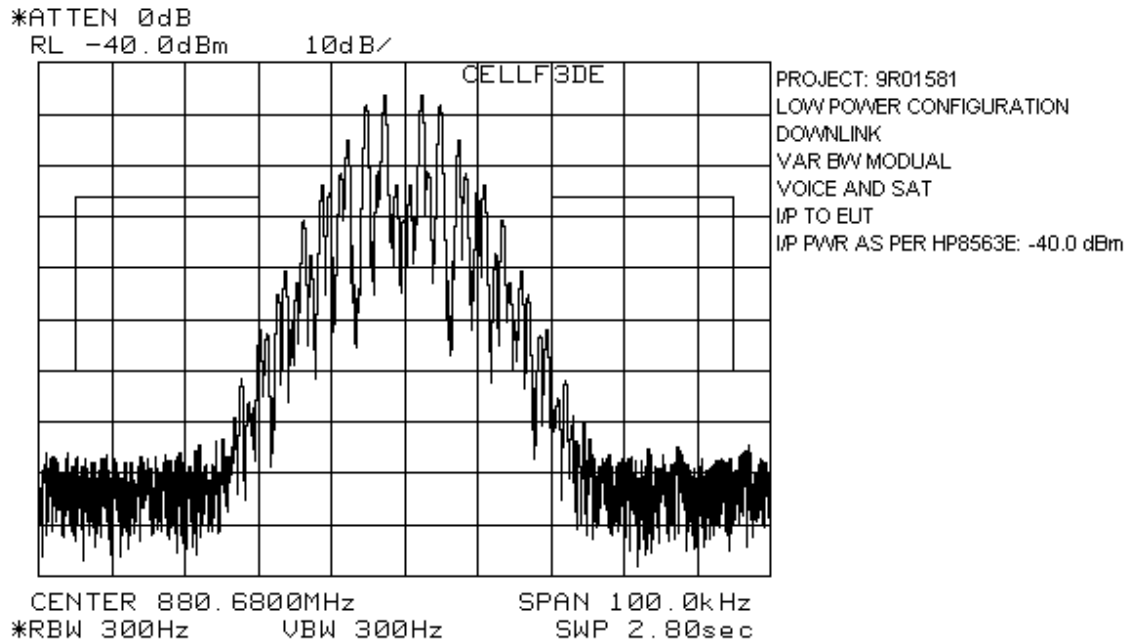
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FCC ID: BCR-RPT-MR801

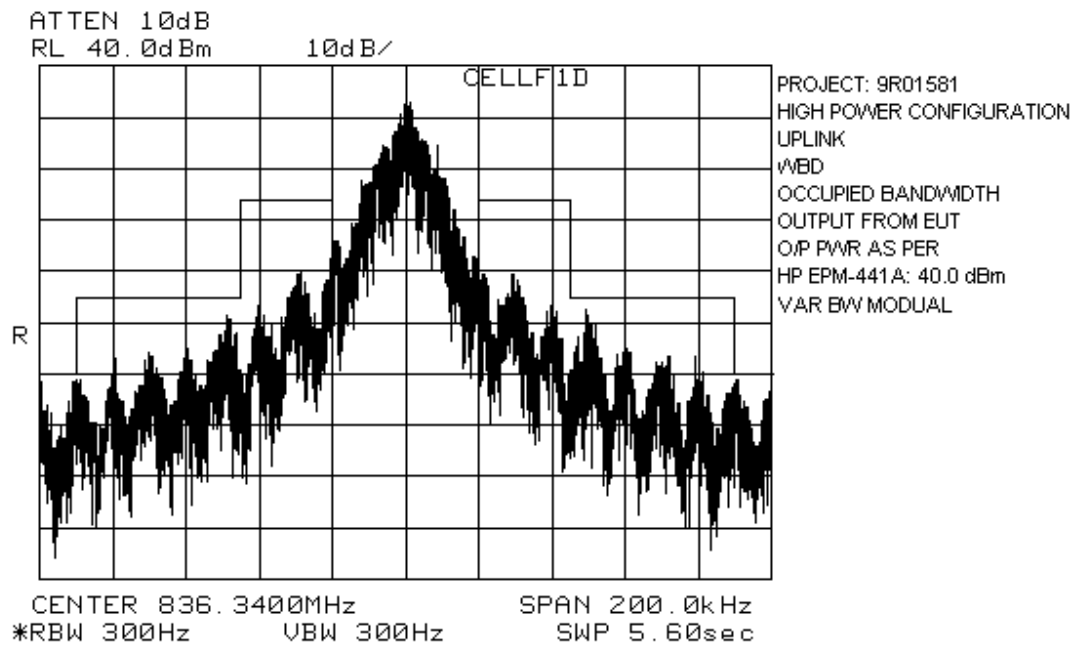
NAME OF TEST: Occupied Bandwidth (WB Data)	PARA. NO.: 2.917 (d)
TESTED BY: Kevin Carr	DATE: July 16, 1999

Test Results: Complies.

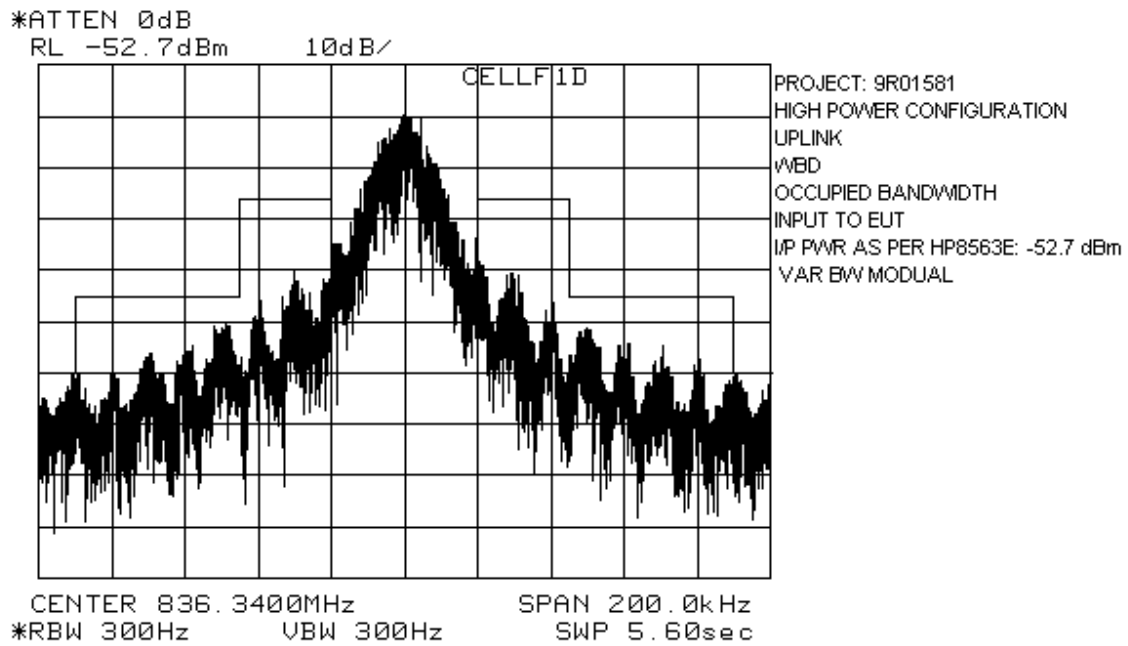
Test Data: See attached graph(s).

EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

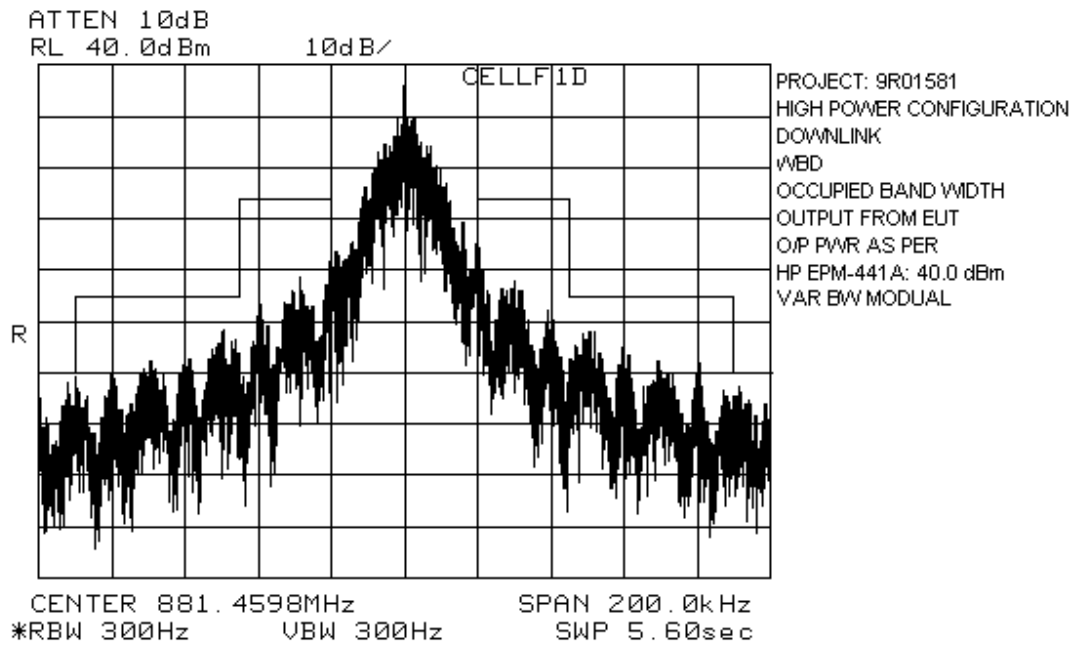
High Power – Variable Bandwidth Module



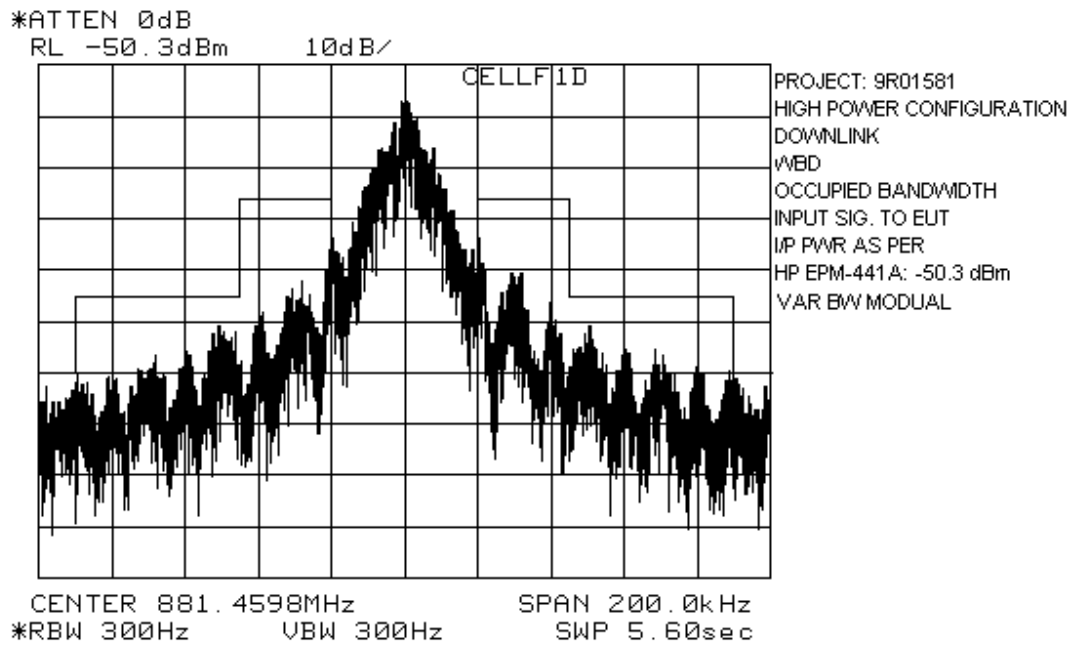
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FCC ID: BCR-RPT-MR801



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FCC ID: BCR-RPT-MR801

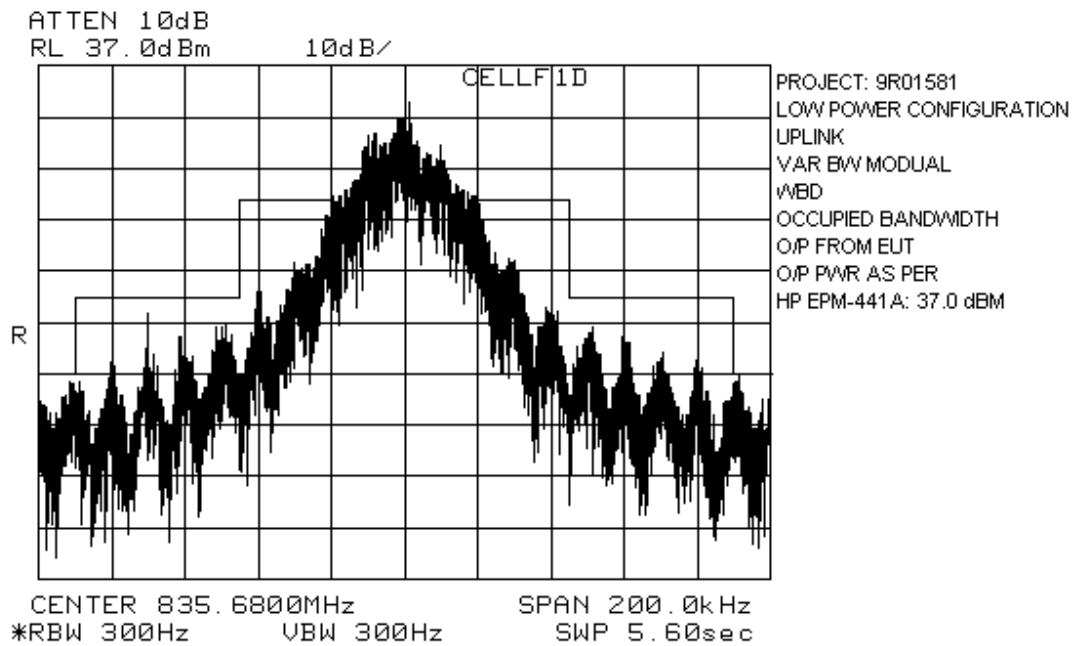


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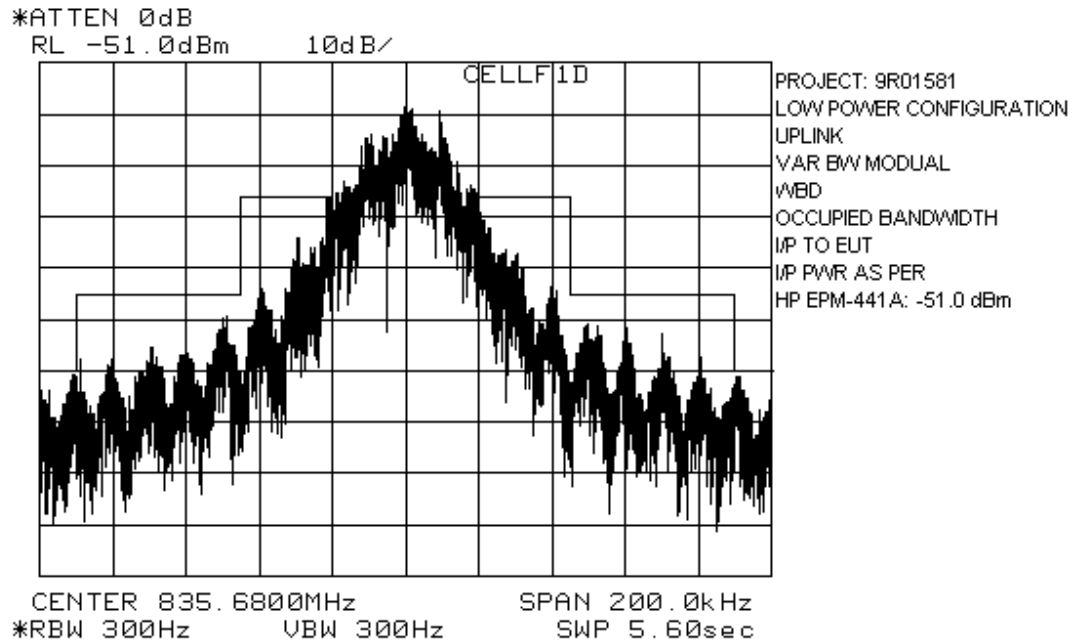


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FCC ID: BCR-RPT-MR801

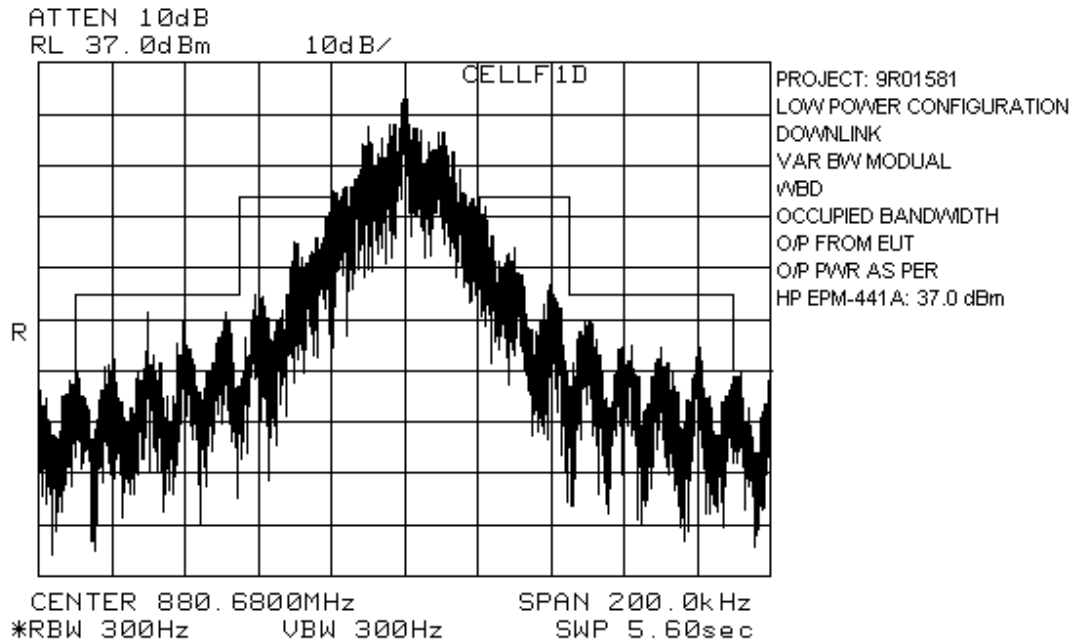
Low Power – Variable Bandwidth Module



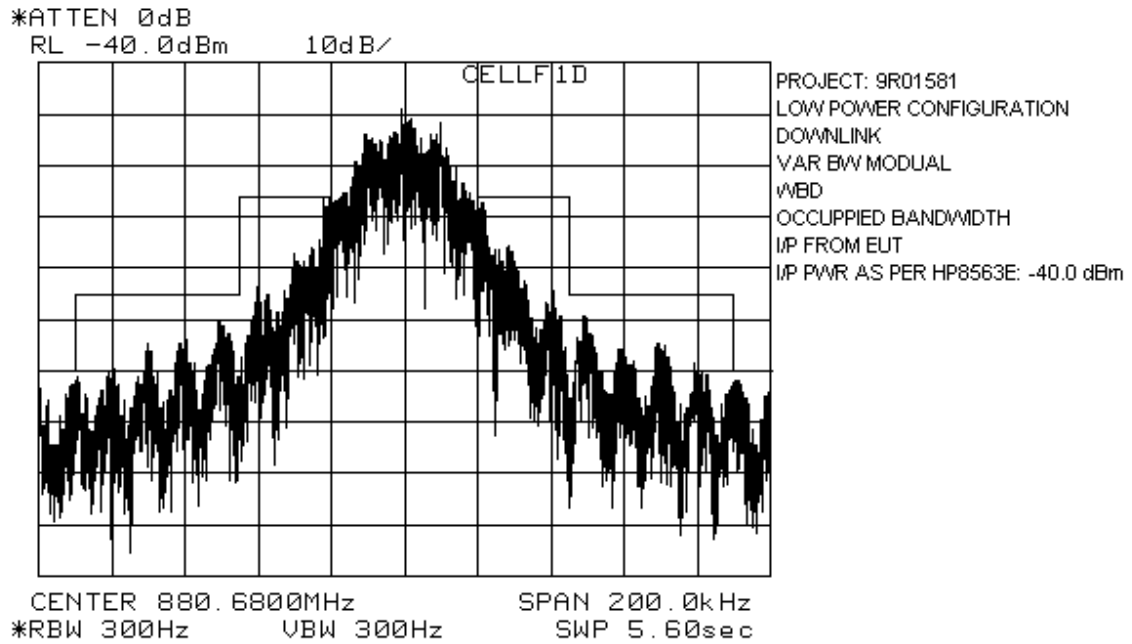
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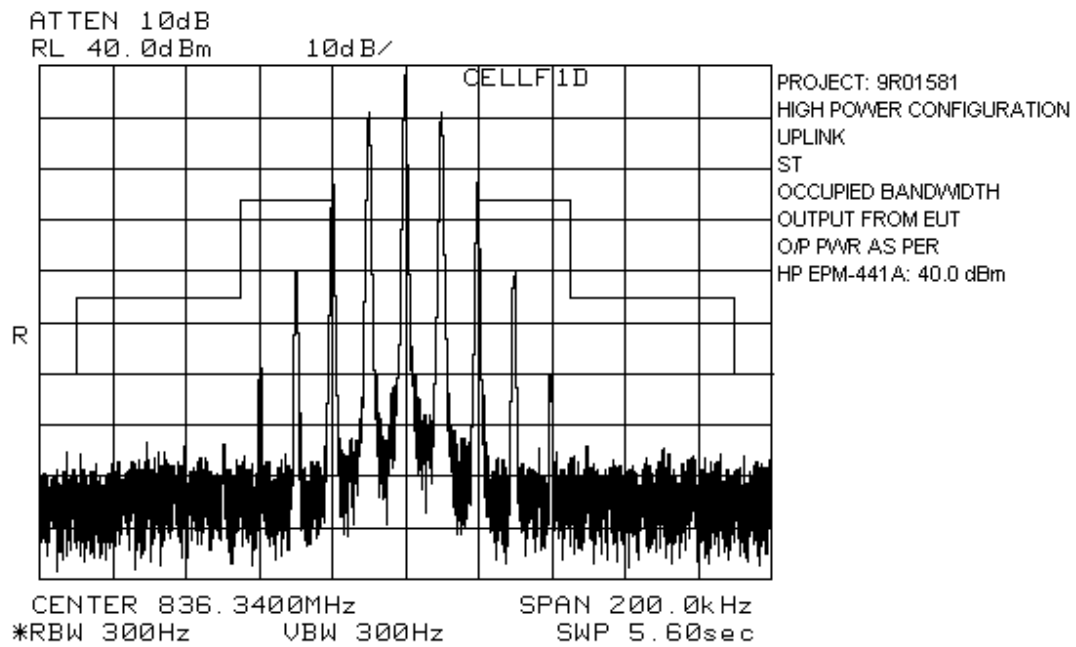
NAME OF TEST: Occupied Bandwidth (ST)	PARA. NO.: 2.917(d)
TESTED BY: Kevin Carr	DATE: July 16, 1999

Test Results: Complies.

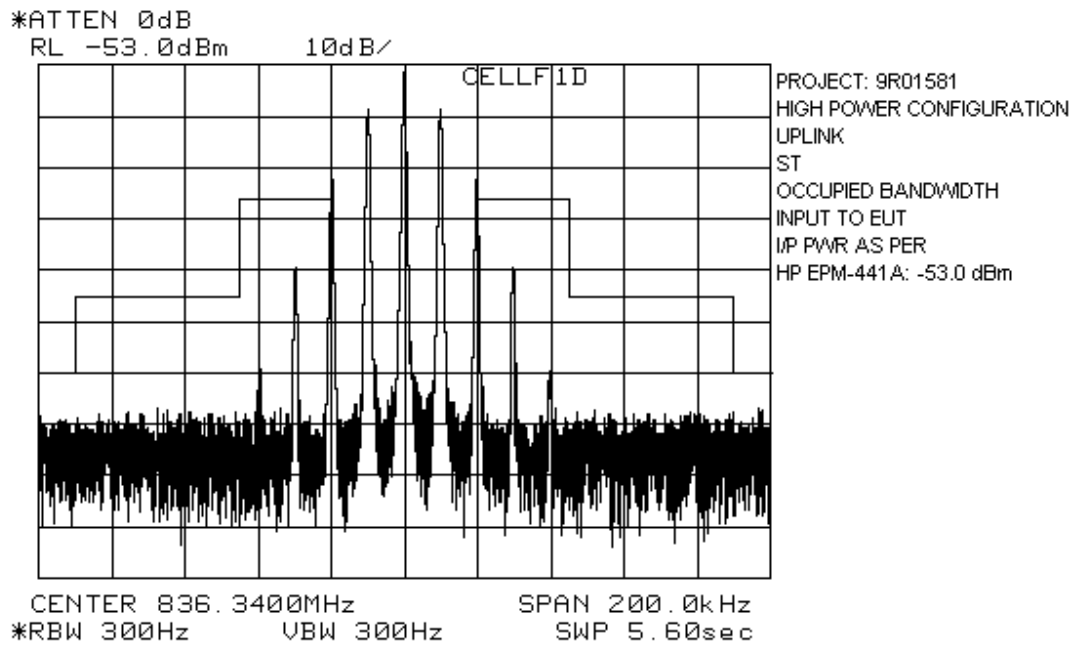
Test Data: See attached graph(s).

EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

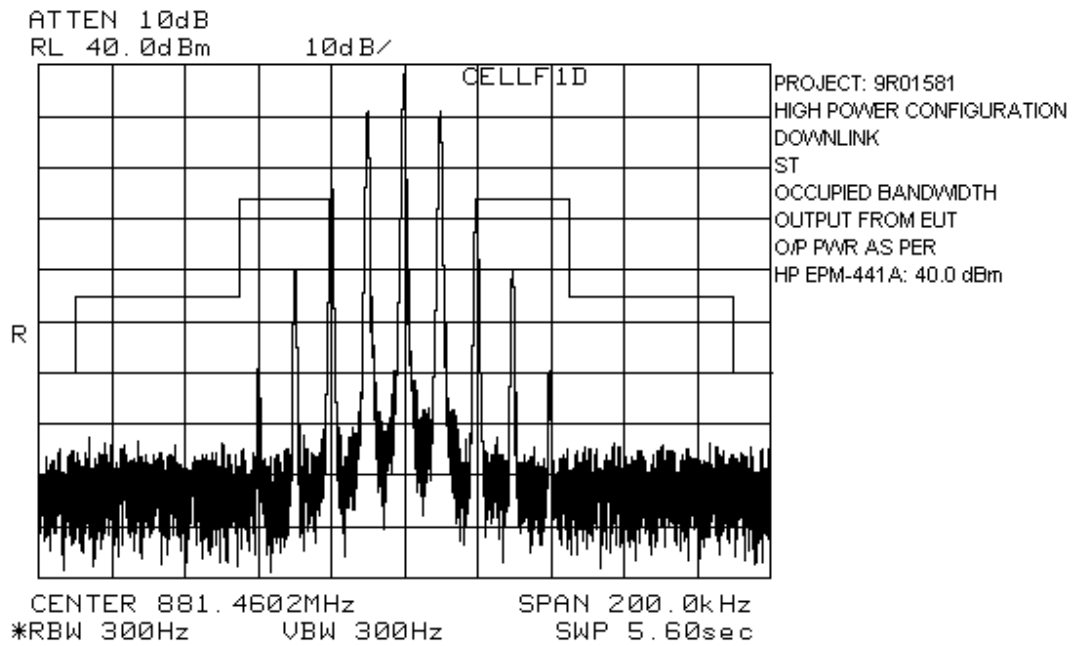
High Power – Variable Bandwidth Module



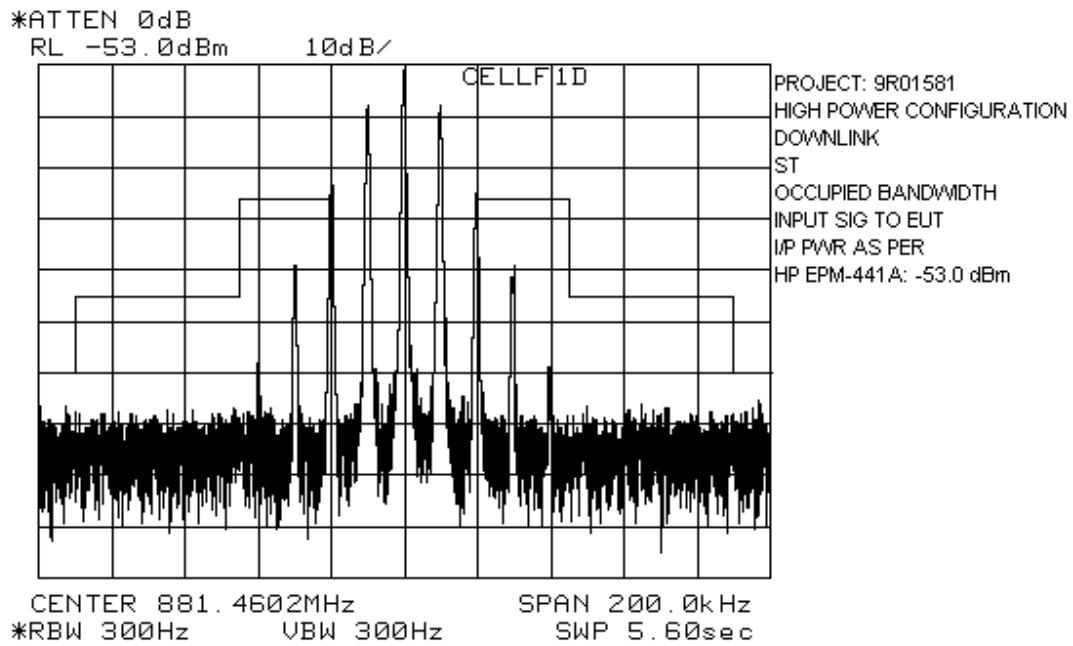
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FCC ID: BCR-RPT-MR801



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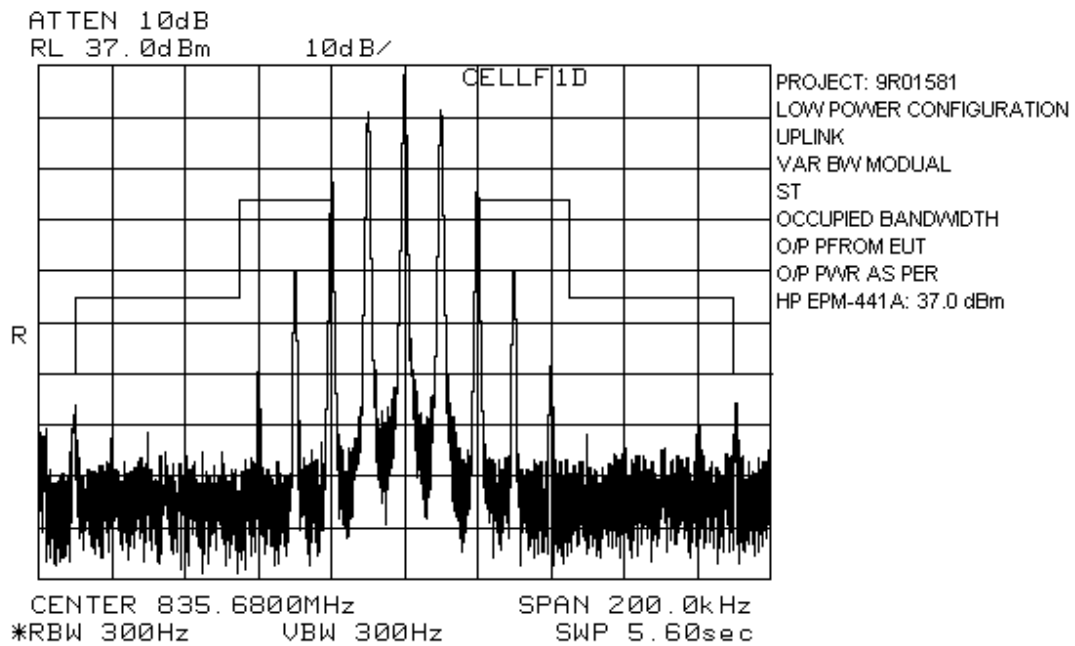


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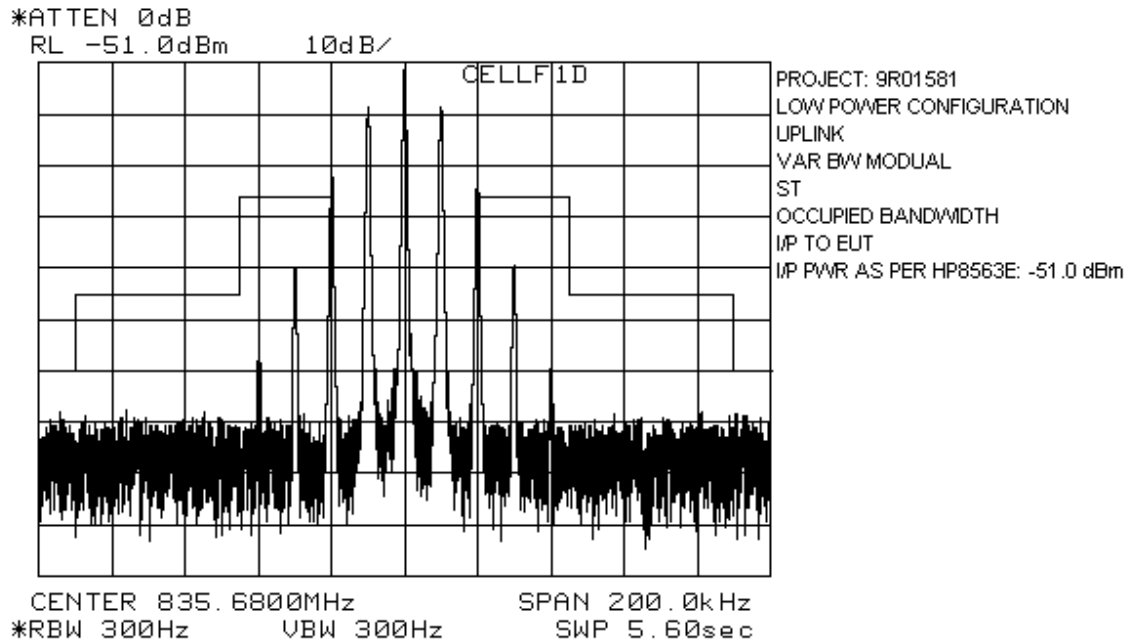


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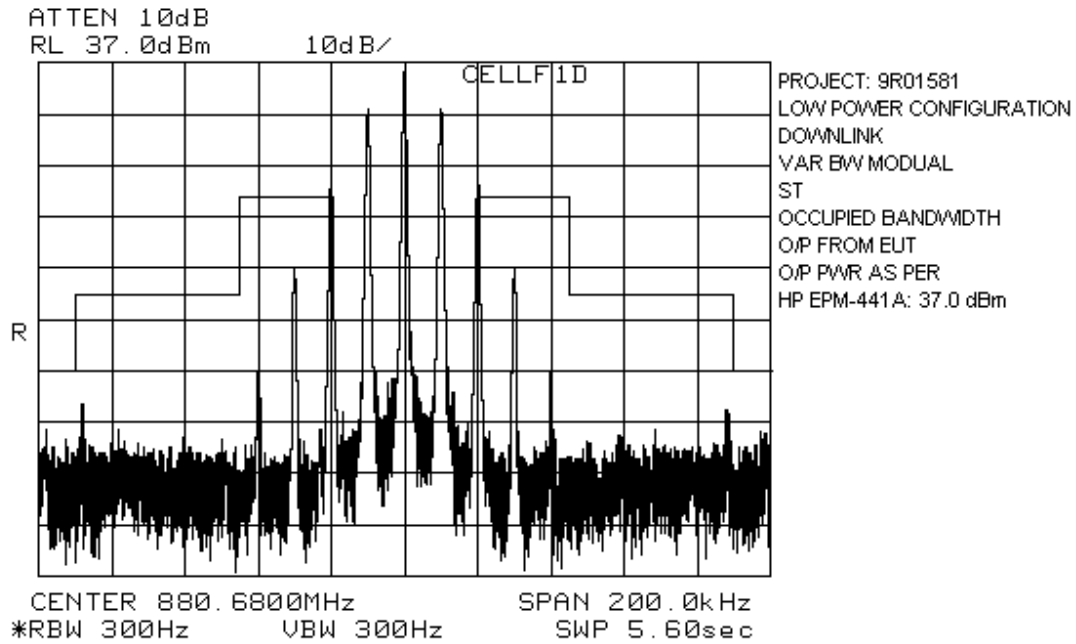
Low Power – Variable Bandwidth Module



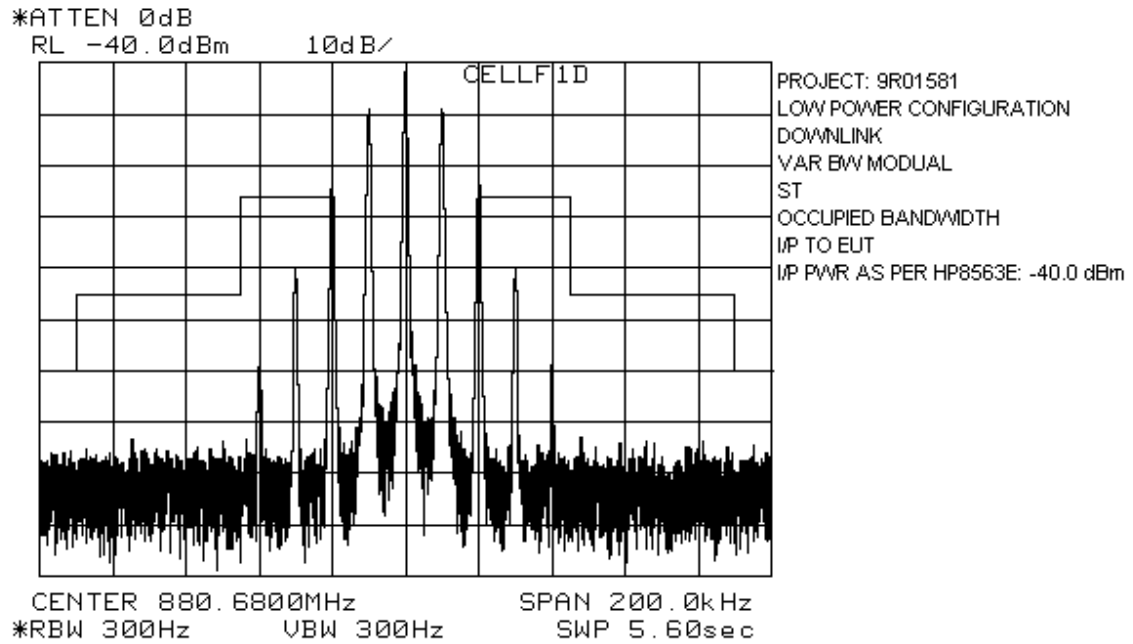
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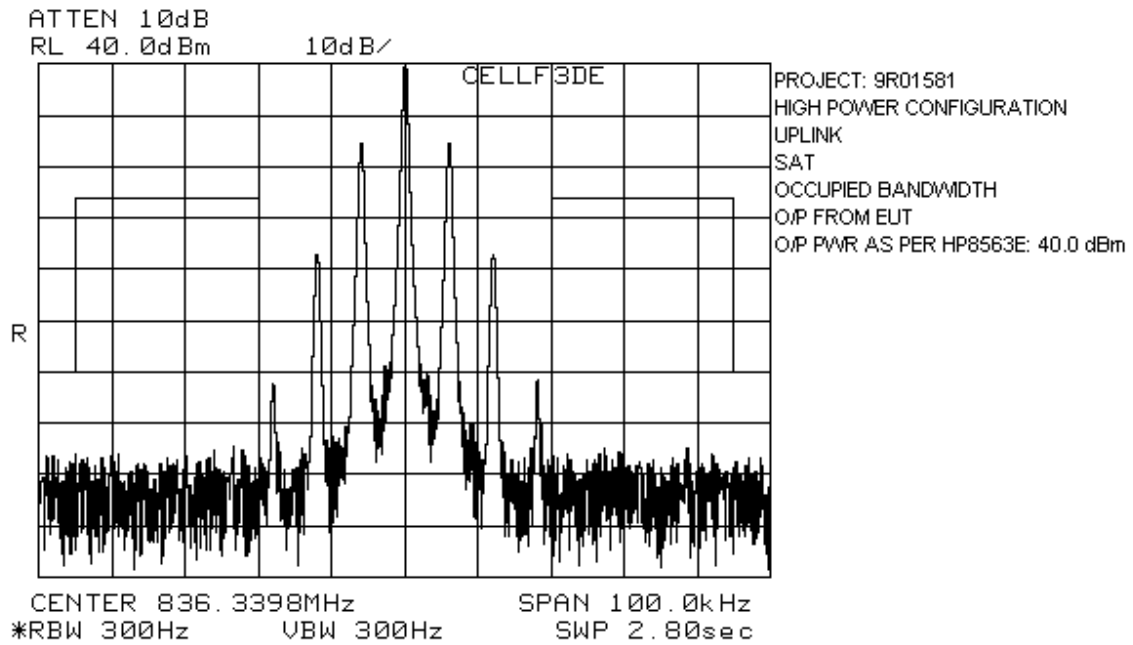
NAME OF TEST: Occupied Bandwidth (SAT)	PARA. NO.: 2.917(d)
TESTED BY: Kevin Carr	DATE: July 15, 1999

Test Results: Complies.

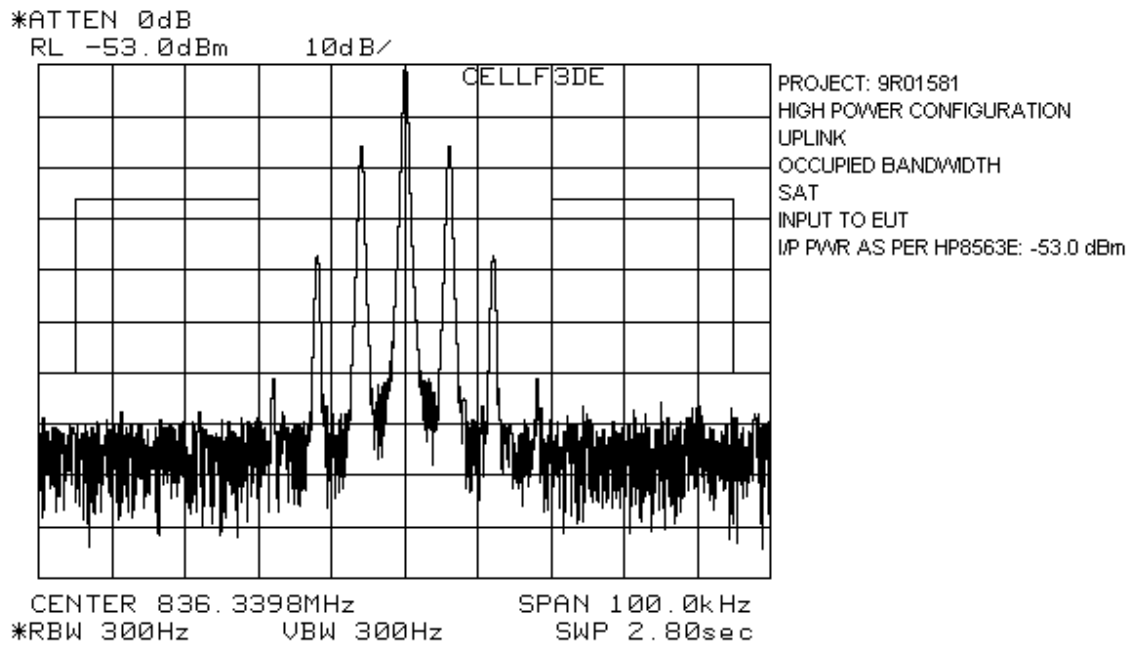
Test Data: See attached graph(s).

EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

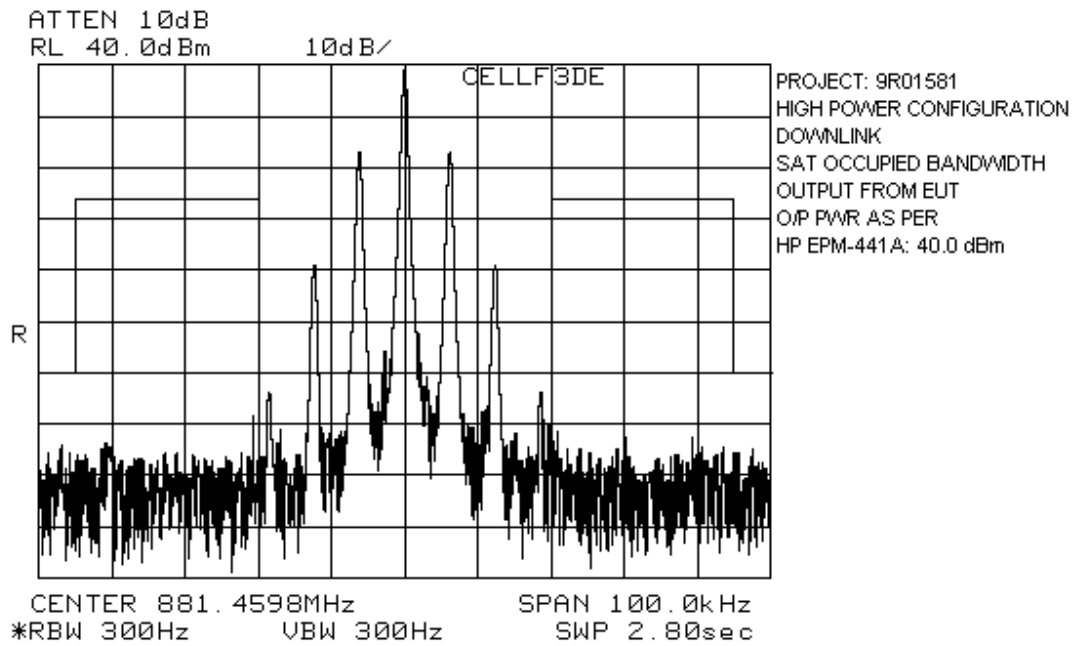
High Power



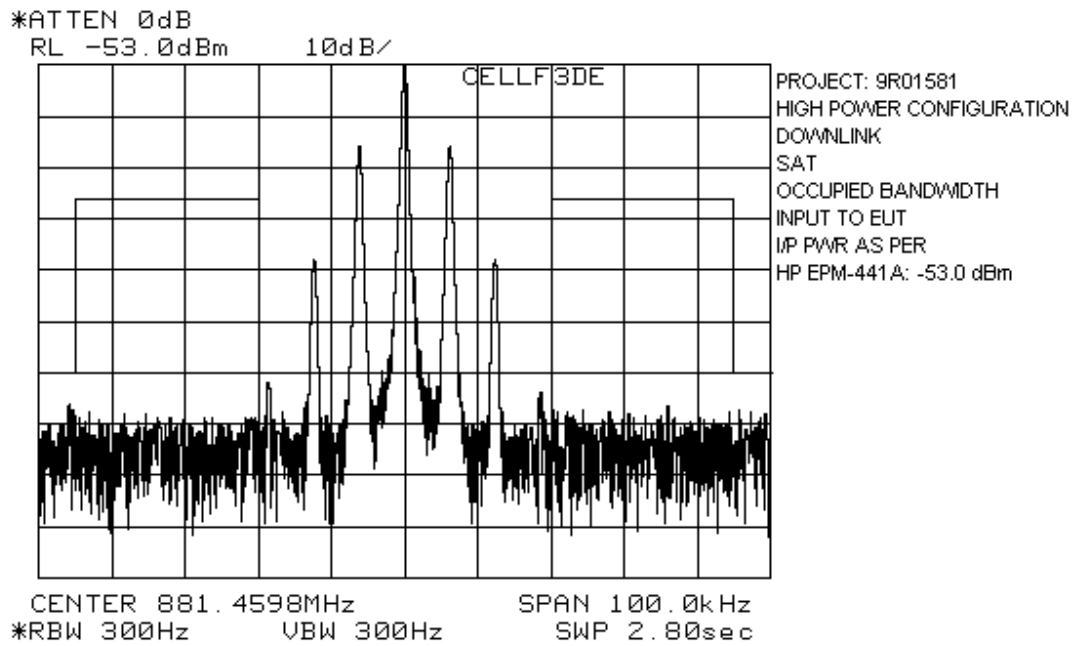
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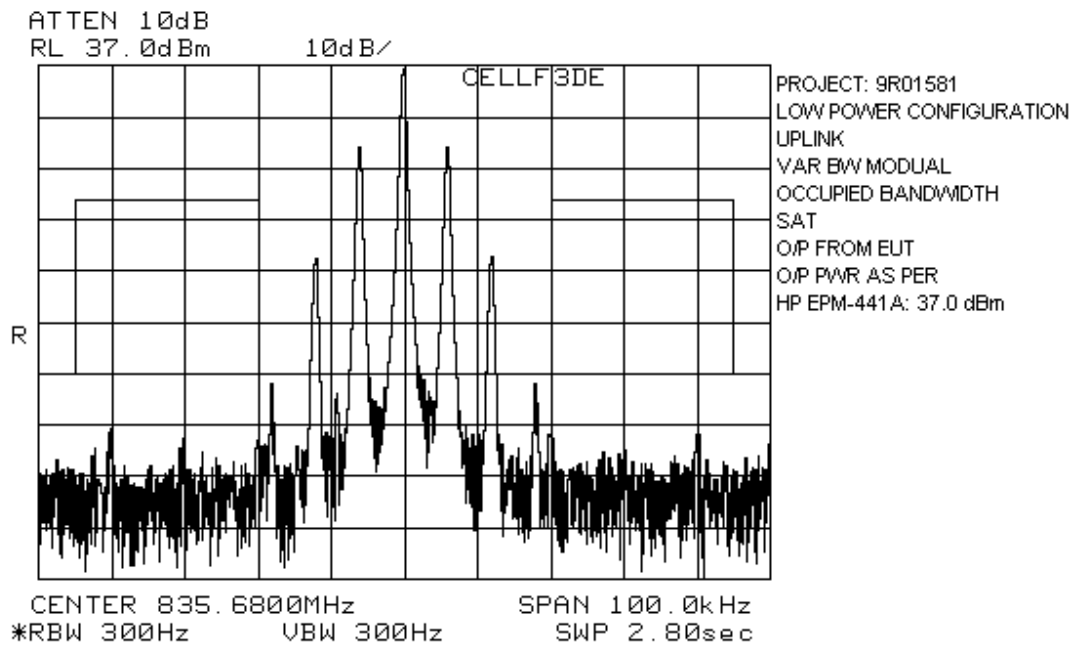


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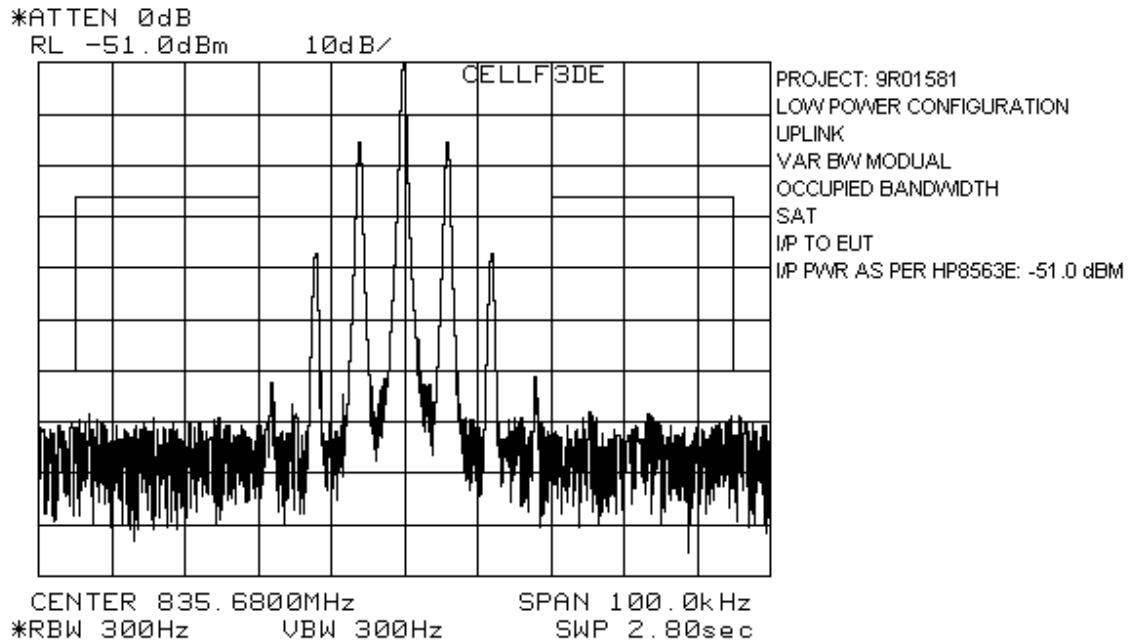


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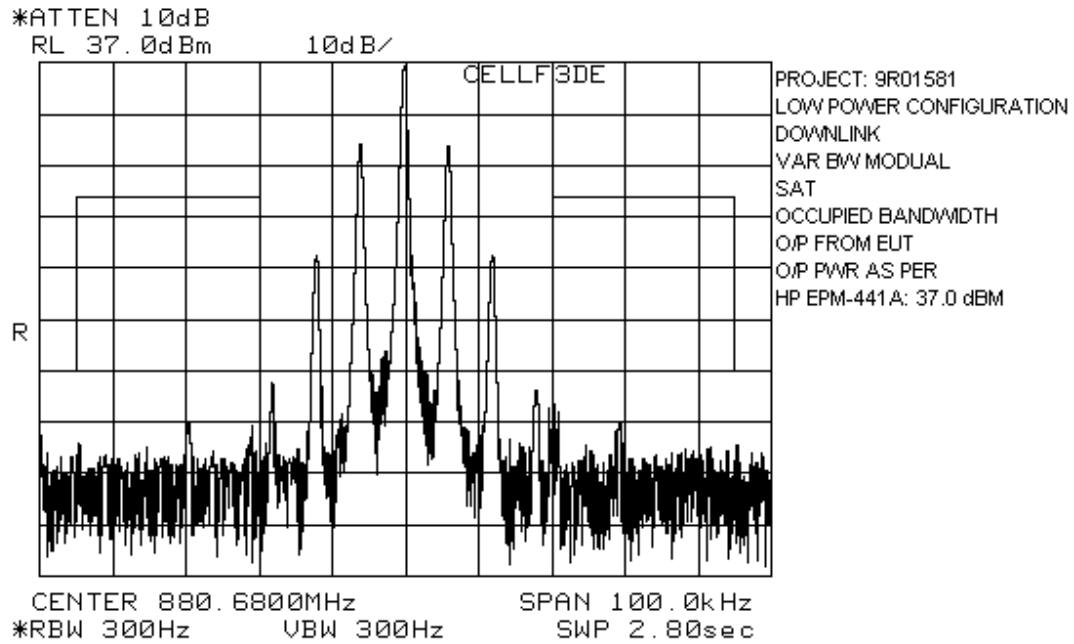
Low Power – Variable Bandwidth Module



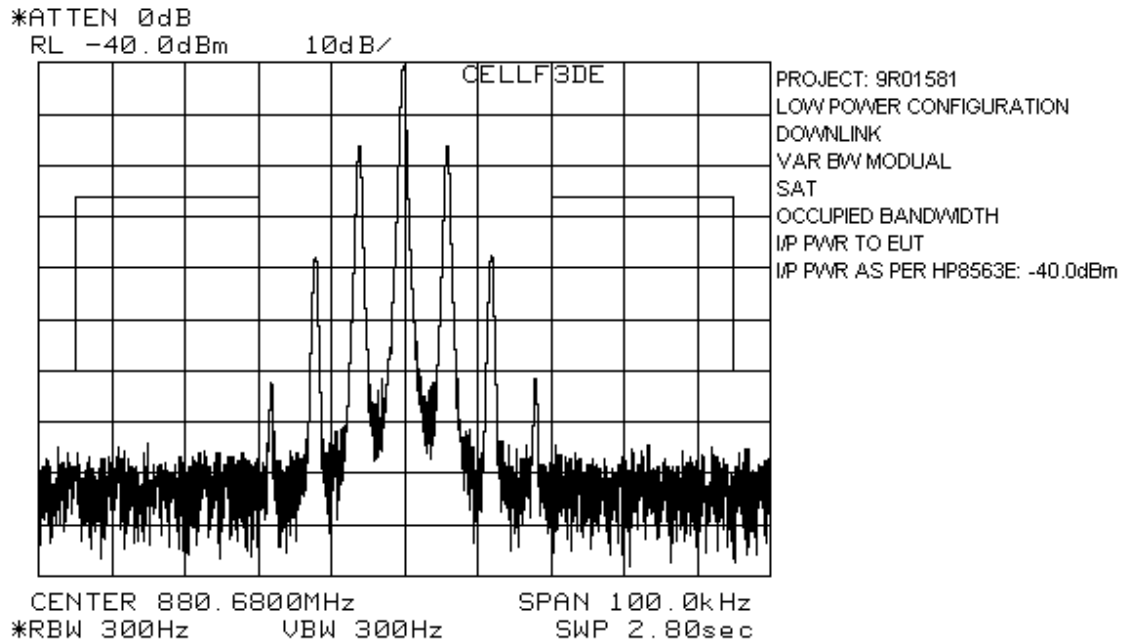
EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801



EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801



EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801



EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

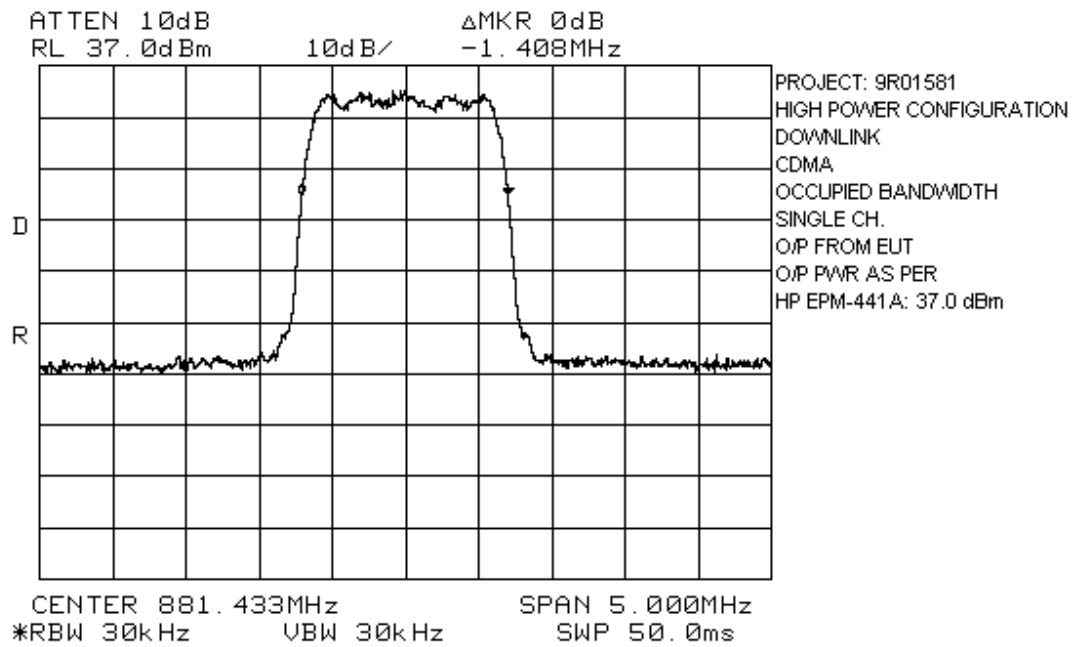
NAME OF TEST: Occupied Bandwidth (Digital Mod.)	PARA. NO.: 2.917(e)
TESTED BY: Kevin Carr	DATE: July 13, 1999

Test Results: Complies.

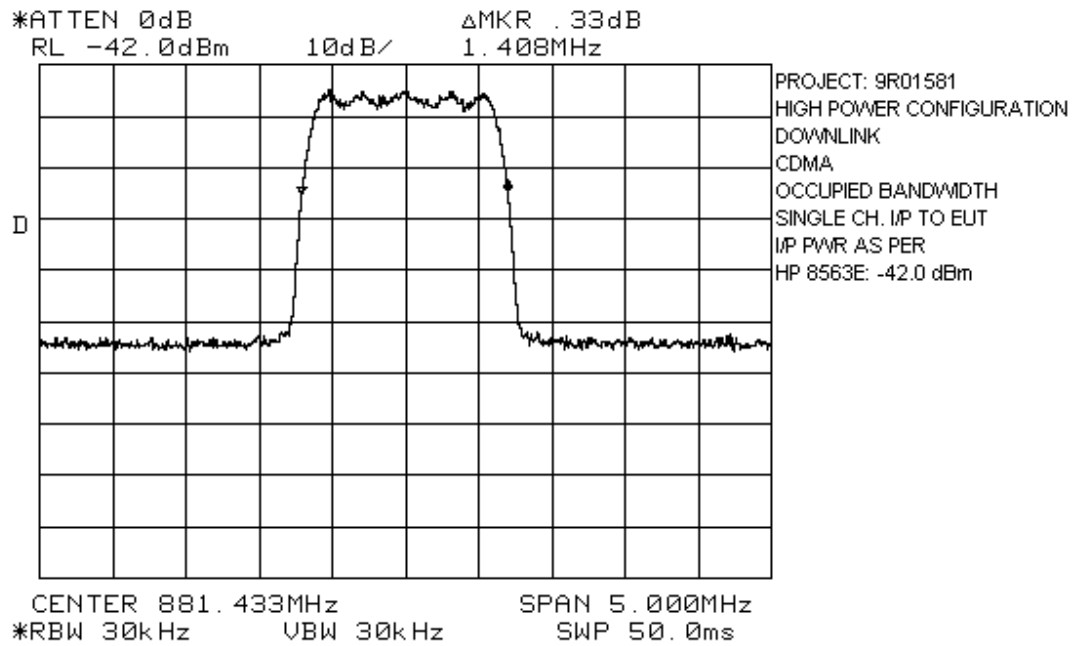
Test Data: See attached graph(s).

EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

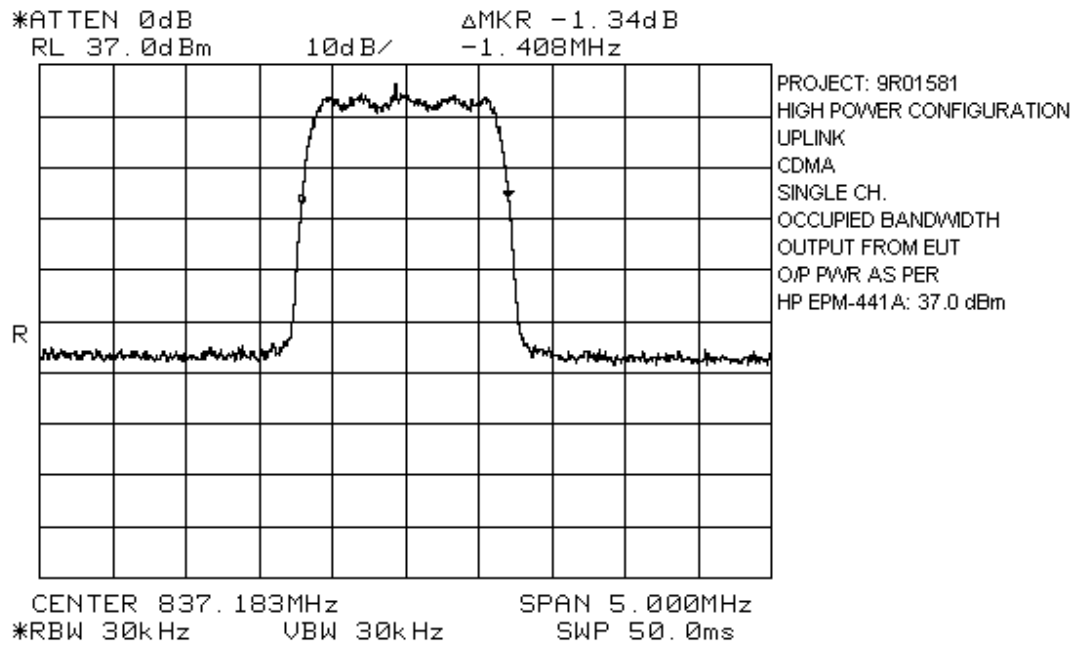
High Power Configuration – Variable Bandwidth Units



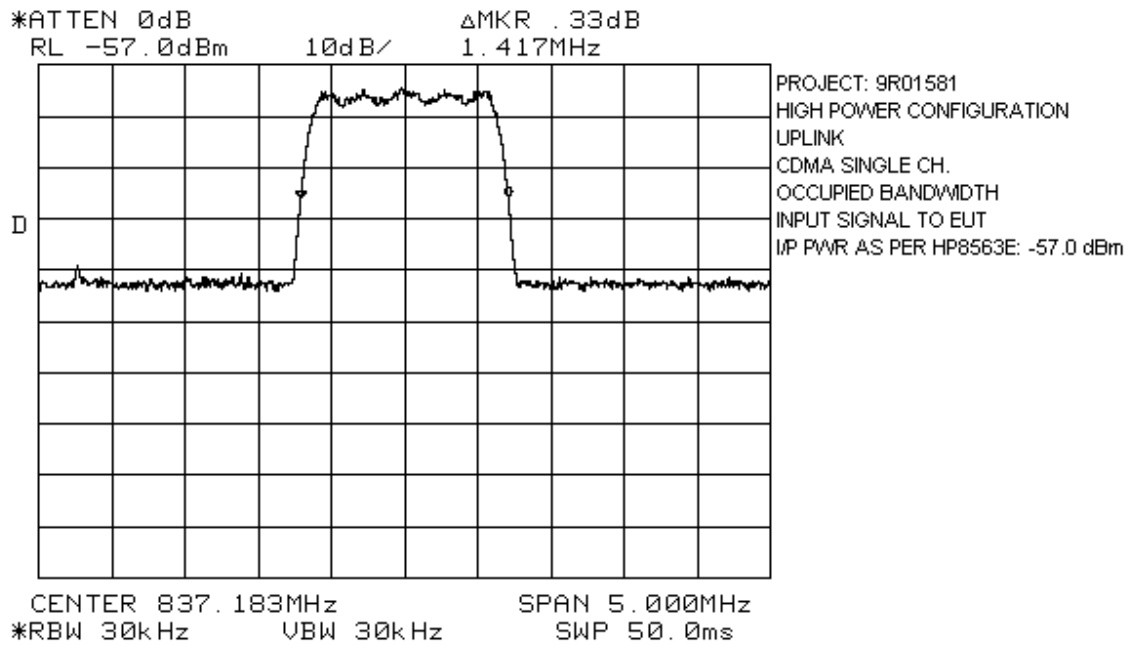
EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801



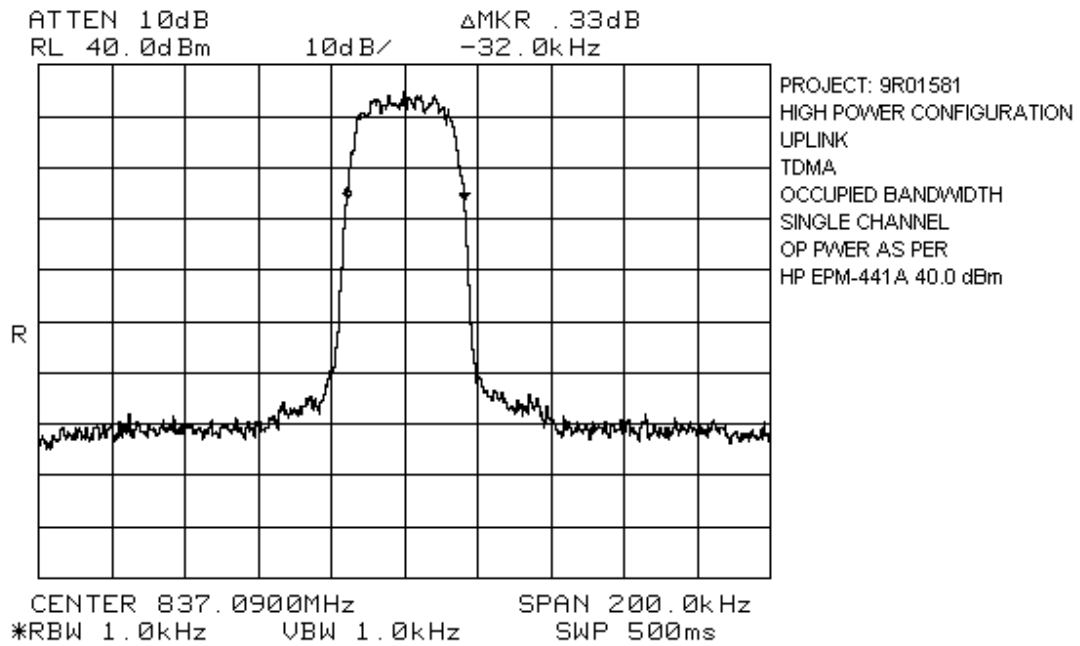
EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801



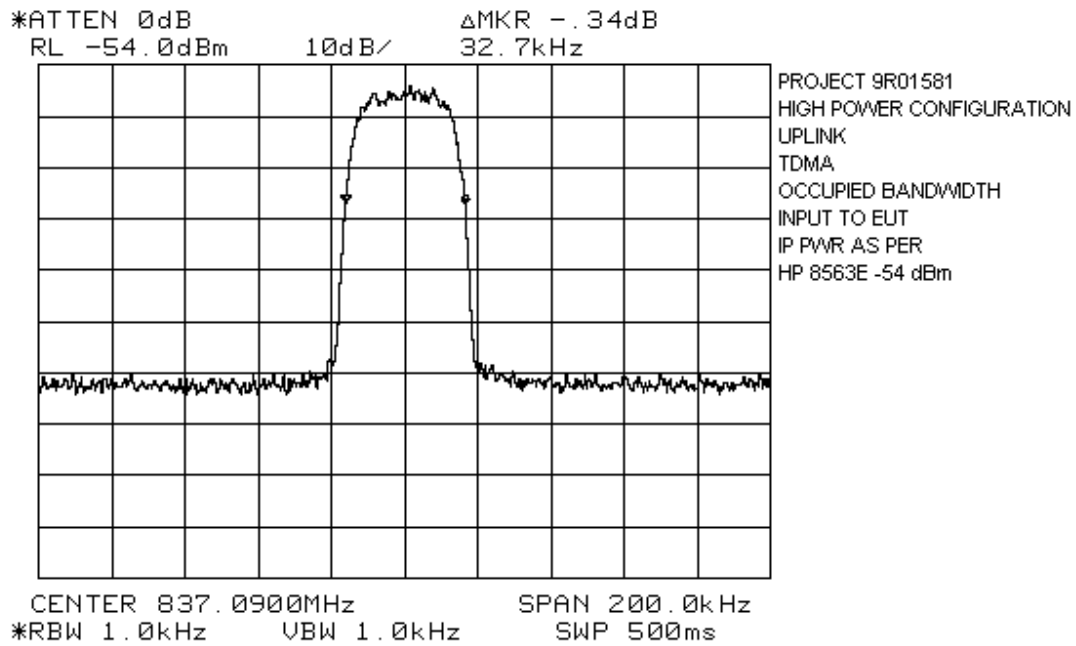
EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801



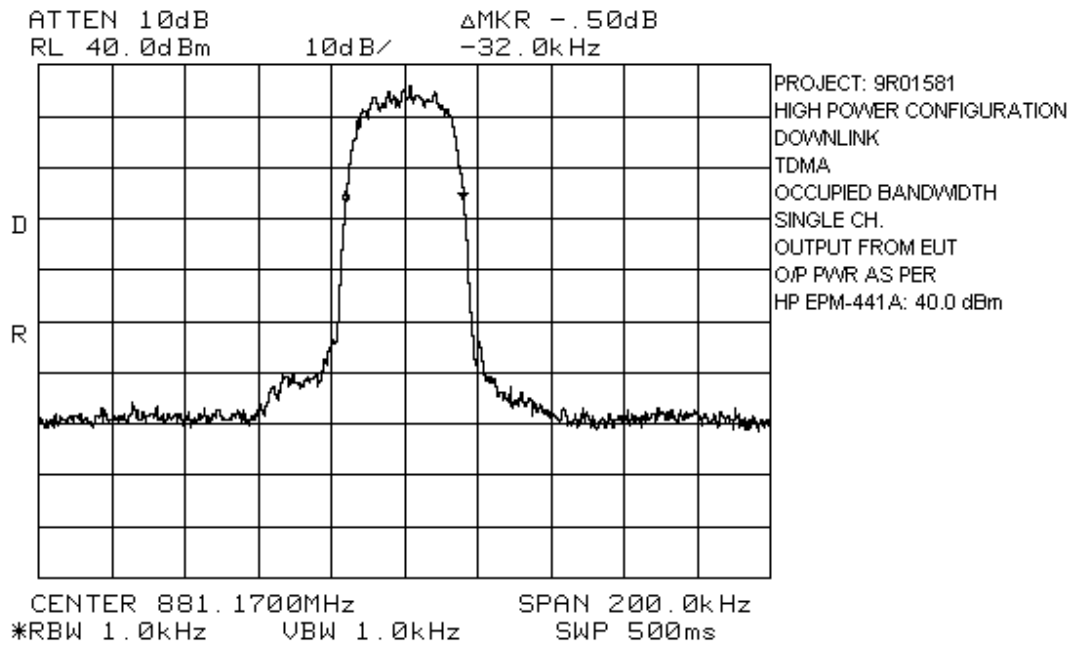
EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801



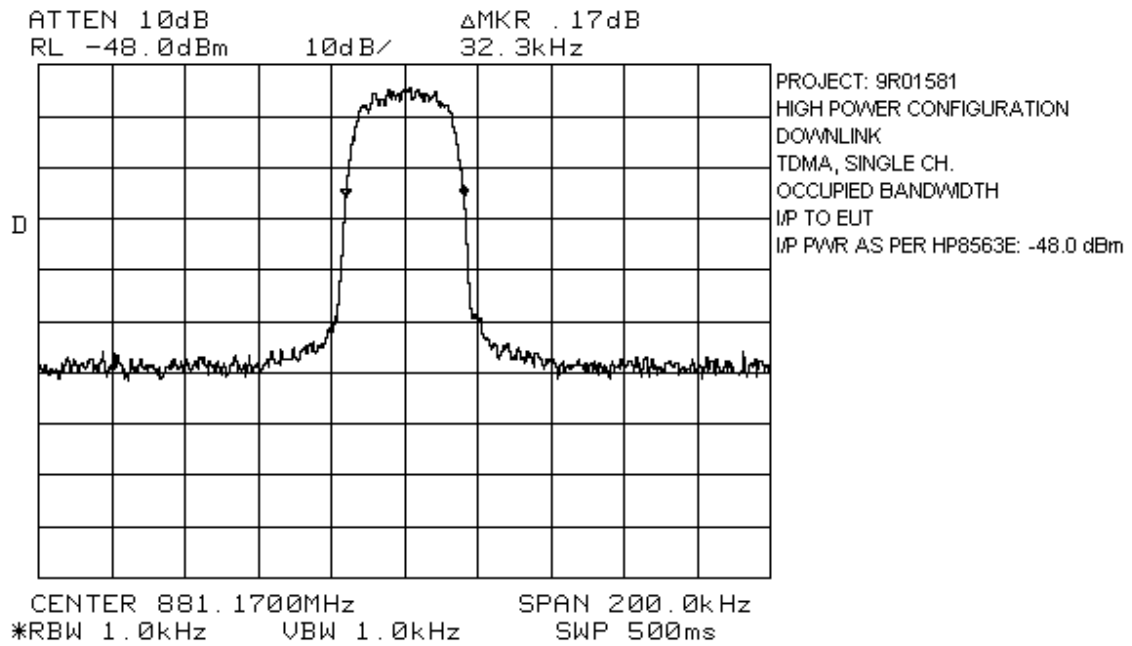
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EQUIPMENT: MR801 Cellular Repeater
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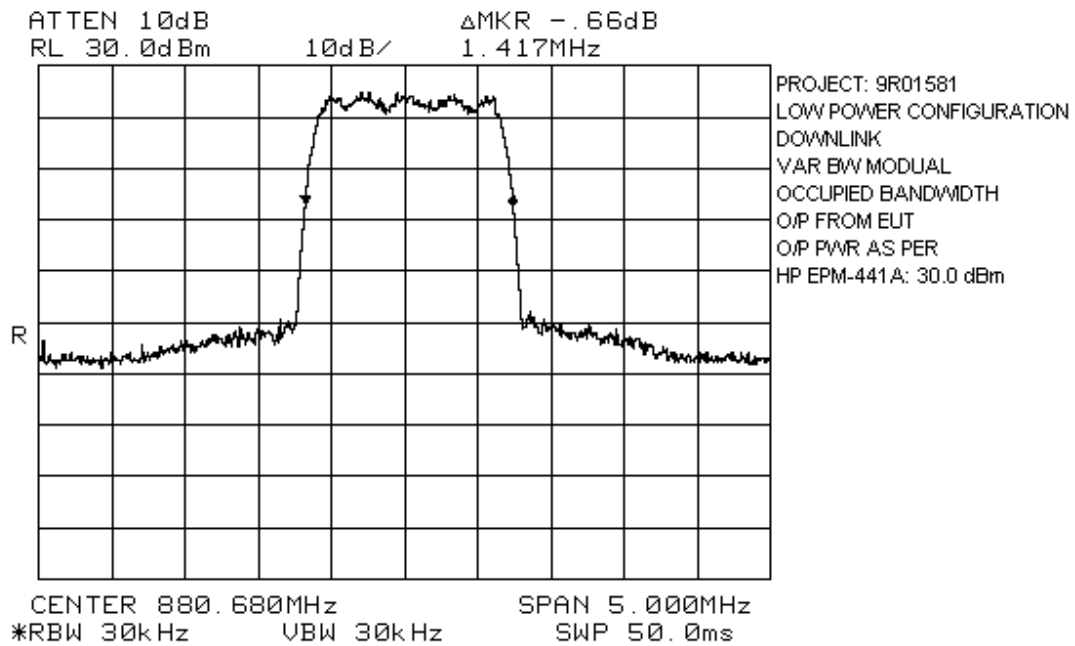


EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

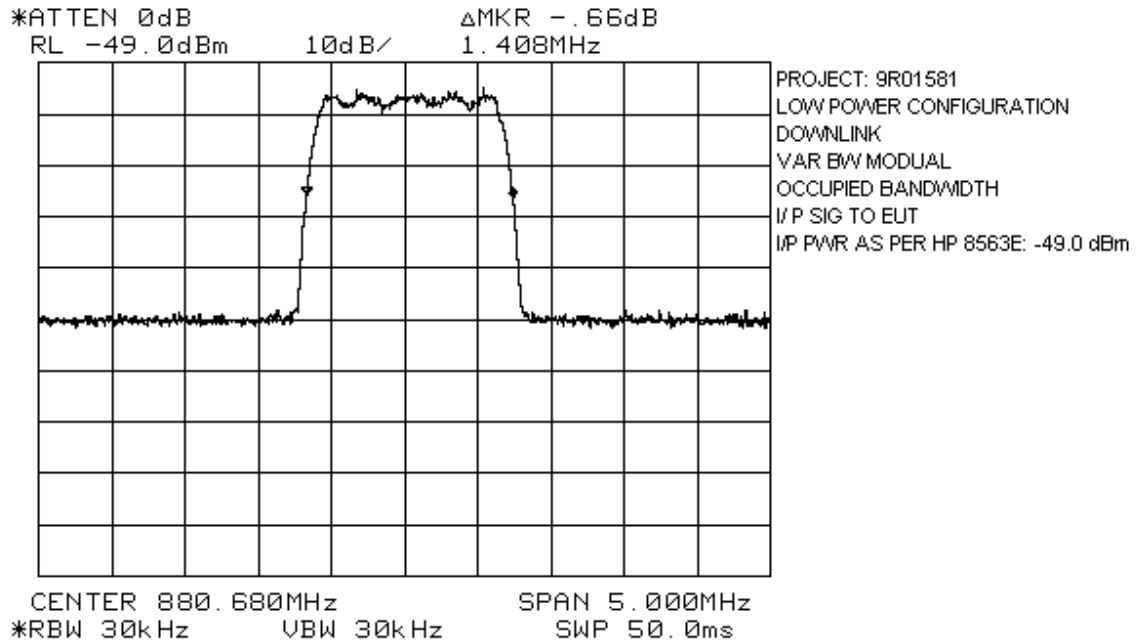


EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

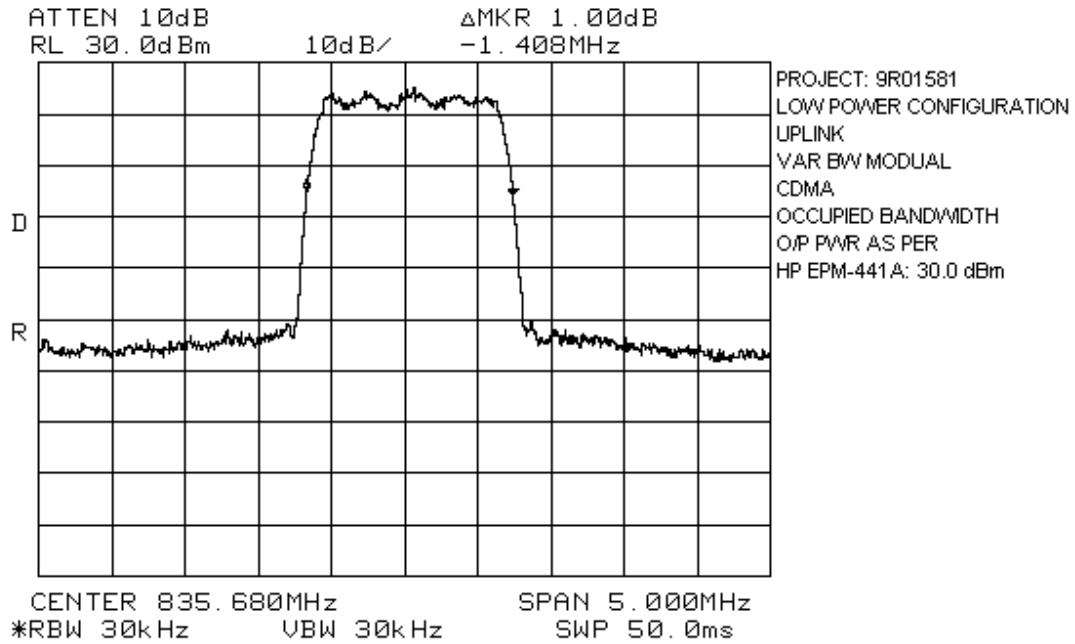
Low Power – Variable Bandwidth Units



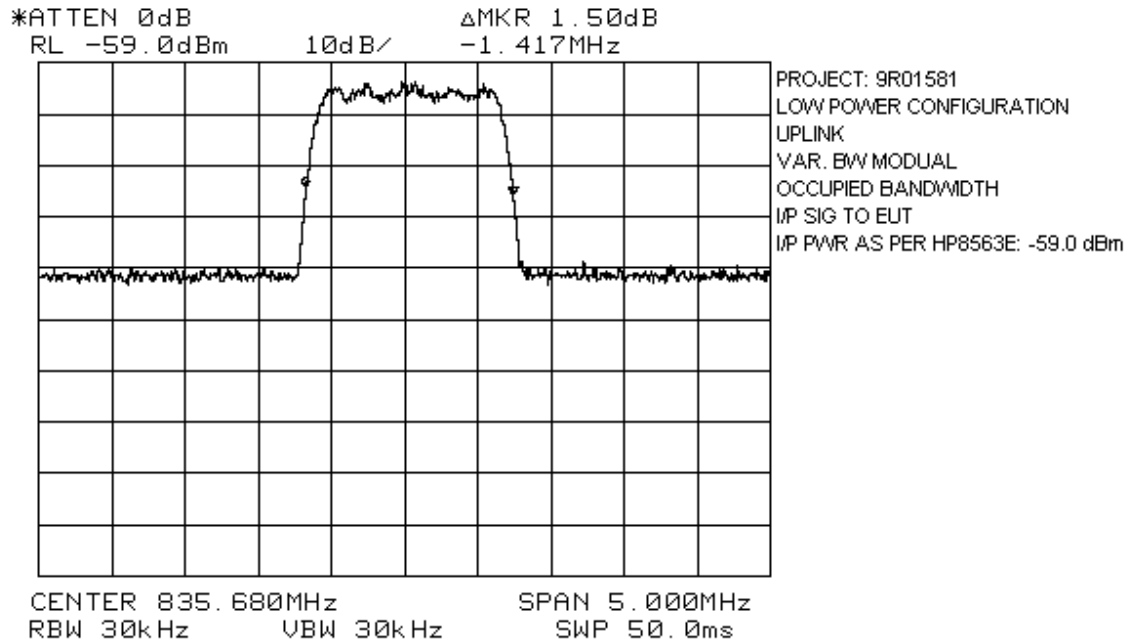
EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801



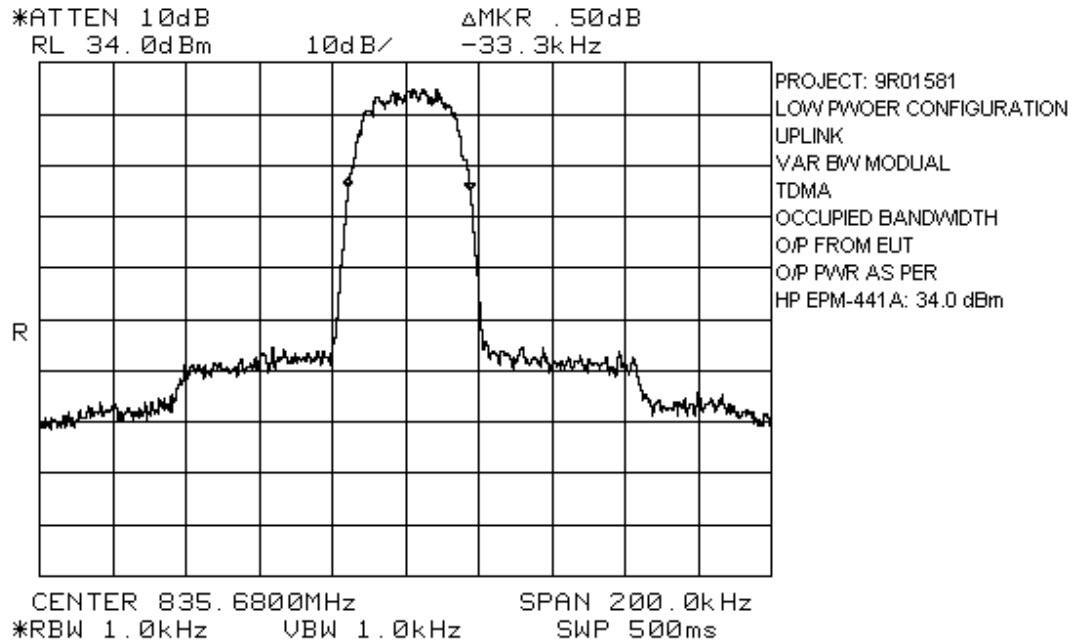
EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801



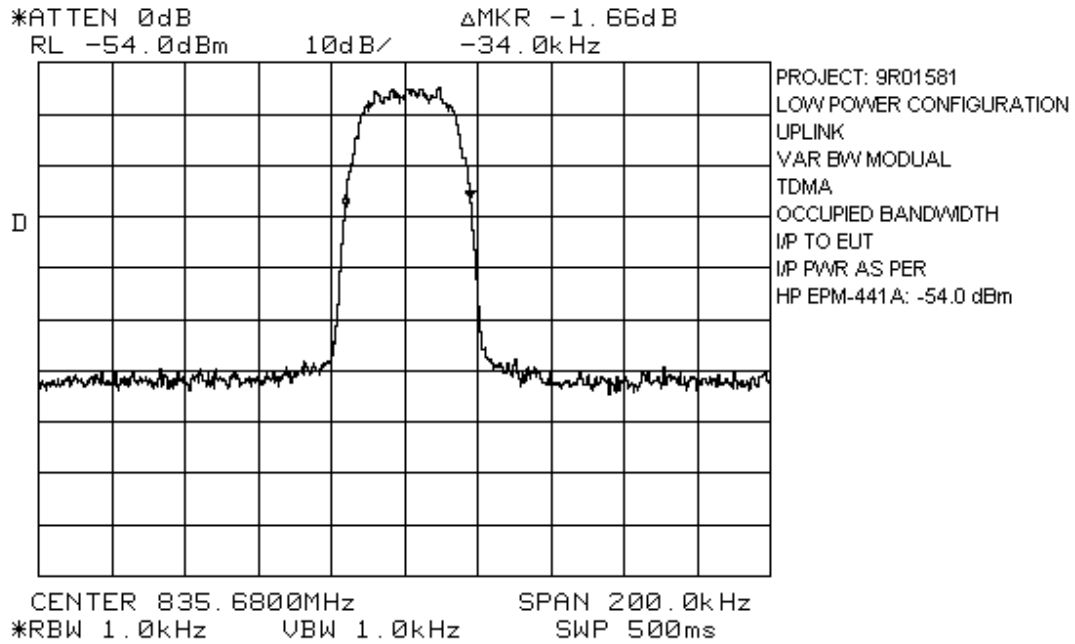
EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801



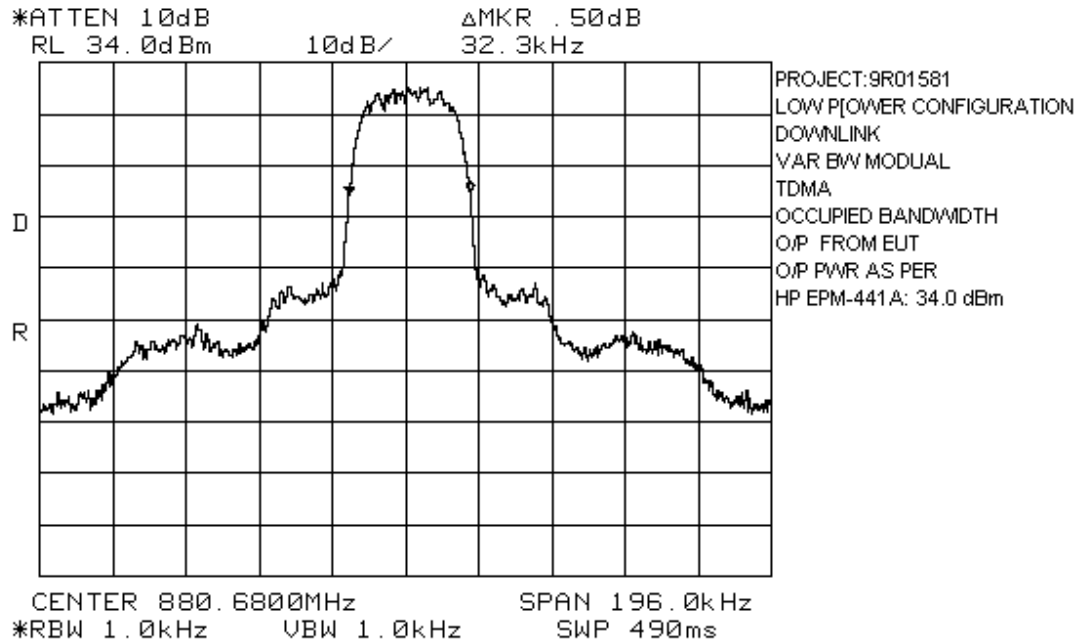
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FCC ID: BCR-RPT-MR801



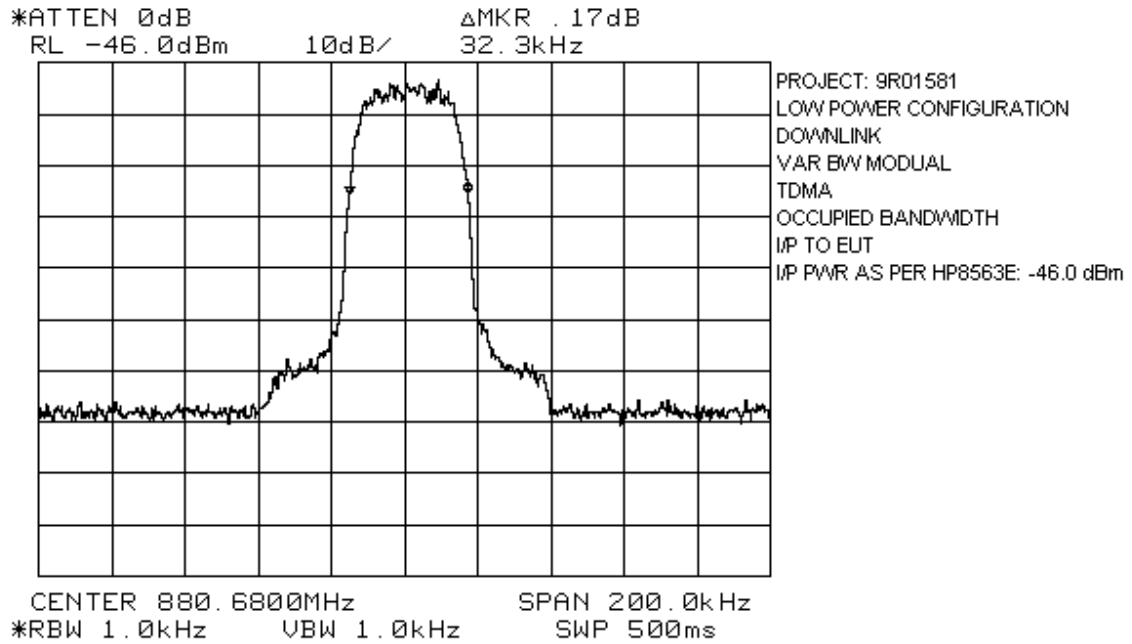
EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801



EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

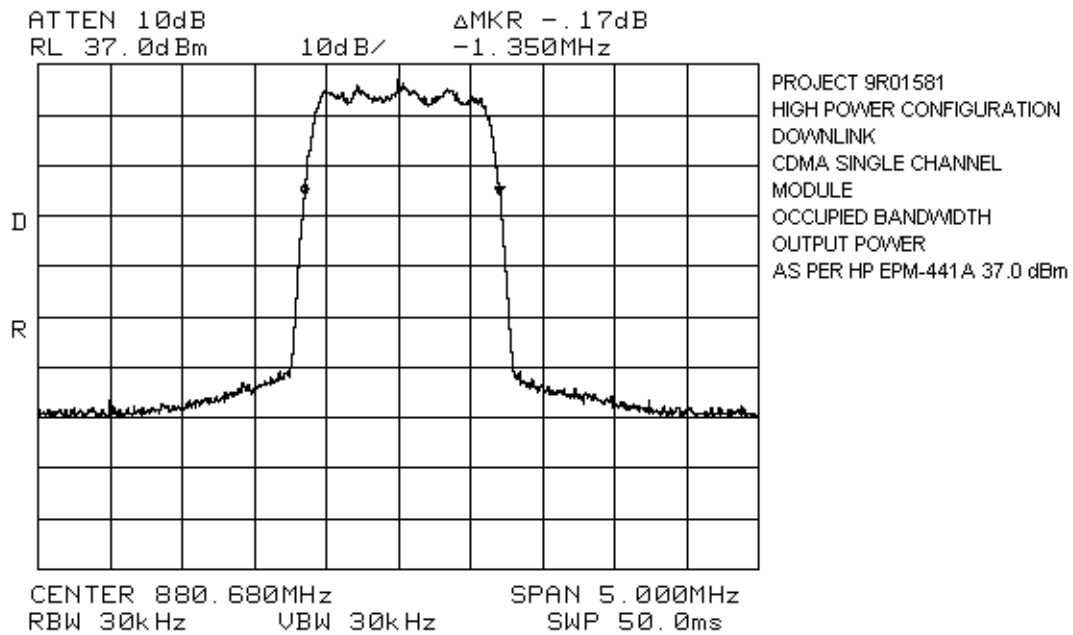


EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

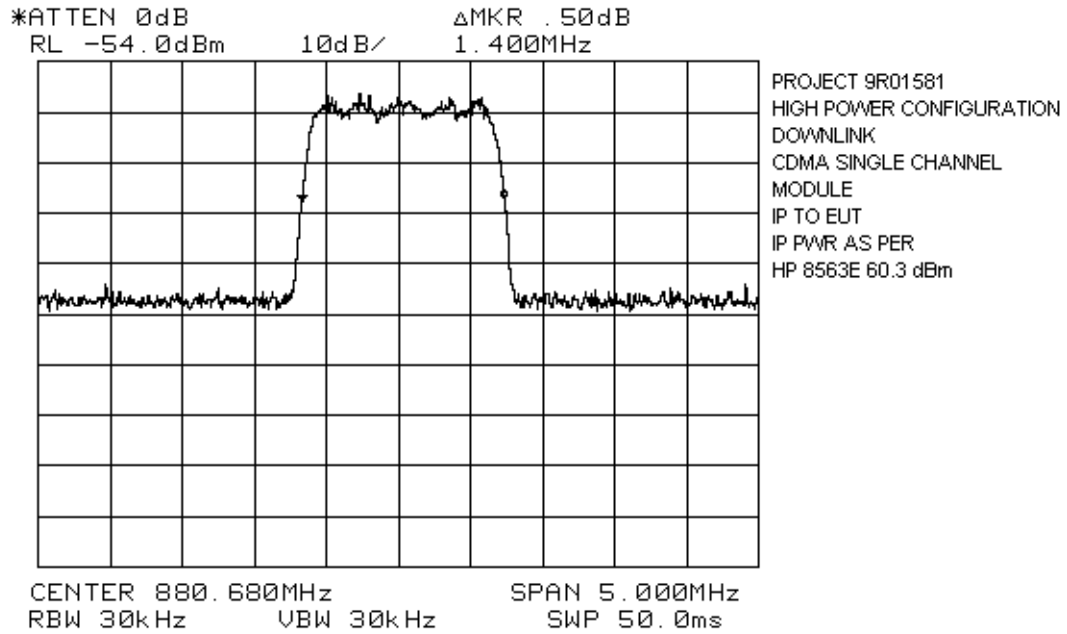


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FCC ID: BCR-RPT-MR801

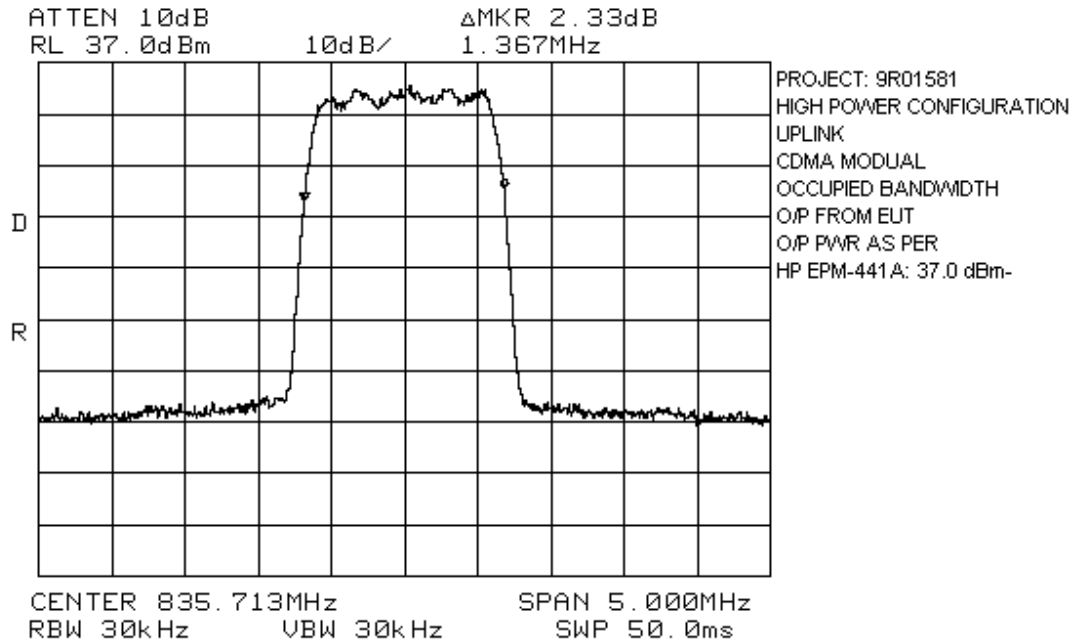
High Power – CDMA Module



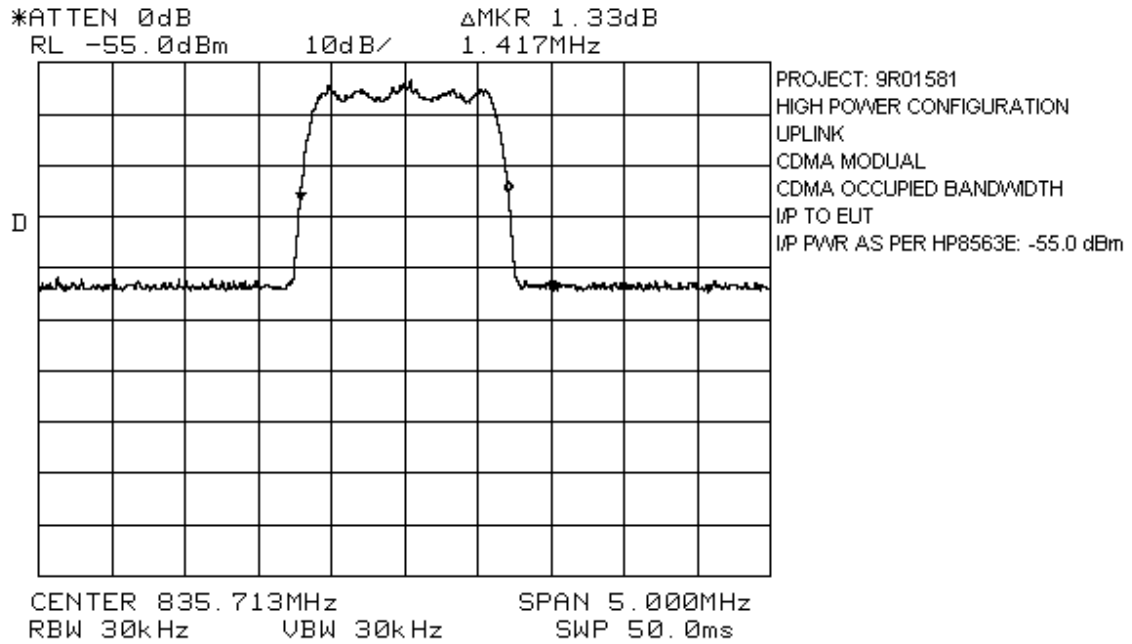
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EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

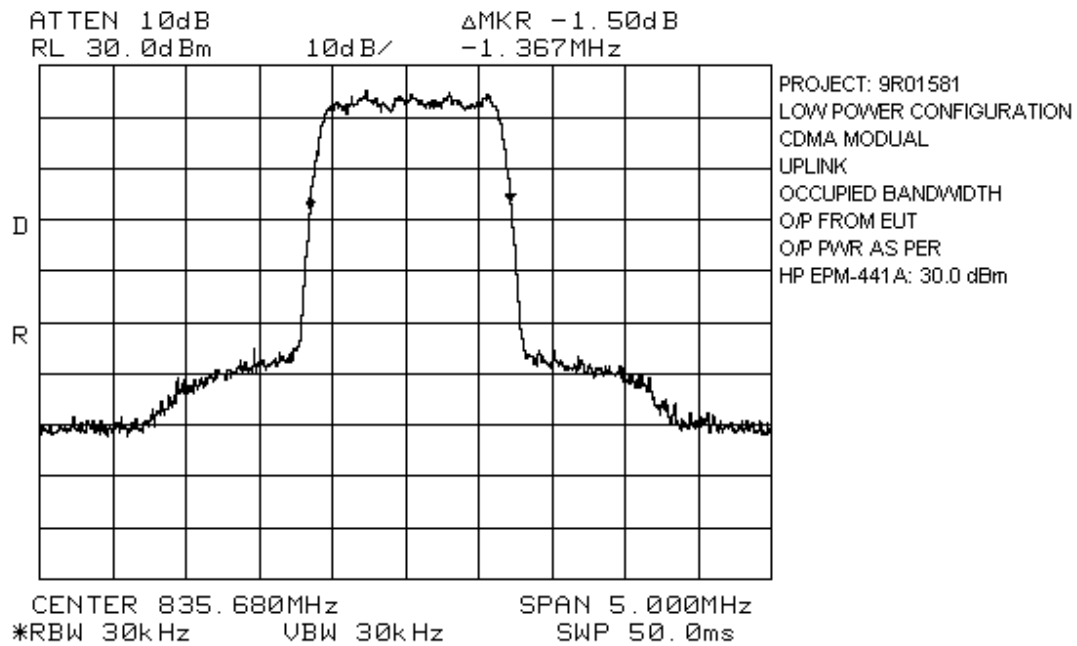


EQUIPMENT: MR801 Cellular Repeater
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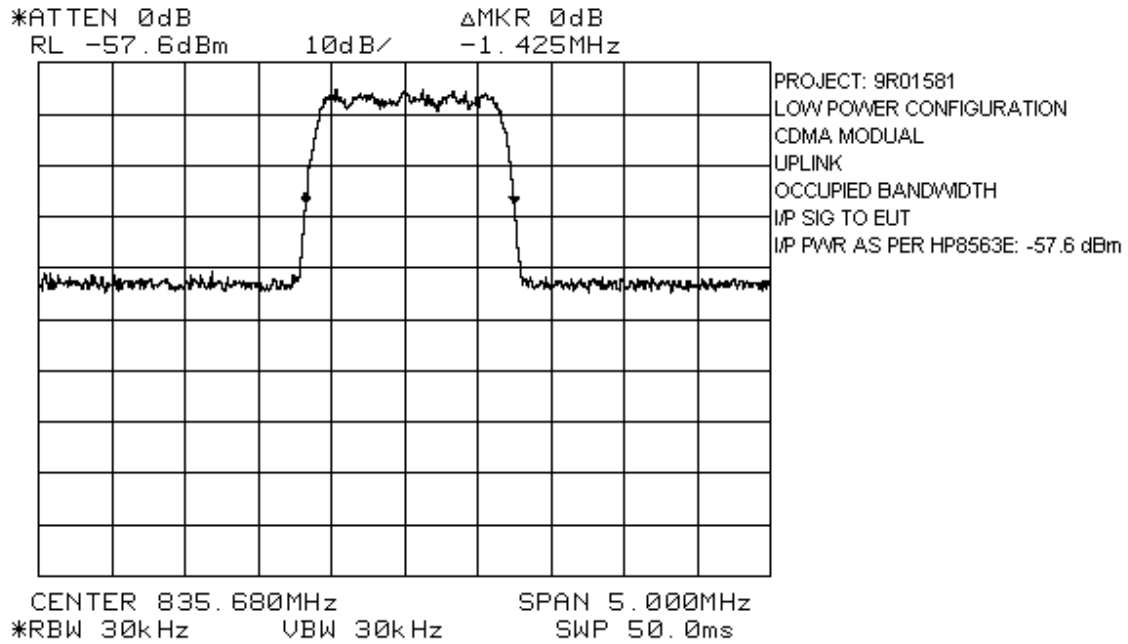


EQUIPMENT: MR801 Cellular Repeater
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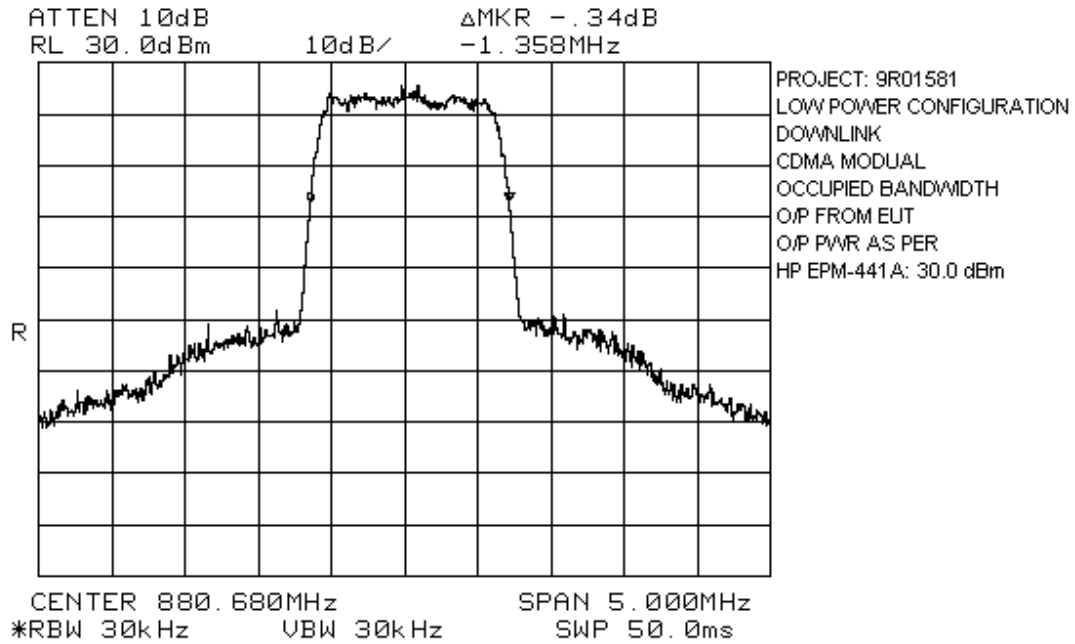
Low Power – CDMA Module



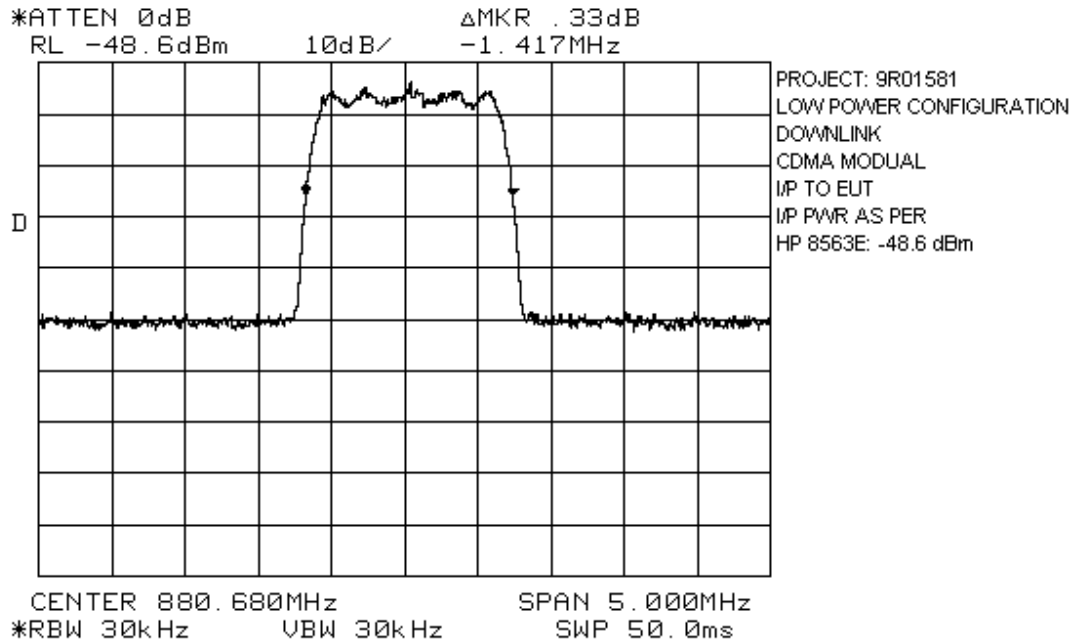
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EQUIPMENT: MR801 Cellular Repeater
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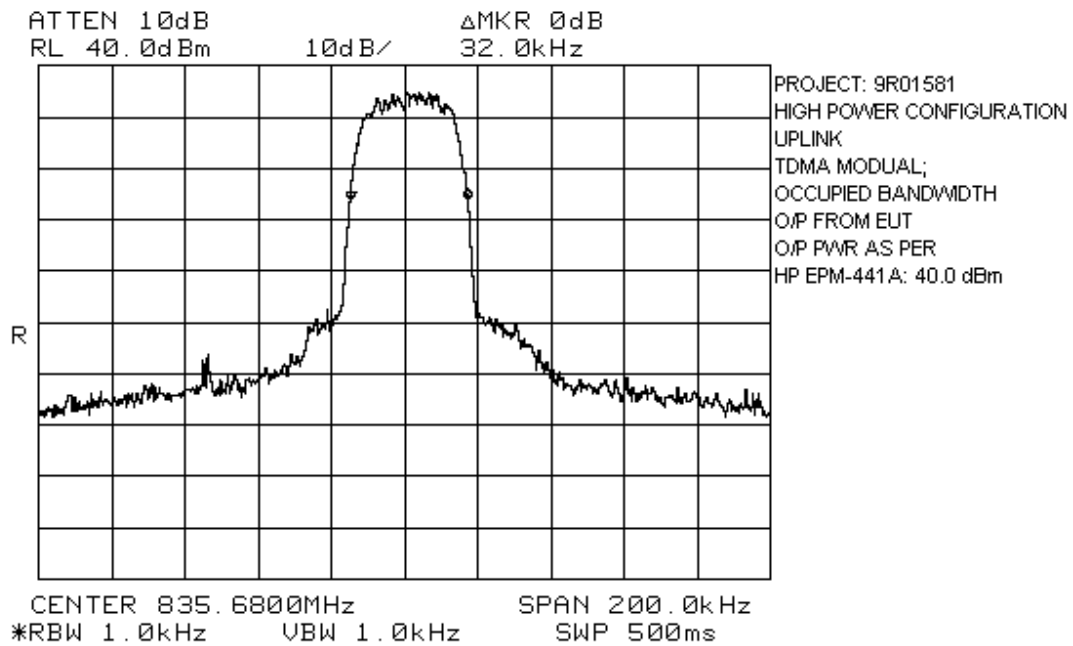


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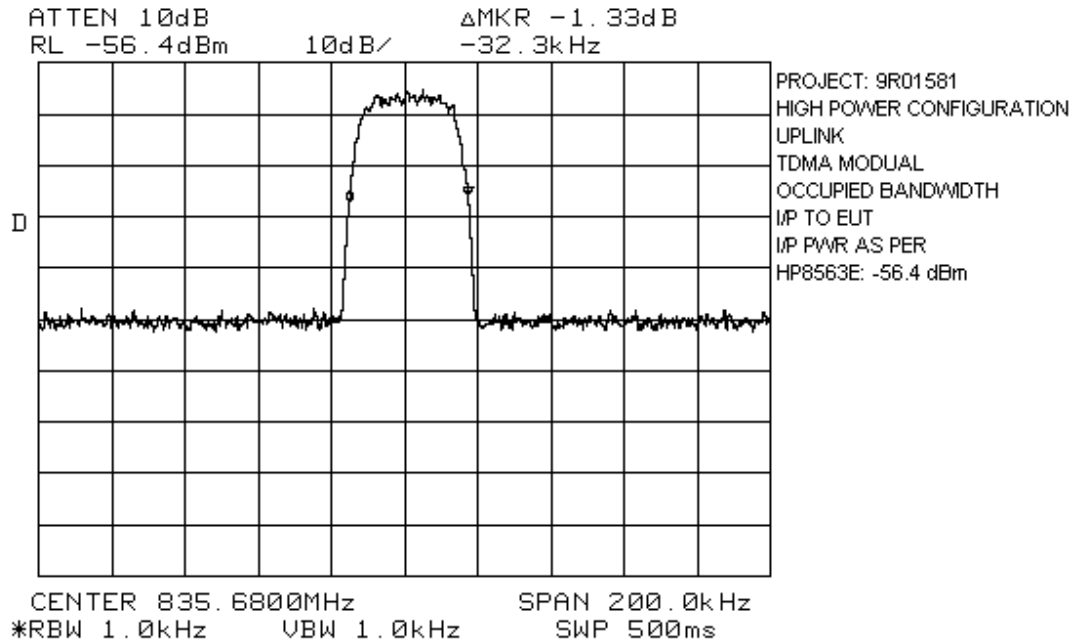


EQUIPMENT: MR801 Cellular Repeater
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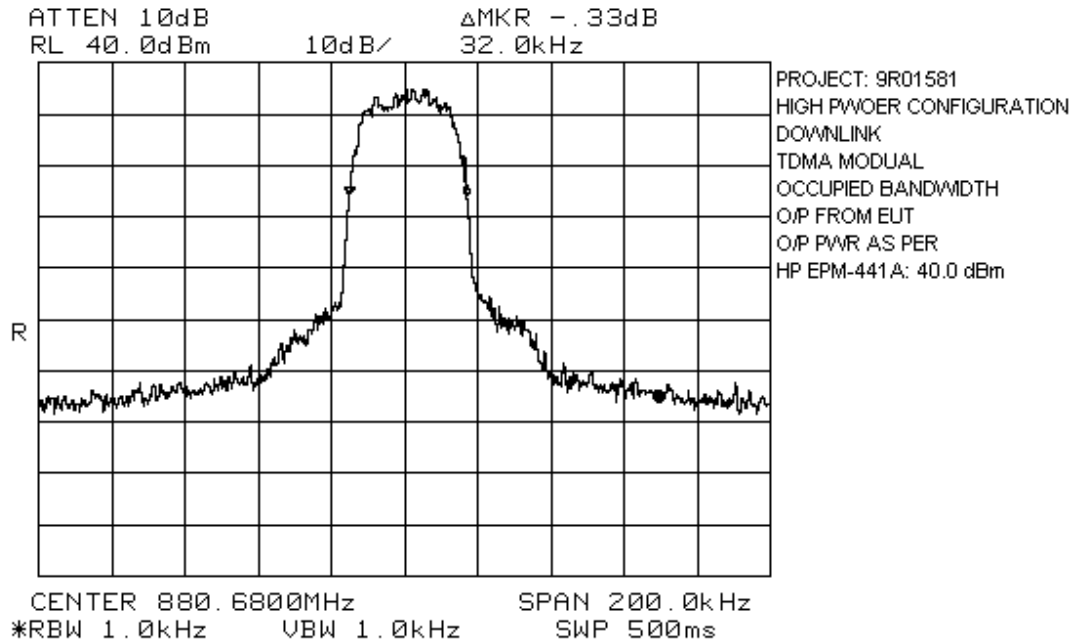
High Power – TDMA Module



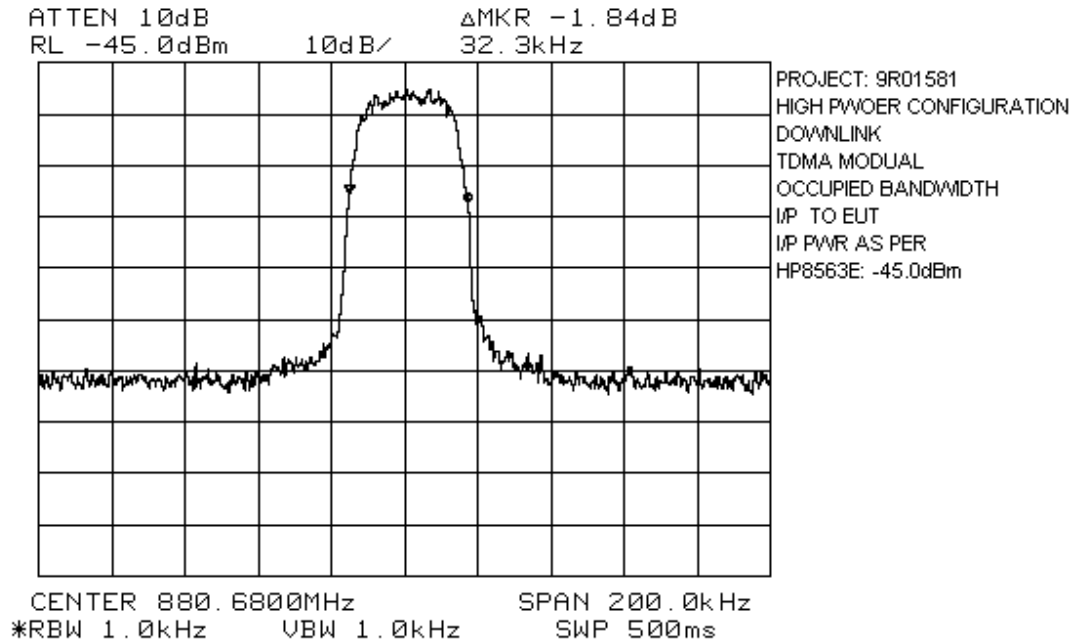
EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801



EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

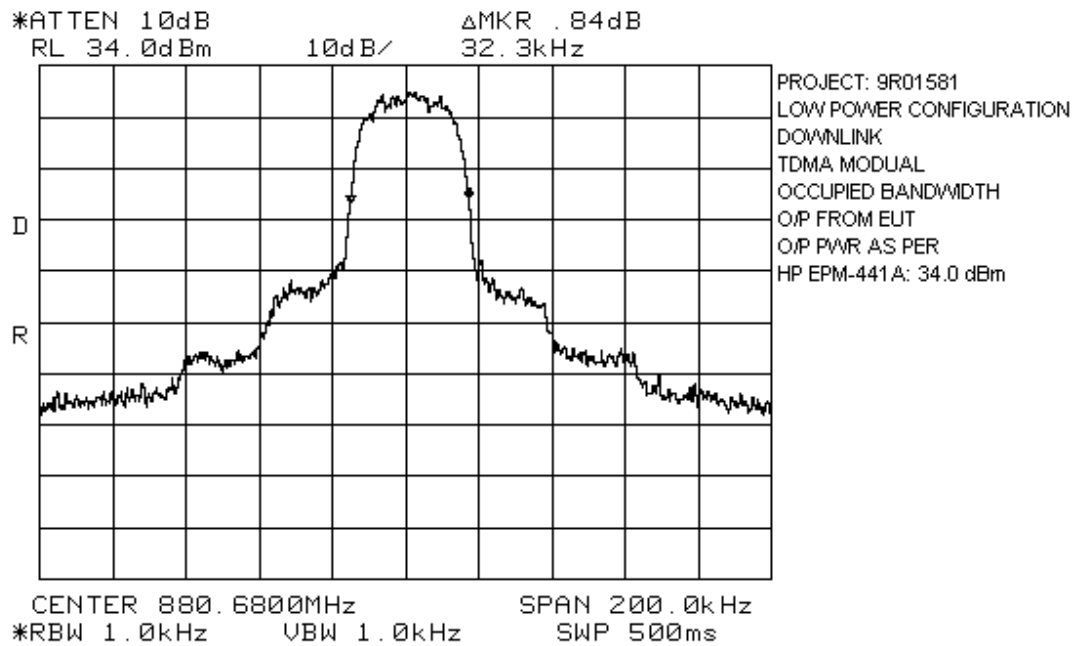


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FCC ID: BCR-RPT-MR801

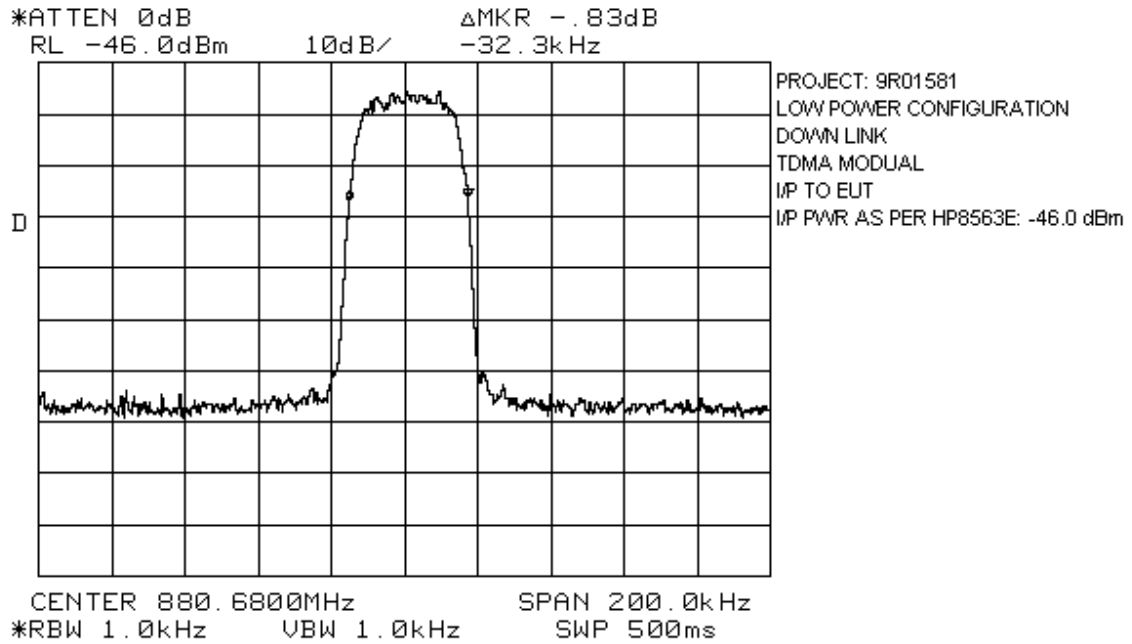


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FCC ID: BCR-RPT-MR801

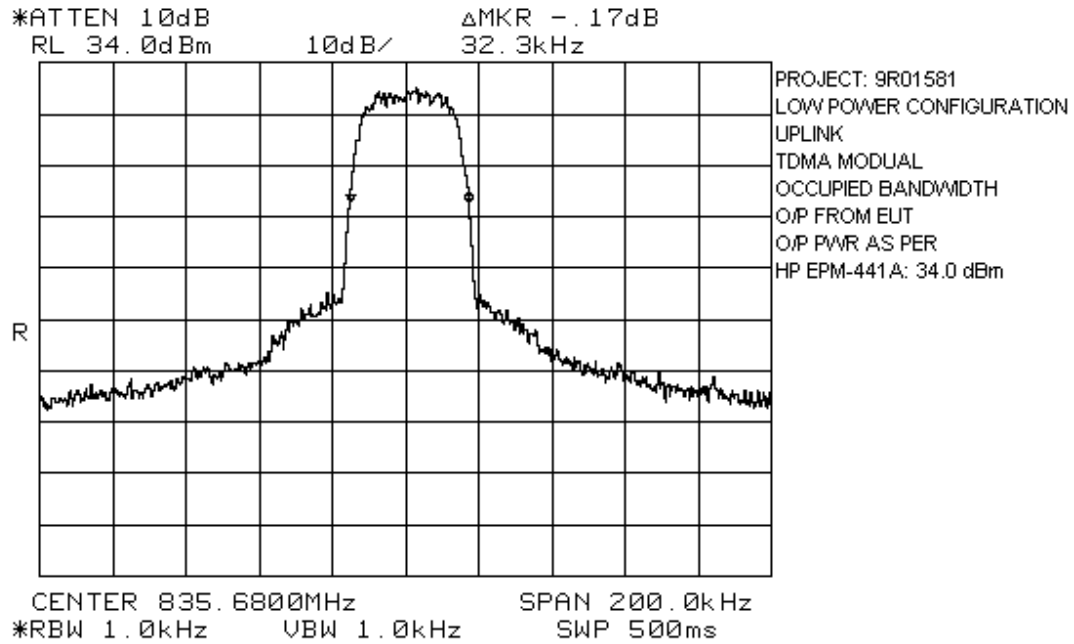
Low Power – TDMA Module



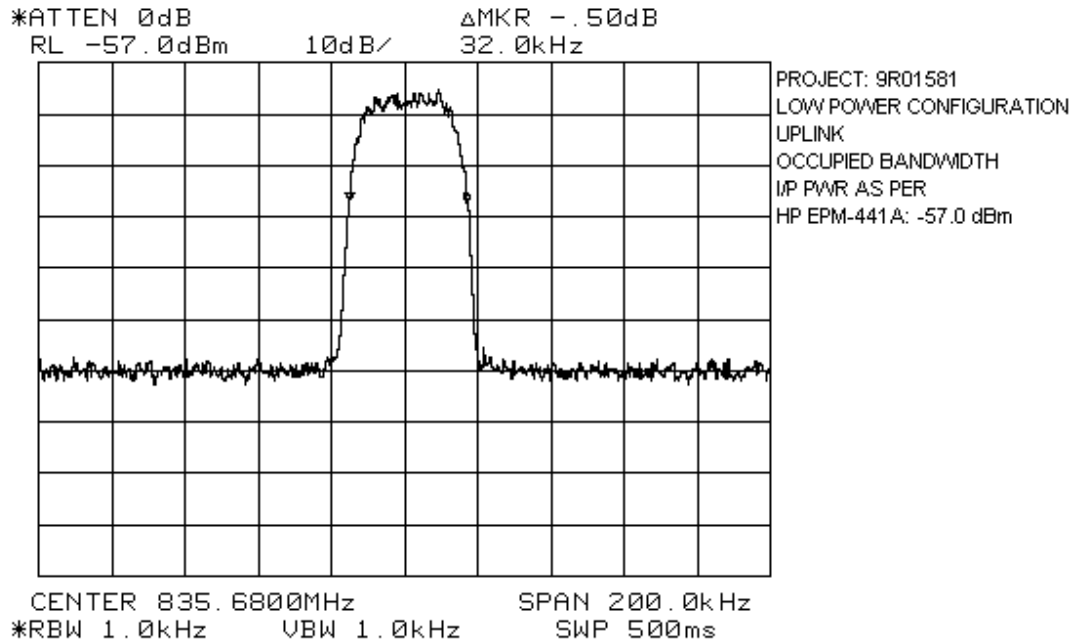
EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801



EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801



EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801



EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

Section 5. Spurious Emissions at Antenna Terminals

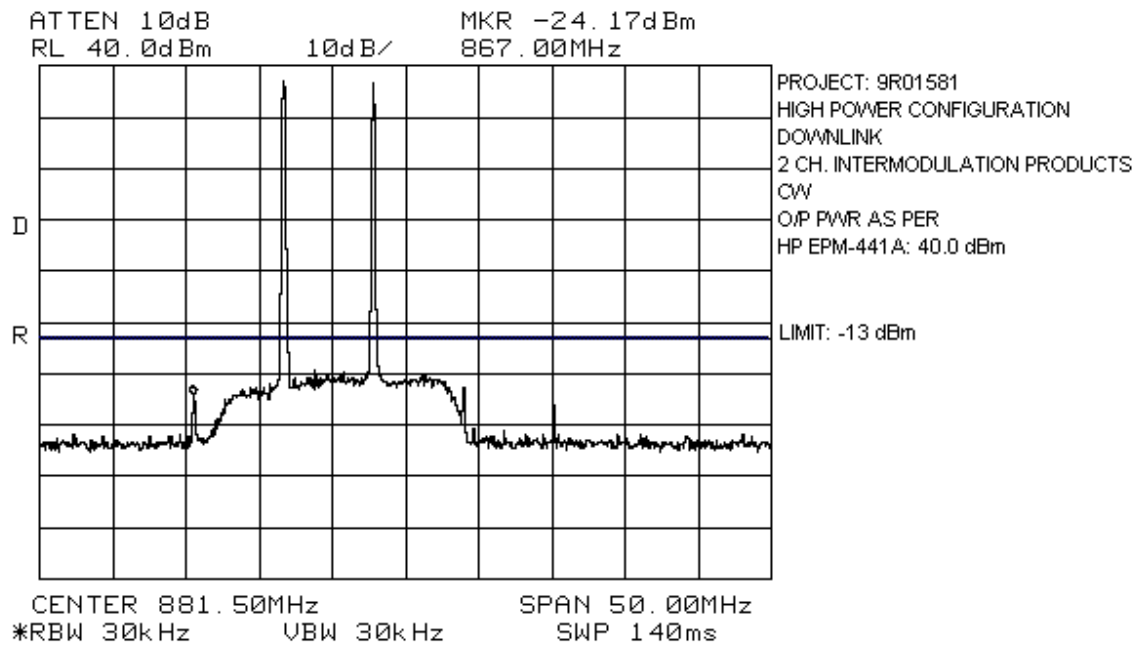
NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.917(e)
TESTED BY: Kevin Carr	DATE: August 11, 1999

Test Results: Complies.**Test Data:**

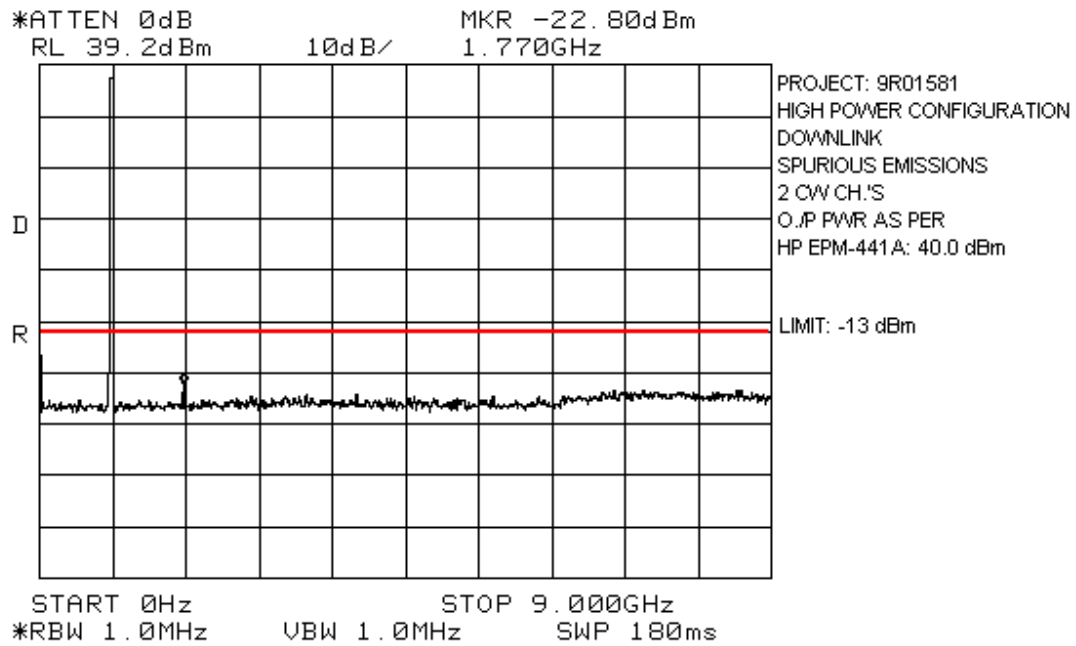
NAME OF TEST	WORST-CASE SPURIOUS LEVEL(dBm)
0 to 10 GHz spurious (Uplink)	-22.97
0 to 10 GHz spurious (Downlink)	-21.23
2 - signal intermodulation (Uplink)	-13.00
2 - signal intermodulation (Downlink)	-13.00
Lower band edge spurious (Uplink)	-13.17
Lower band edge spurious (Downlink)	-13.00
Upper band edge spurious (Uplink)	-13.10
Upper band edge spurious (Downlink)	-13.00

EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

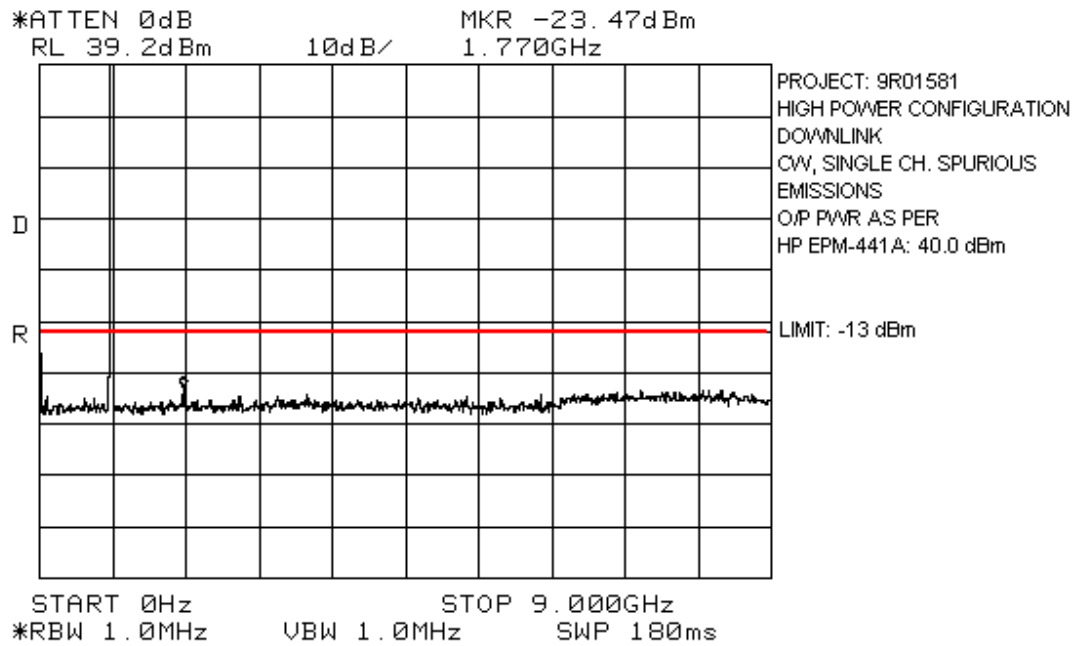
High Power – Variable Bandwidth Module



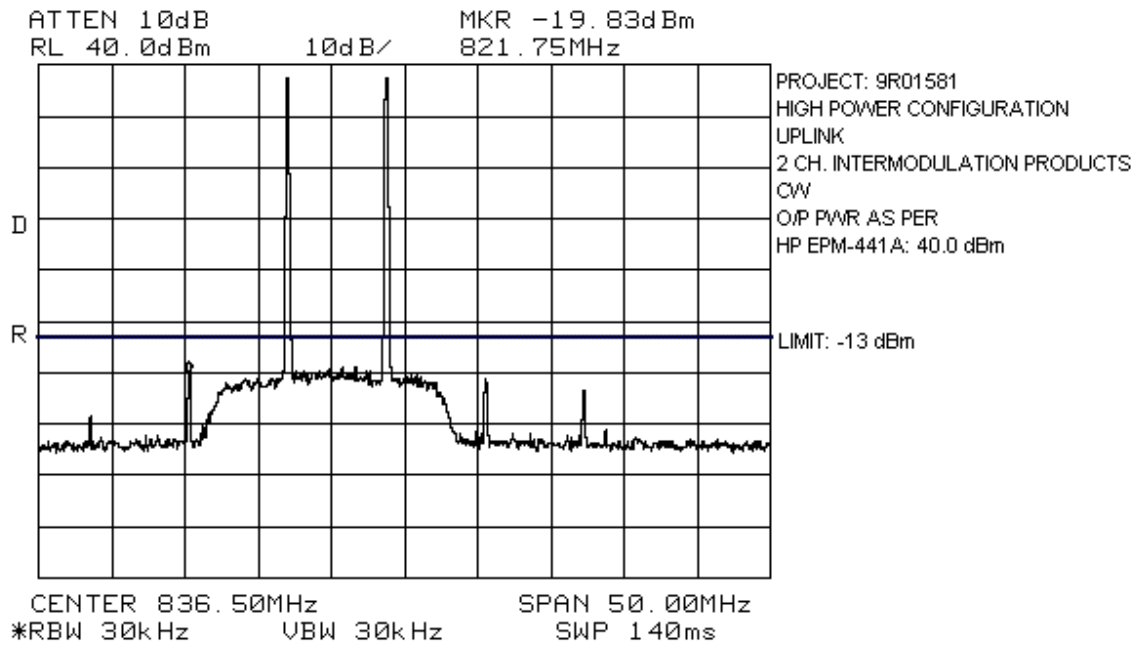
EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801



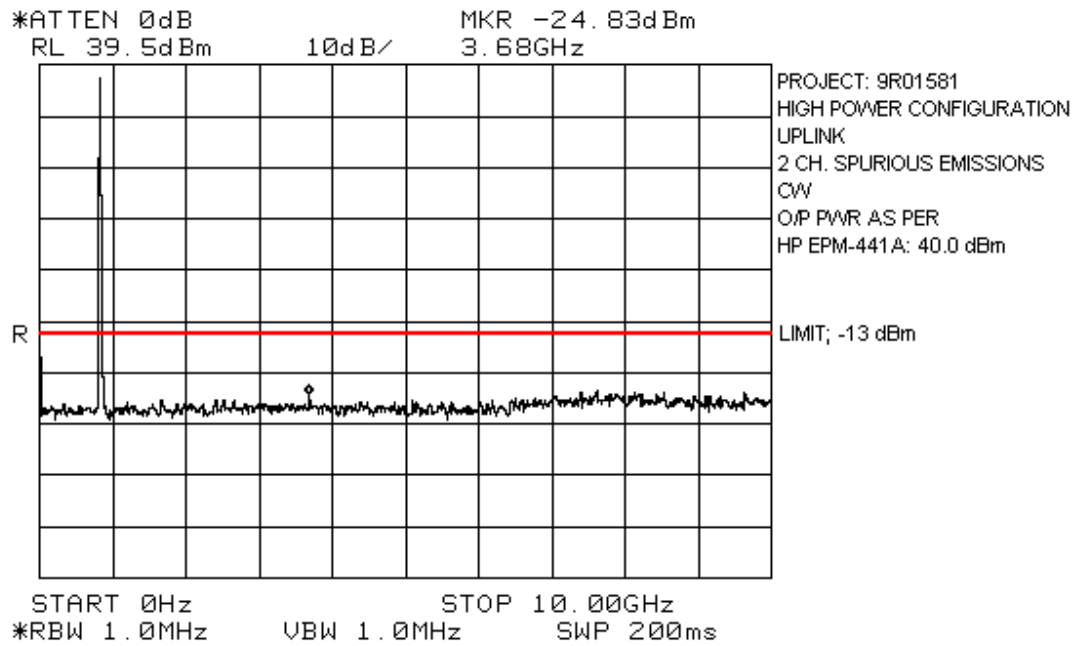
EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801



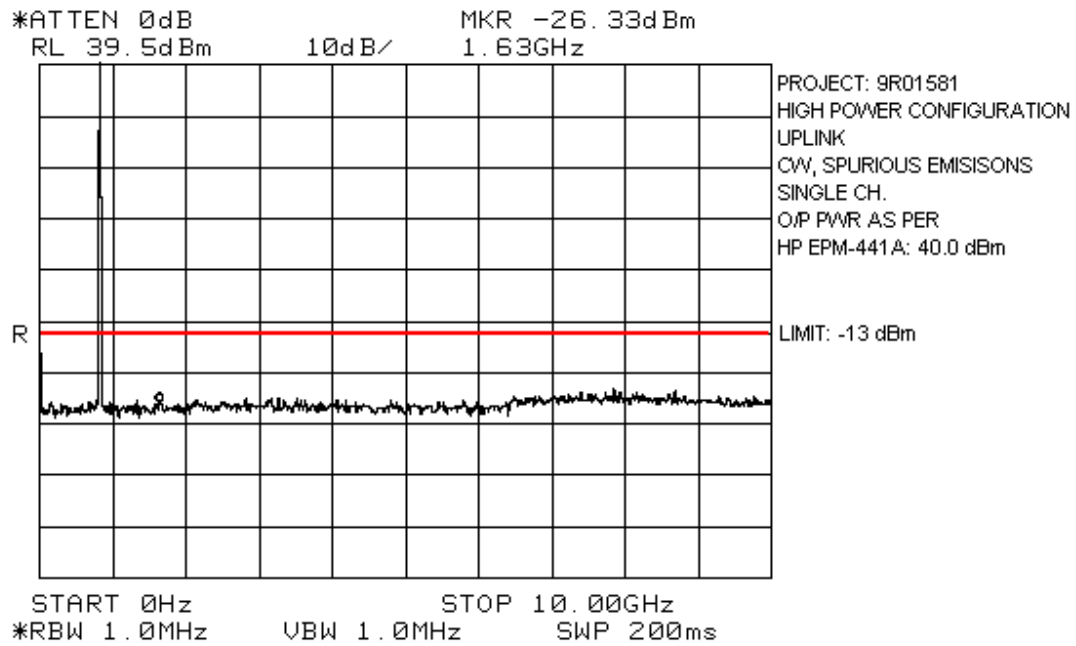
EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801



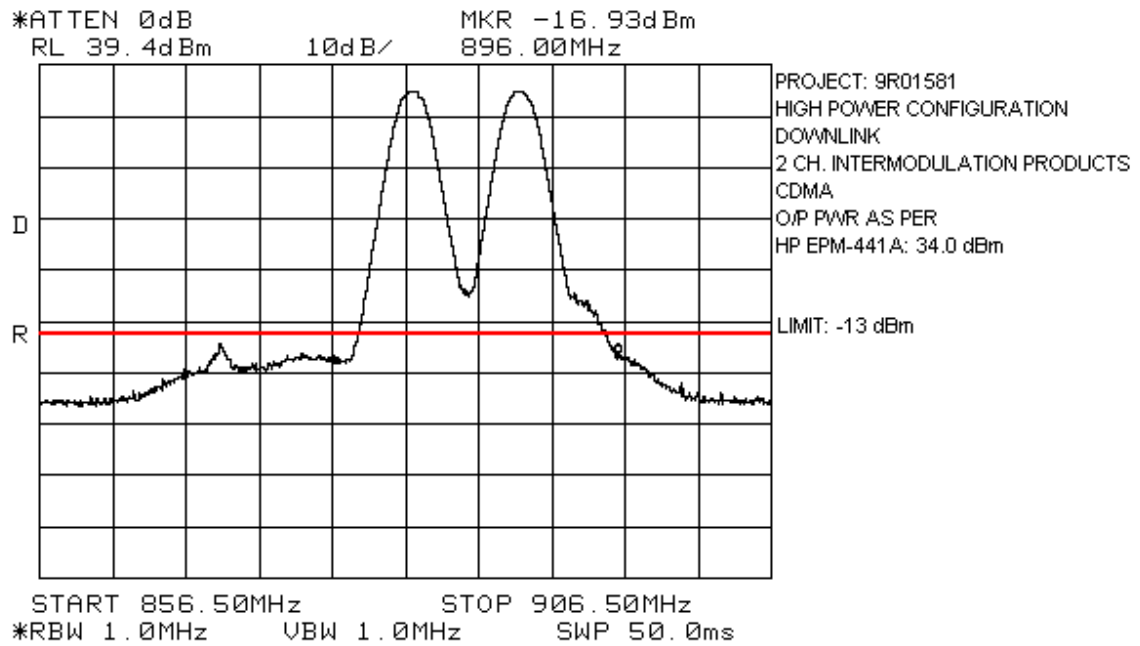
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FCC ID: BCR-RPT-MR801



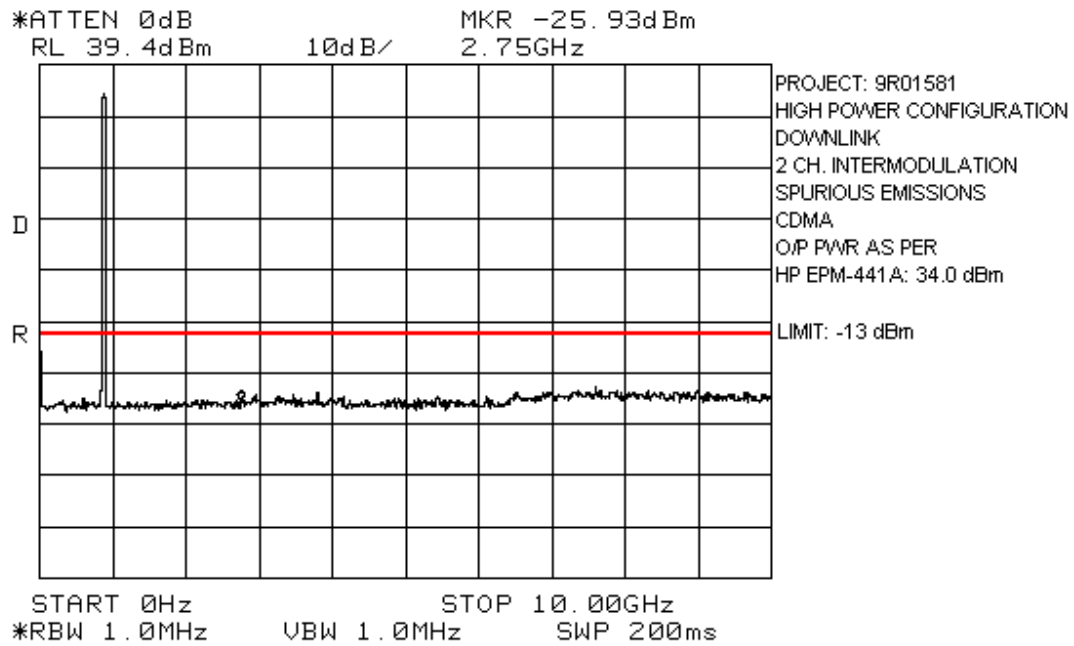
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FCC ID: BCR-RPT-MR801



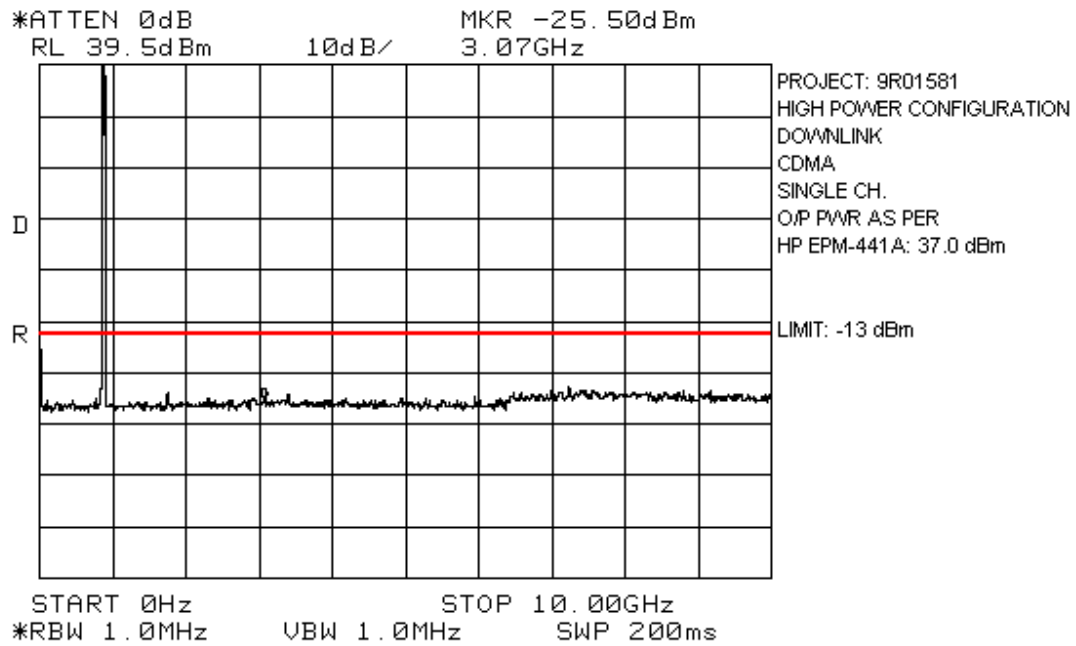
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FCC ID: BCR-RPT-MR801



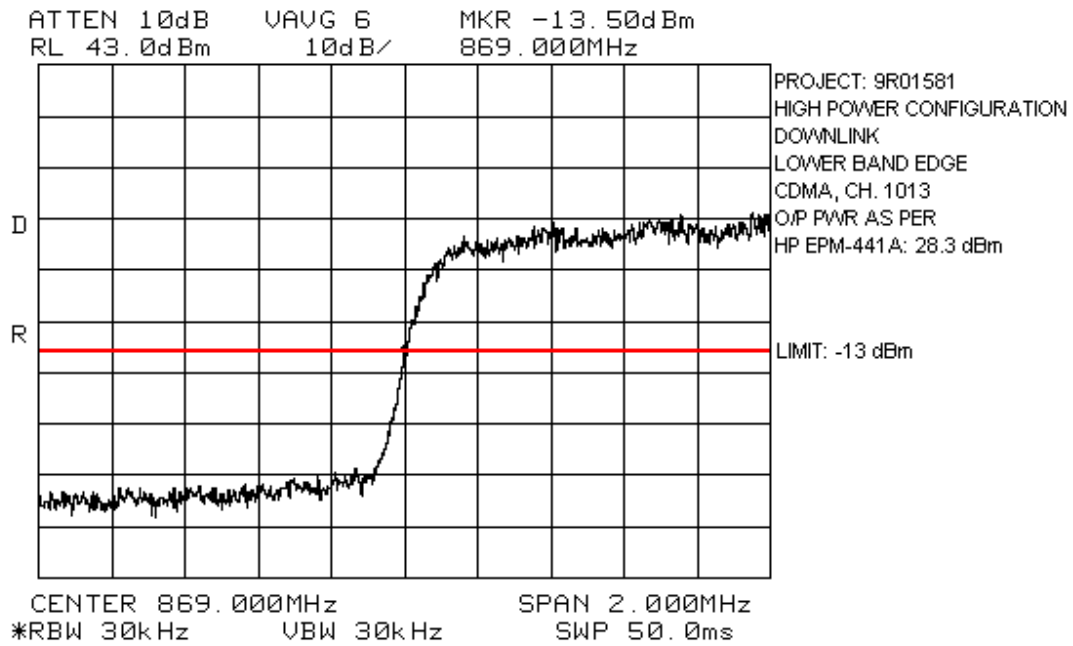
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FCC ID: BCR-RPT-MR801



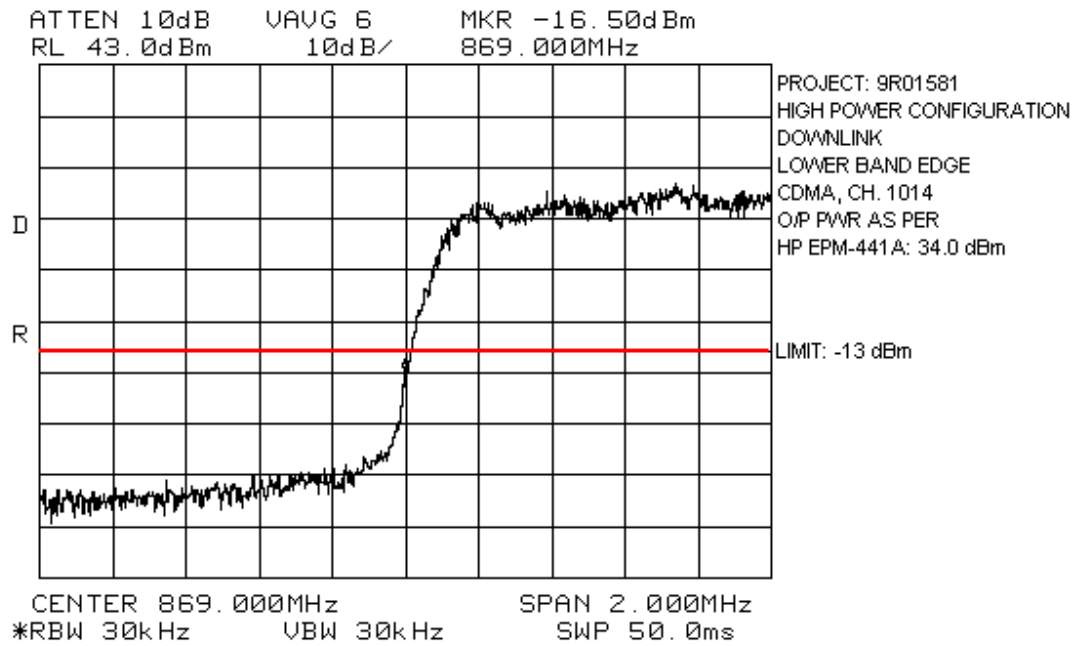
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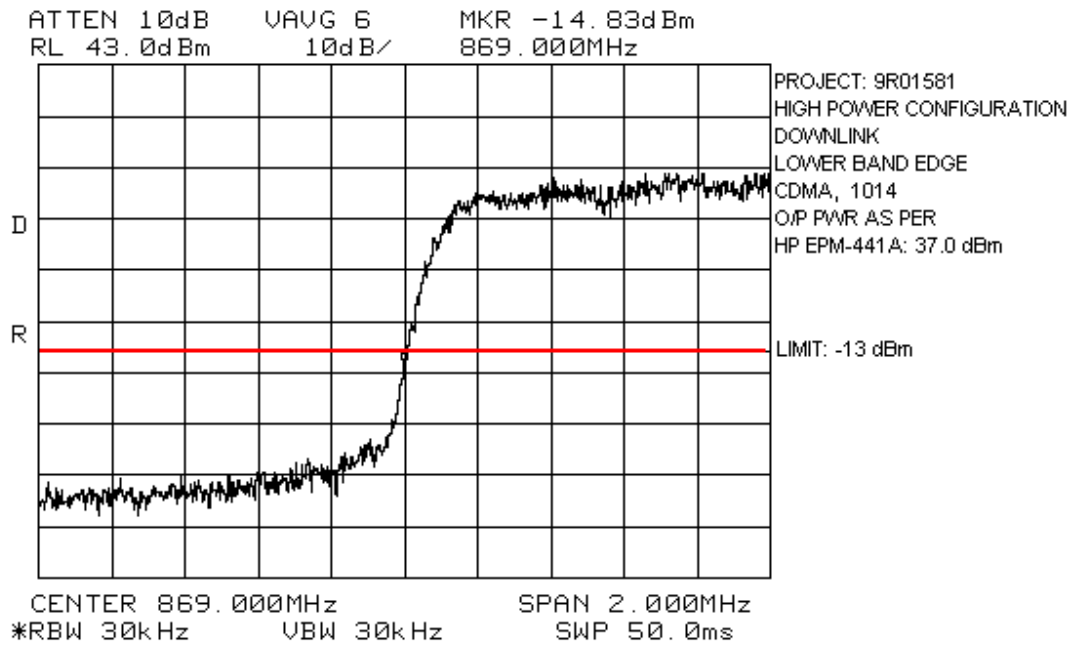
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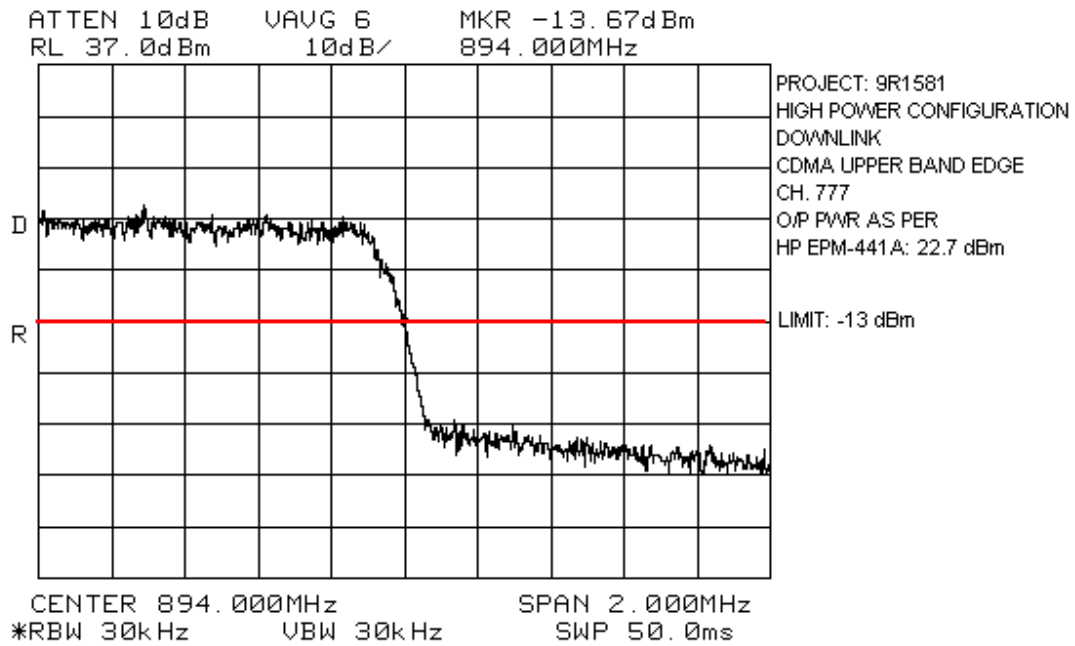
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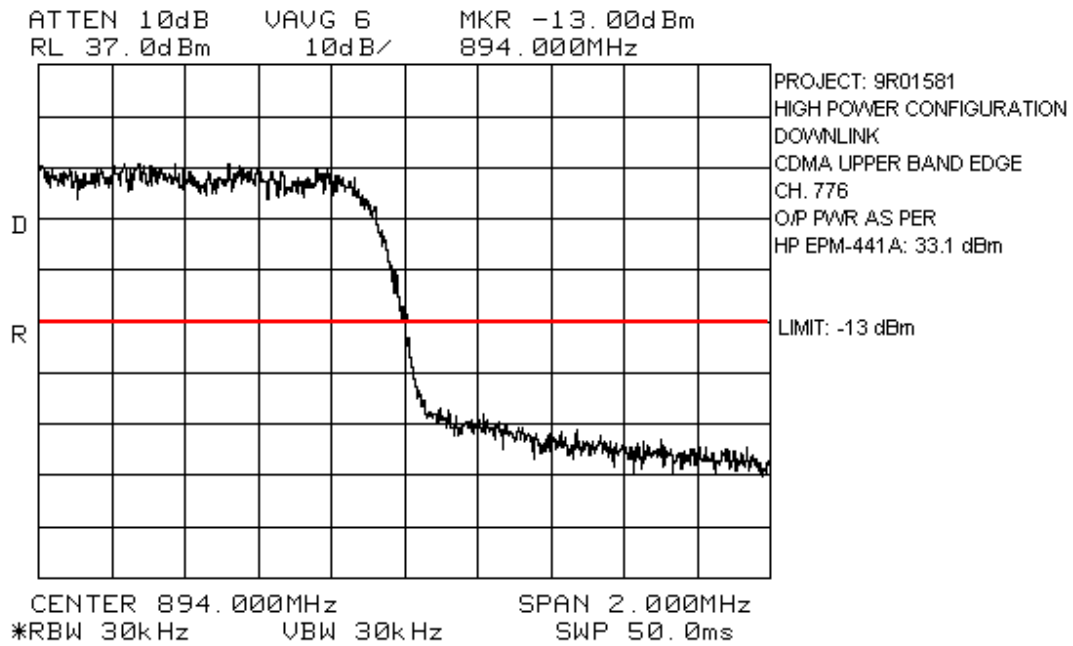
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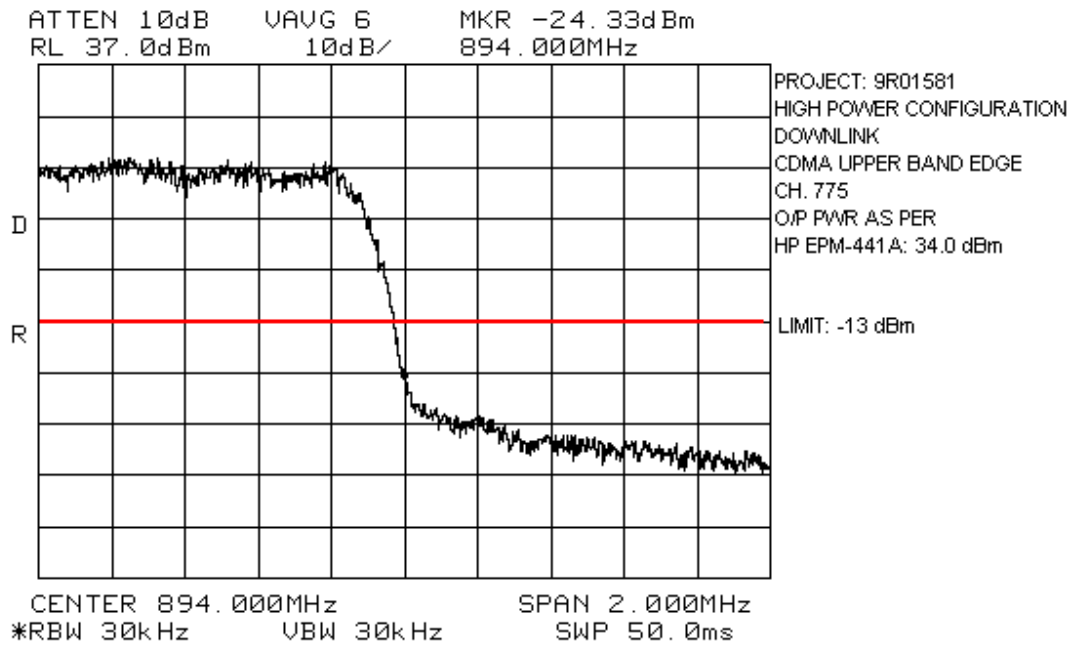
EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801



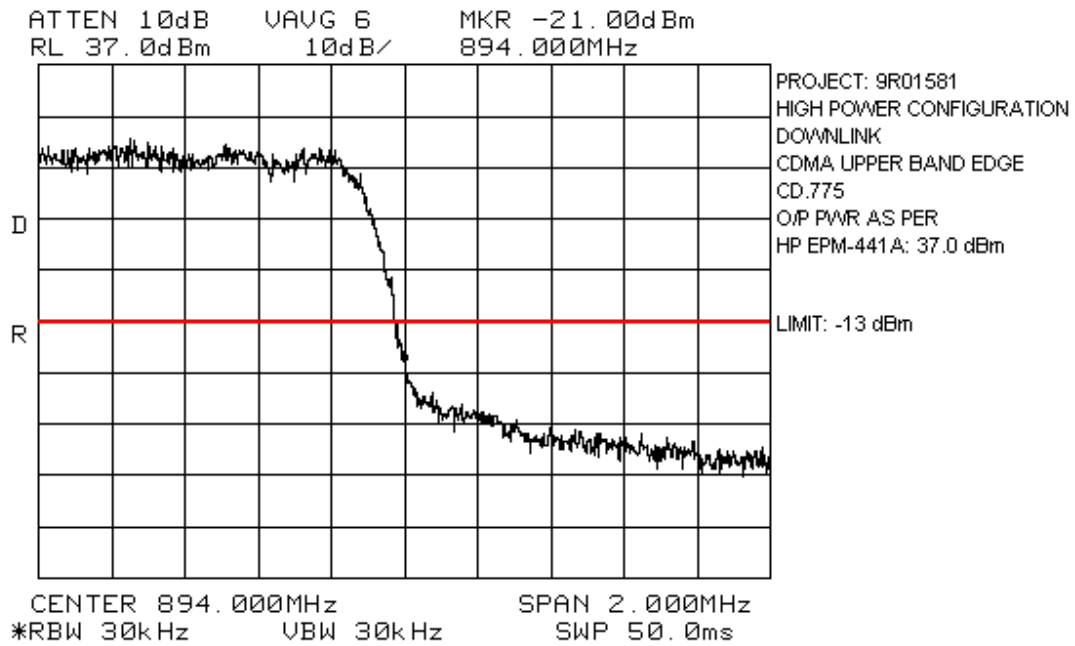
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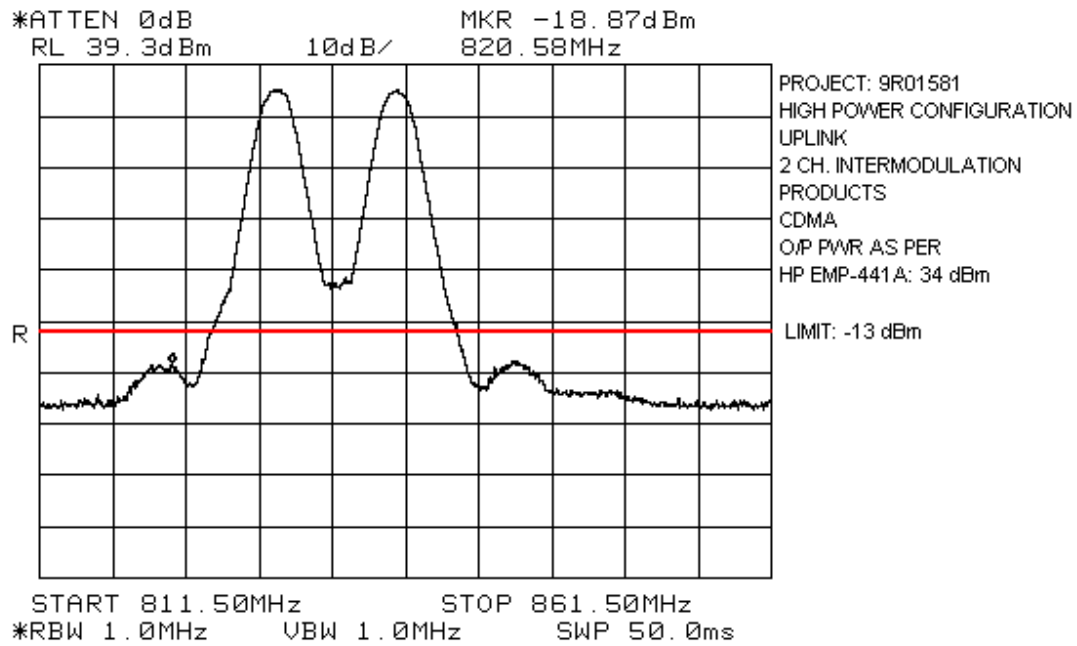
EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801



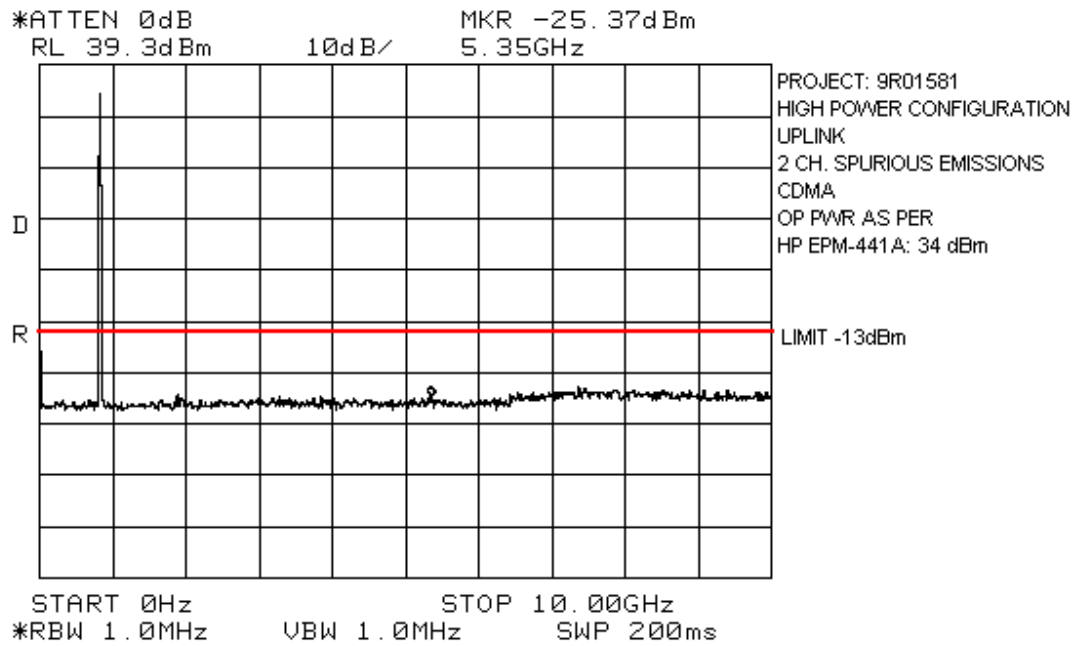
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FCC ID: BCR-RPT-MR801



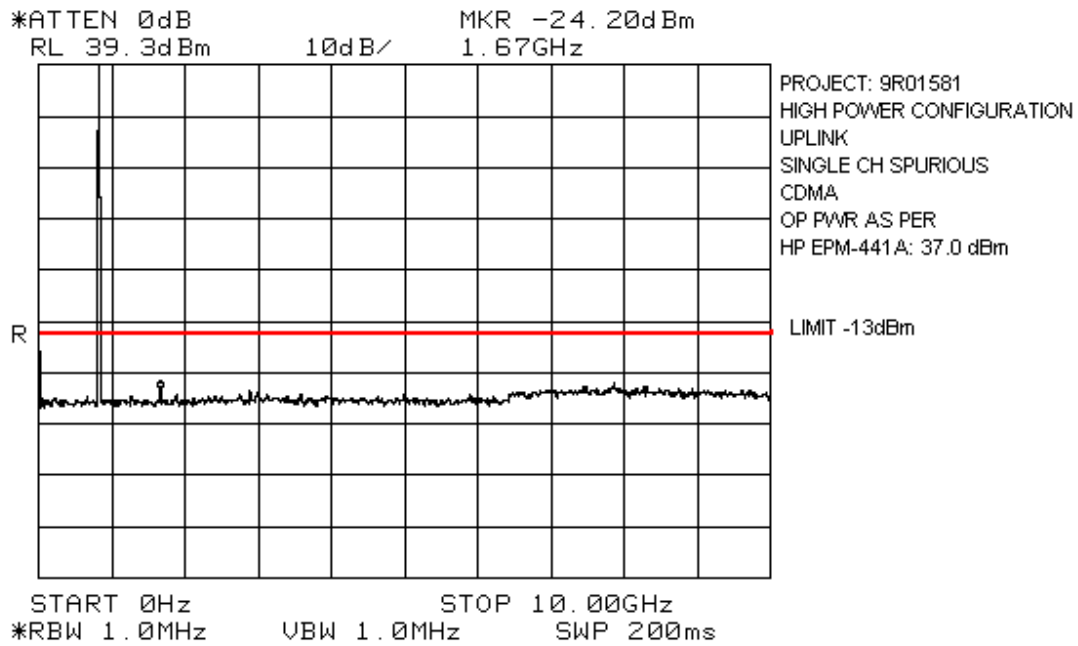
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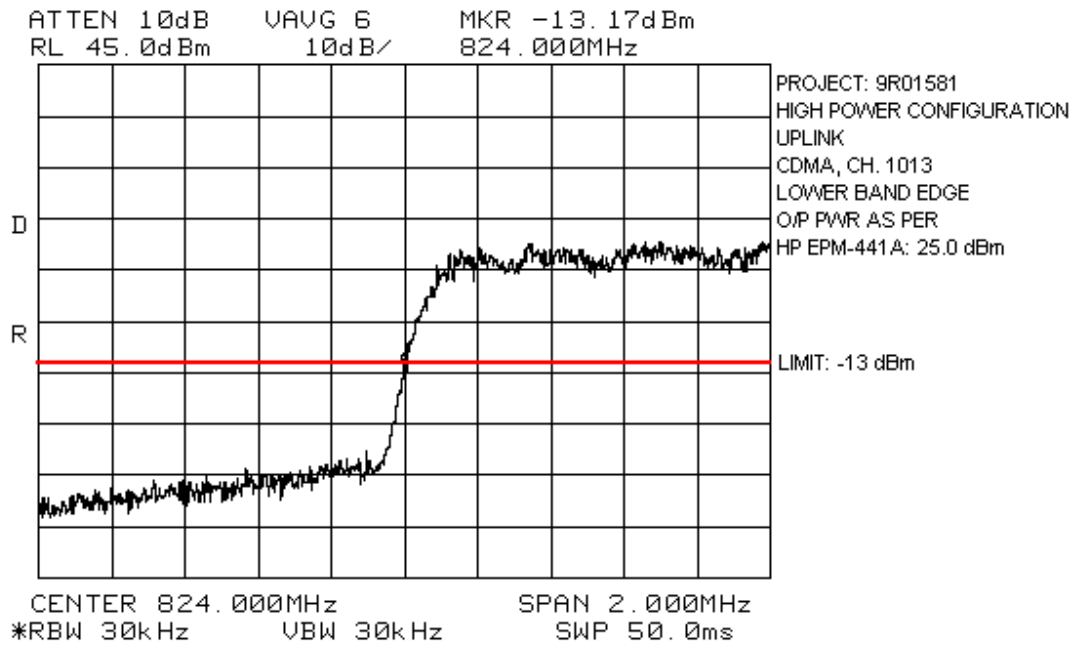
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FCC ID: BCR-RPT-MR801



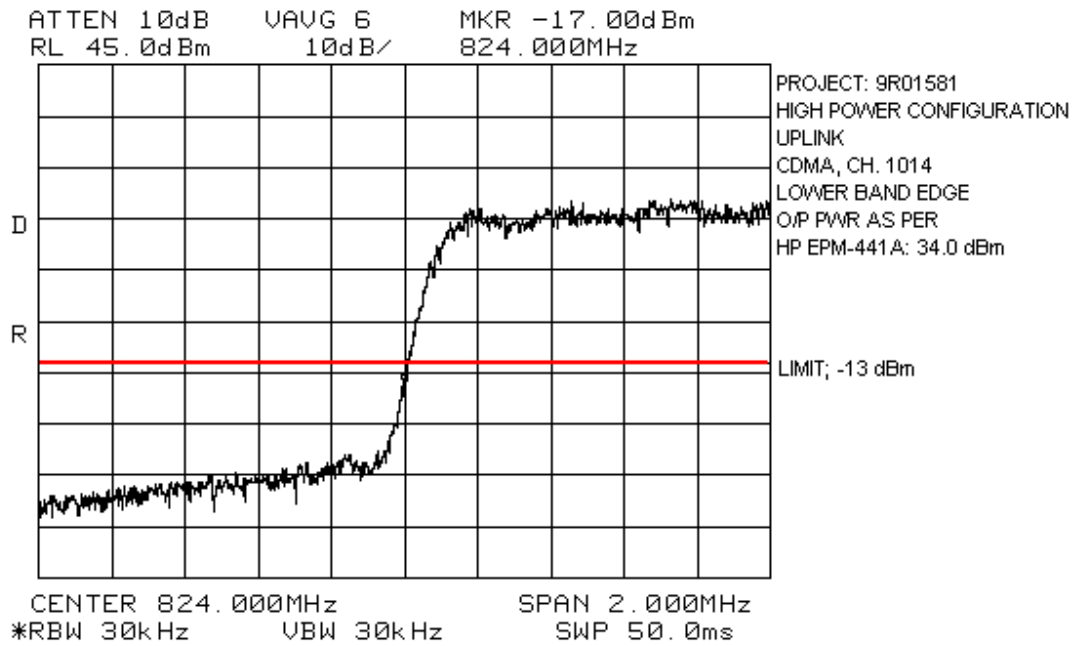
EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801



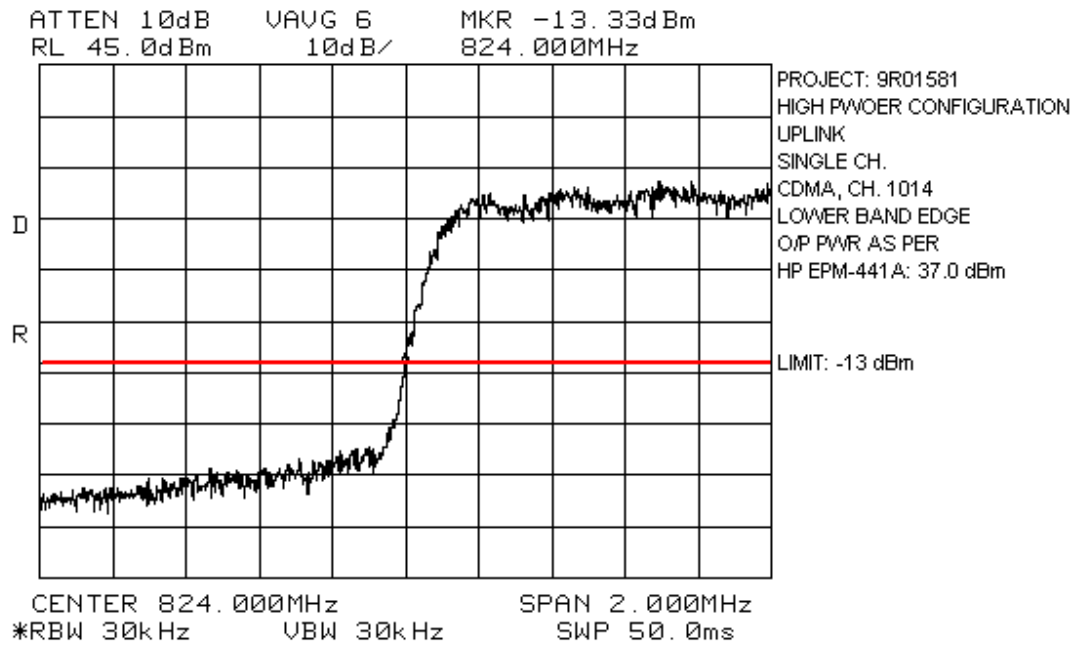
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FCC ID: BCR-RPT-MR801



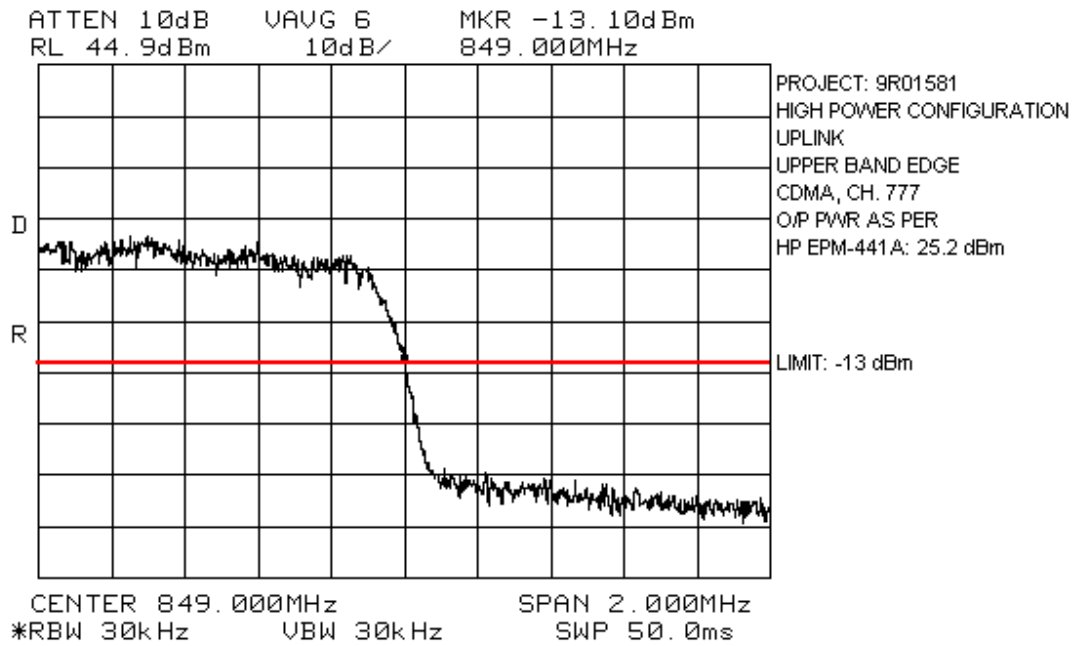
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FCC ID: BCR-RPT-MR801



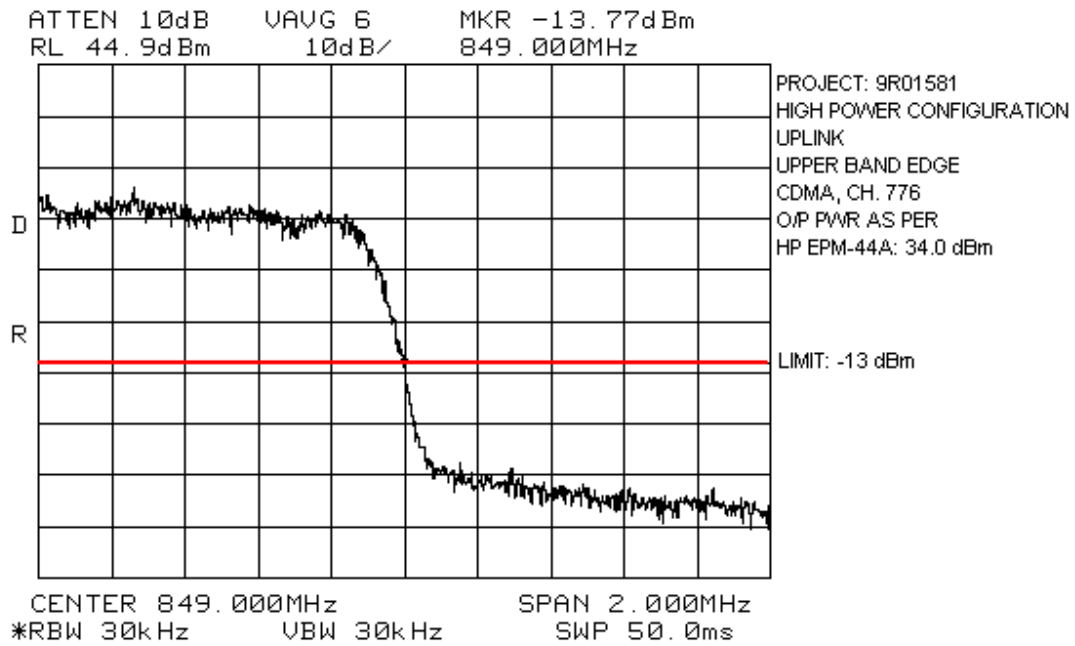
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FCC ID: BCR-RPT-MR801



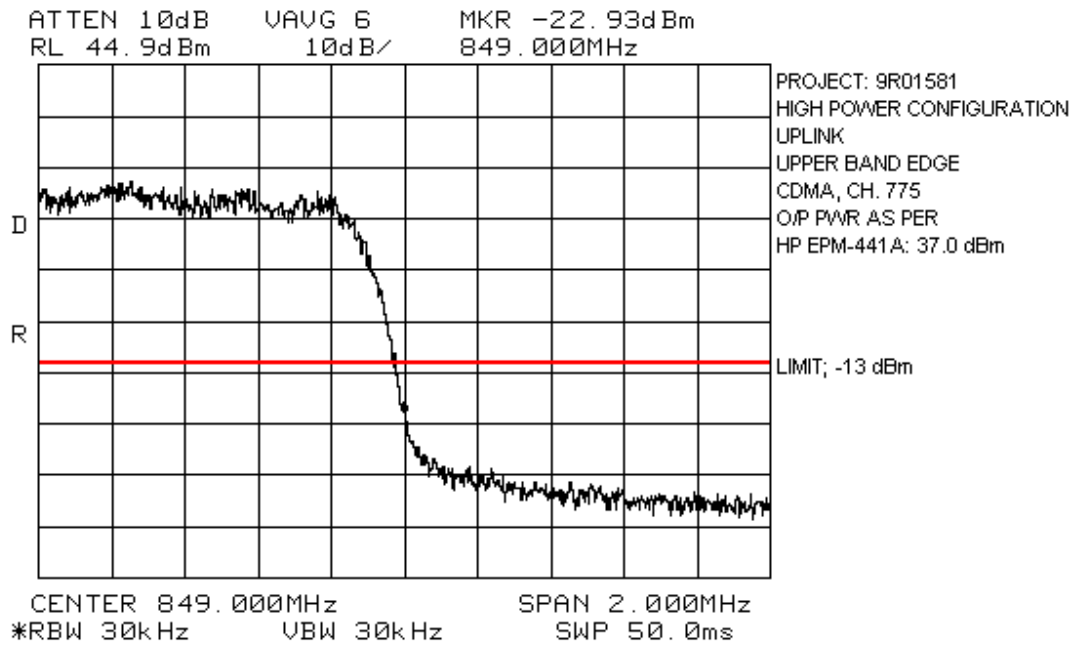
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FCC ID: BCR-RPT-MR801



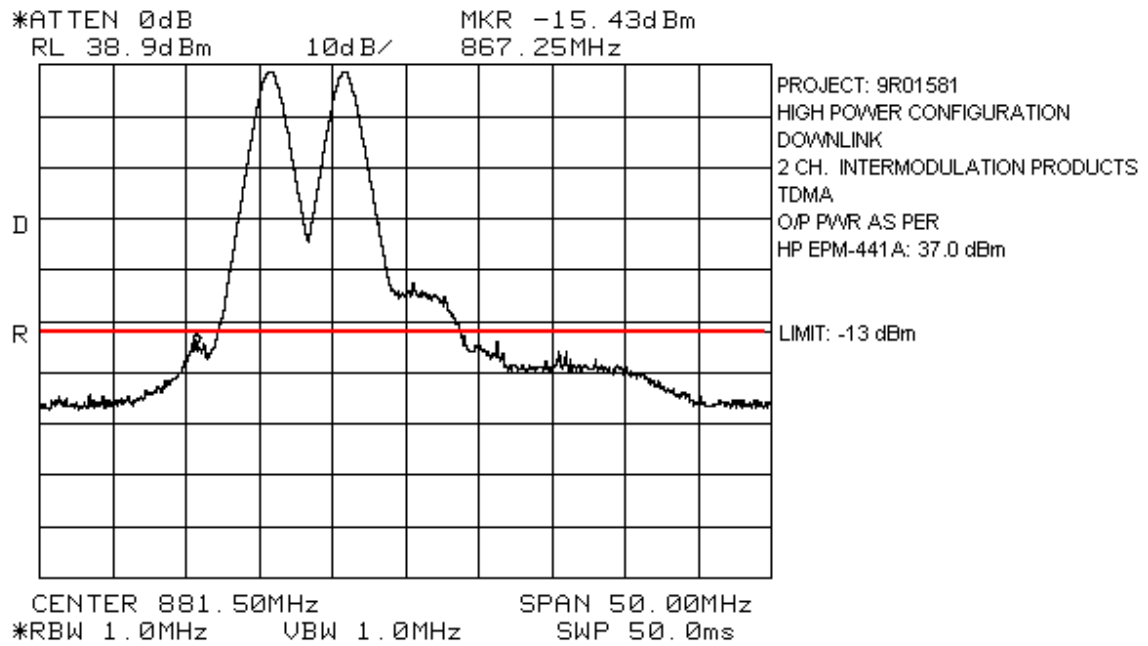
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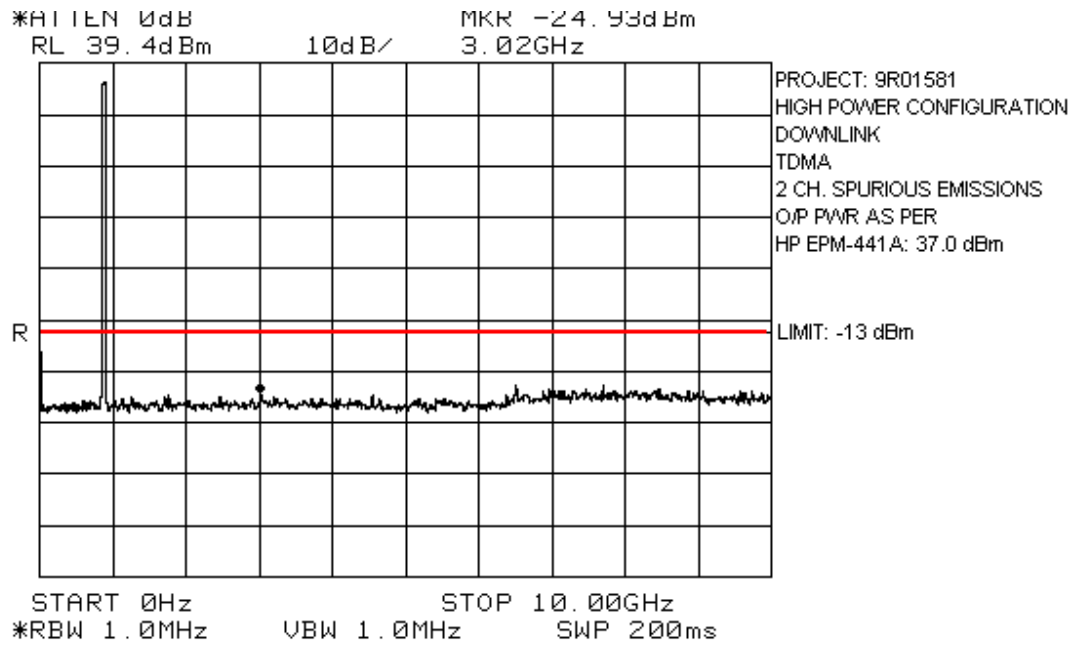
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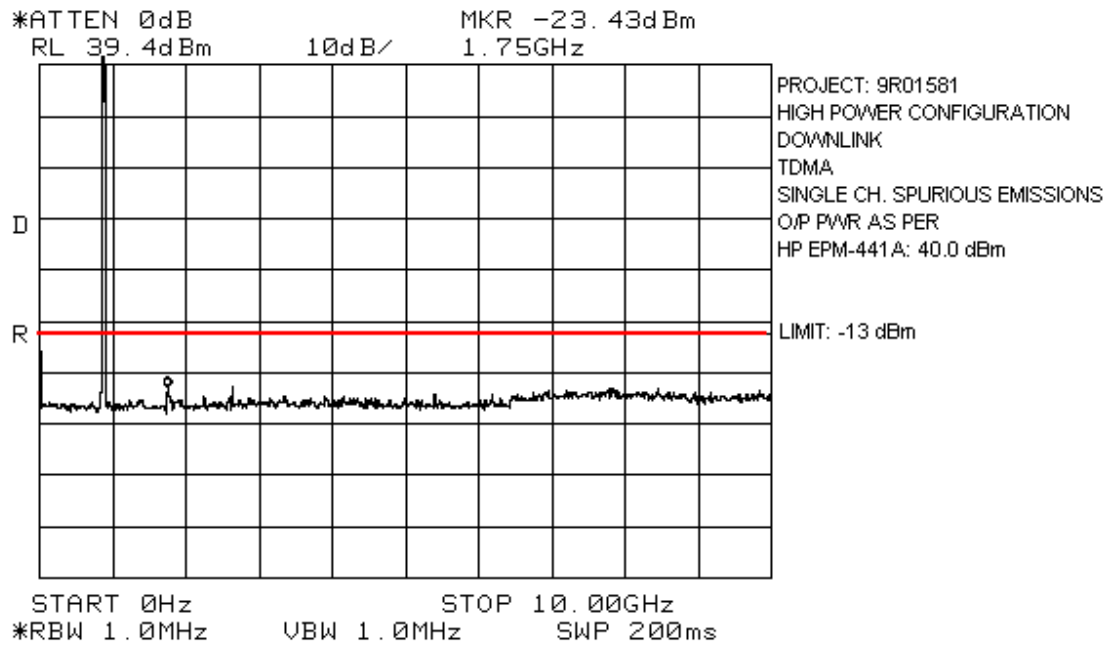
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FCC ID: BCR-RPT-MR801



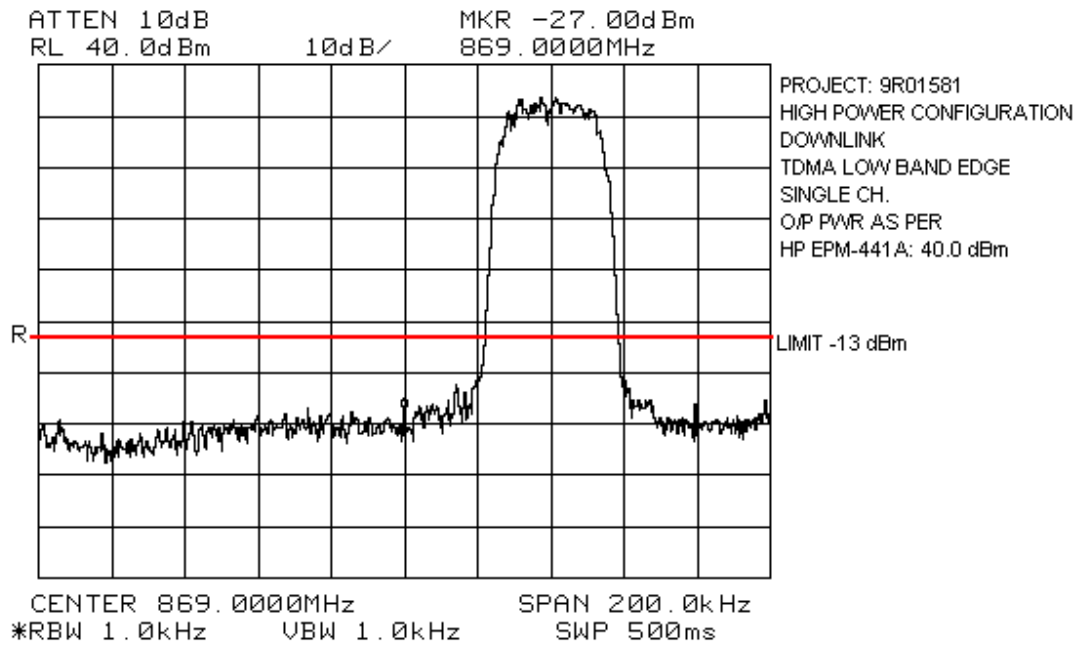
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FCC ID: BCR-RPT-MR801



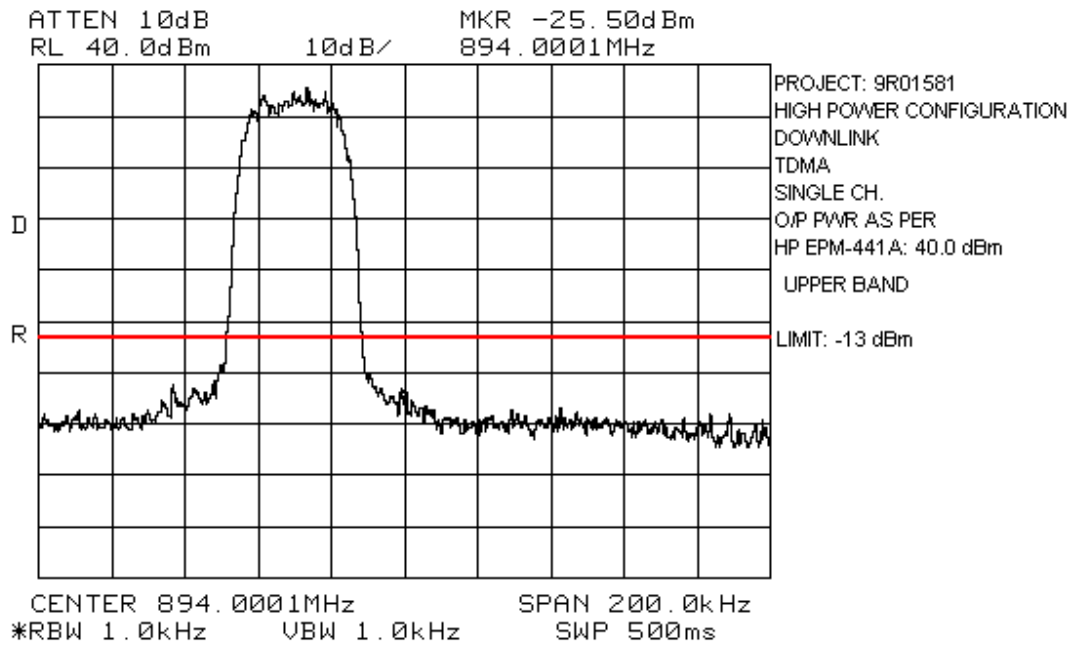
EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801



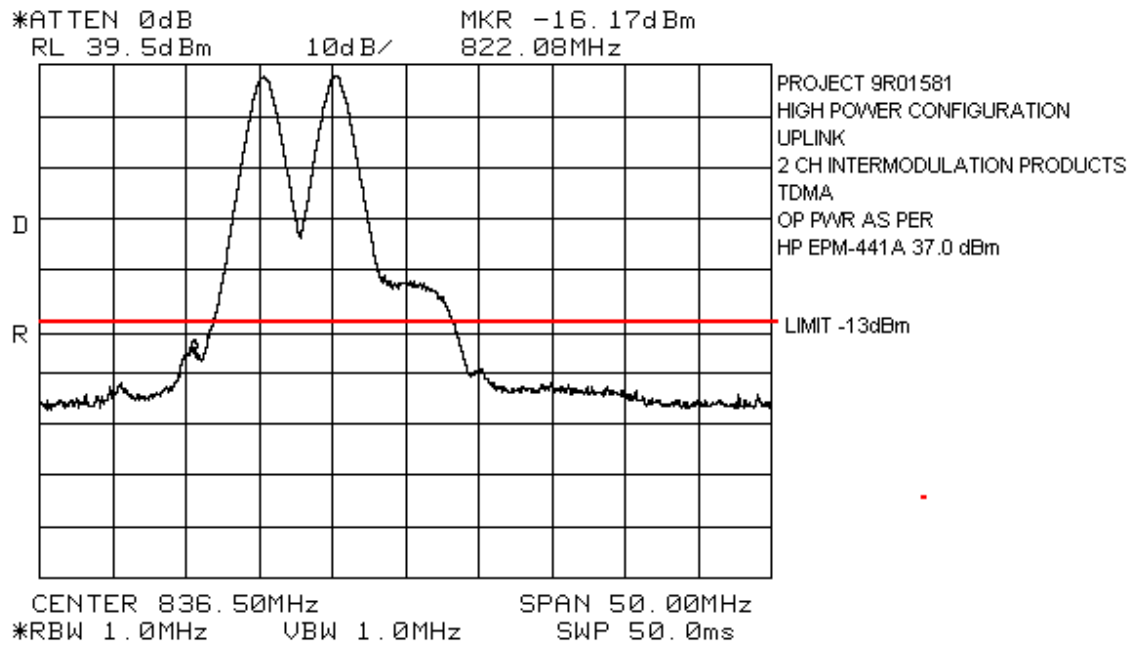
EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801



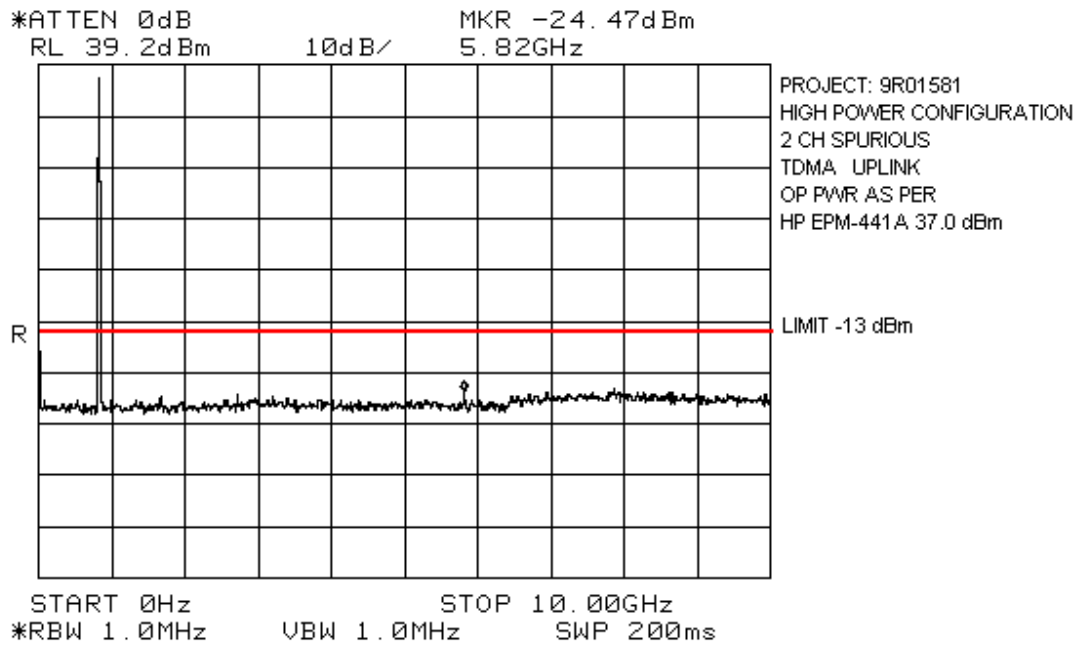
EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801



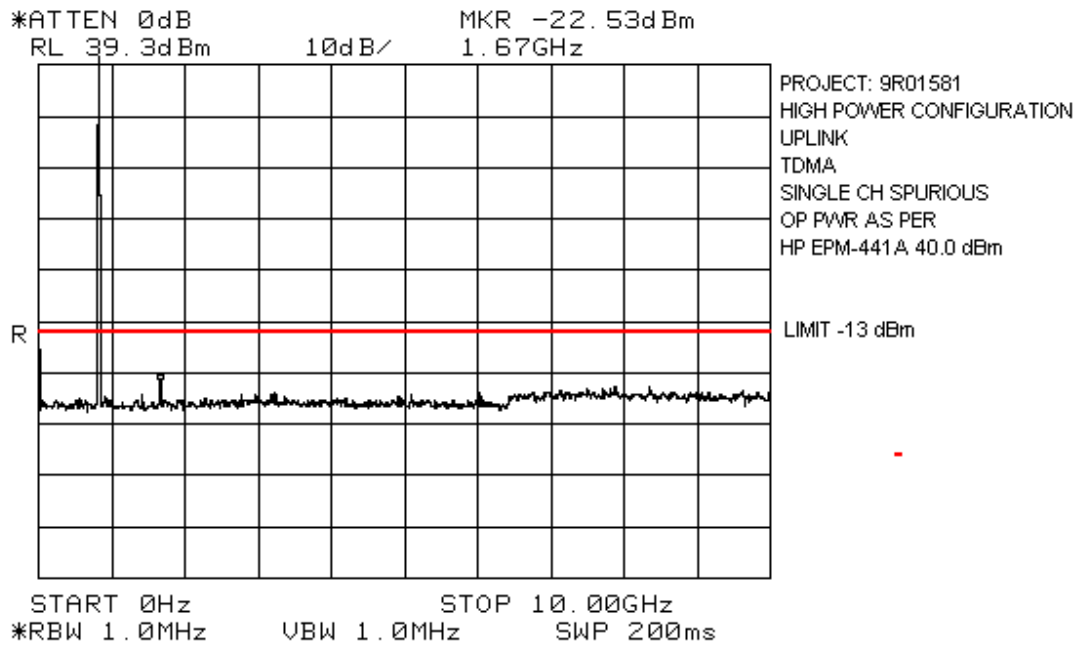
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FCC ID: BCR-RPT-MR801



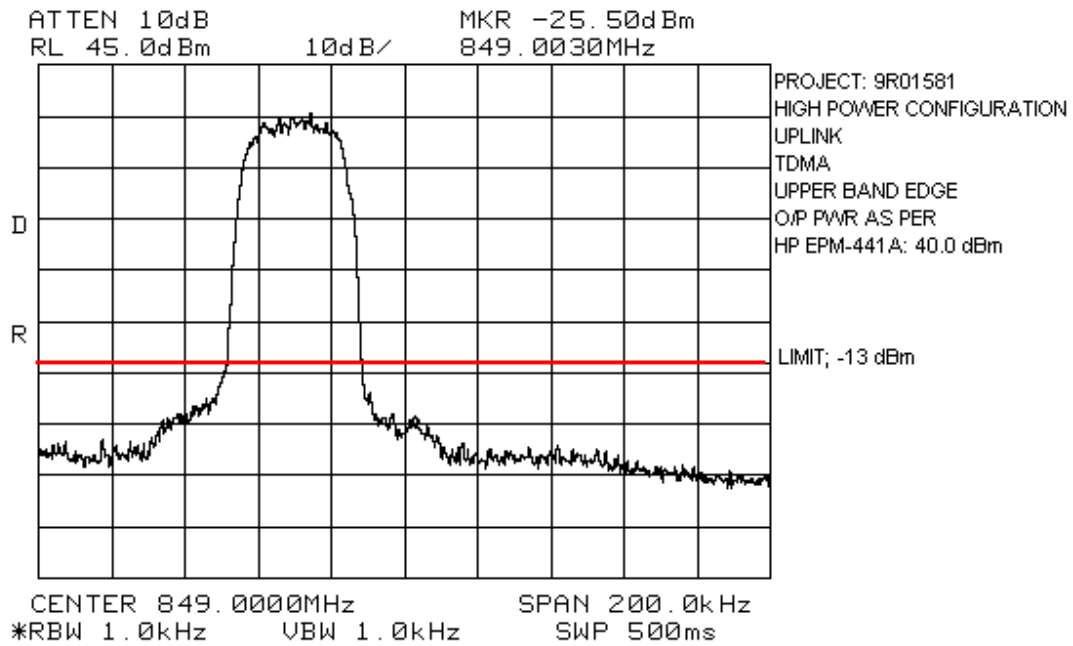
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FCC ID: BCR-RPT-MR801



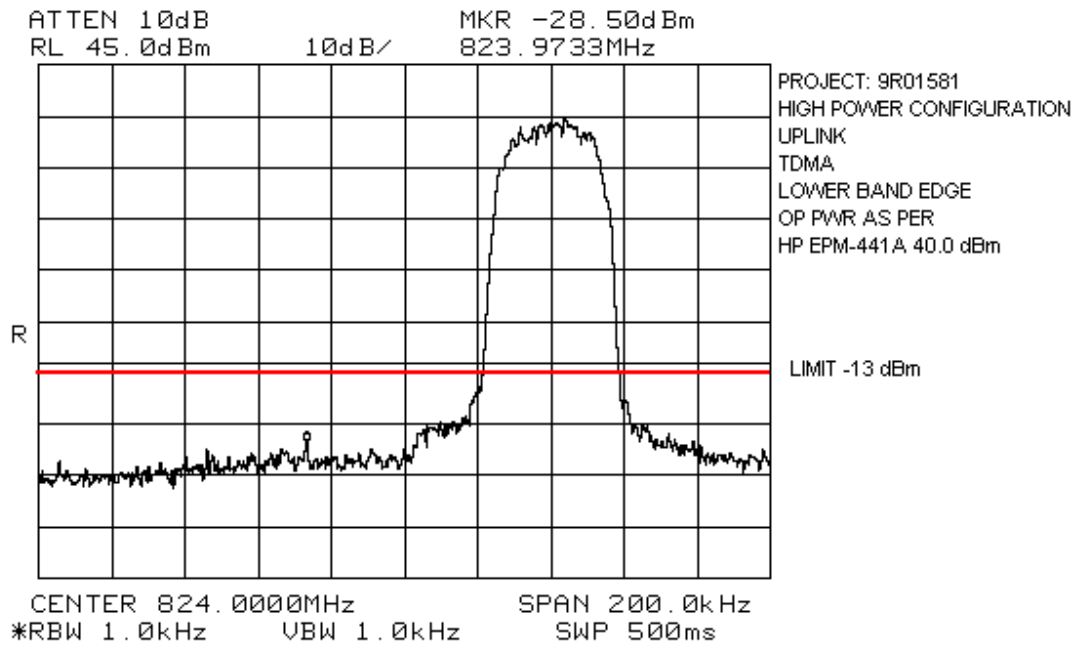
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EQUIPMENT: MR801 Cellular Repeater
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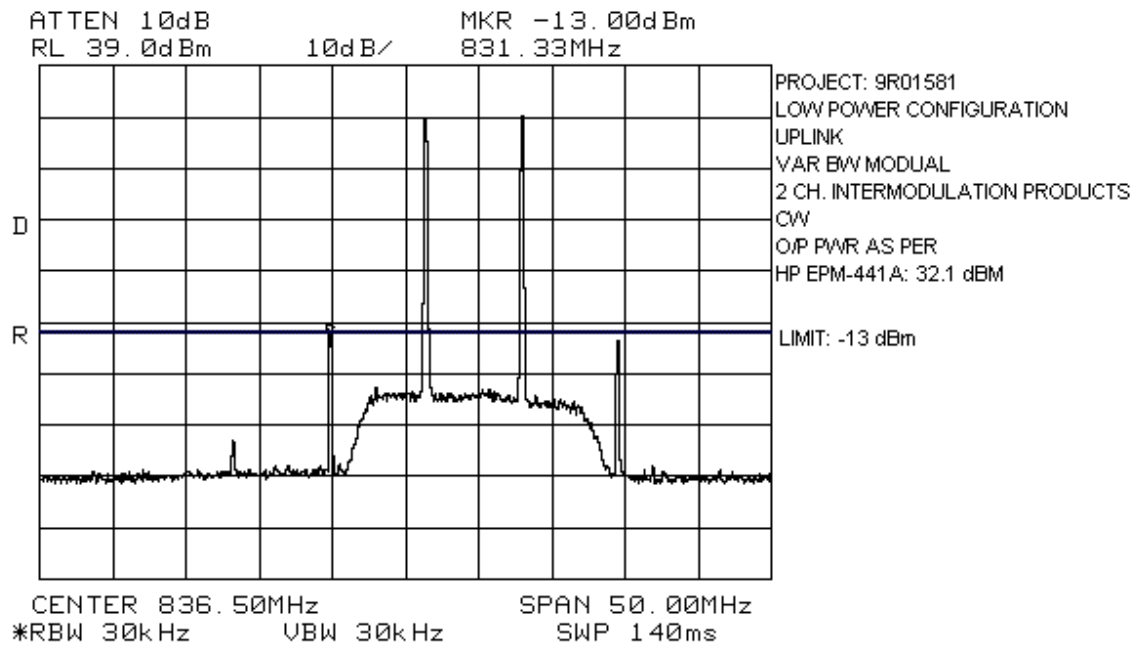


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FCC ID: BCR-RPT-MR801

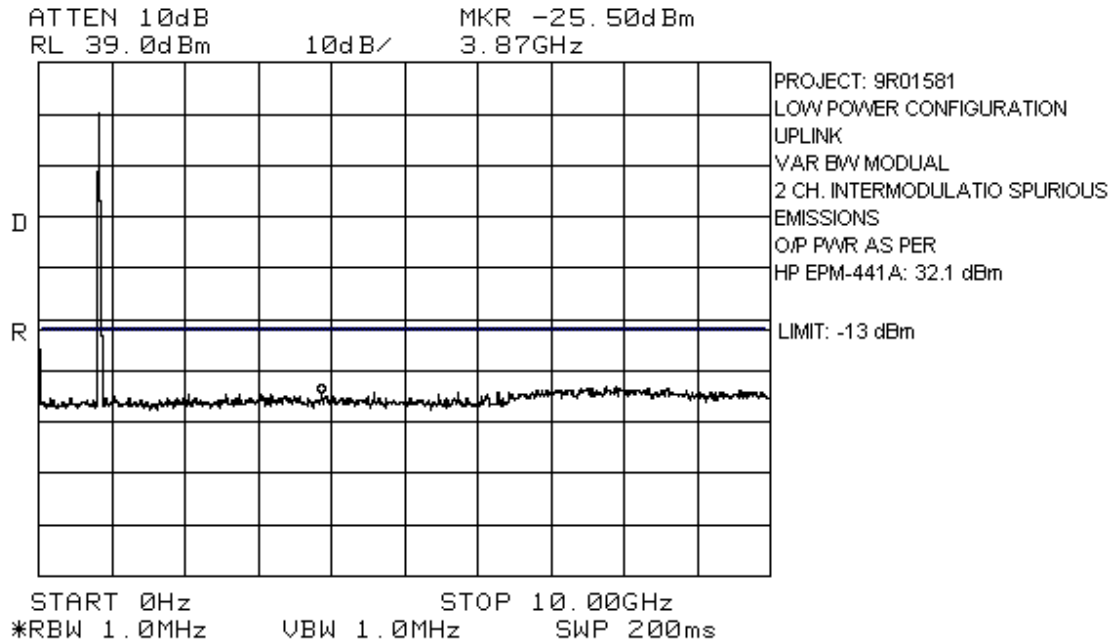


EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

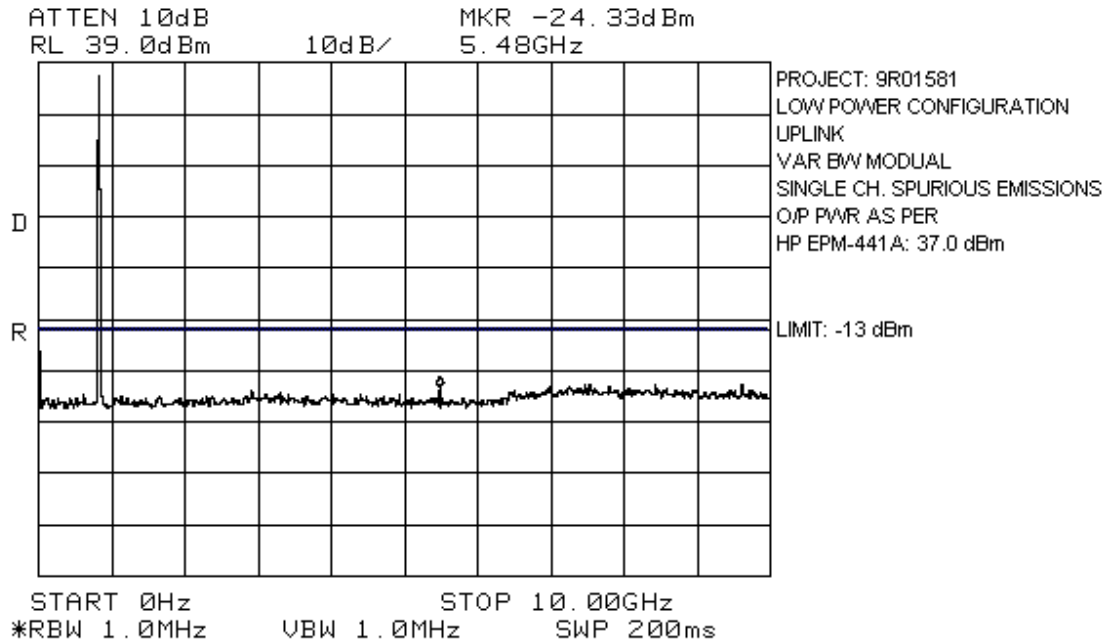
Low Power – Variable Bandwidth Module



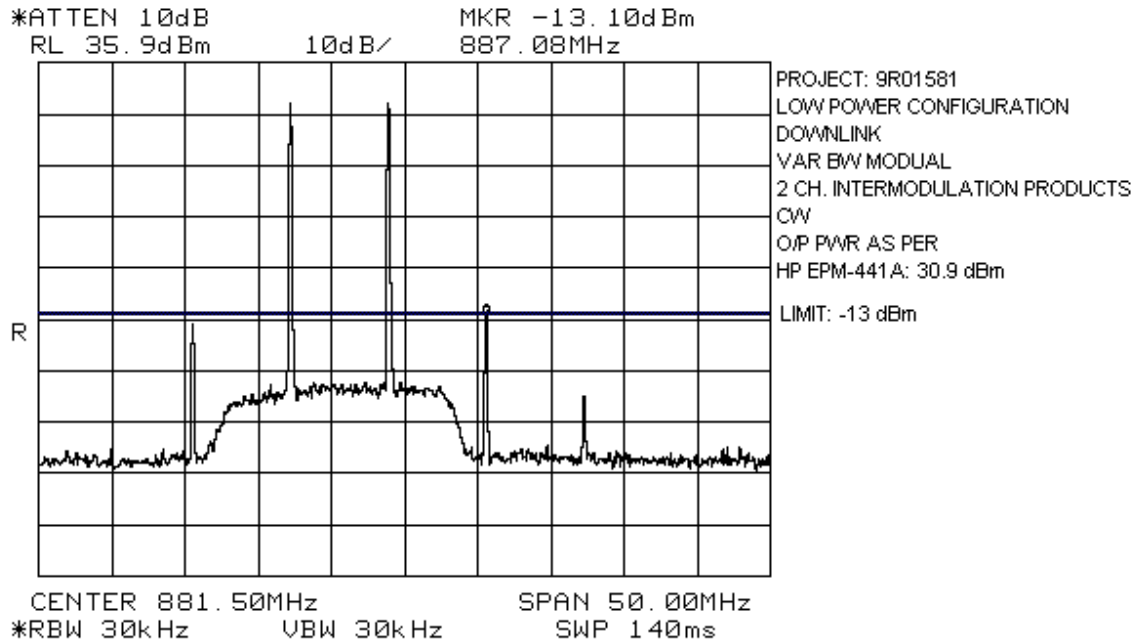
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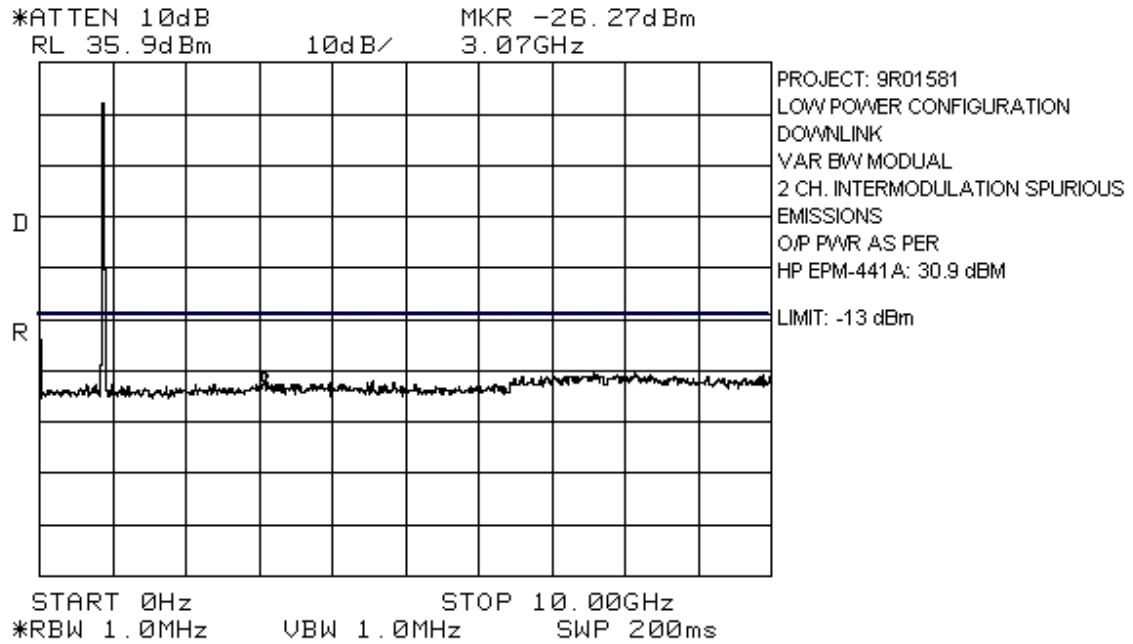
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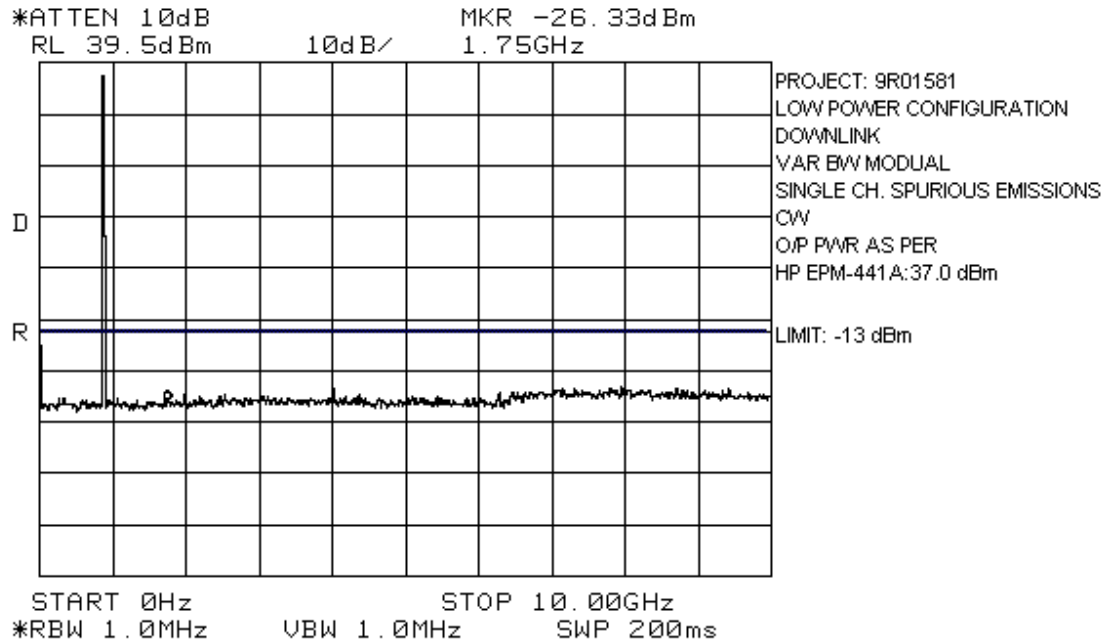
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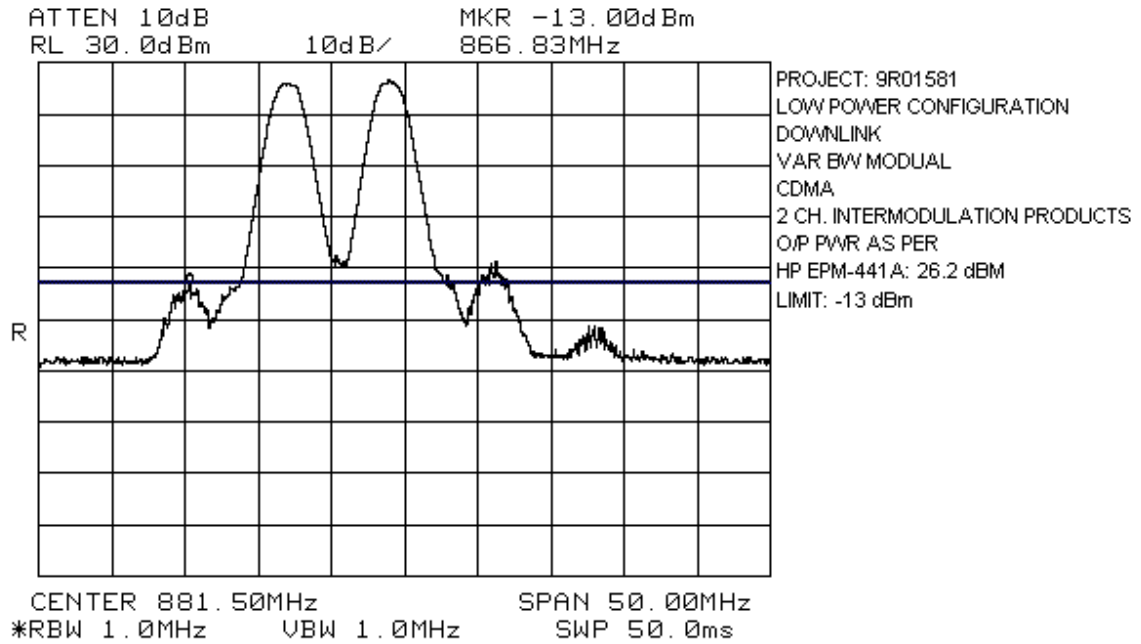
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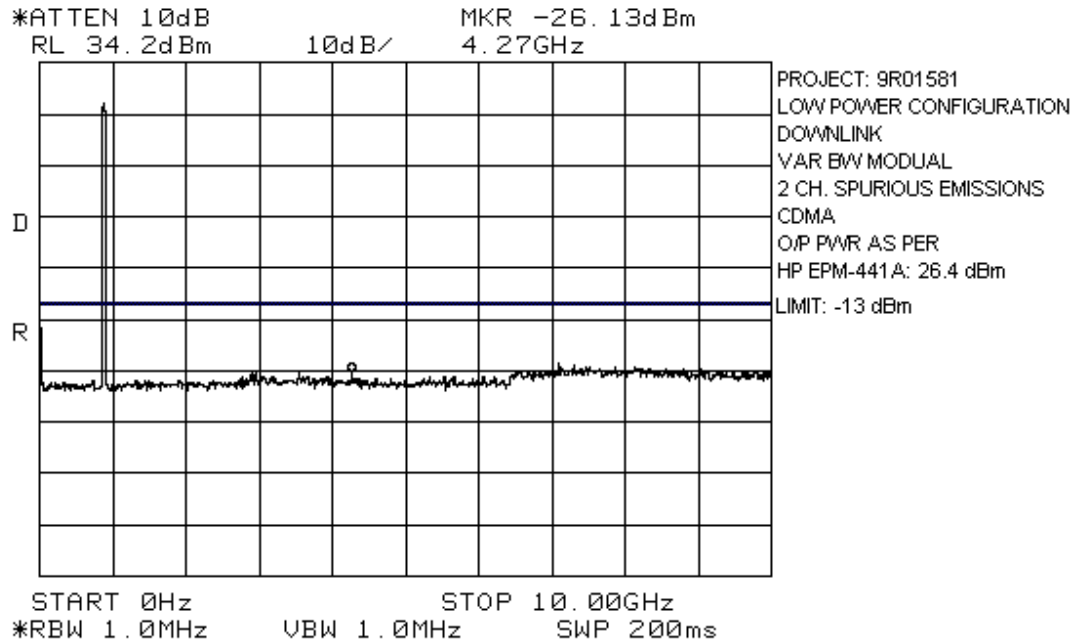
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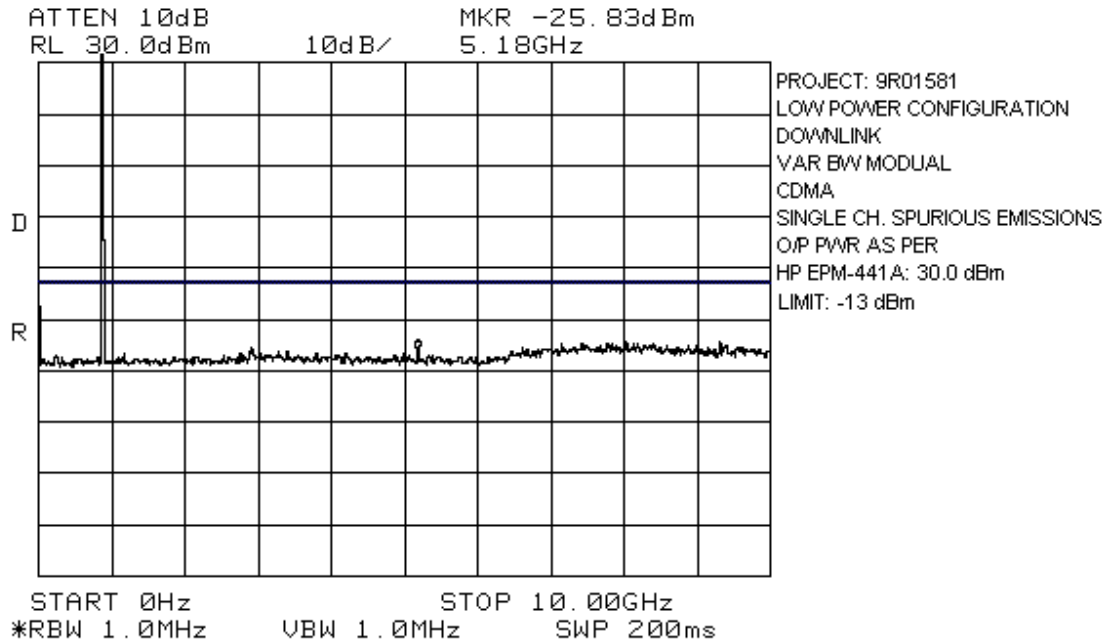
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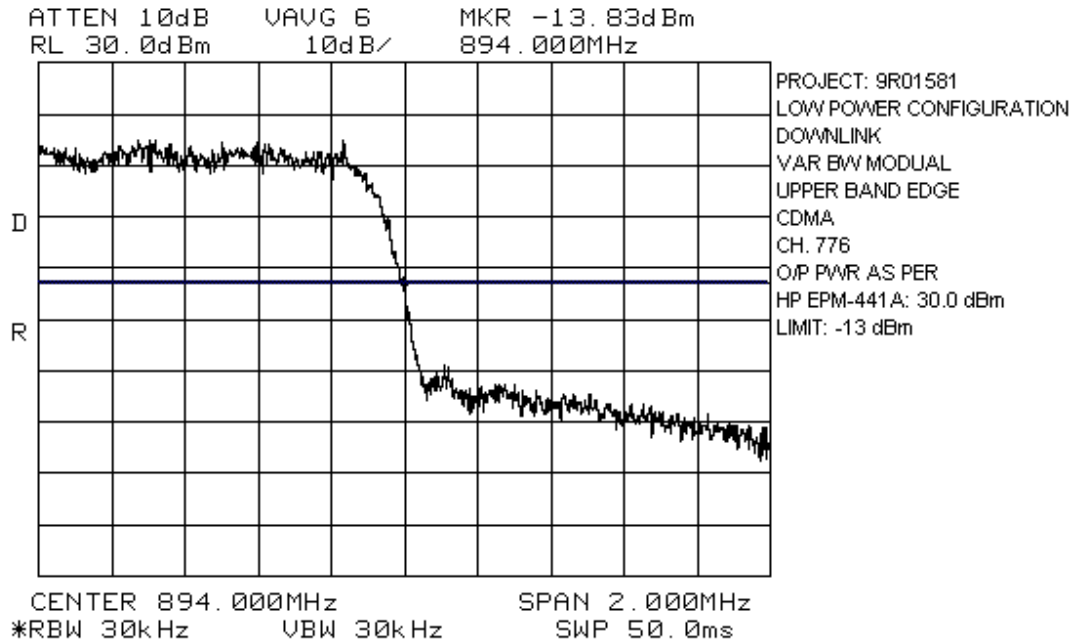
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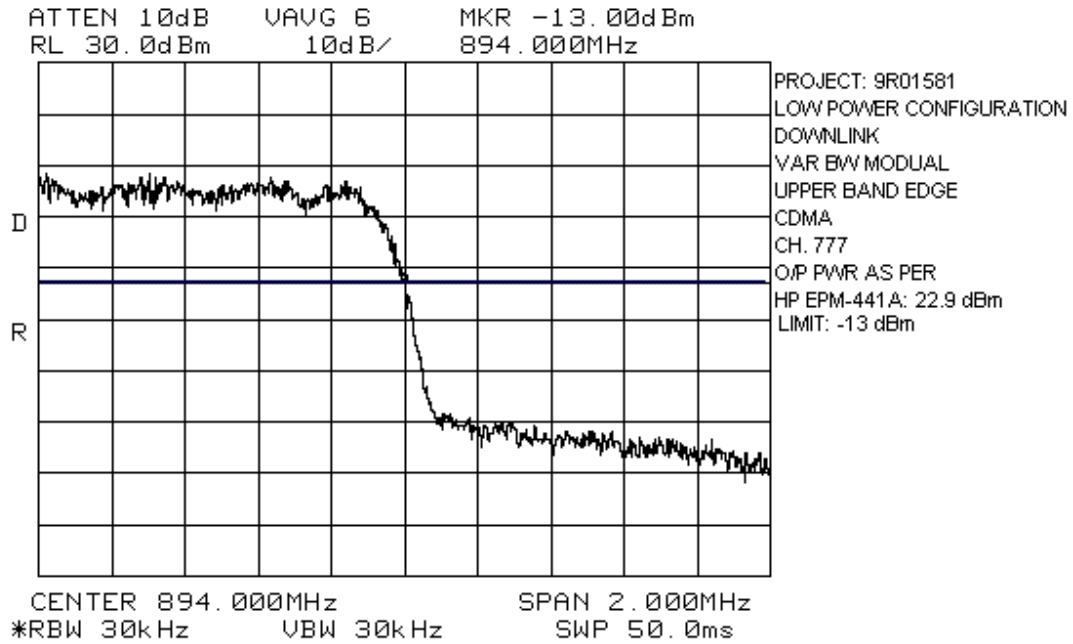
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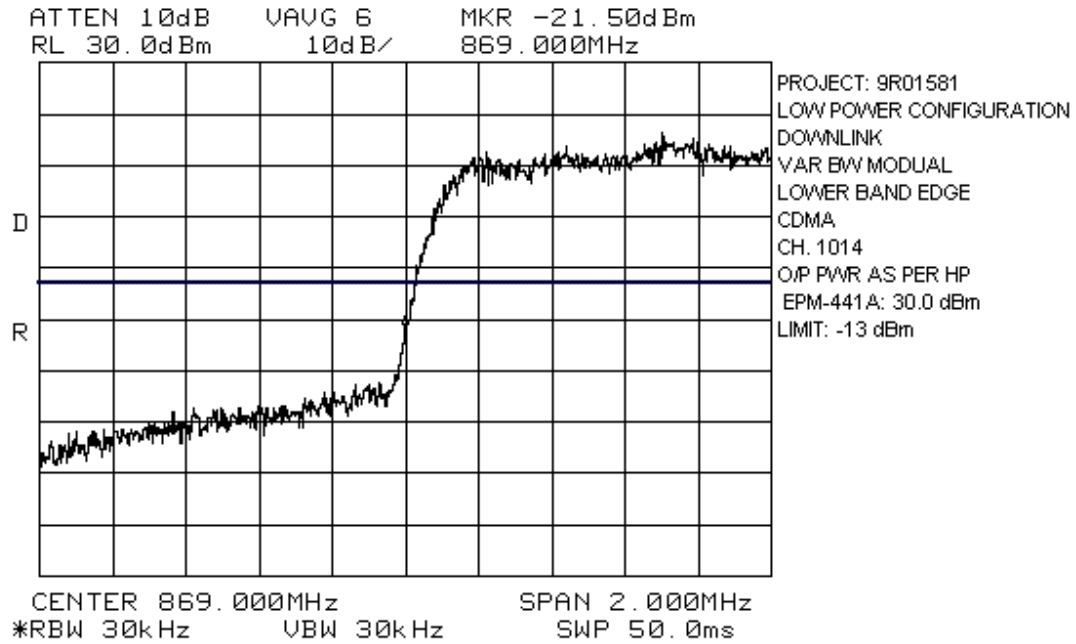
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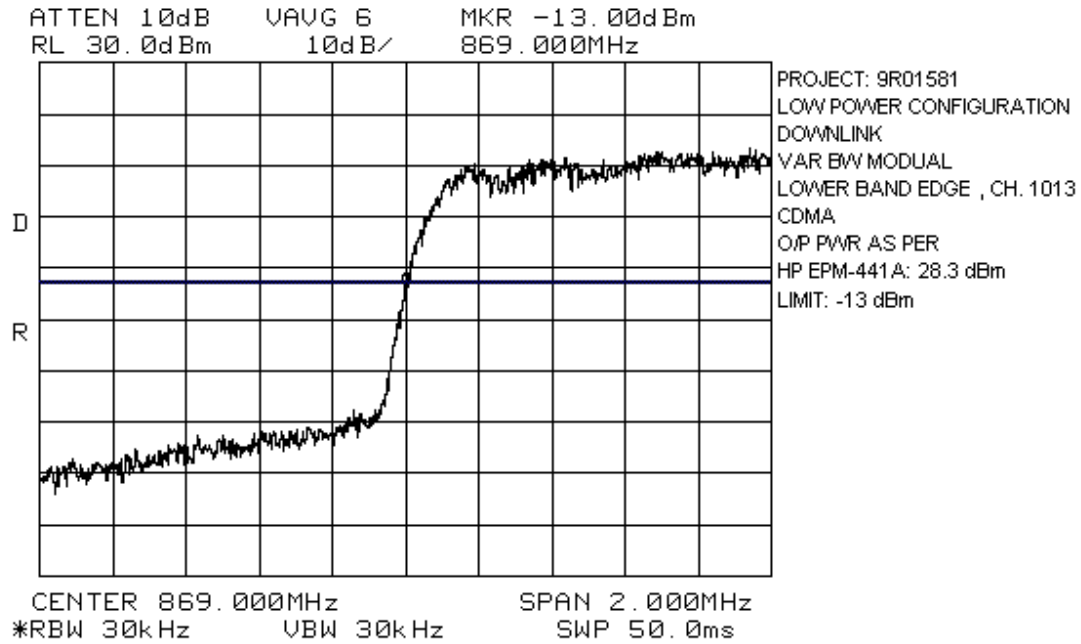
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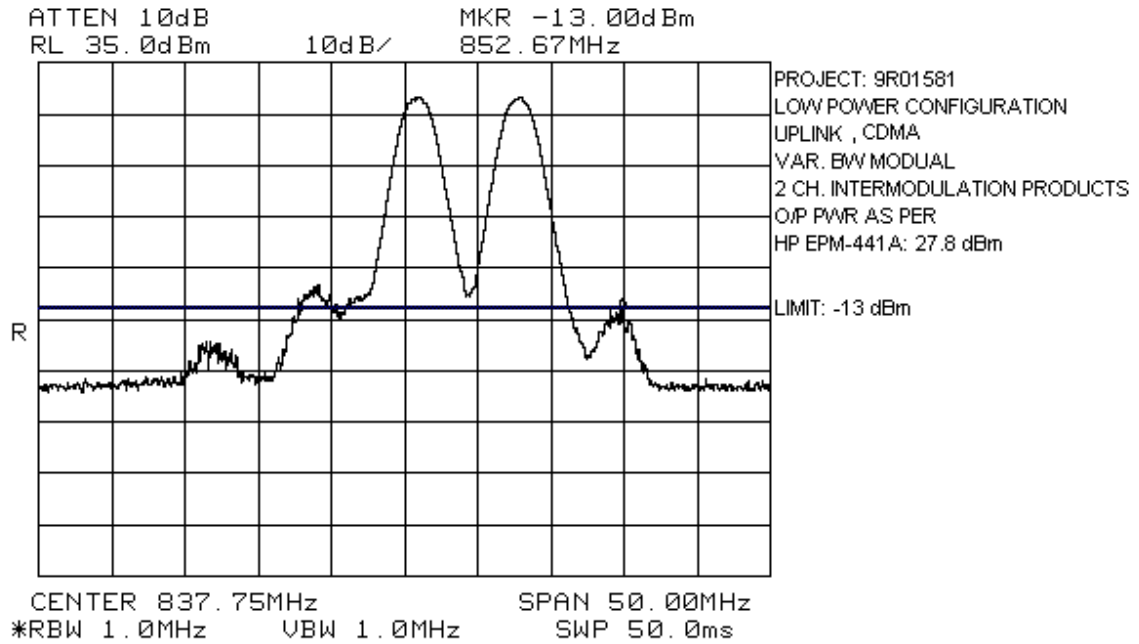
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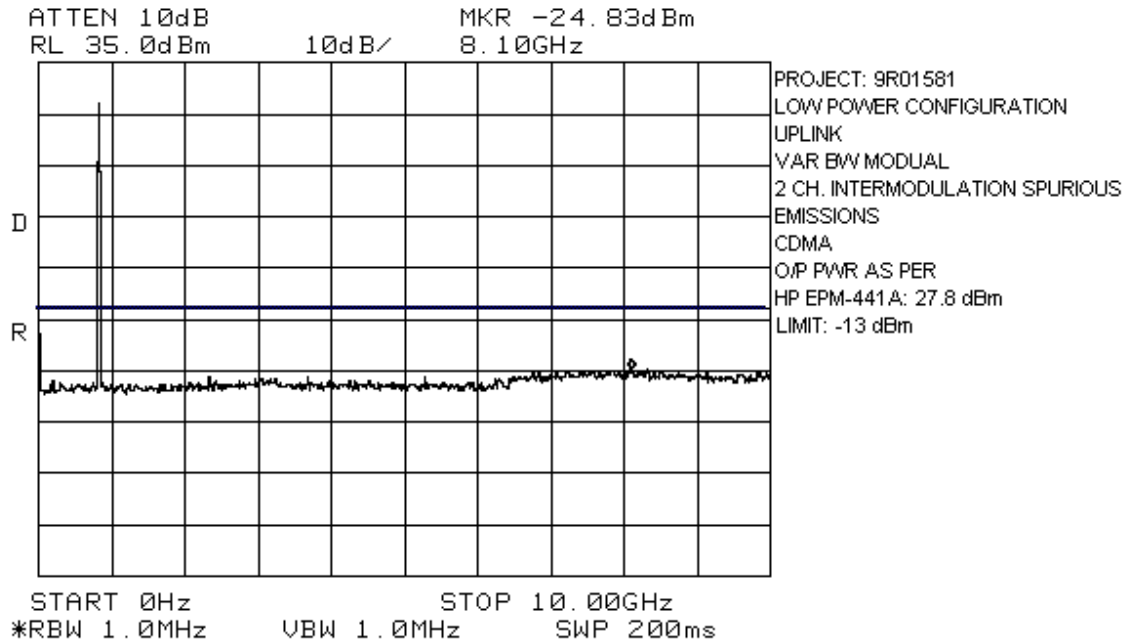
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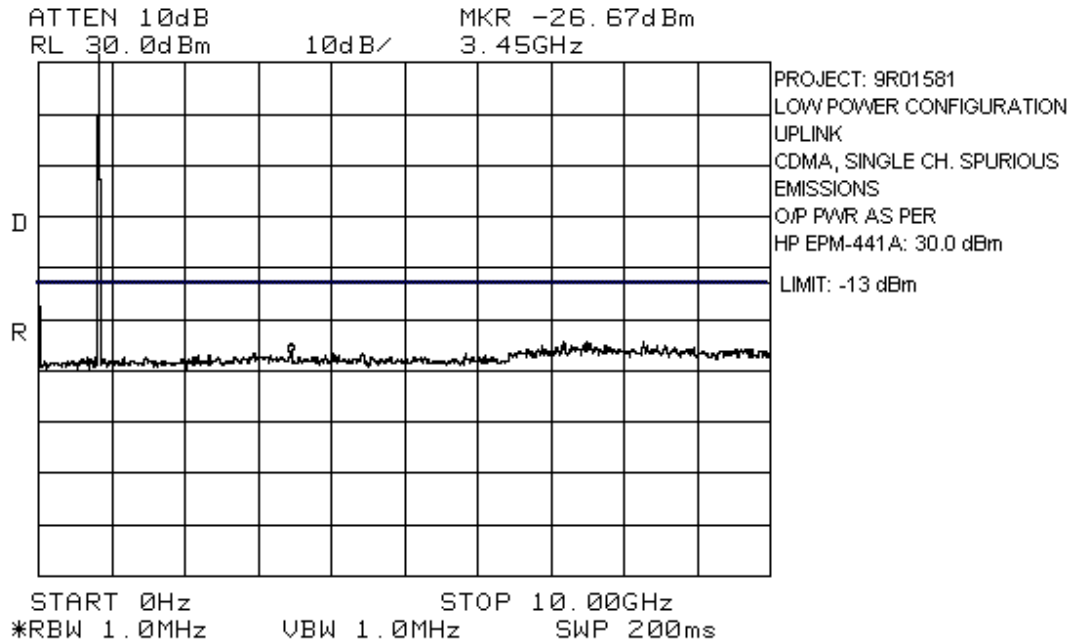
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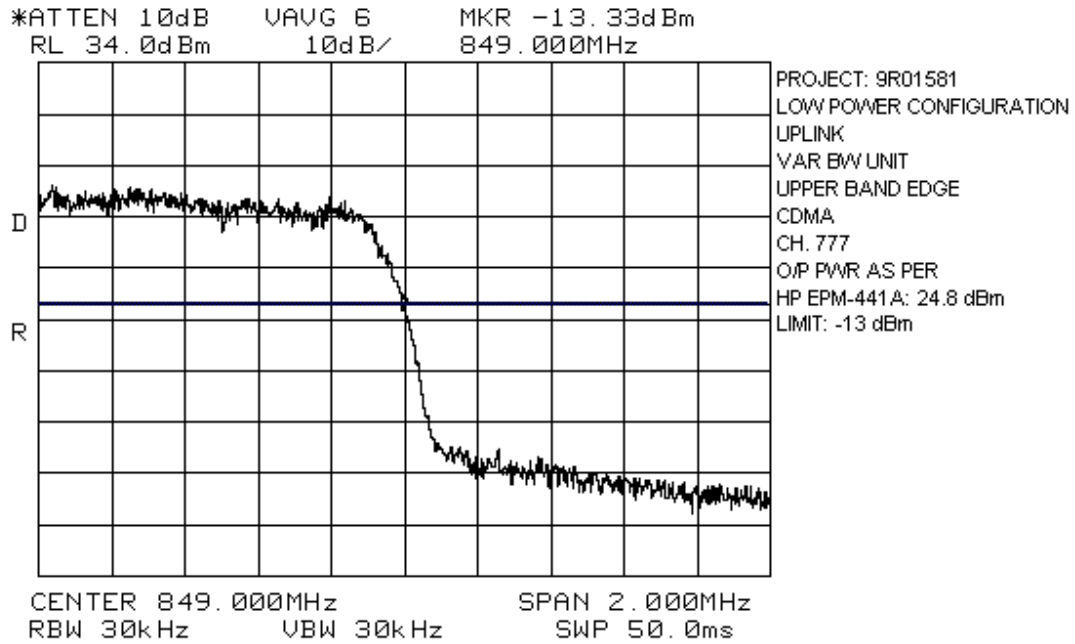
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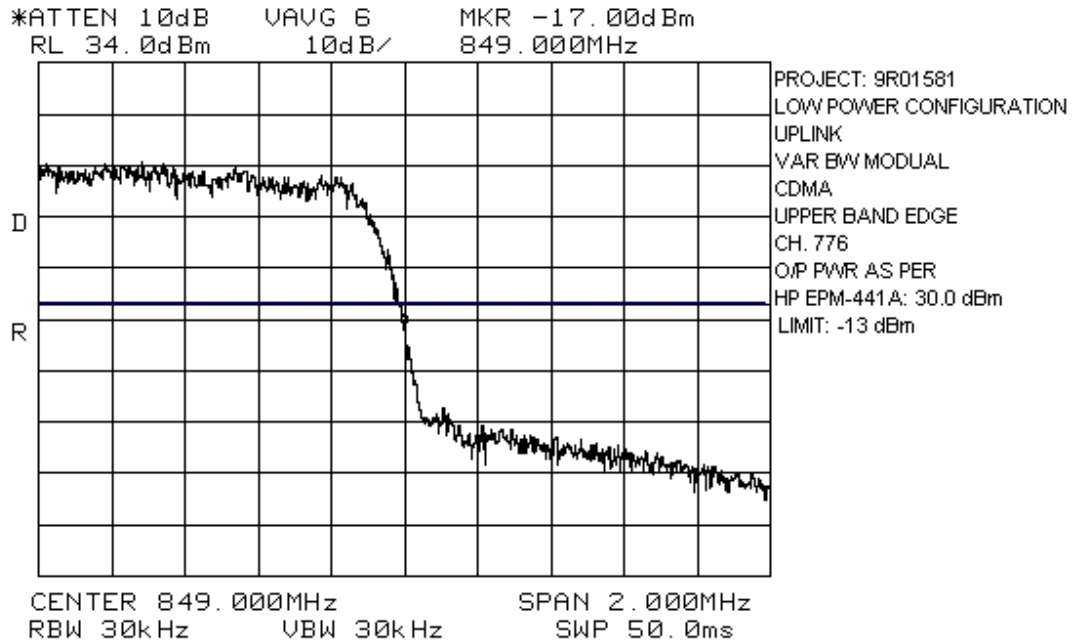
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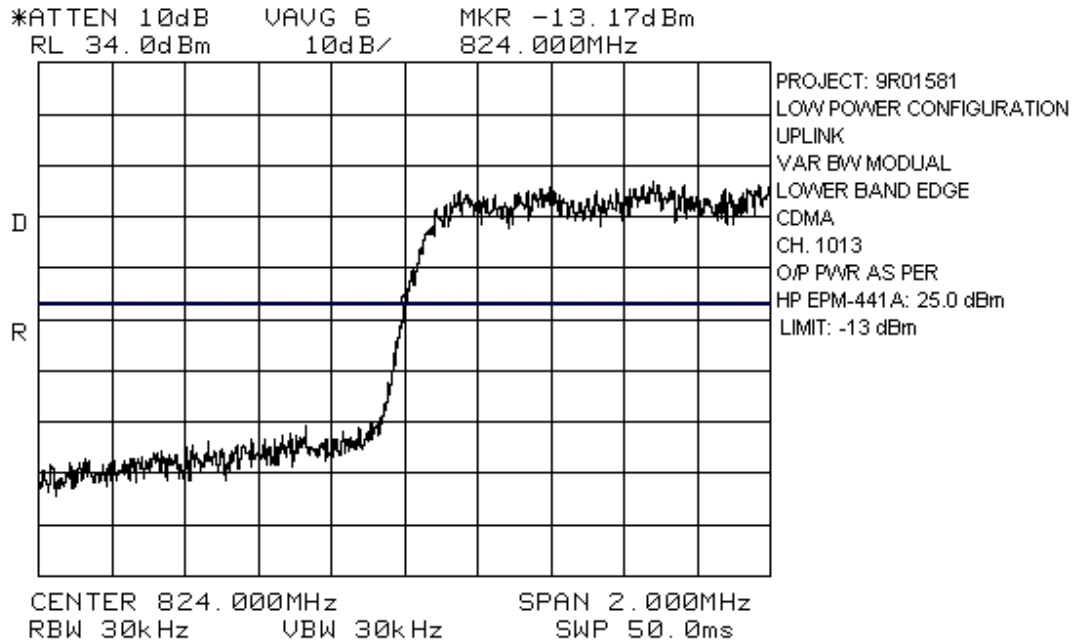
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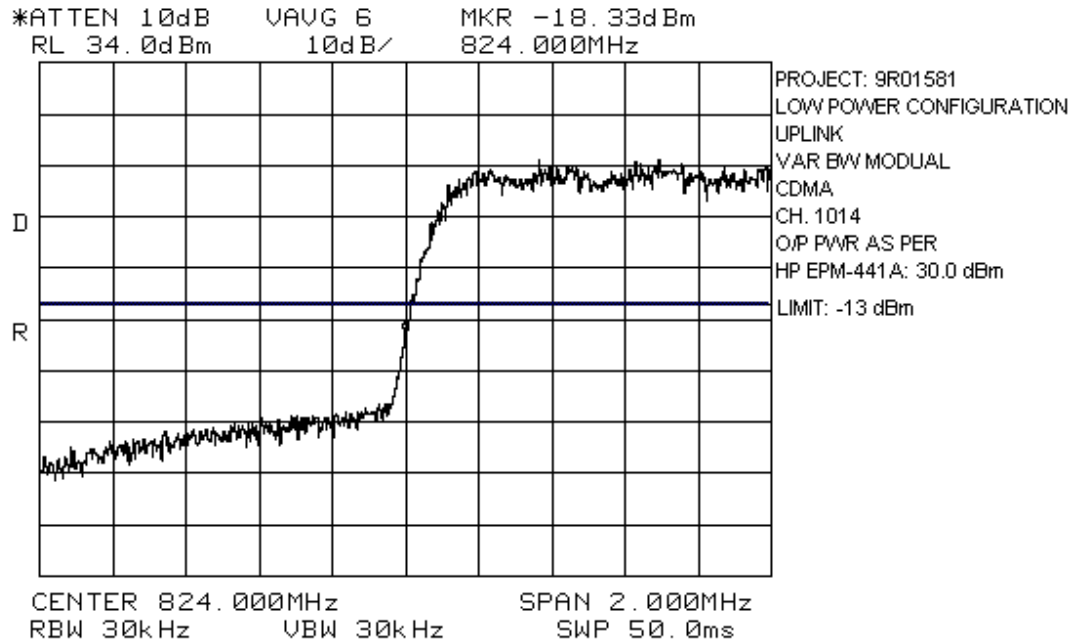
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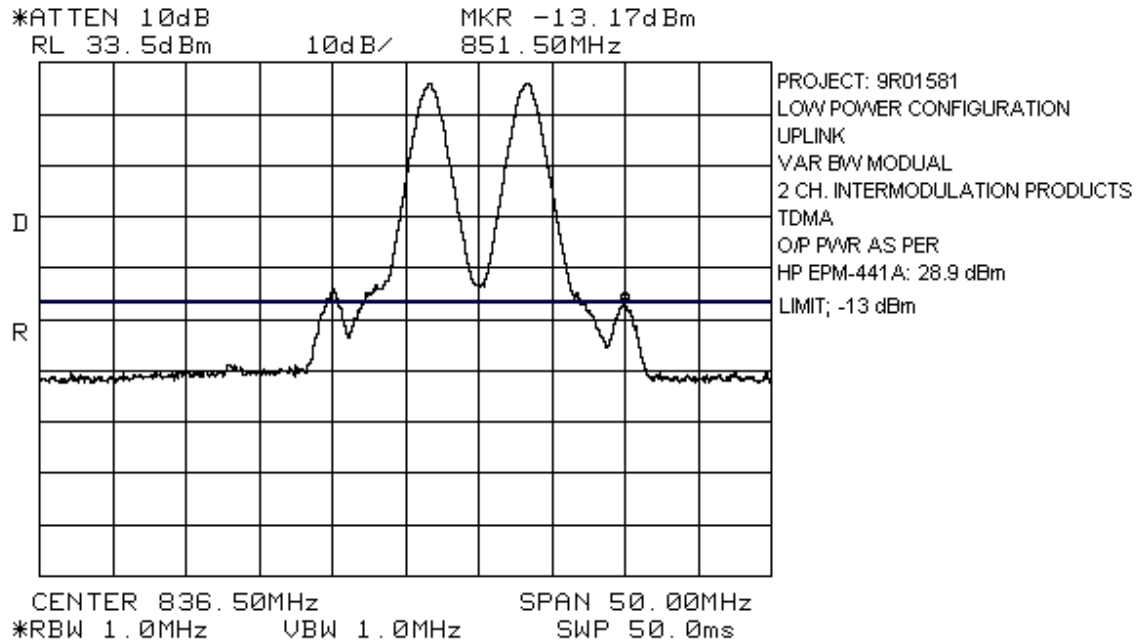
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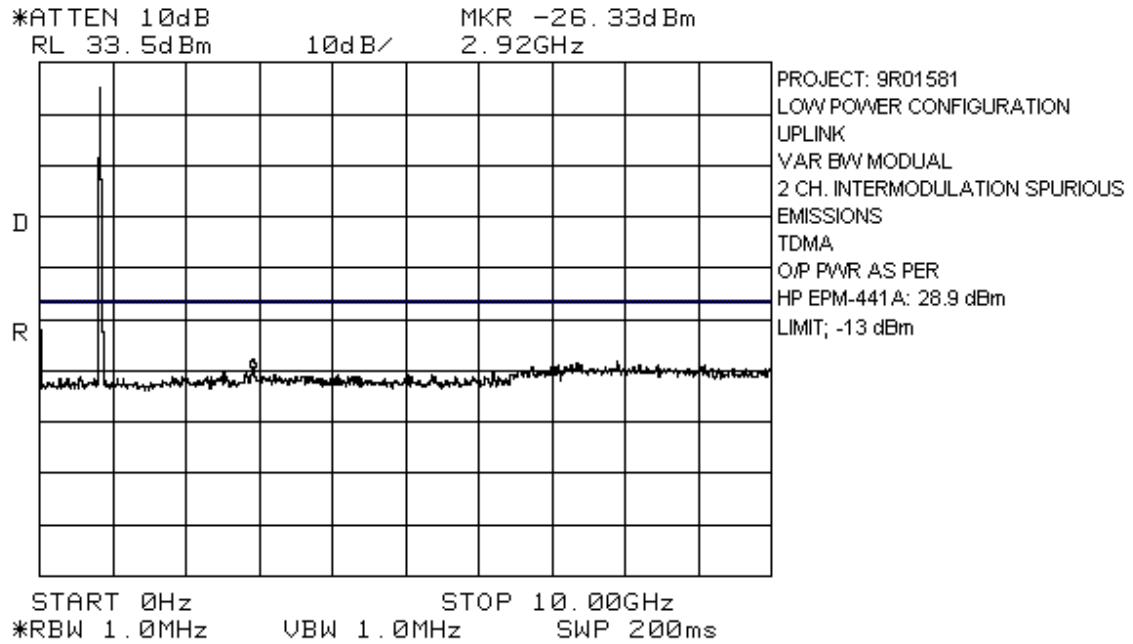
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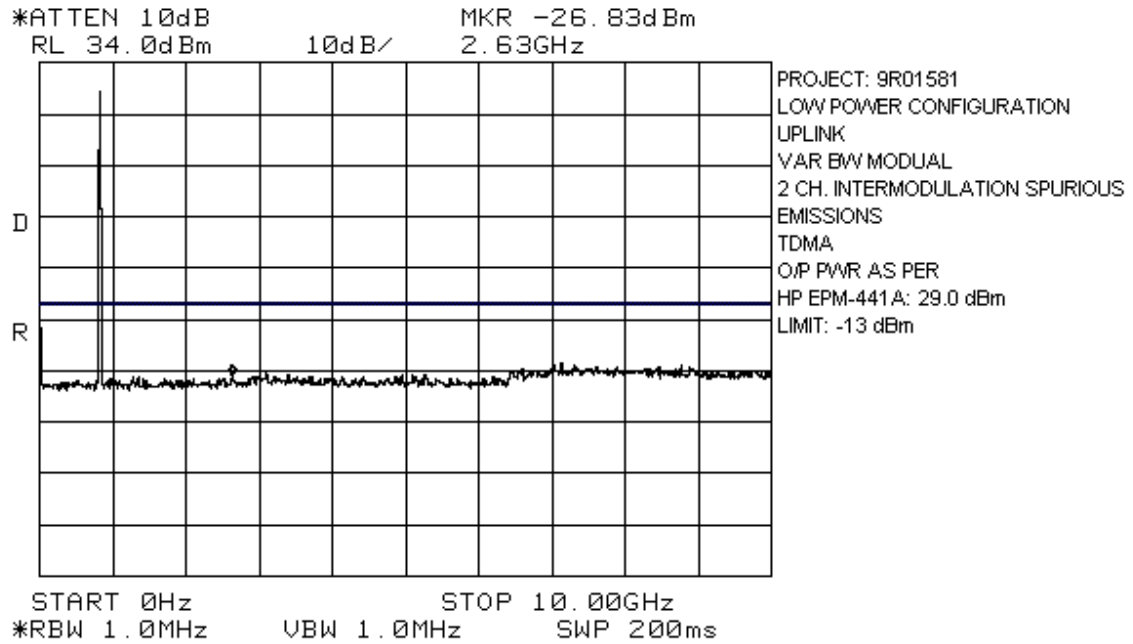
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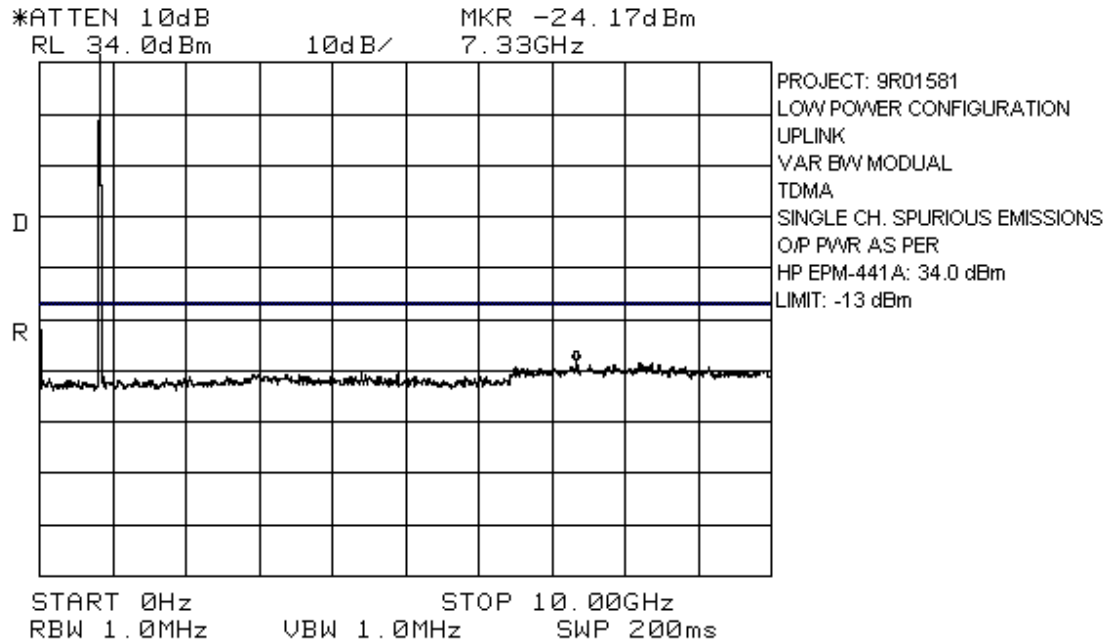
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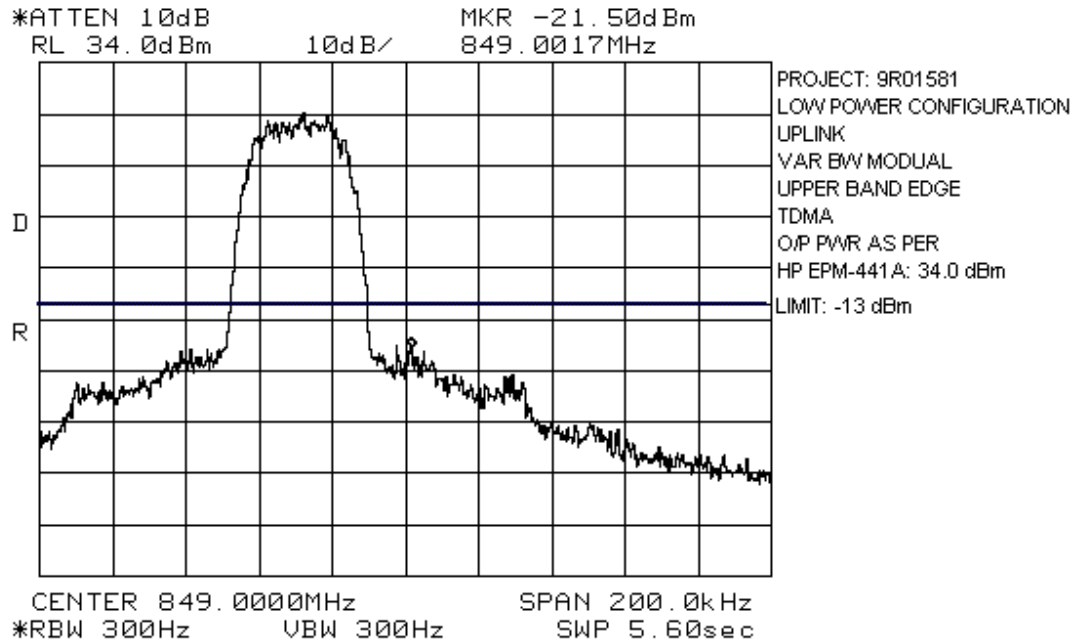
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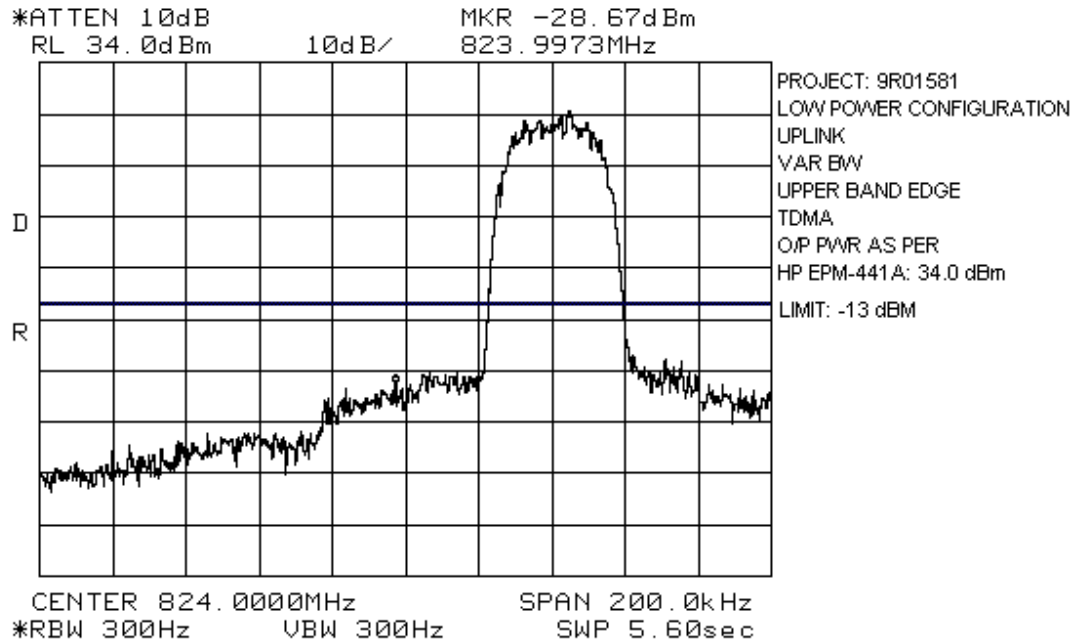
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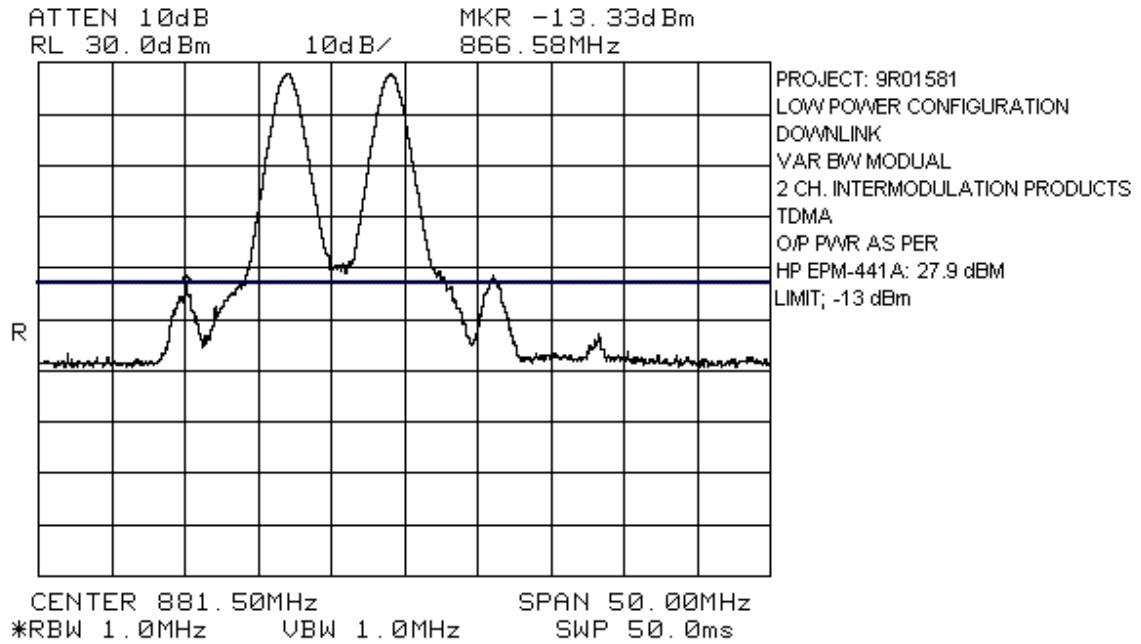
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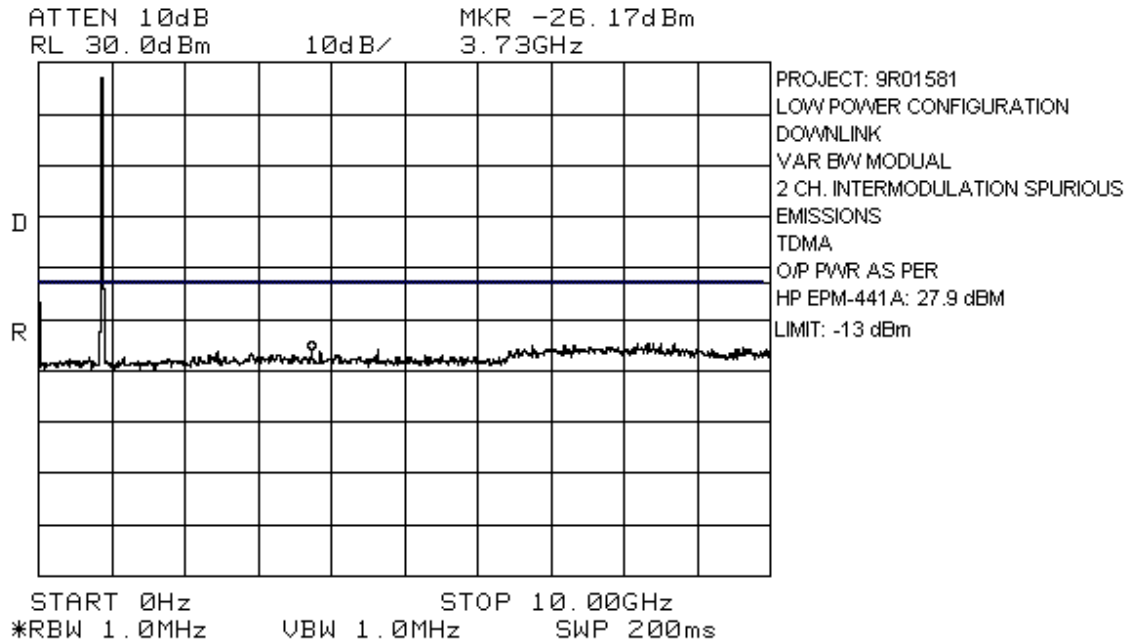
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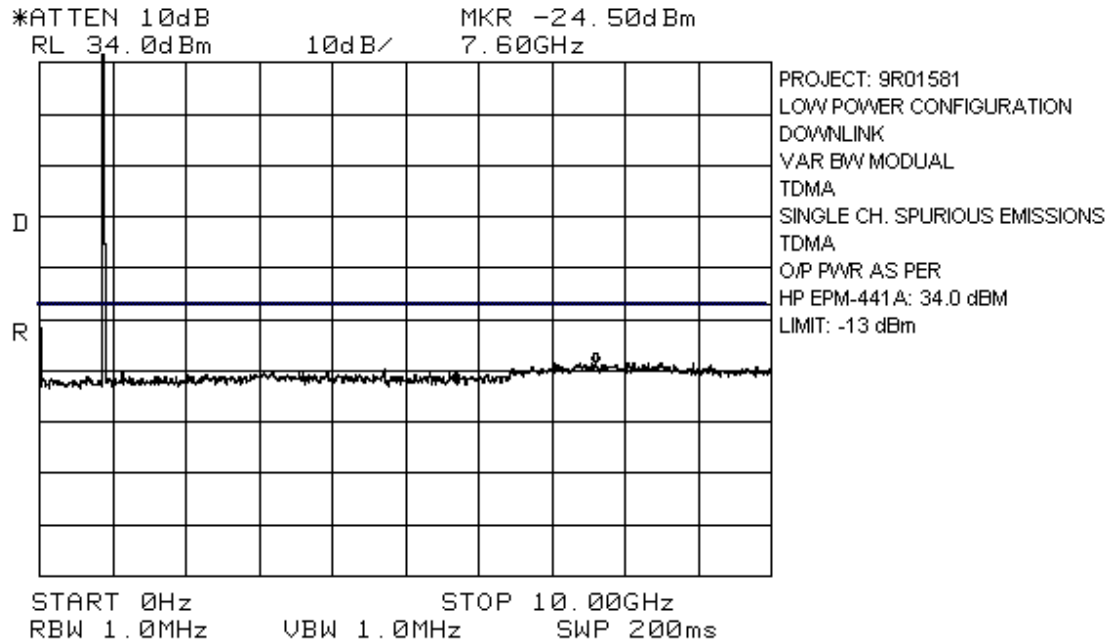
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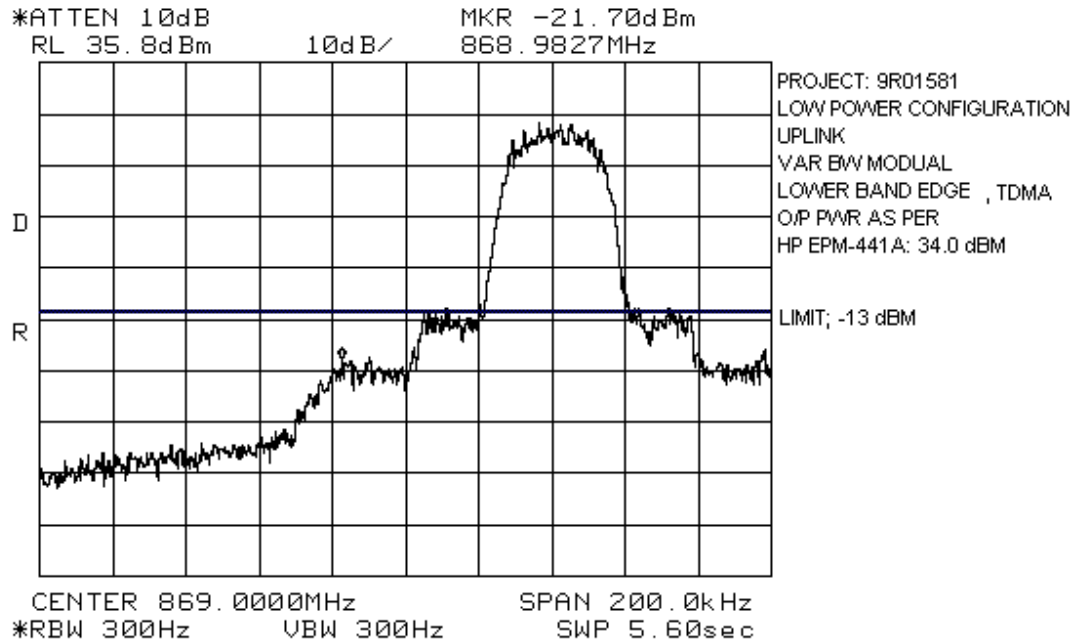
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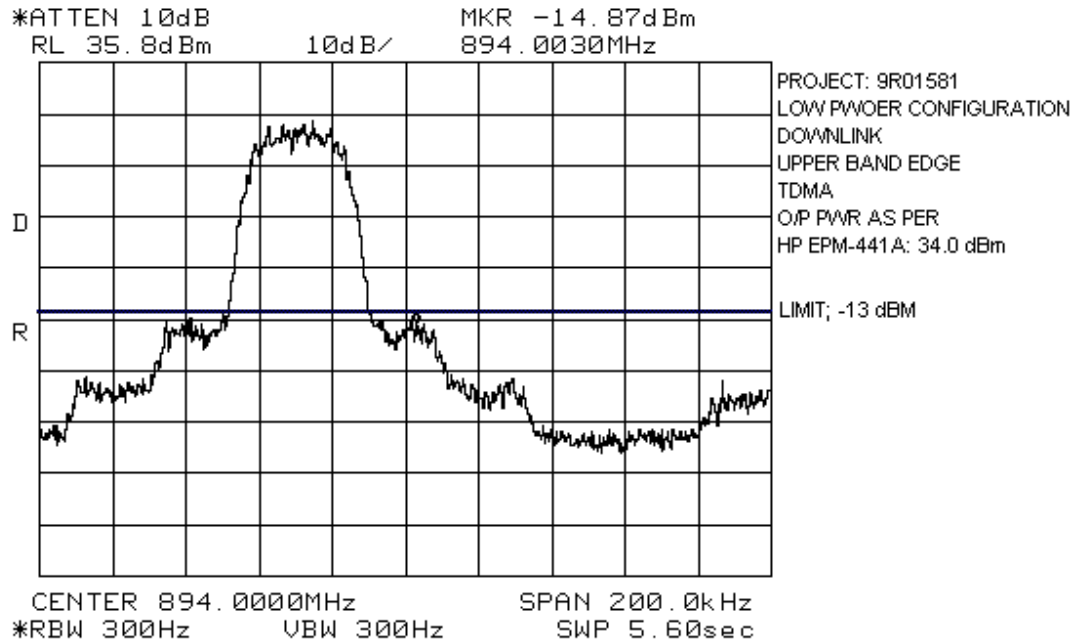
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EQUIPMENT: MR801 Cellular Repeater
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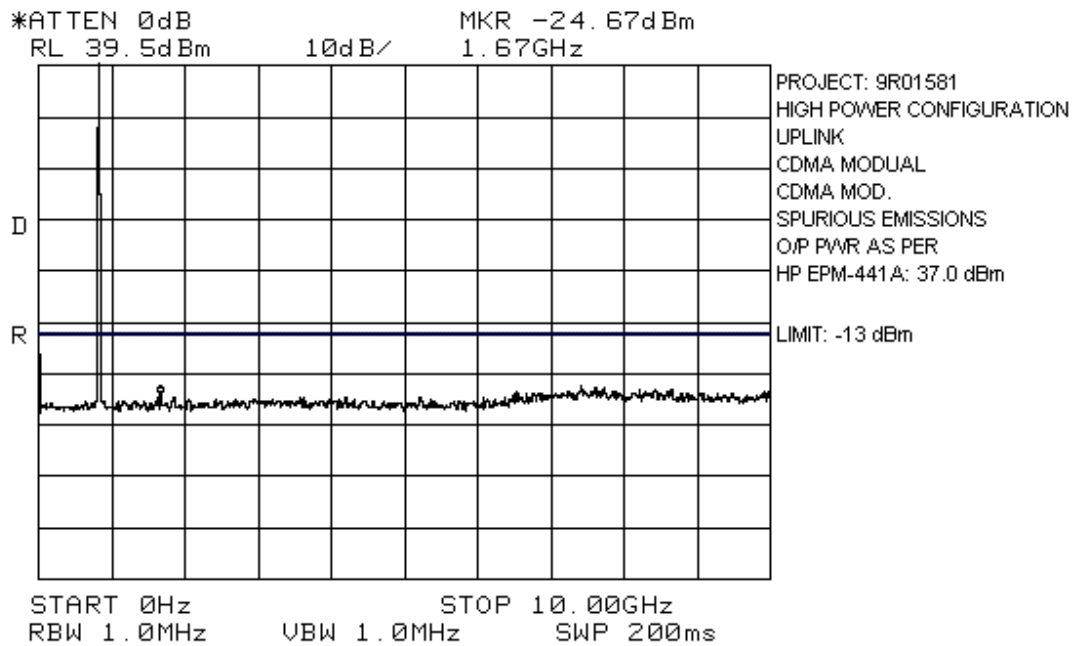


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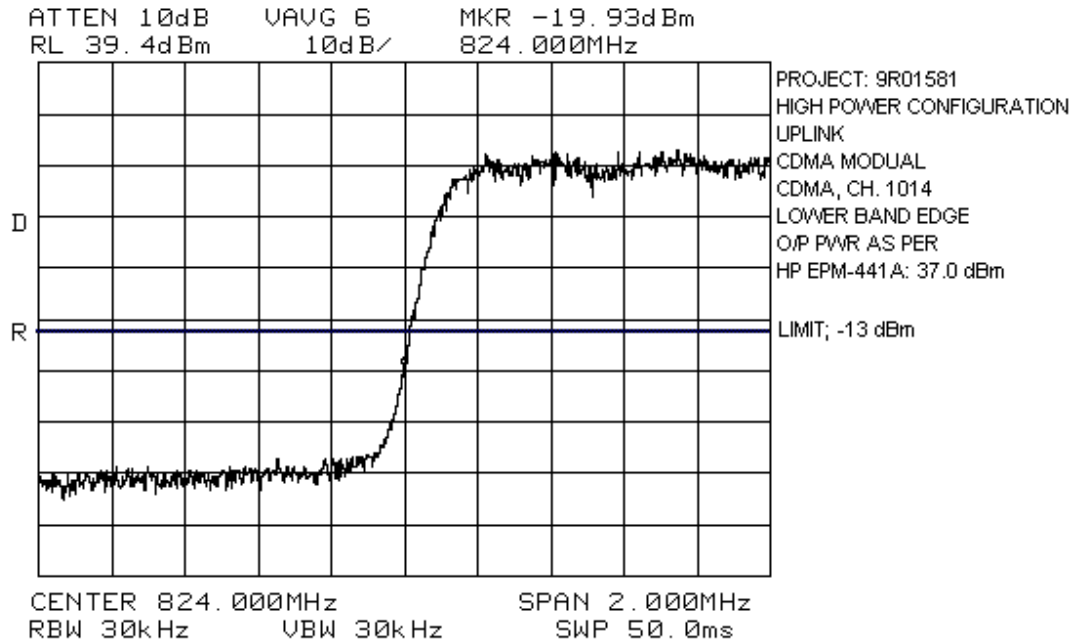


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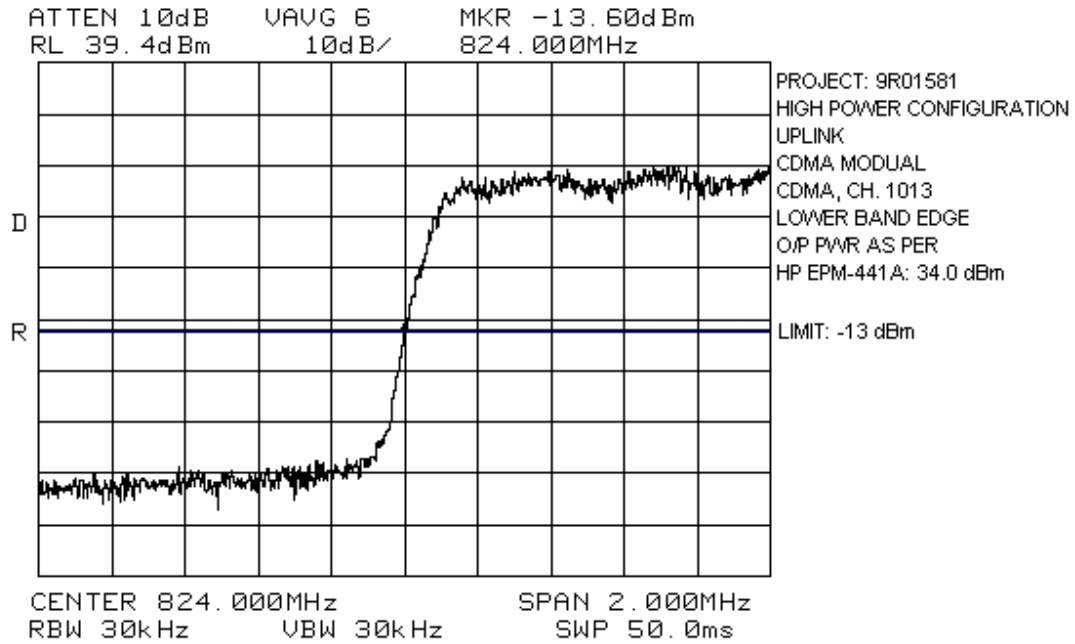
High Power – CDMA Module



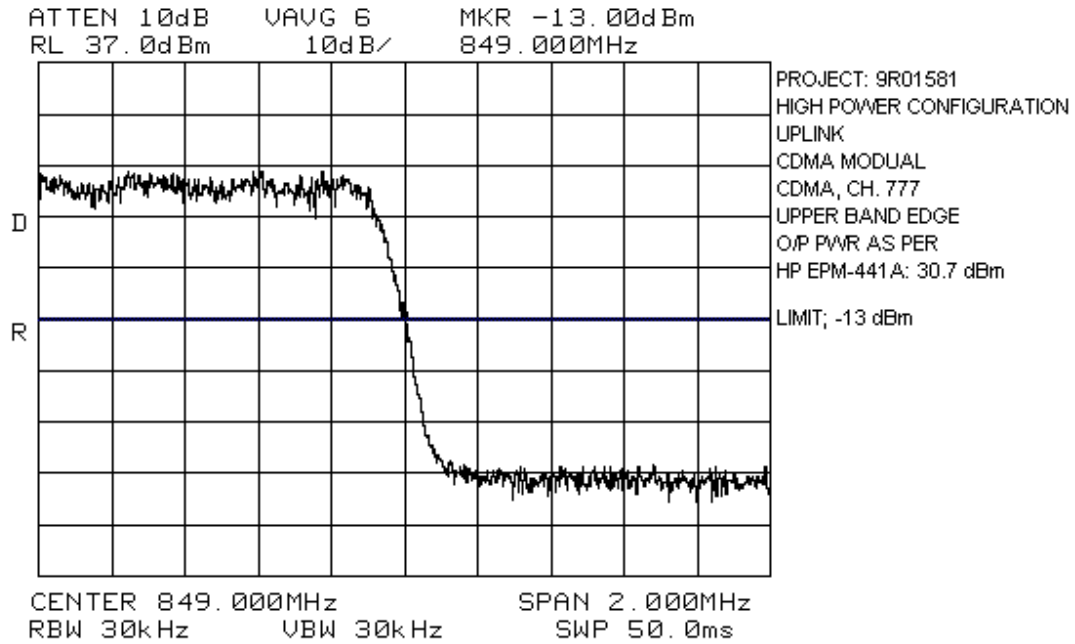
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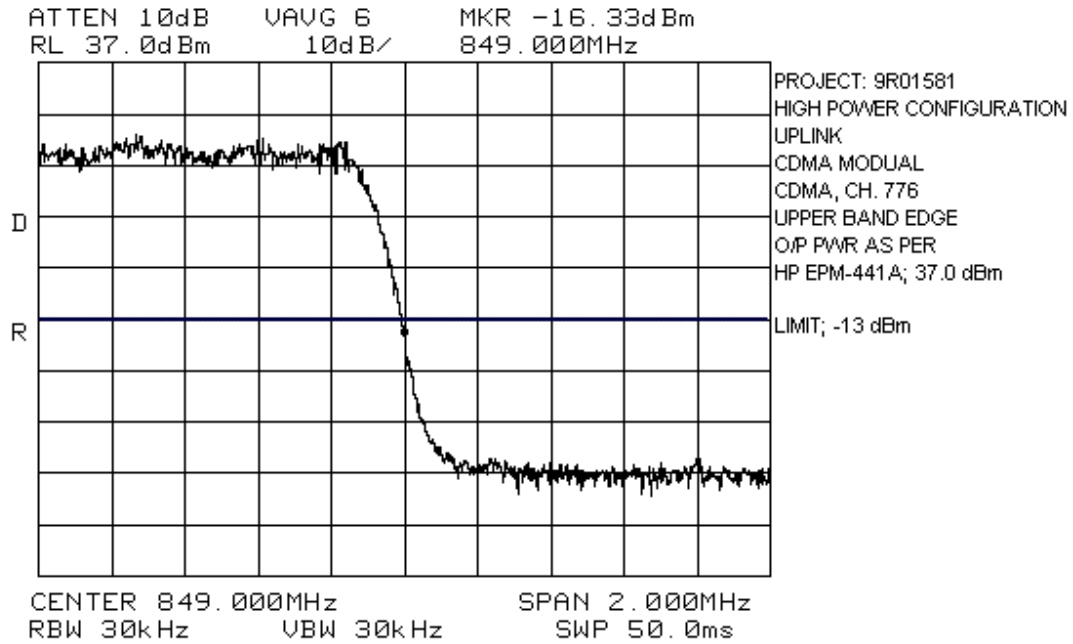
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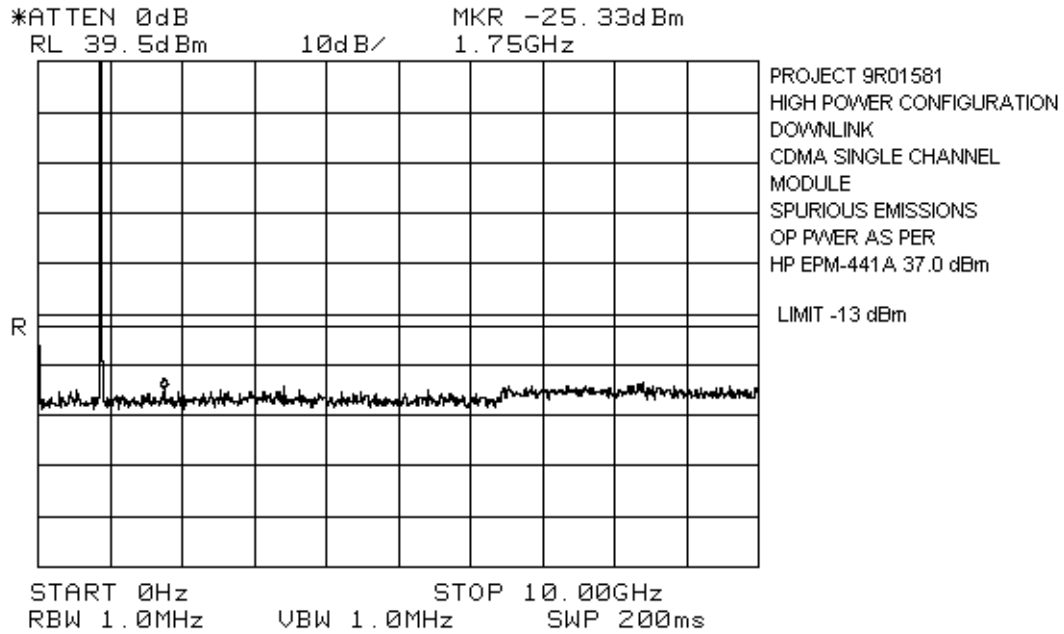
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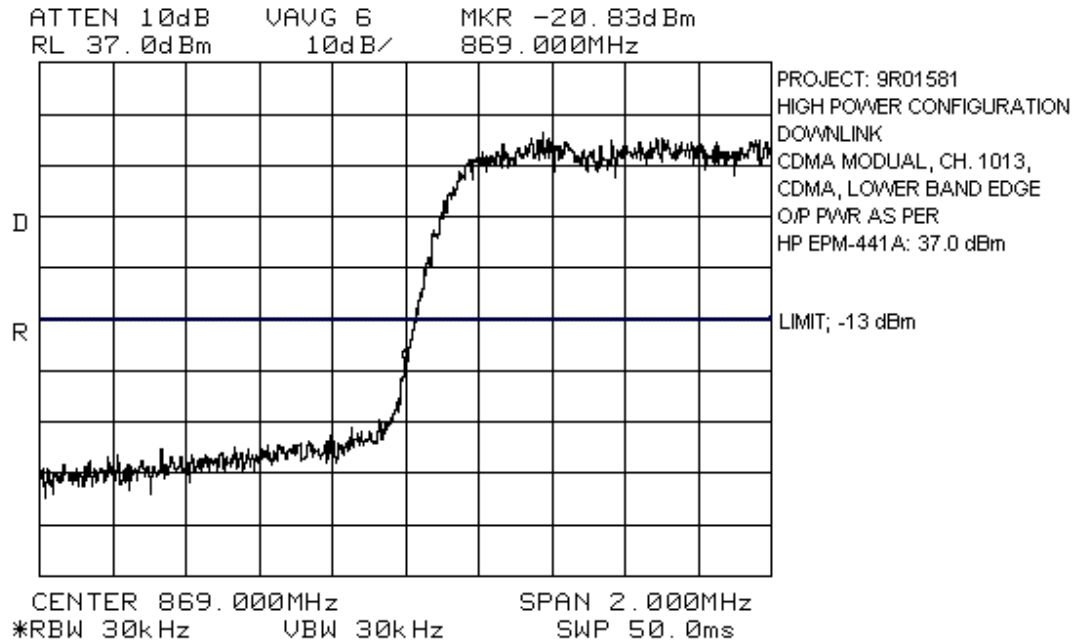
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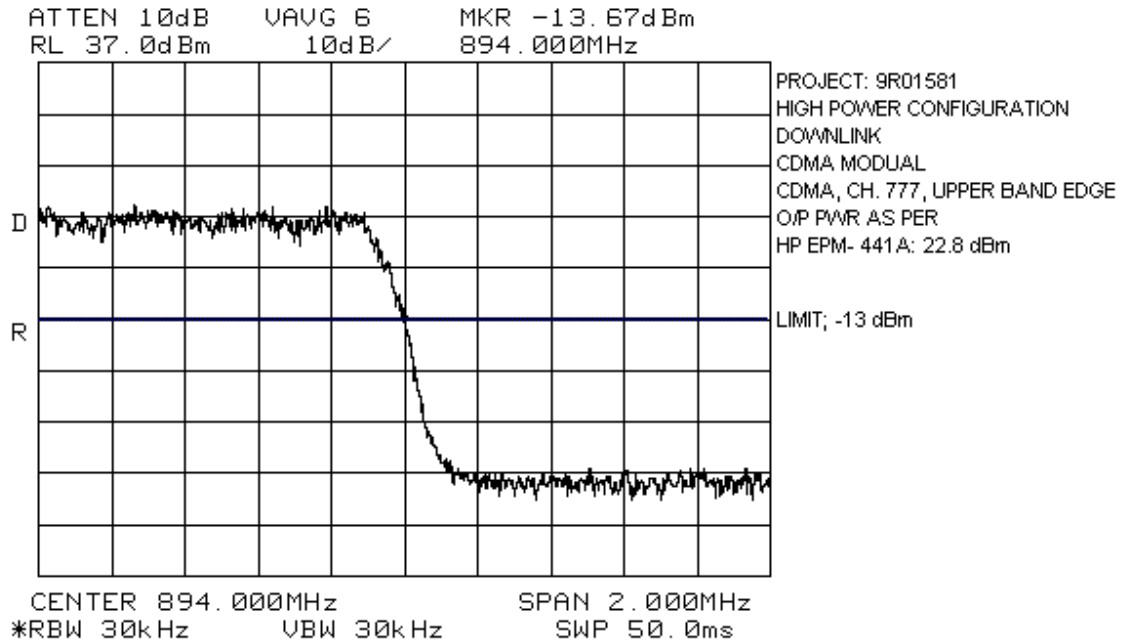
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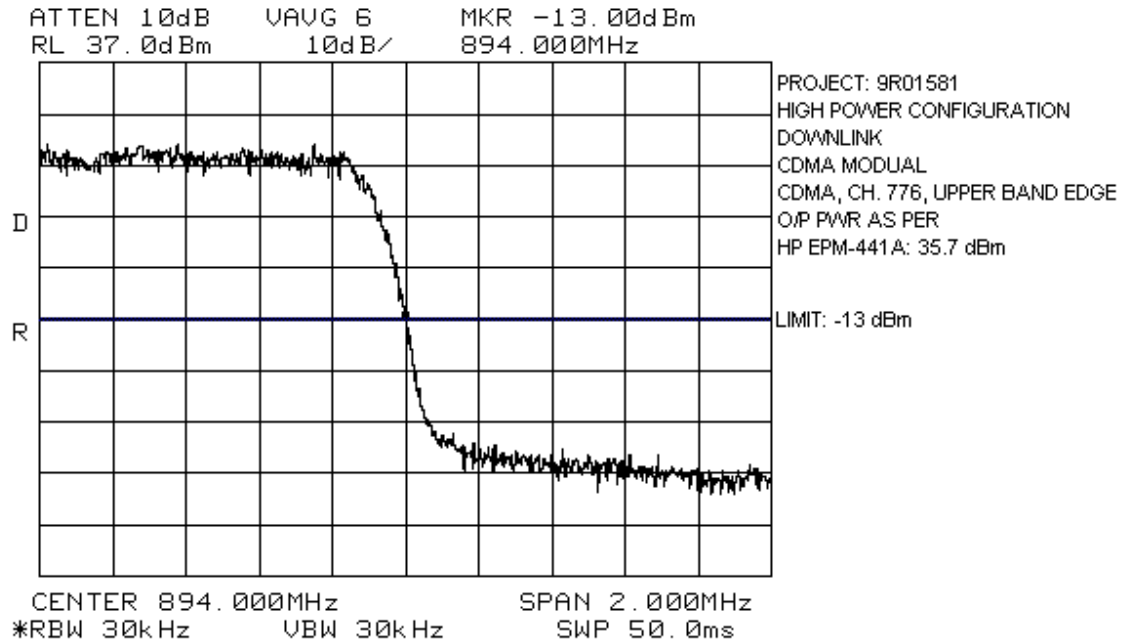
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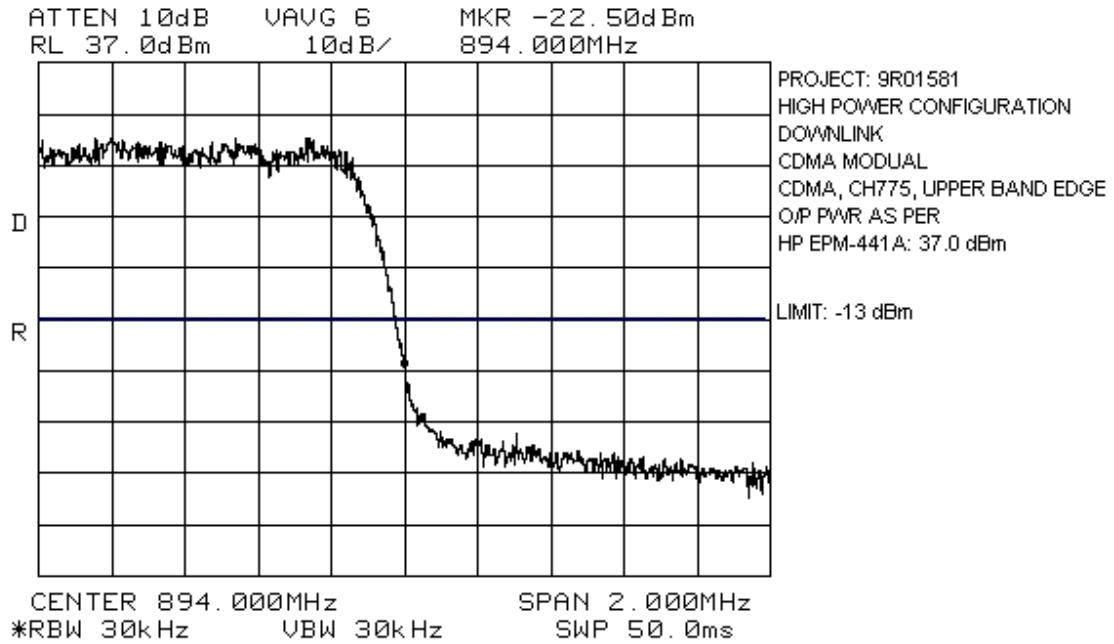
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EQUIPMENT: MR801 Cellular Repeater
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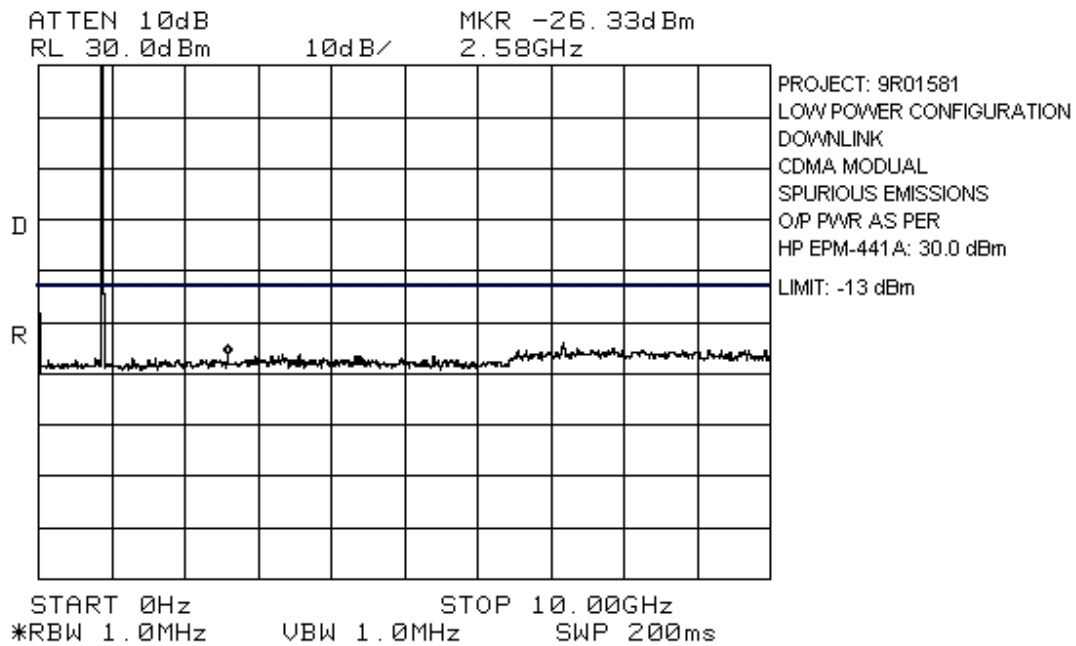


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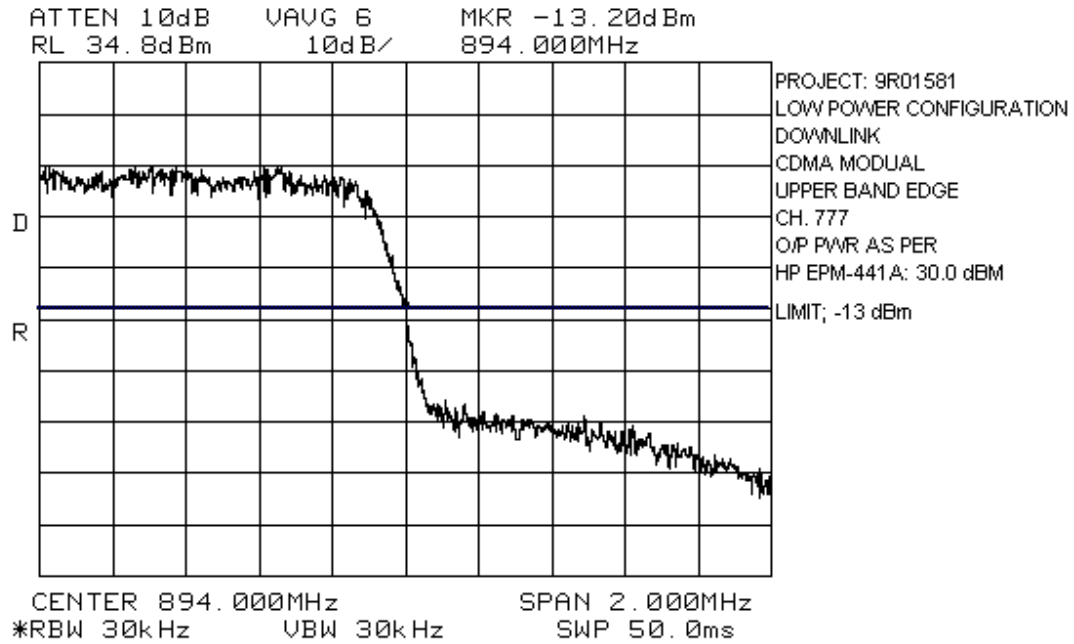


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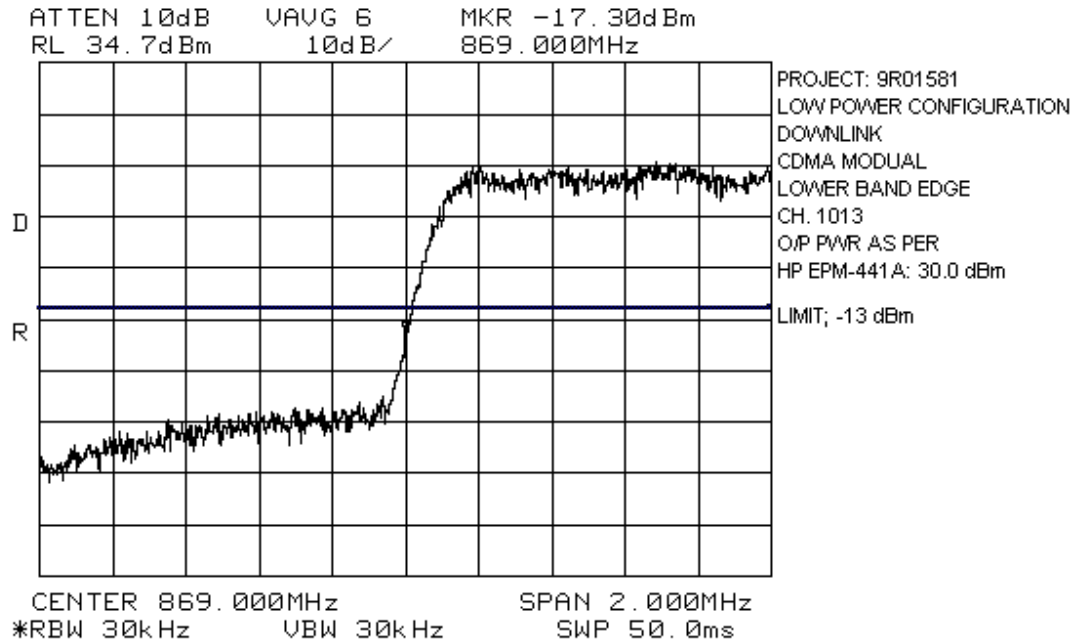
Low Power – CDMA Module



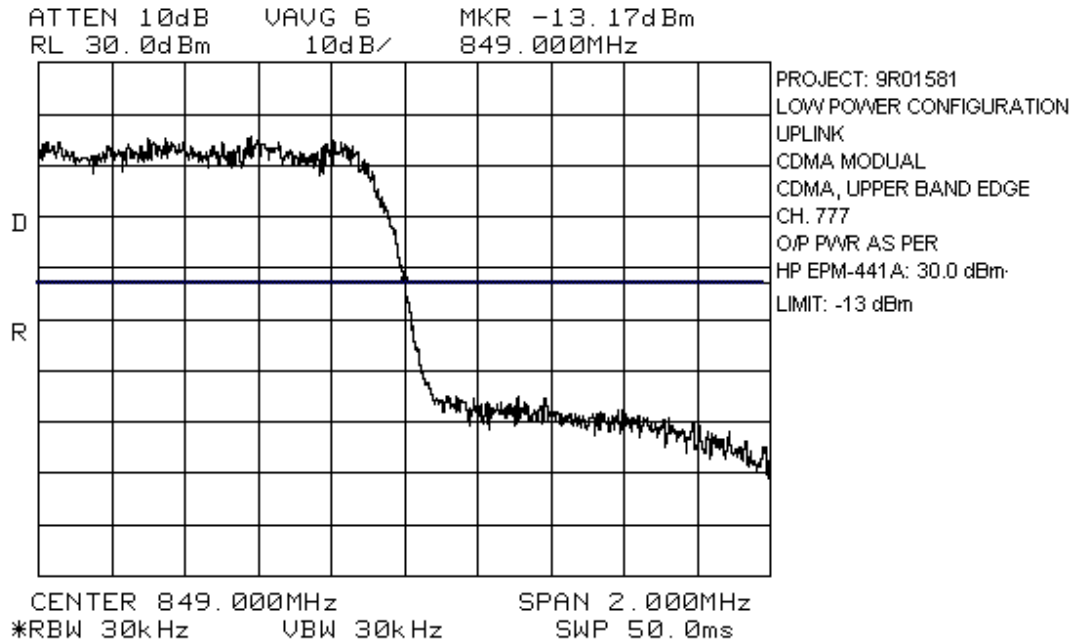
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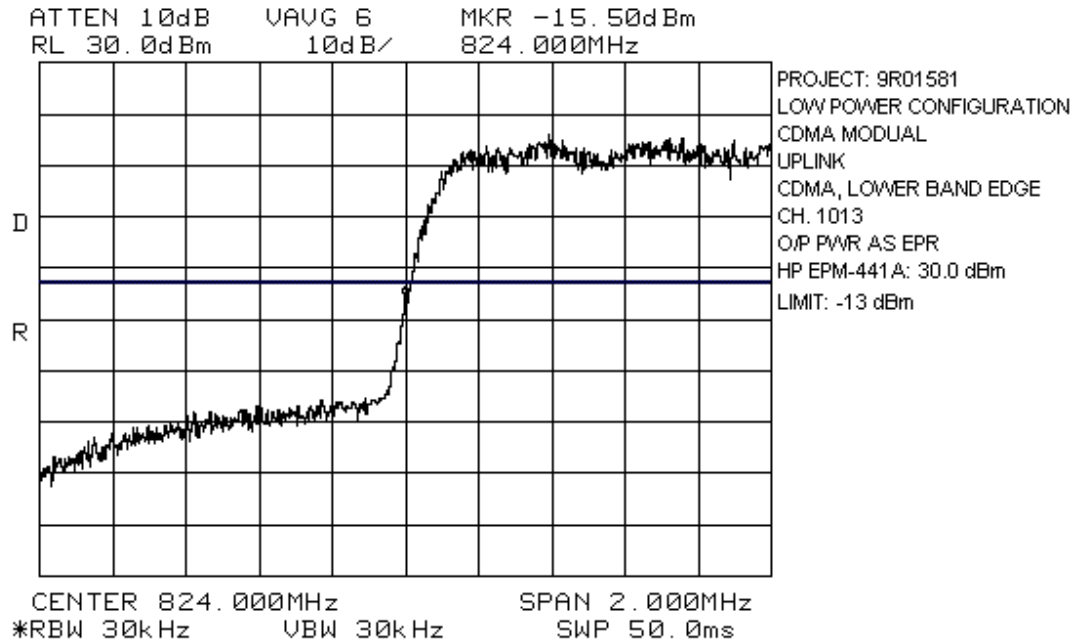
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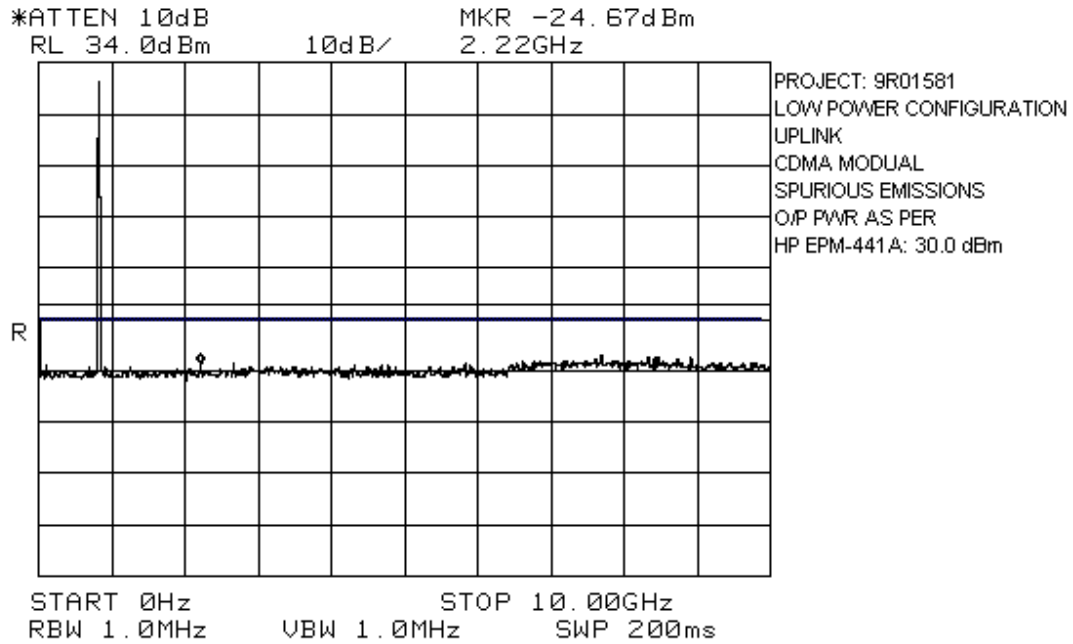
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EQUIPMENT: MR801 Cellular Repeater
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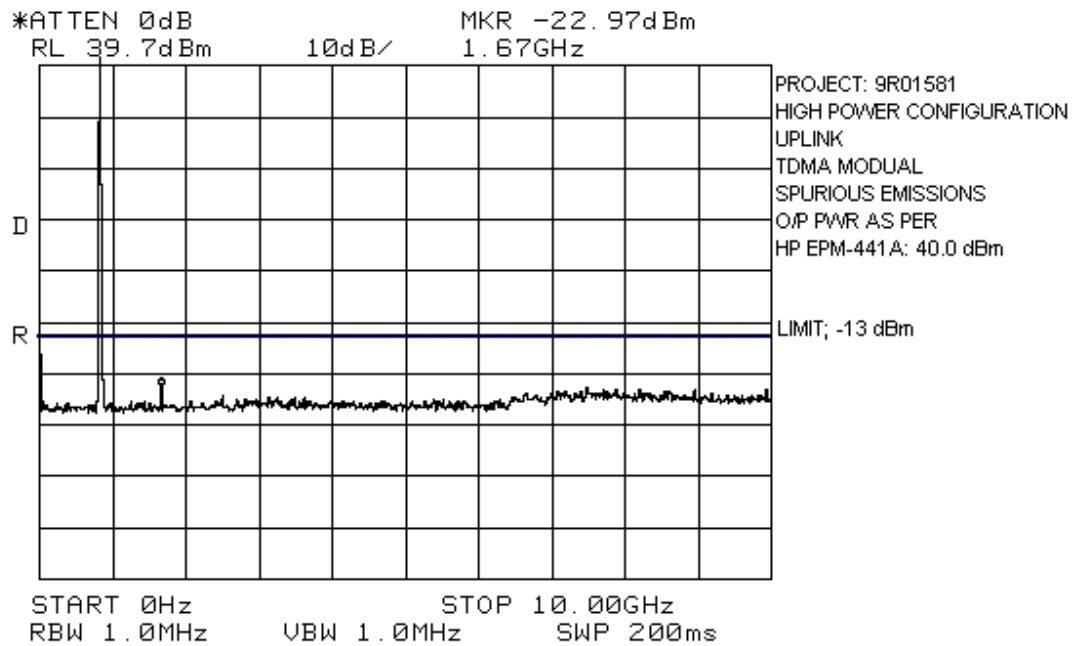


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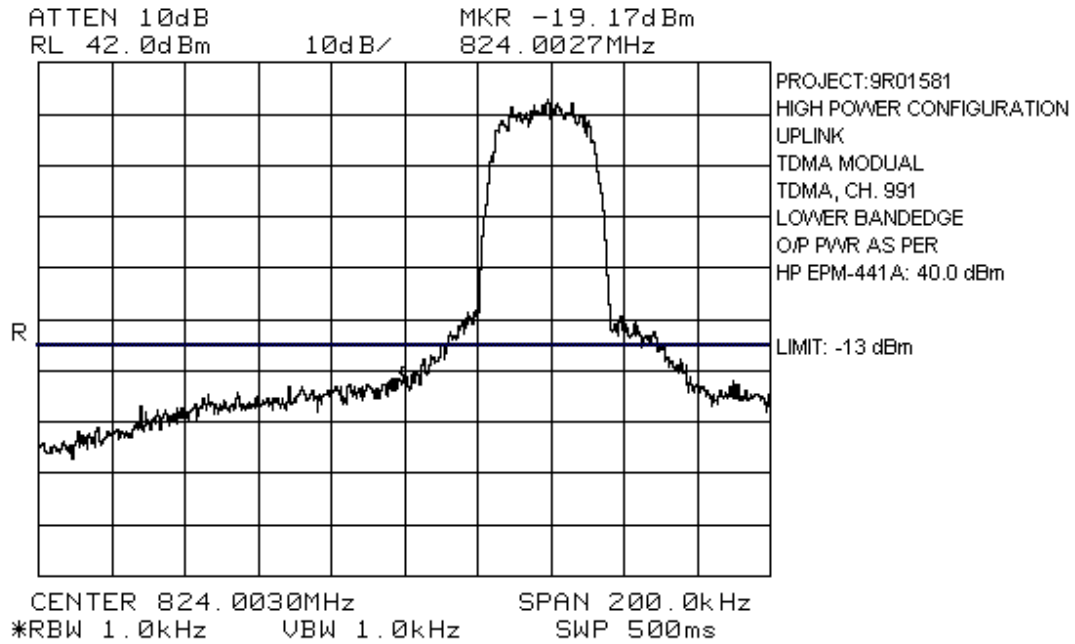


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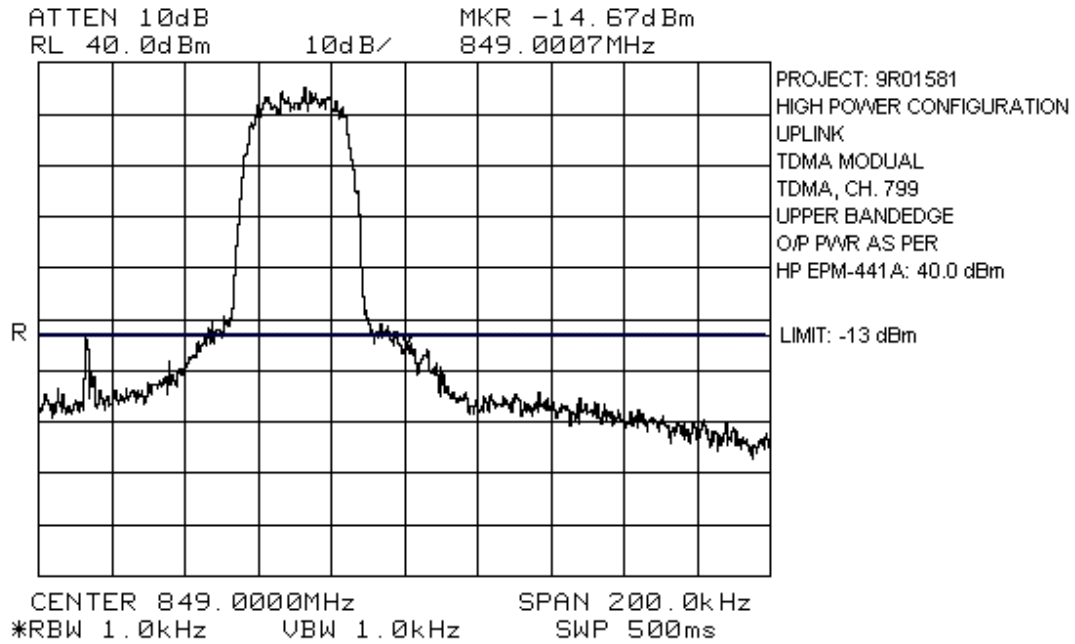
High Power – TDMA Module



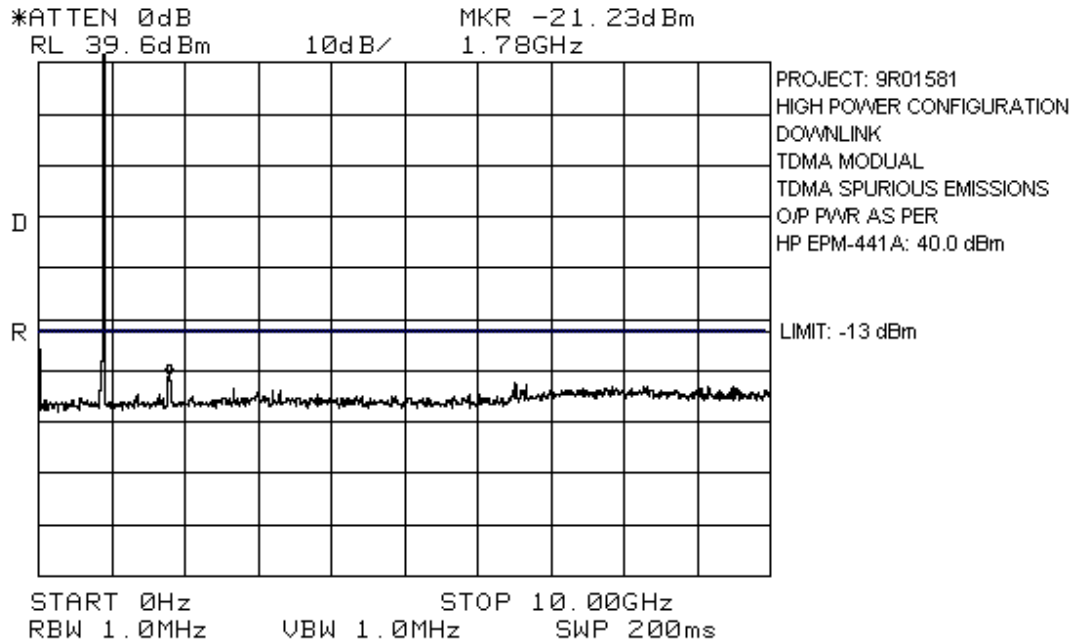
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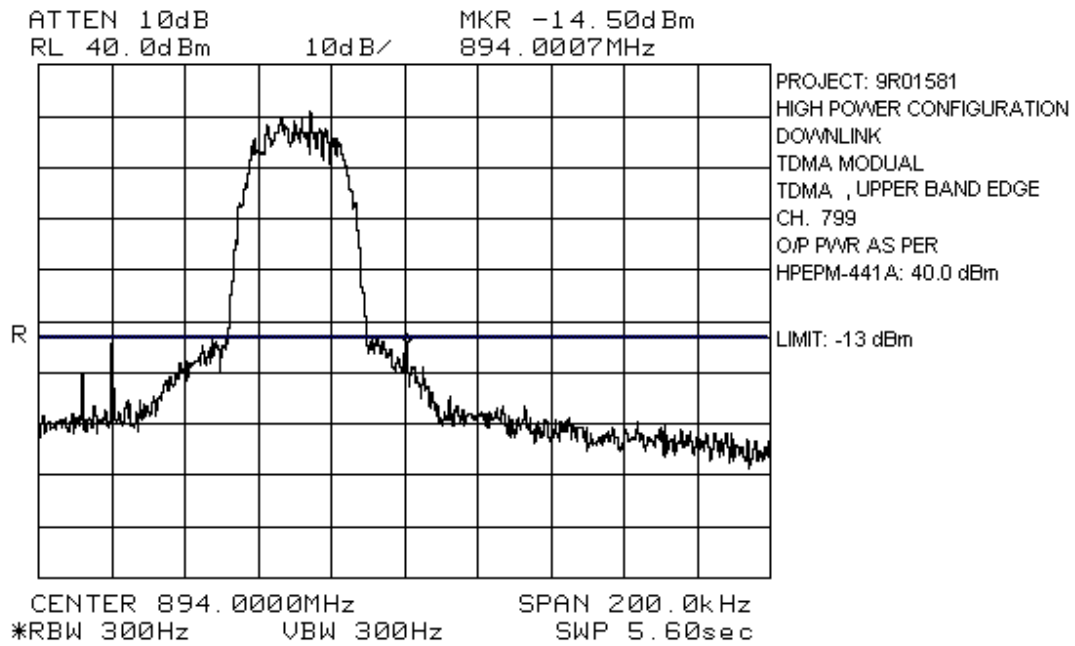
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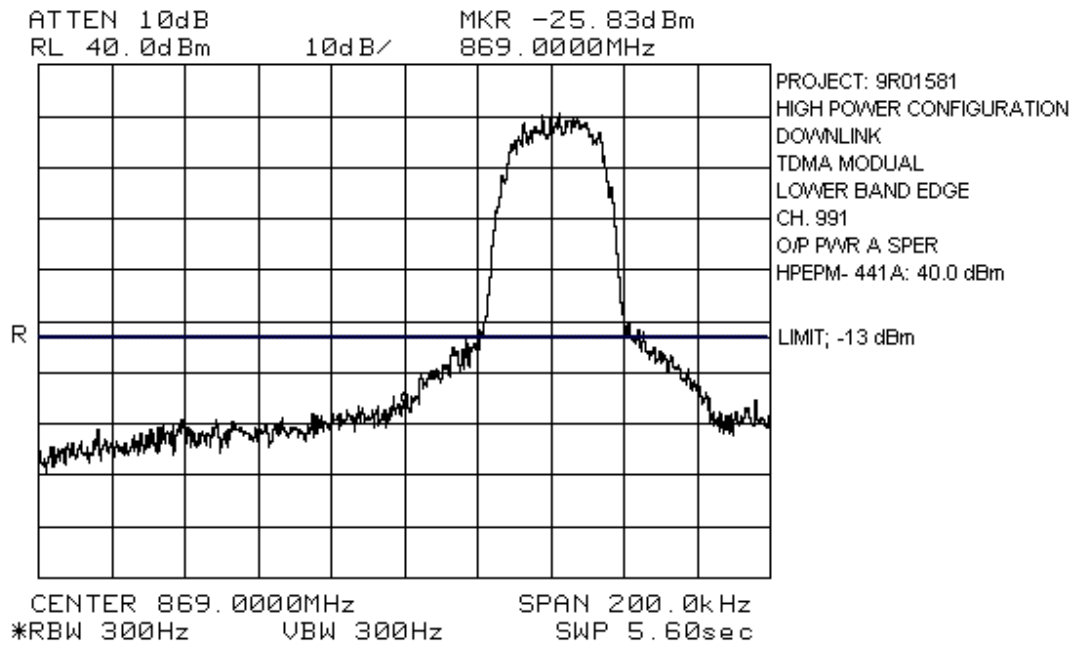
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EQUIPMENT: MR801 Cellular Repeater
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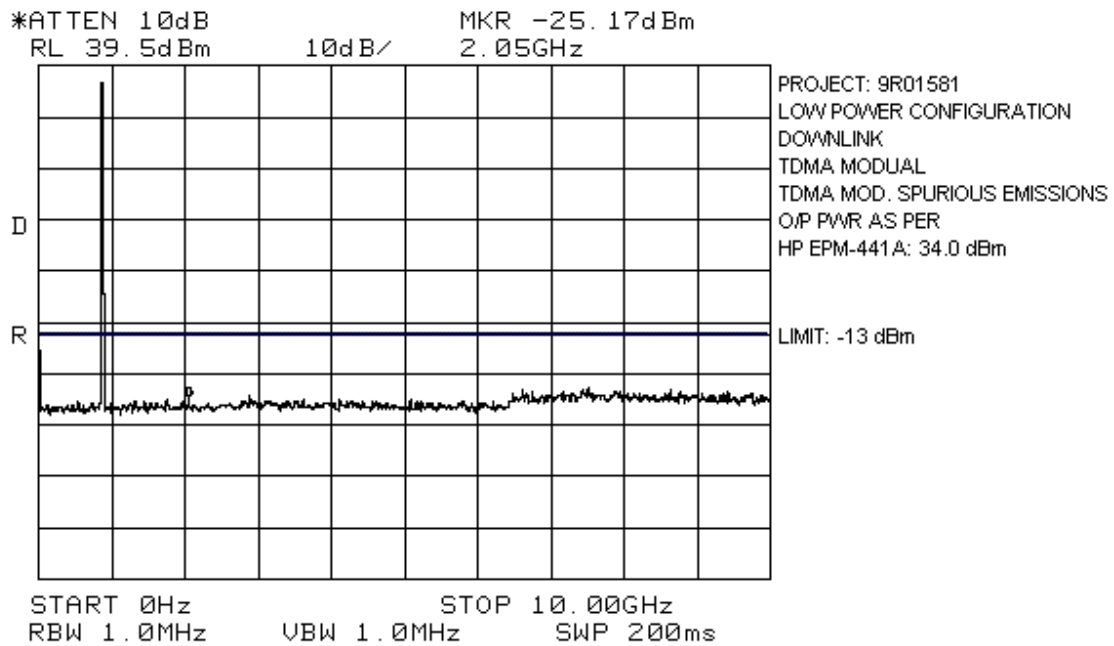


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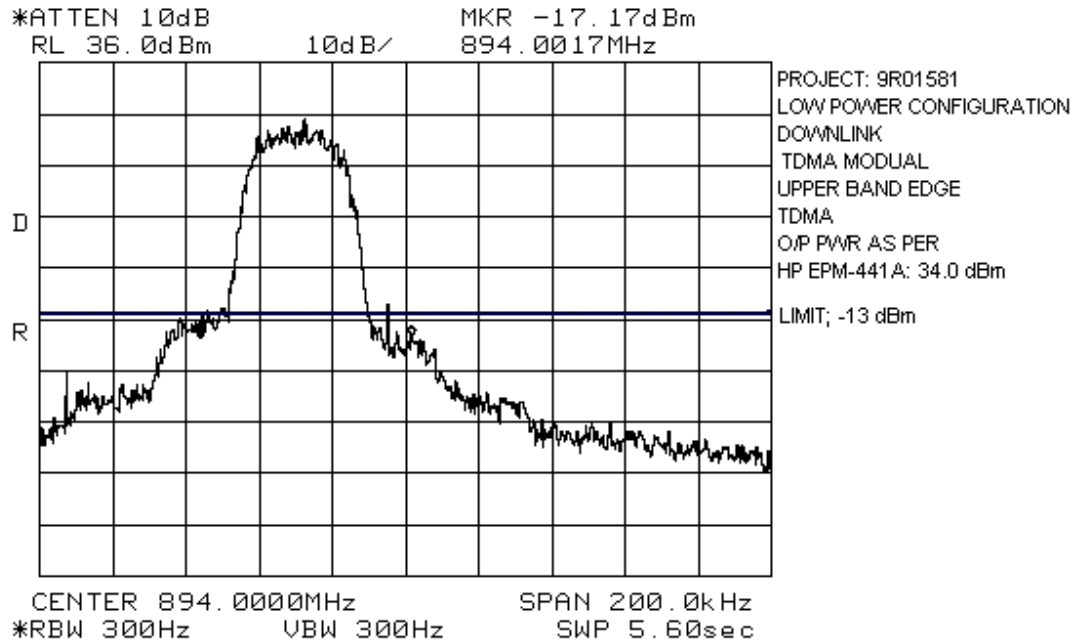


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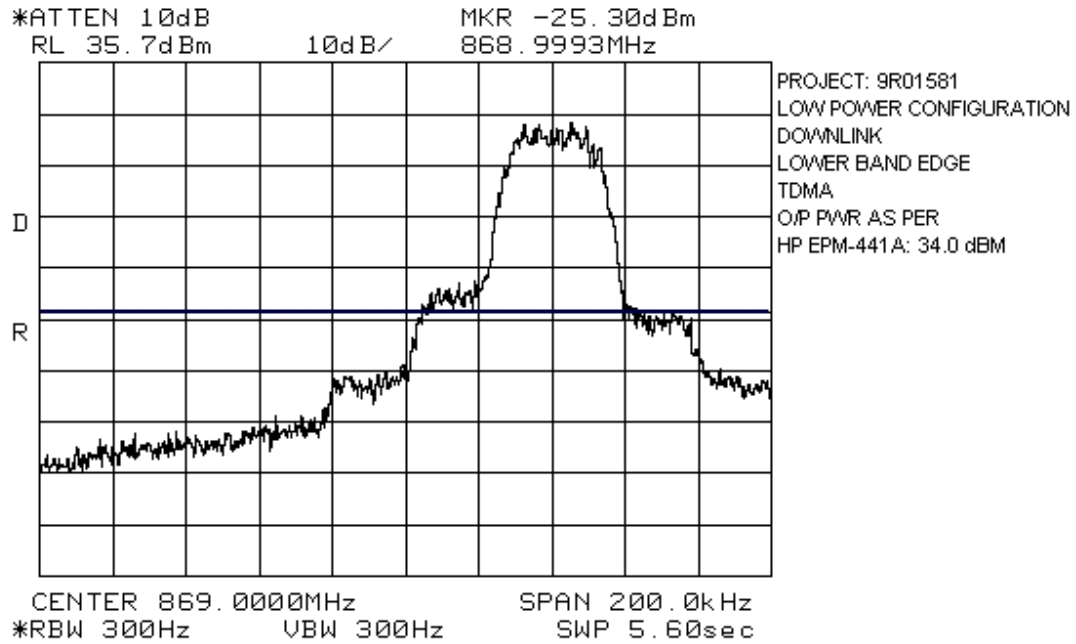
Low Power - TDMA



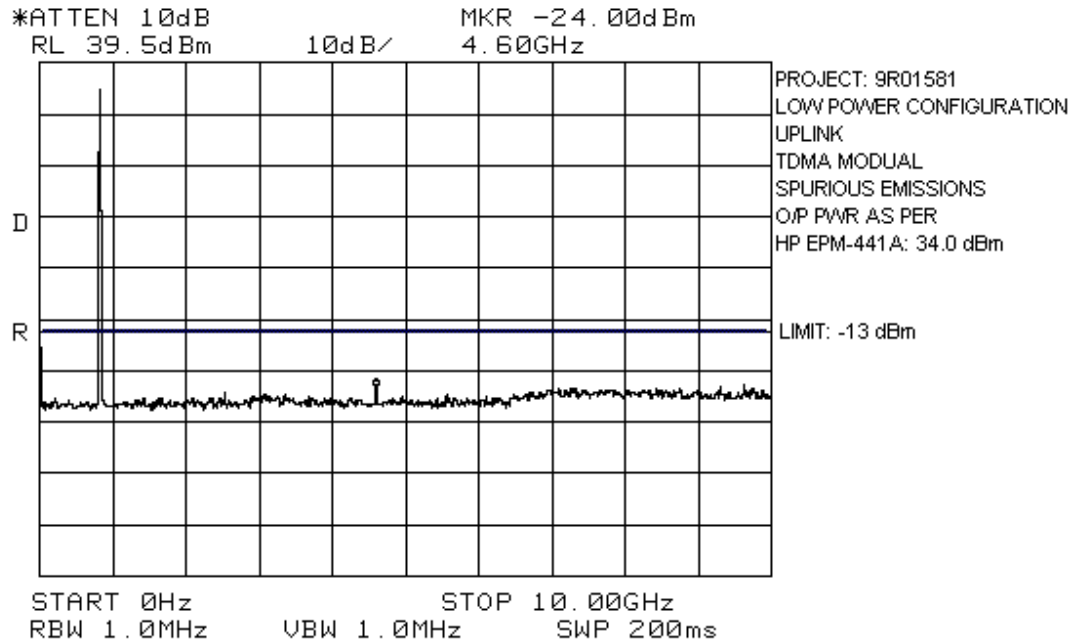
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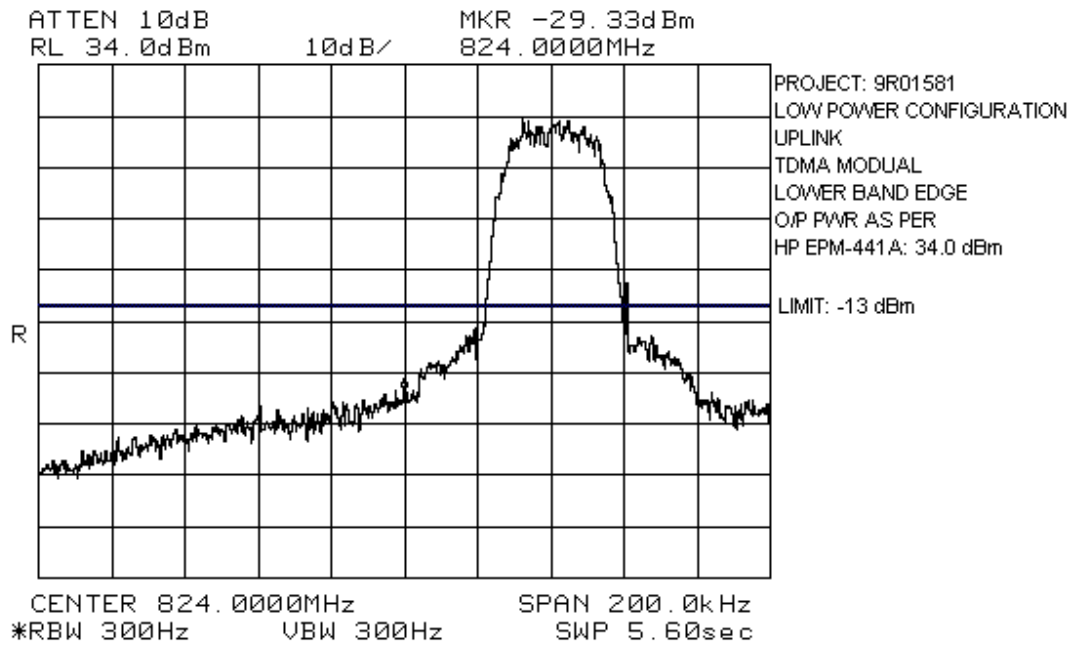
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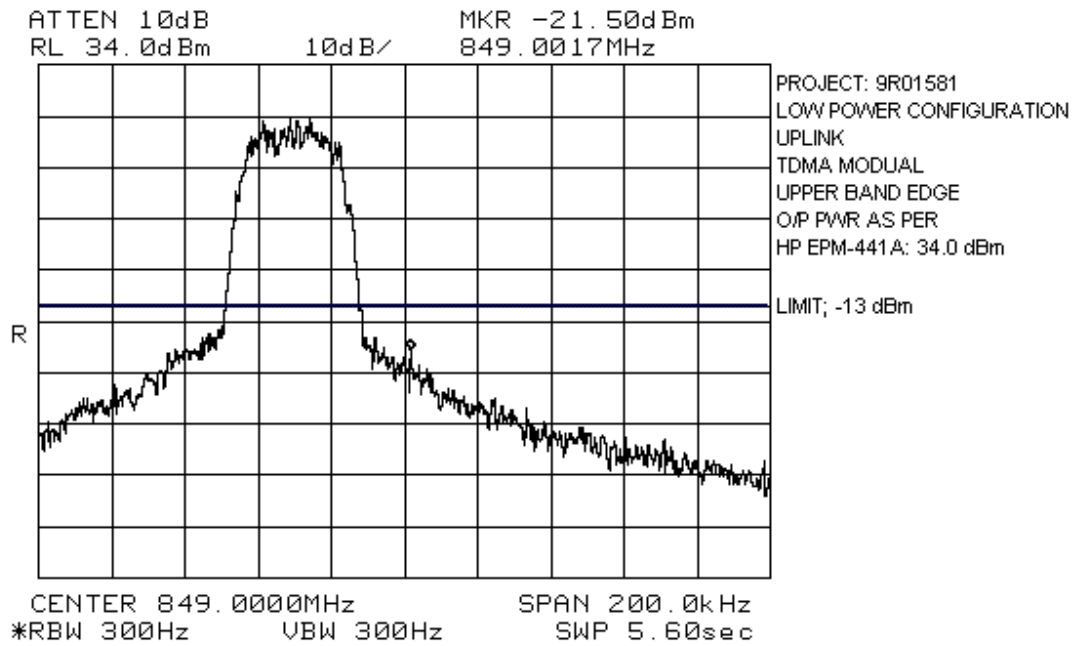
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EQUIPMENT: MR801 Cellular Repeater
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EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801



EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious	PARA. NO.: 2.917(e)
TESTED BY: Kevin Carr	DATE: August 12, 1999

Test Results: Complies.
The maximum field strength is 41.1 dB μ V/m @ 3343.7 MHz
@ 3m.

Test Data:

EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

Test Data - Radiated Emissions - Uplink

Test Distance (meters) : 3		Range: A Tower		Receiver: ESVP		RBW: 1 MHz, 3 MHz		Detector: VBW, Peak			
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)
1671.4	Hrn2	V			49.1	29.3	-41.7		36.7	82.3	45.6
1672.6	Hrn2	H			51.8	29.3	-41.7		39.4	82.3	42.9
2507.0	Hrn2	V			49.0	31.2	-45.9		34.3	82.3	48.0
2508.0	Hrn2	H			51.5	31.2	-45.9		36.8	82.3	45.5
3342.7	Hrn2	V			48.6	34.4	-42.8		40.2	82.3	42.1
3343.7	Hrn2	H			49.5	34.4	-42.8		41.1	82.3	38.5
4178.5	Hrn2	V			50.1	36.6	-42.9		43.8	82.3	39.0
4178.4	Hrn2	H			49.6	36.6	-42.9		43.3	82.3	38.9
5014.5	Hrn2	V			48.6	39.3	-44.5		43.4	82.3	39.2
5015.1	Hrn2	H			48.3	39.3	-44.5		43.1	82.3	

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.

All other emissions >> 40 dB below the limit.

EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

Test Data - Radiated Emissions - Downlink

Test Distance (meters) : 3		Range: A Tower		Receiver: ESVP		RBW: 120		Detector: Q-Peak			
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)
1761.5	Hrn2	V			51.8	29.8	-43.1		38.5	82.3	43.8
1761.5	Hrn2	H			51.0	29.8	-43.1		37.7	82.3	44.6
2642.3	Hrn2	V			50.5	31.6	-45.5		36.6	82.3	45.7
2641.9	Hrn2	H			51.8	31.6	-45.5		37.9	82.3	44.4
3522.8	Hrn2	V			47.8	35.3	-42.2		40.9	82.3	41.4
3522.7	Hrn2	H			49.0	35.3	-42.2		42.1	82.3	40.2
4403.6	Hrn2	V			48.3	37.1	-43.2		42.2	82.3	40.1
4403.4	Hrn2	H			48.6	37.1	-43.2		42.5	82.3	39.8
5284.3	Hrn2	V			47.5	39.7	-44.0		43.2	82.3	39.1
5284.3	Hrn2	H			47.3	39.7	-44.0		43.0	82.3	39.3
Notes: The spectrum was search up to the 10 th 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. All other emissions >> 40 dB below the limit.											

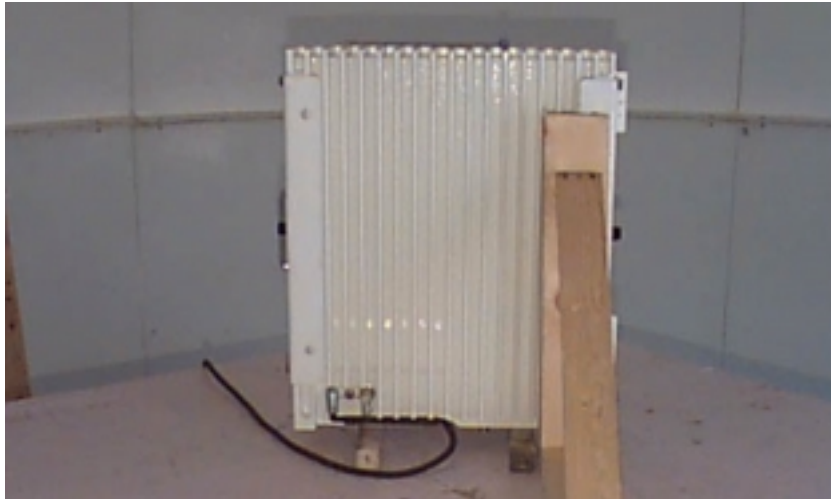
EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

Photographs of Test Setup

Front View



Rear View



EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

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: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

Section 8. Test Equipment List

CAL CYCLE	EQUIPMENT	MANUFACTURER	MODEL	SERIAL	LAST CAL.	NEXT CAL.	
1 Year	Attenuator	Narda	768-20	9507	July 24/98	Sept. 24/99	
1 Year	Attenuator	Narda	765-20	9510	July 24/98	Sept. 24/99	
1 Year	Attenuator	Narda	768-10	9704	July 24/98	Sept. 24/99	
1 Year	RF Millivoltmeter	Rohde & Schwarz	URV5	FA000420	July 23/98	Sept. 24/99	
1 Year	Insertion Unit	Rohde & Schwarz	URV5-Z4	FA000905	July 23/98	Sept. 24/99	
2 Year	Horn Antenna	EMCO #2	3115	4336	Oct. 30/97	Oct. 30/99	
1 Year	Log Periodic Antenna 2	EMCO	3148	9904-1054	Apr. 30/99	Oct. 30/00	
1 Year	Directional Coupler	Hewlett Packard	765D	228	July 21/98	Sept 24/99	
	Detector	Sierra	164B	395	N/A	N/A	
1 Year	50 ohm Combiner Pad	Mini Circuits	ZA3PD-2	9746	July 23/98	Sept. 24/99	
1 Year	Low Noise Amplifier	Avantek	AWT-8035	1005	Aug. 4/98	Sept. 24/99	
1 Year	Low Noise Amplifier	DBS Microwave	DWT-13035	9623	Aug. 4/98	Sept. 24/99	
3 Year	RF Generator	Rohde & Schwarz	SME3	DE14439	June 29/96	Dec. 29/99	
1 Year	RF Generator	Rohde & Schwarz	SIMIQ03E	DE24154	Sept. 24/98	Sept. 24/99	
	Power Supply	Hewlett Packard	6274B	2552A-08243	NCR	NCR	
2 Year	Spectrum Analyzer	Hewlett Packard	8563E	862205	Jan. 22/98	Jan. 22/00	
1 Year	Power Head (Rental)	Hewlett Packard	878A	909238	Feb. 5/99	Feb. 5/00	
1 Year	Power Meter (Rental)	Hewlett Packard	EPM-441A	837896	Oct 1/98	Oct 1/99	

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

EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

ANNEX A
TEST METHODOLOGIES

EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

NAME OF TEST: RF Power Output	PARA. NO.: 2.985
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Minimum Standard: Para. No. 22.913(a). The maximum effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 watts.

Method Of Measurement:

Detachable Antenna:

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

Integral Antenna:

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

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

where,

P = the equivalent isotropic radiated power in watts

E = the maximum measured field strength in V/m

R = the measurement range (3 meters)

G = the numeric gain of the transmit antenna in relation to an isotropic radiator

EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

NAME OF TEST: Occupied Bandwidth (Voice & SAT)	PARA. NO.: 2.989
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Minimum Standard: 22.917(c) The mean power of any emission removed from the carrier frequency by a displacement frequency (f_d in kHz) must be attenuated below the mean power of the unmodulated carrier (P) as follows:

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

at least $117 \log(f_d/12)$

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

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

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: 300 Hz
VBW: $\geq$ RBW
Span: 100 kHz
Sweep: Auto
Mask: CELLF3E

Input Signal Characteristics (F3E/F3D):

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

EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

NAME OF TEST: Occupied Bandwidth (WB Data)	PARA. NO.: 2.989
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Minimum Standard: 22.917(c) The mean power of any emission removed from the carrier frequency by a displacement frequency (f_d in kHz) must be attenuated below the mean power of the unmodulated carrier (P) as follows:

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

at least 26 dB

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

at least 45 dB

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

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

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: 300 Hz

VBW: $\geq$ RBW

Span: 200 kHz

Sweep: Auto

Mask: CELLF1D

Input Signal Characteristics:

RF level: Maximum recommended by manufacturer

AF1 frequency: 10 kHz, random bit sequence

AF1 level: sufficient to produce 8 kHz deviation

EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

NAME OF TEST: Occupied Bandwidth (ST)	PARA. NO.: 2.989
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Minimum Standard: 22.917(c) The mean power of any emission removed from the carrier frequency by a displacement frequency (f_d in kHz) must be attenuated below the mean power of the unmodulated carrier (P) as follows:

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

at least 26 dB

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

at least 45 dB

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

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

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: 300 Hz

VBW: $\geq$ RBW

Span: 200 kHz

Sweep: Auto

Mask: CELLF1D

Input Signal Characteristics:

RF level: Maximum recommended by manufacturer

AF1 frequency: 10 kHz tone

AF1 level: sufficient to produce 8 kHz deviation

EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

NAME OF TEST: Occupied Bandwidth (Digital Modulation) PARA. NO.: 2.989
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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: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

NAME OF TEST: Spurious Emission at Antenna Terminals	PARA. NO.: 2.991
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Minimum Standard: Para. No. 22.917(e). The mean power of emissions must be attenuated below the mean power of the unmodulated carrier on any frequency twice or more than twice the fundamental emission by at least $43 + 10 \log P$. This is equivalent to -13 dBm absolute power.

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: 30 kHz (AMPS). As required for digital modulations.

VBW: $\geq$ RBW

Start Frequency: 0 MHz

Stop Frequency: 10 GHz

Sweep: Auto

EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

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

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

Calculation Of Field Strength Limit:

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

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

For emissions ≤ 1 GHz:

$G = 1.64$ (Dipole Gain)

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

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

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

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

For emissions > 1 GHz:

$G = 1$ (Isotropic Gain)

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

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

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

The spectrum is searched to 10 GHz.

EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

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

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

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

Table C-1

Method Of Measurement:Frequency Stability With Voltage Variation:

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

Frequency Stability With Temperature Variation:

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

KTL Ottawa

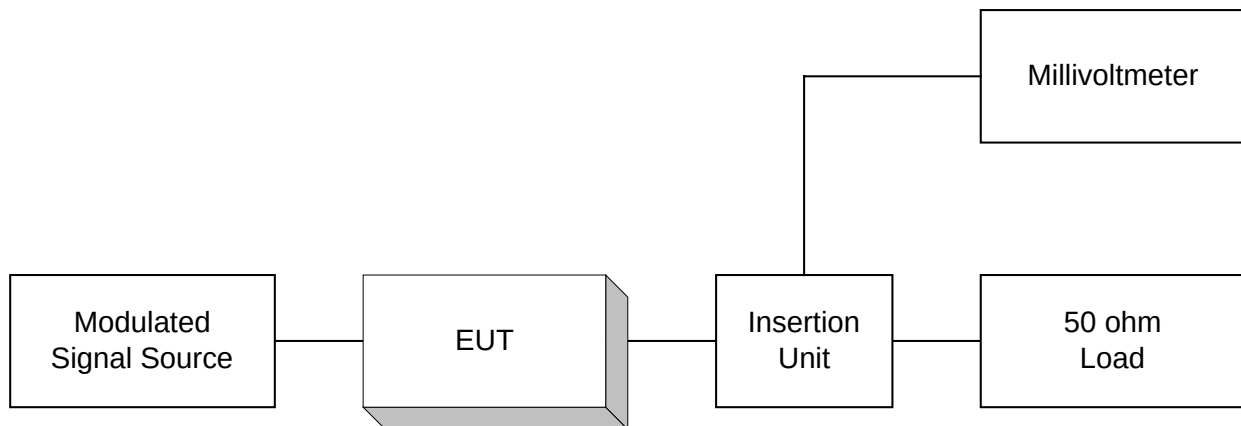
FCC PART 22, SUBPART H
CELLULAR BAND REPEATERS
PROJECT NO.: 9R01581
ANNEX B

EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

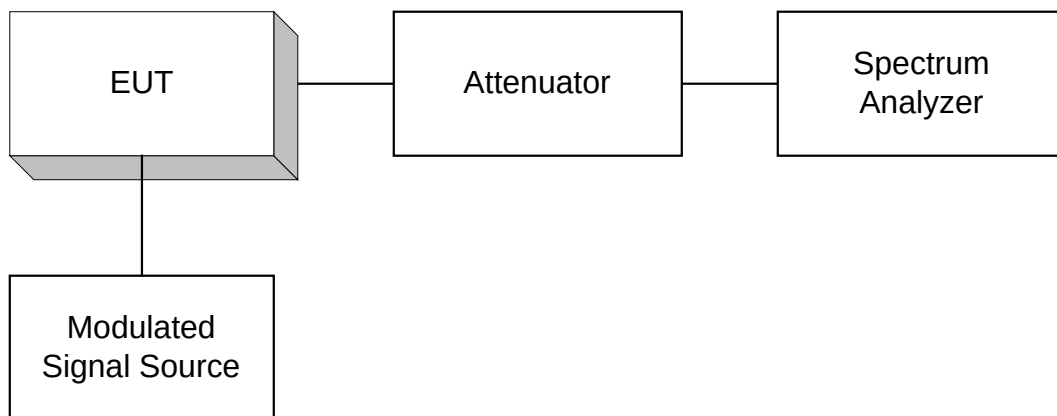
ANNEX B
TEST DIAGRAMS

EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

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

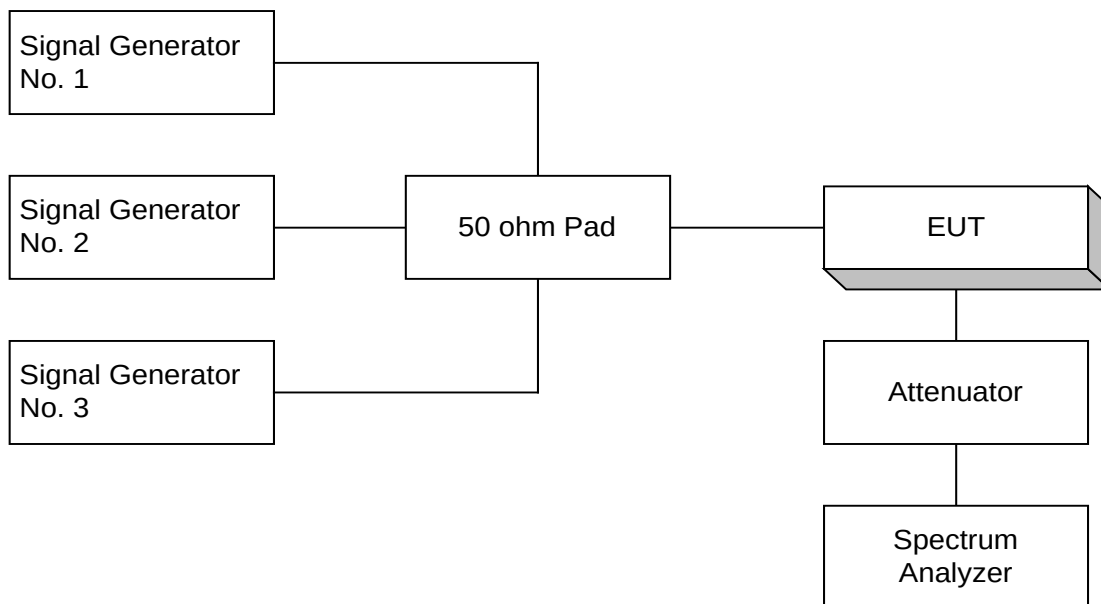
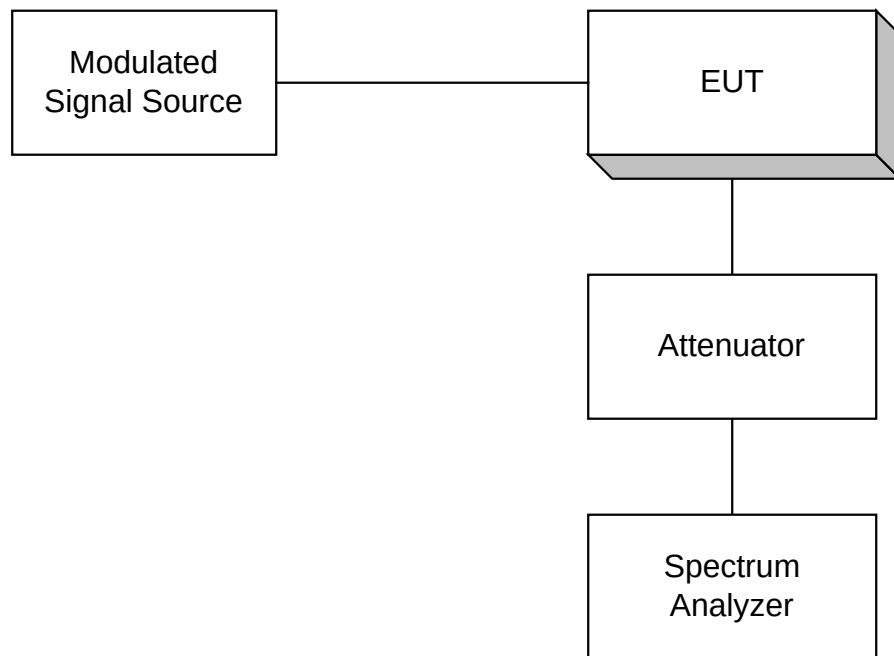


Para. No. 2.989 - Occupied Bandwidth



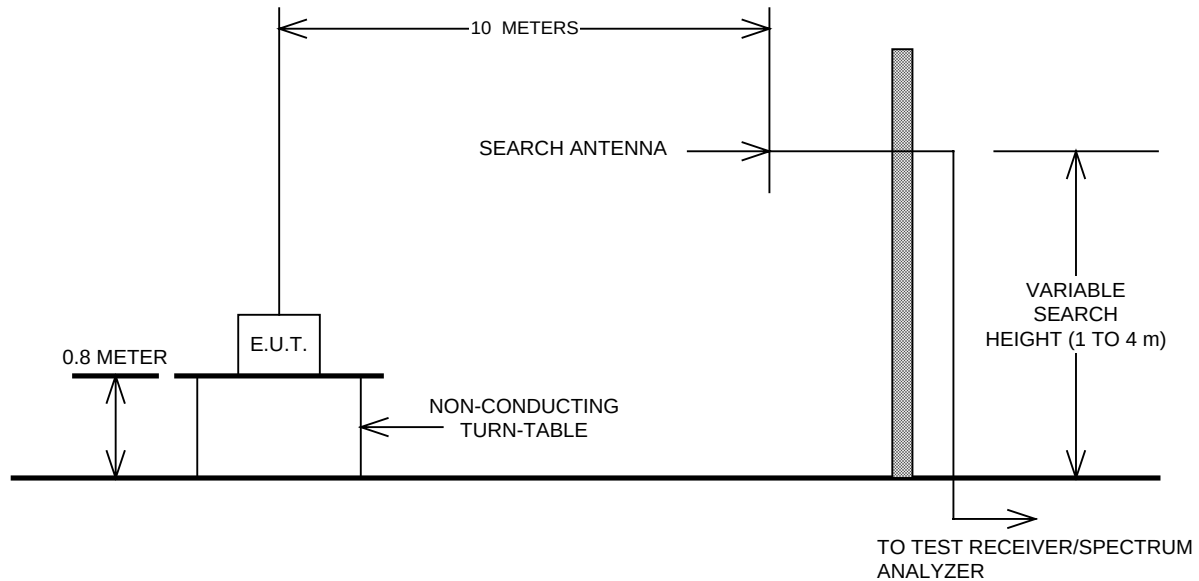
EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

Para. No. 2.991 Spurious Emissions at Antenna Terminals



EQUIPMENT: MR801 Cellular Repeater
FCC ID: BCR-RPT-MR801

Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability

