

KTL Test Report:	9R01580
Applicant:	Allen Telecom Inc. 140 Vista Centre Drive Forrest, Virginia 24551
Equipment Under Test: (E.U.T.)	RF Booster System
FCC ID:	BCR-MRB-CELL
In Accordance With:	FCC Part 22, Subpart H 800 MHz Cellular Subscriber Units
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:	111

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EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

Section 1. Summary of Test Results

Manufacturer: Allen Telecom Inc.

Model No.: None

Serial No.: None

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 22, Subpart H.



New Submission



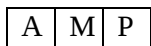
Production Unit



Class II Permissive Change



Pre-Production Unit



Equipment Code

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.

See " Summary of Test Data".



NVLAP LAB CODE: 100351-0

TESTED BY: _____ DATE: _____
Kevin Carr, Technologist

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EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	MEAS.	RESULT
RF Power Output	2.1046	7W ERP	Chart	Complies
Audio Frequency Response	2.1047	6dB/Octave	N/A	N/A
Audio Low Pass Filter Response	2.1047	Graph	N/A	N/A
Modulation Limiting	2.1047	Graph	N/A	N/A
Occupied Bandwidth (Voice & SAT)	2.1049	Mask	Plot	Complies
Occupies Bandwidth (WB Data & SAT)	2.1049	Mask	Plot	Complies
Occupied Bandwidth (ST)	2.1049	Mask	Plot	Complies
Occupied Bandwidth (SAT)	2.1049	Mask	Plot	Complies
Spurious Emissions at Antenna Terminals	2.1051	-13 dBm	Plot	Complies
Field Strength of Spurious Emissions	2.1053	82.3 dBμV/m	Chart	Complies
Frequency Stability	2.1055	2.5 ppm	Chart	N/A

Footnotes For N/A's:**Test Conditions:****Indoor** Temperature: 27 °C
 Humidity: 45 %**Outdoor** Temperature: 35 °C
 Humidity: 70 %

.

EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

Section 2. General Equipment Specification

Frequency Range:	UL: Not tested, hardwired to base station. DL: 869 MHz – 894 MHz
Tunable Bands:	Not Applicable
Necessary Bandwidth:	
Type of Modulation and Designator:	AMPS (F8W, F1D) CDMA (F9W0 TDMA (DXW)
Data Source:	Internal
Output Impedance:	50 ohms
RF Power Output (rated):	See Page 10
Number of Channels:	1023
Duty Cycle:	Continuous
Channel Spacing:	30 kHz
Operator Selection of Frequency:	Software Controlled
Power Output Adjustment Capability:	Software Controlled

EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

Description of Modifications For Class II Permissive Change

NOT APPLICABLE

EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

Modifications Made During Testing

NOT APPLICABLE

EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

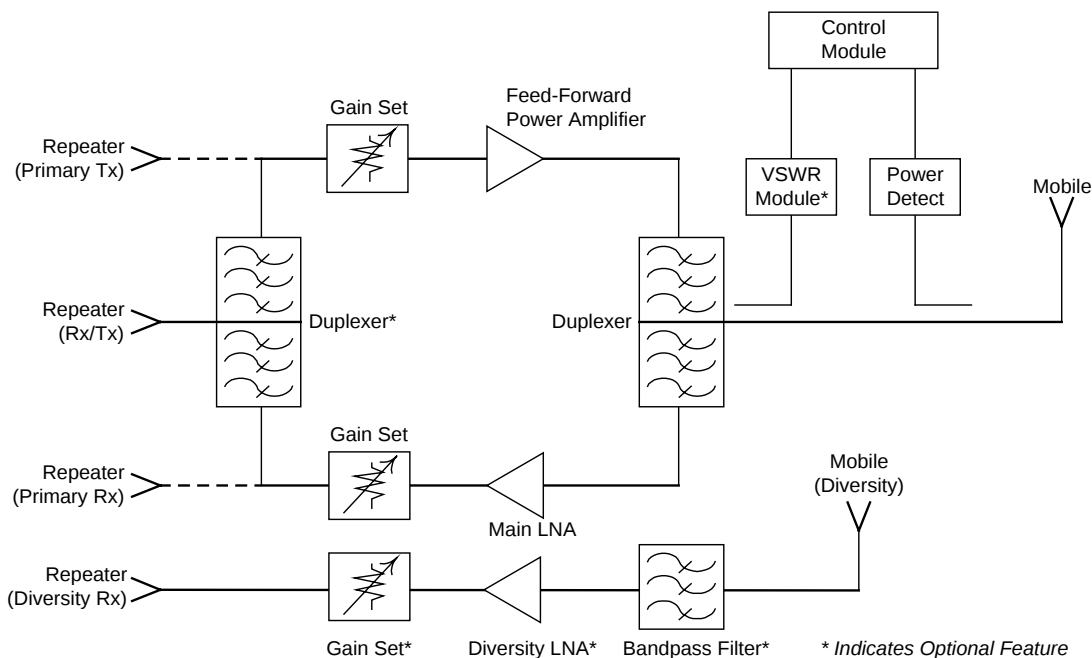
Theory of Operation

The RF Booster is a band selective device which will increase the maximum output power of a signal from a repeater in the downlink. In addition, an integrated LNA will reduce the noise figure in the uplink so as to maintain balance in both paths. It is employed wherever additional signal strength is need and isolation requirements allow it. It can be ordered initially with a repeater or retrofitted to an existing product in the field.

The RF Booster is available for most frequency bands including PCS1900, GSM1800, GSM900, AMPS800 and LMR800. As it is a band selective amplifier, it can be used with all technologies, including GSM, CDMA, TDMA, iDEN and Analog.

The RF Booster passes alarms back through the repeater it is attached to. The operator may monitor the RF Booster through the repeater as well, via terminal emulation program or the MIKOM OMC software platform. The same communication language that is used for the repeater supports the operator when querying status reports or changing settings.

System Diagram



EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL**Section 3. RF Power Output**

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
TESTED BY: Kevin Carr	DATE: June 29, 1999

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

High Power Configuration		
Dual Channel	Output Power (dBm)	Output Power (W)
CDMA, 2 Channel	40.7	11.7
TDMA, 2 Channel	43.1	20.4
Analog, 2 Channel	46.3	42.7
High Power Configuration		
Single Channel Power	Output Power (dBm)	Output Power (W)
CDMA, 1 Channel	44.8	30.2
TDMA, 1 Channel	44.8	30.2
Analog, 1 Channel	46.3	42.7

Low Power Configuration		
Channel	Output Power (dBm)	Output Power (W)
CDMA, 2 Channel	38.9	7.8
TDMA, 2 Channel	40.8	12.0
Analog, 2 Channel	43.7	23.4
Low Power Configuration		
Single Channel Power	Output Power (dBm)	Output Power (W)
CDMA, 1 Channel	39.1	8.1
TDMA, 1 Channel	42.0	15.8
Analog, 1 Channel	43.7	23.4

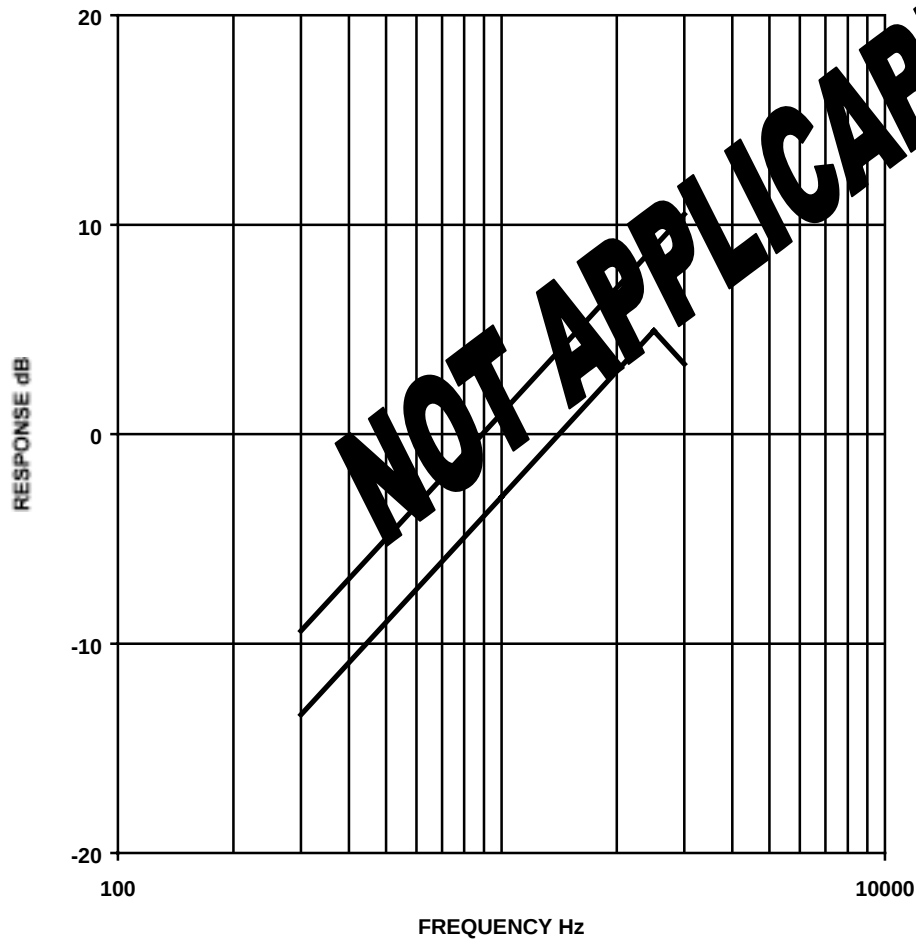
EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

NAME OF TEST: Audio Frequency Response

PARA. NO.: 2.1047

TESTED BY:

DATE:



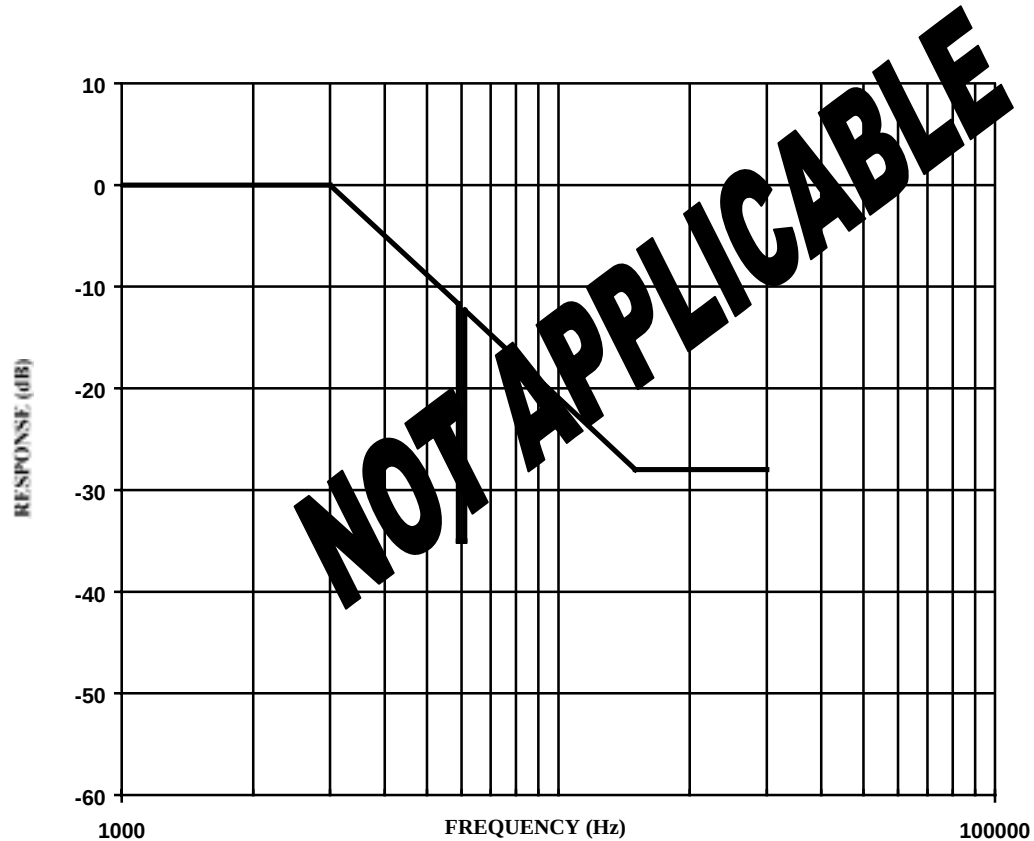
EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

NAME OF TEST: Audio Low-Pass Filter Response

PARA. NO.: 2.1047

TESTED BY:

DATE:



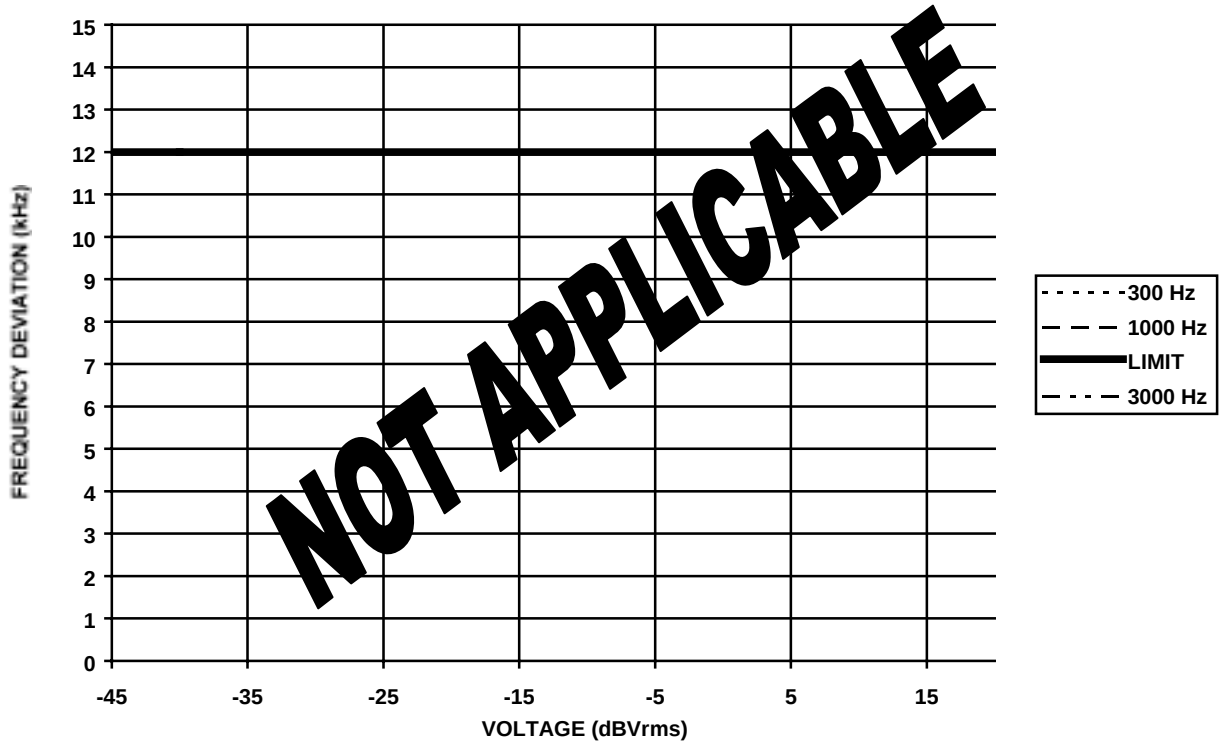
EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

NAME OF TEST: Modulation Limiting

PARA. NO.: 2.1047

TESTED BY:

DATE:



SAT Deviation:

WB Data Deviation:

ST Deviation:

EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

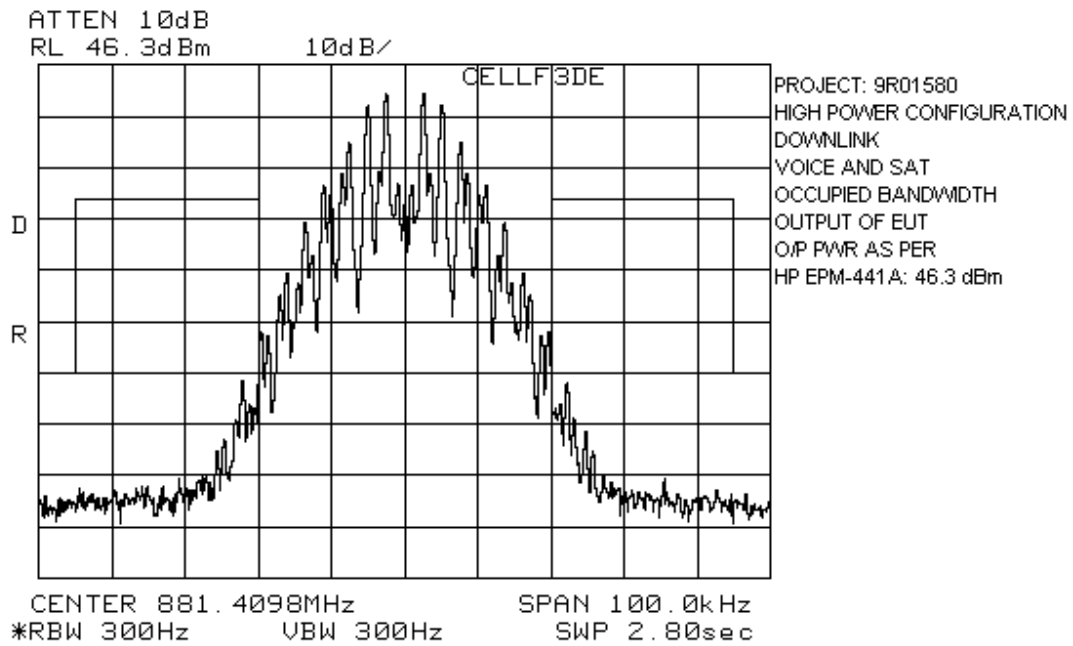
Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth (Voice + SAT)	PARA. NO.: 2.1049
TESTED BY: Kevin Carr	DATE: June 29, 1999

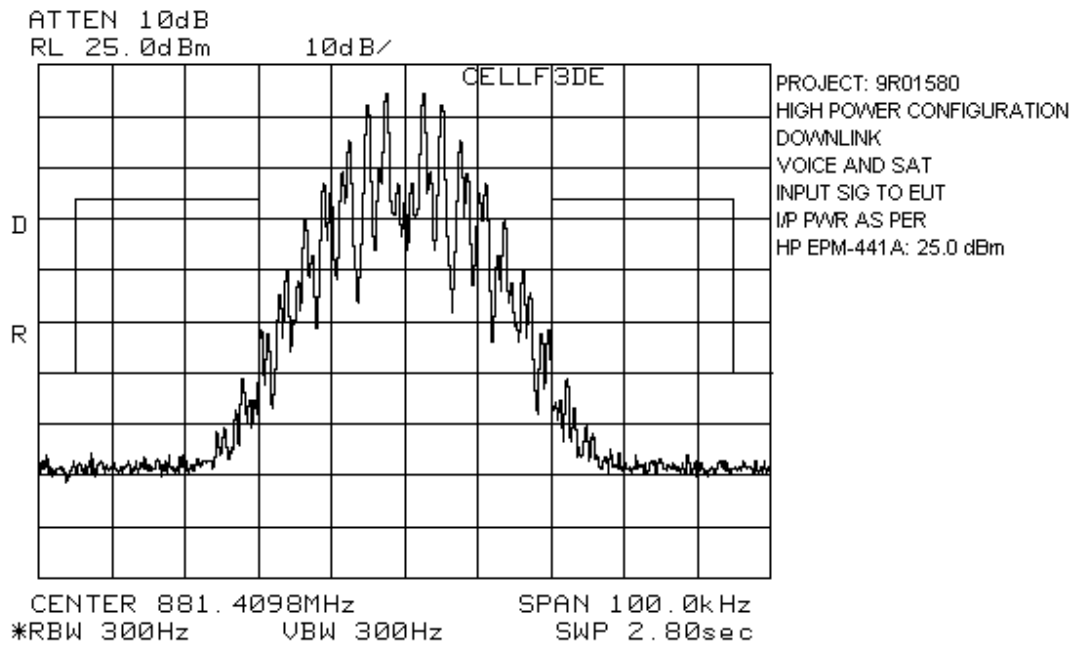
Test Results: Complies.

Test Data: See attached graph(s).

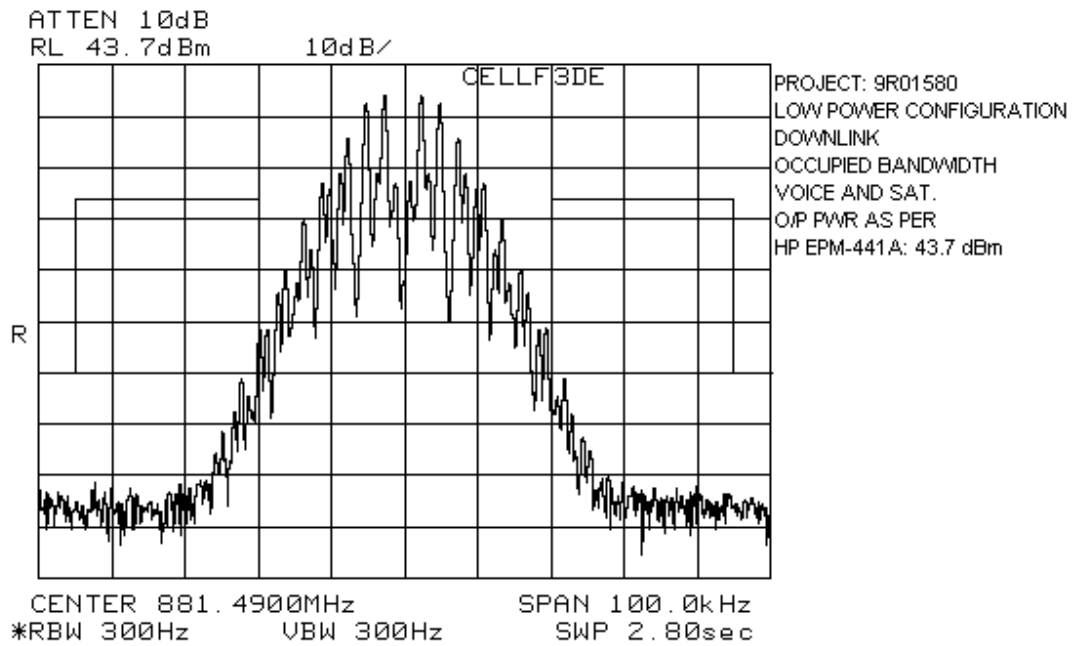
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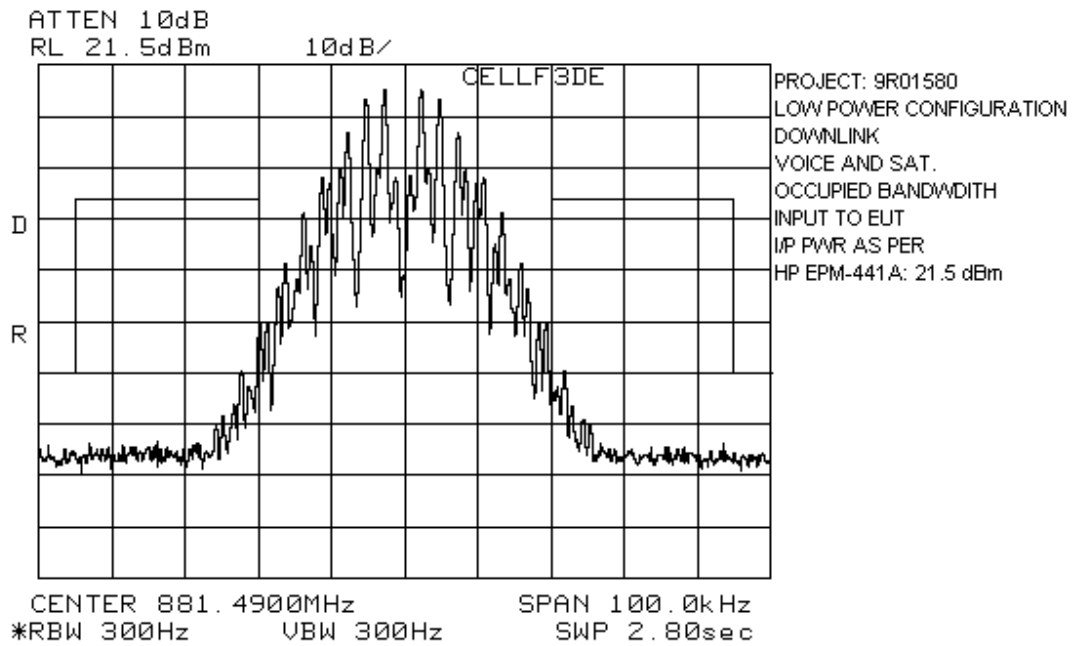
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FCC ID: BCR-MRB-CELL



EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL



EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL



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FCC PART 22, SUBPART H
800 MHz CELLULAR SUBSCRIBER UNITS
PROJECT NO.: 9R01580

EQUIPMENT: RF Booster System

FCC ID: BCR-MRB-CELL

NAME OF TEST: Occupied Bandwidth (WB Data & SAT)	PARA. NO.: 2.1049
TESTED BY: Kevin Carr	DATE: June 29, 1999

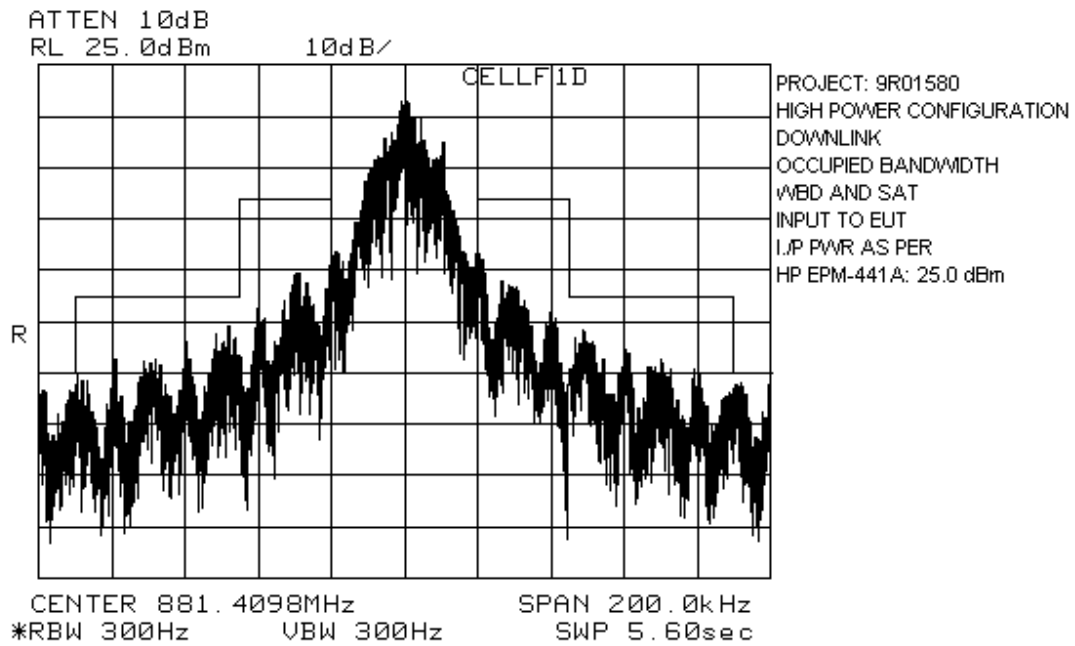
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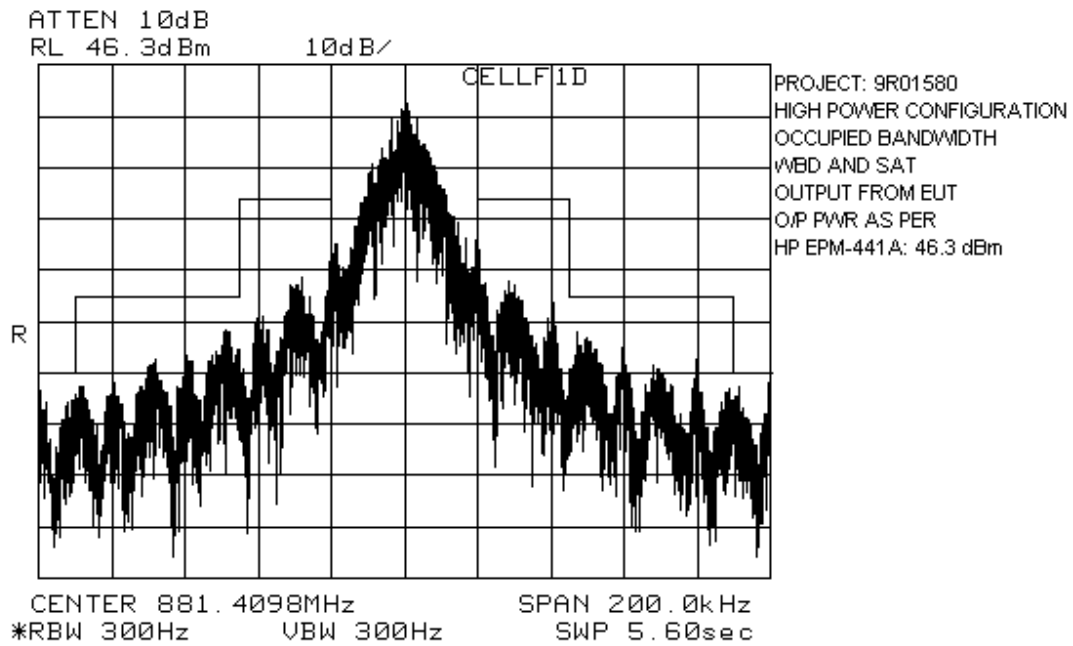
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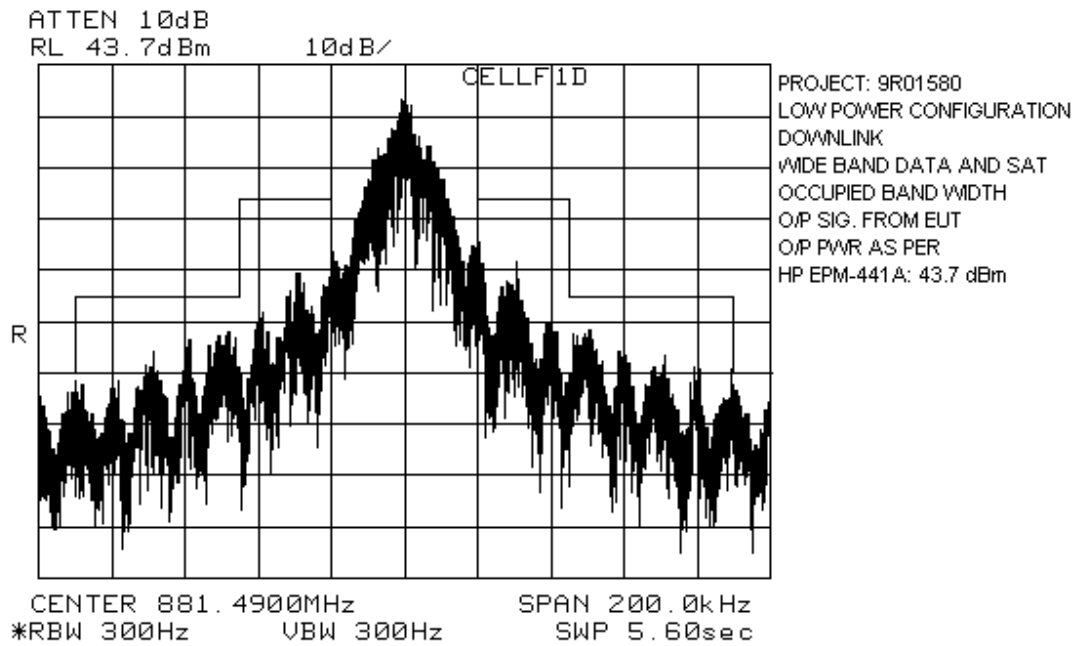
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FCC ID: BCR-MRB-CELL



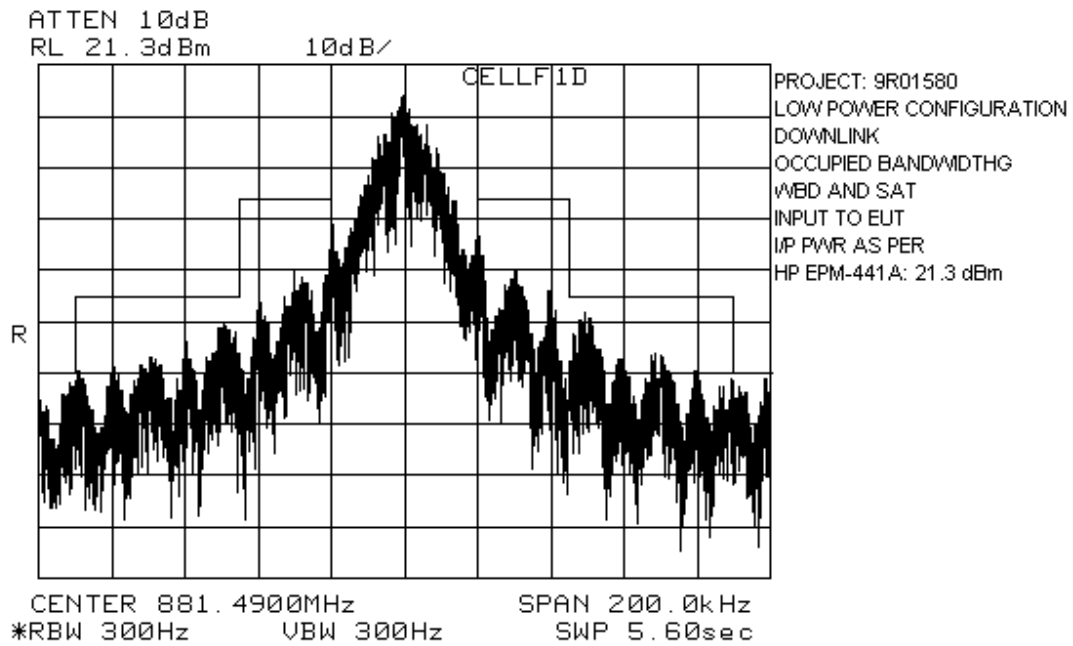
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FCC ID: BCR-MRB-CELL



EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL



EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL



EQUIPMENT: RF Booster System

FCC ID: BCR-MRB-CELL

NAME OF TEST: Occupied Bandwidth (ST)	PARA. NO.: 2.1049
TESTED BY: Kevin Carr	DATE: July 12, 1999

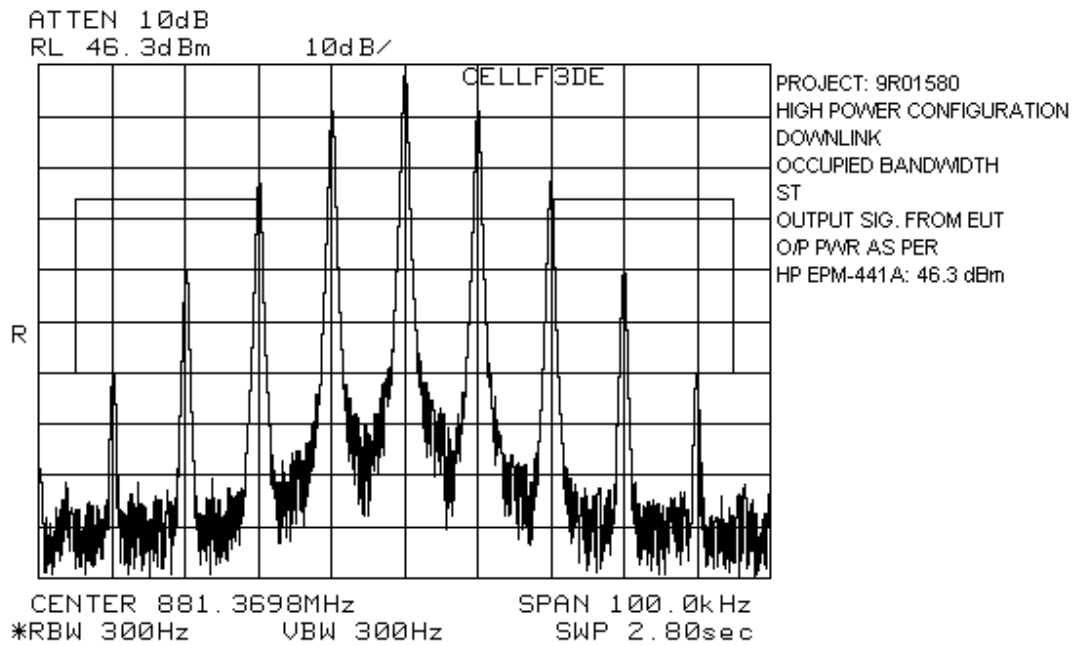
Test Results:

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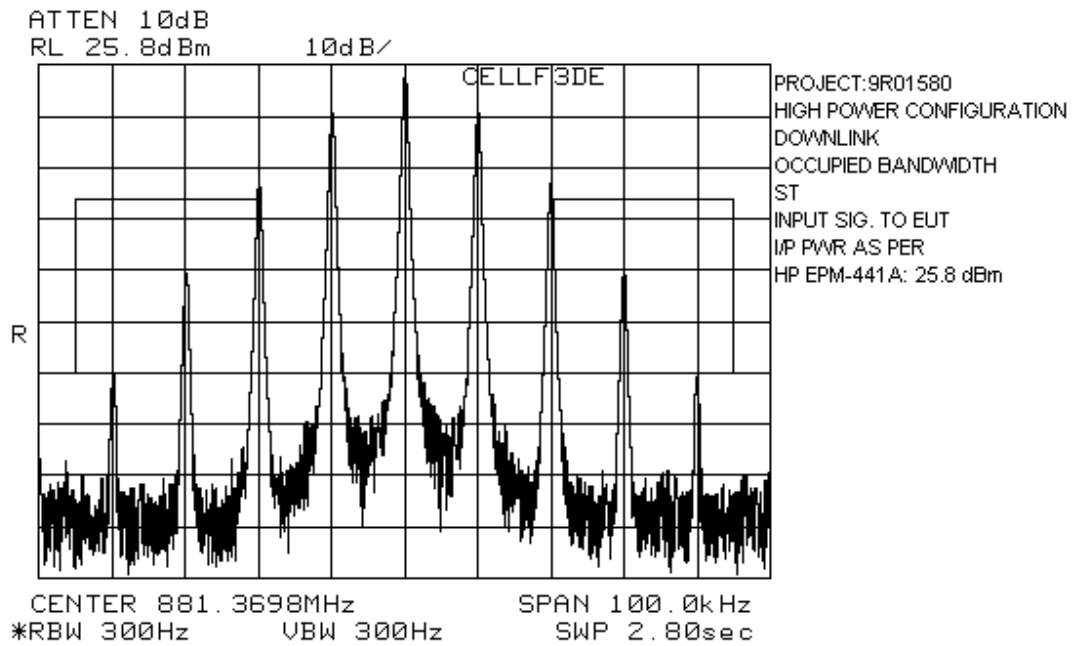
Test Data:

See attached graph(s).

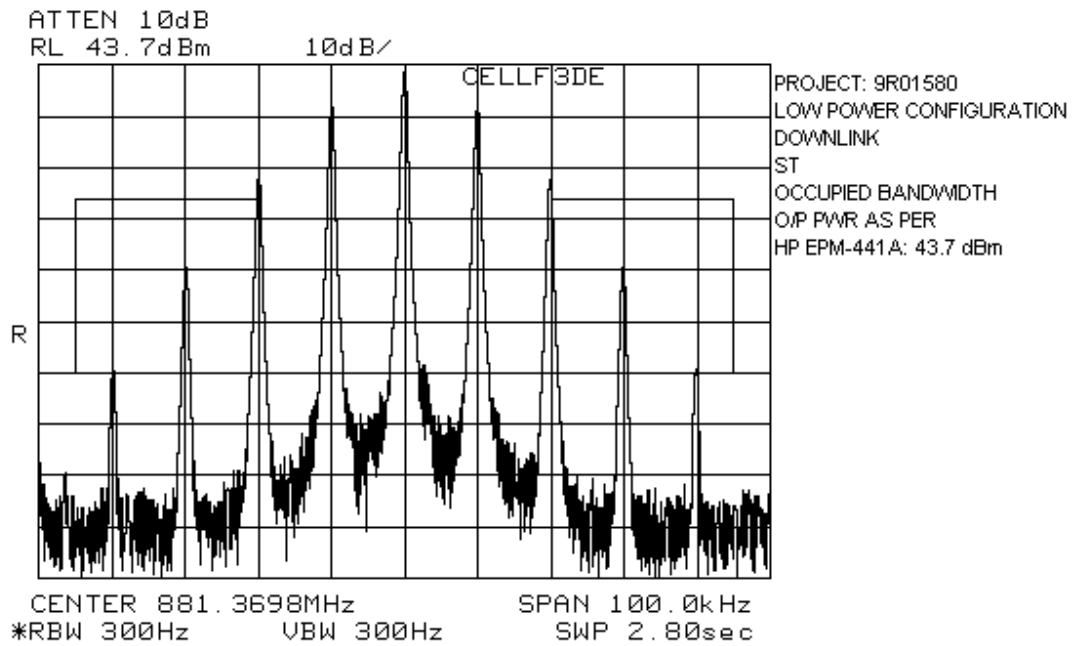
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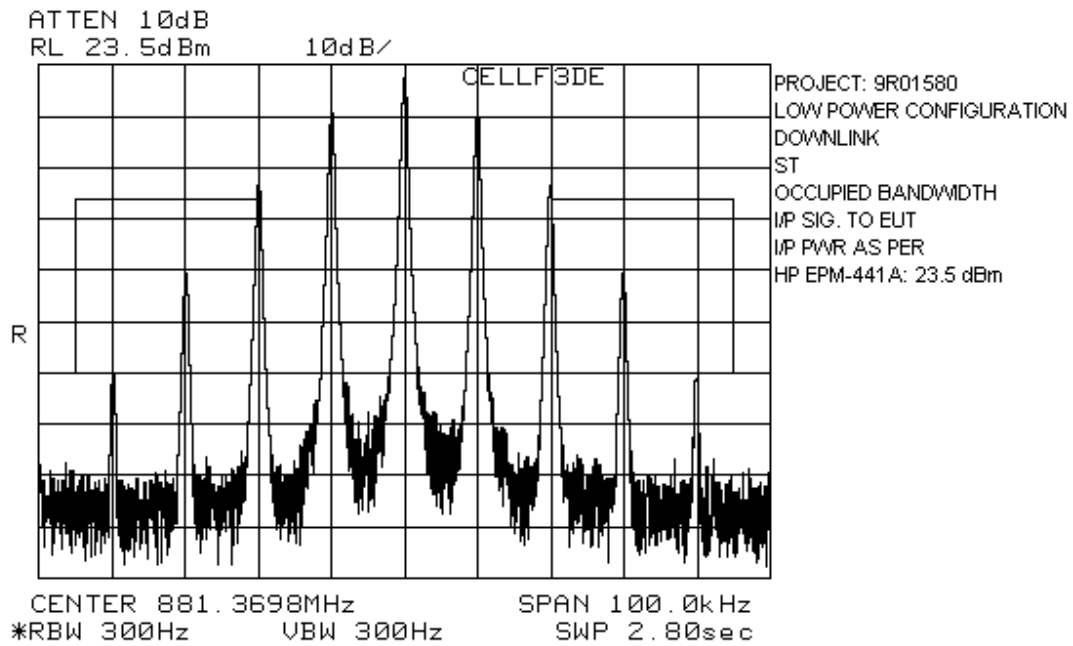
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FCC ID: BCR-MRB-CELL



EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL



EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL



KTL Ottawa

FCC PART 22, SUBPART H
800 MHz CELLULAR SUBSCRIBER UNITS
PROJECT NO.: 9R01580

EQUIPMENT: RF Booster System

FCC ID: BCR-MRB-CELL

NAME OF TEST: Occupied Bandwidth (SAT)	PARA. NO.: 2.1049
TESTED BY: Kevin Carr	DATE: July 12, 1999

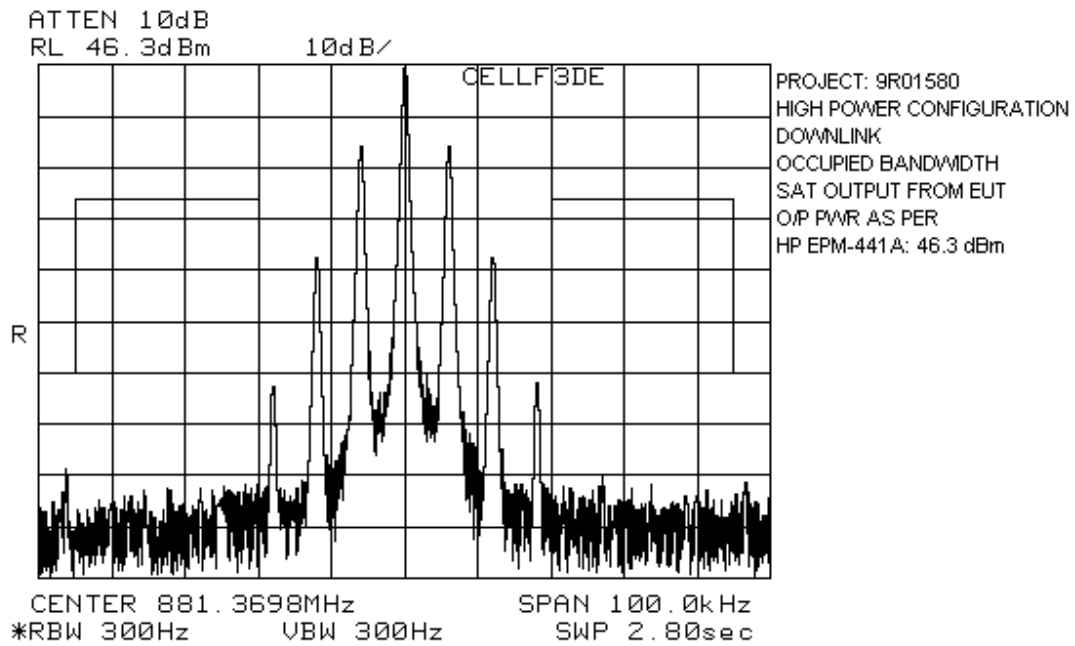
Test Results:

Complies.

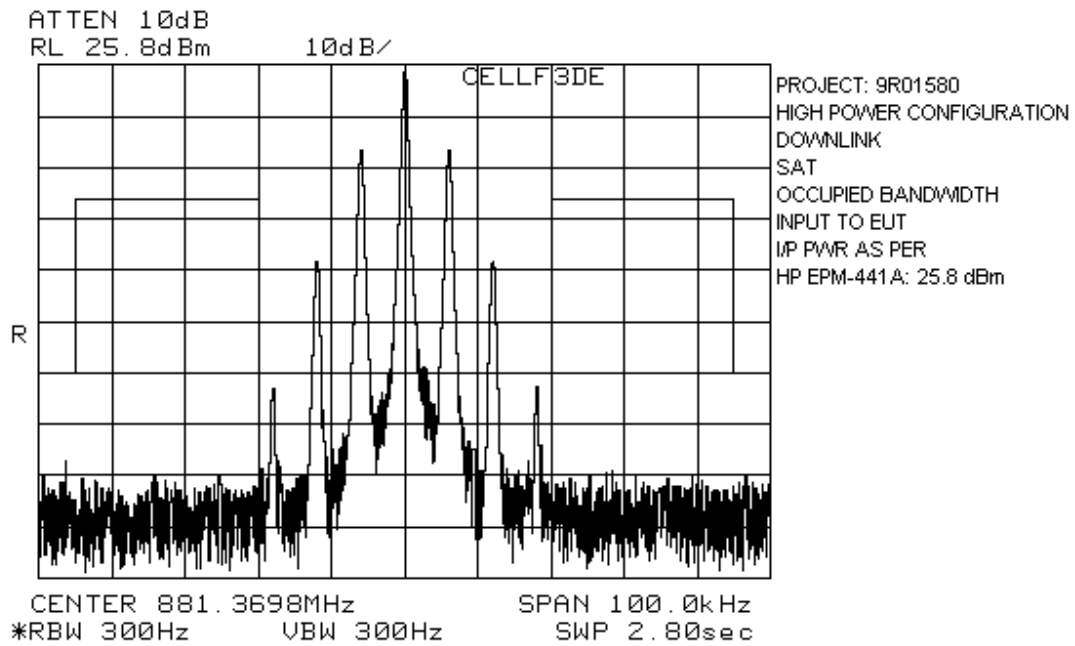
Test Data:

See attached graph(s).

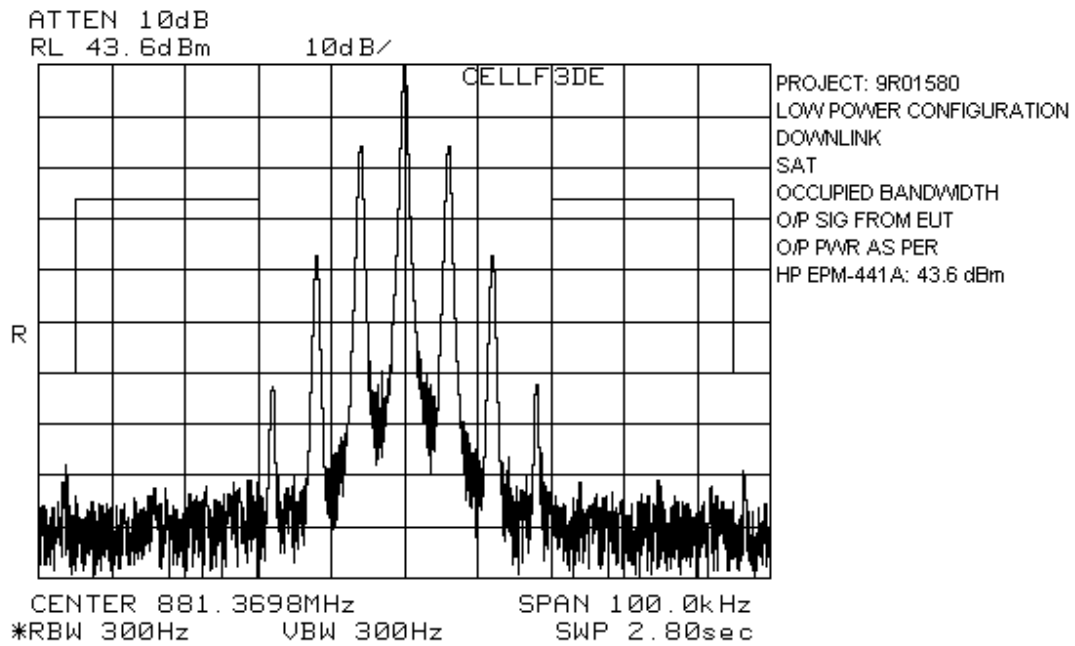
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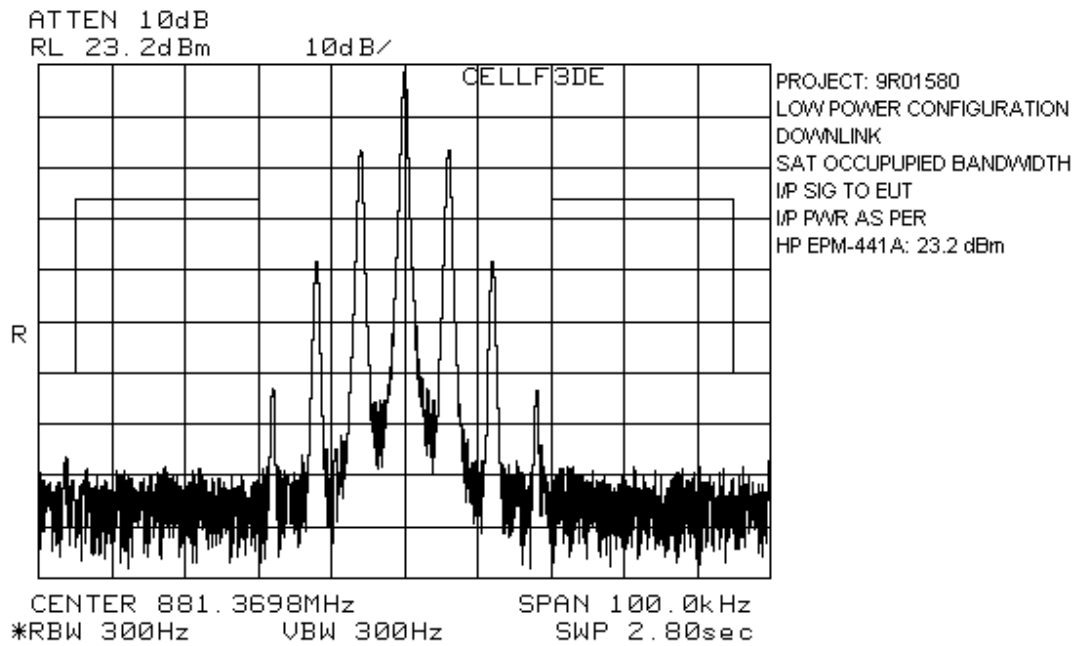
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FCC ID: BCR-MRB-CELL



EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL



EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL



KTL Ottawa

FCC PART 22, SUBPART H
800 MHz CELLULAR SUBSCRIBER UNITS
PROJECT NO.: 9R01580

EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

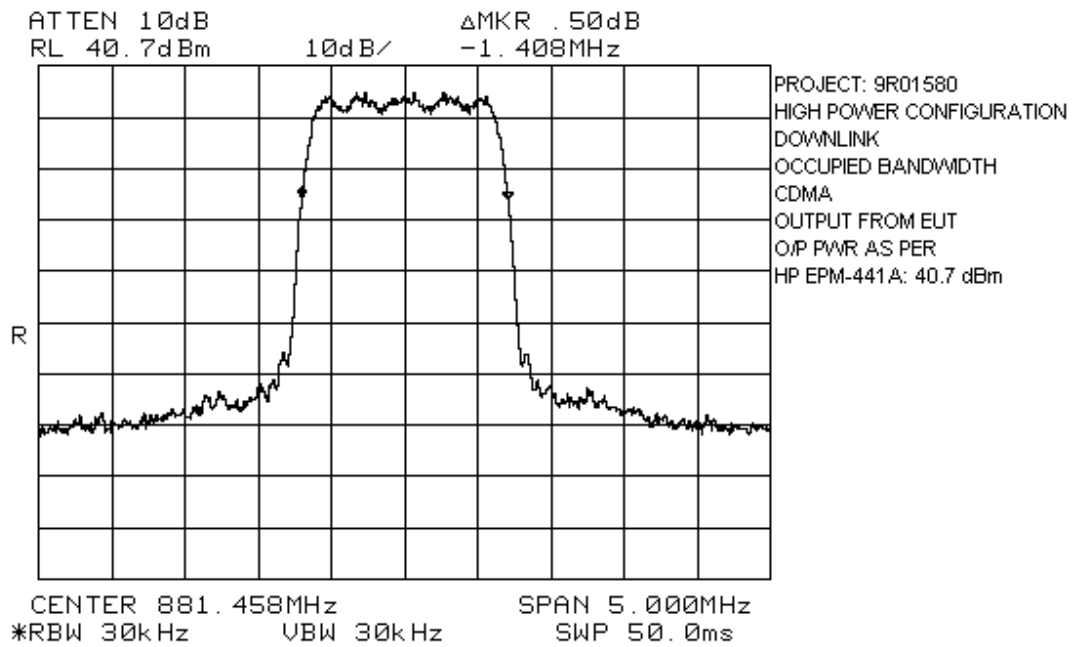
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TESTED BY: Kevin Carr	DATE: June 25, 1999

Test Results: Complies.

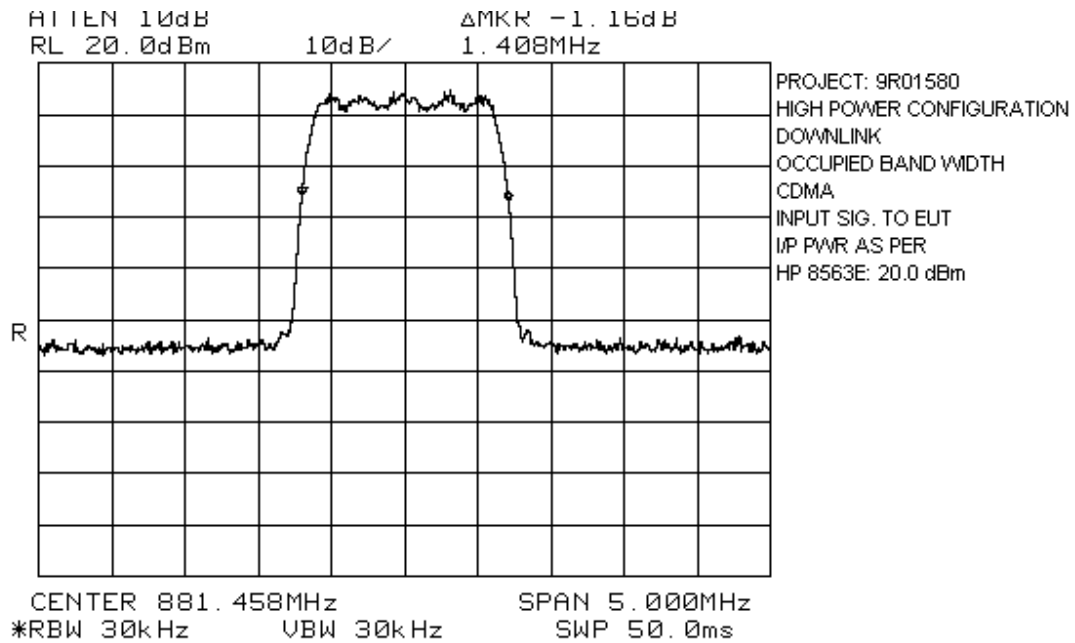
Test Data: See attached graph(s).

EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

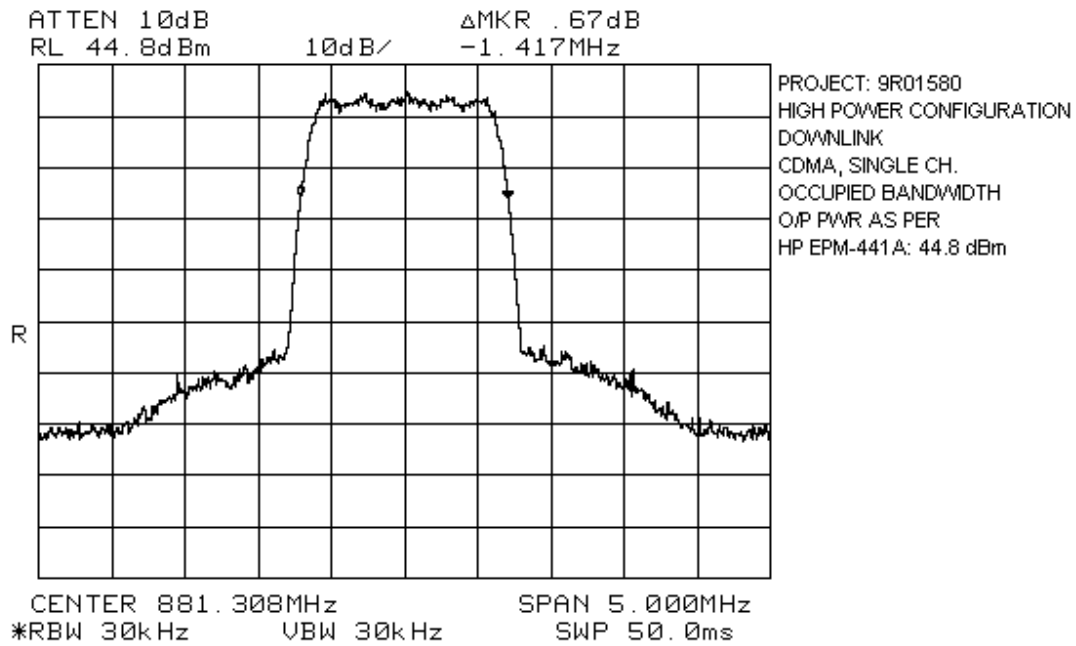
Digital Modulation – High Power



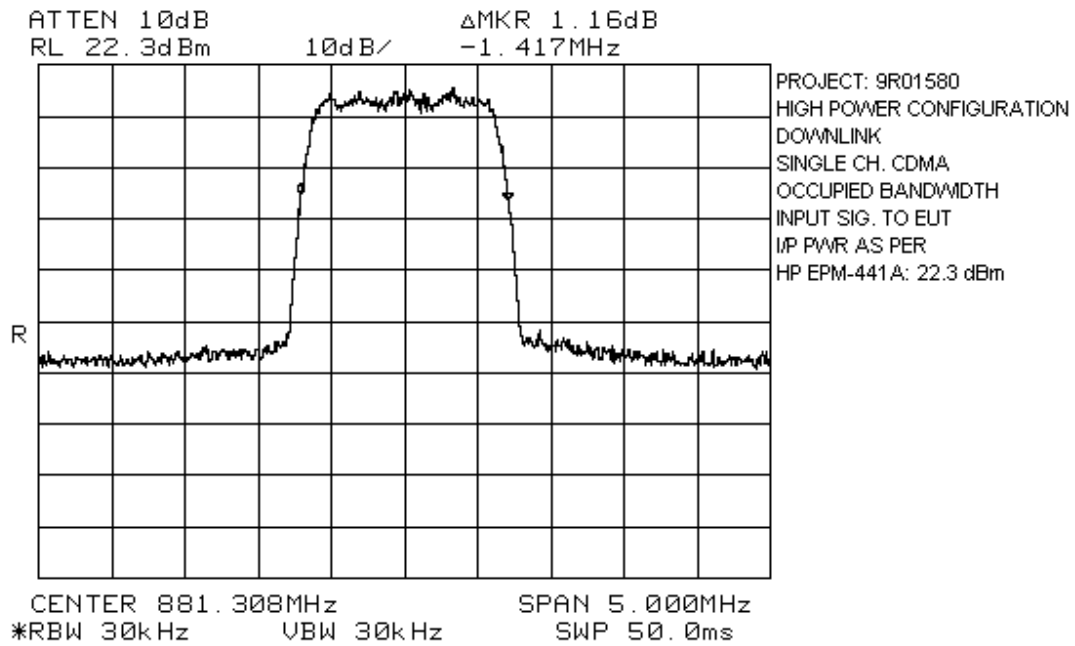
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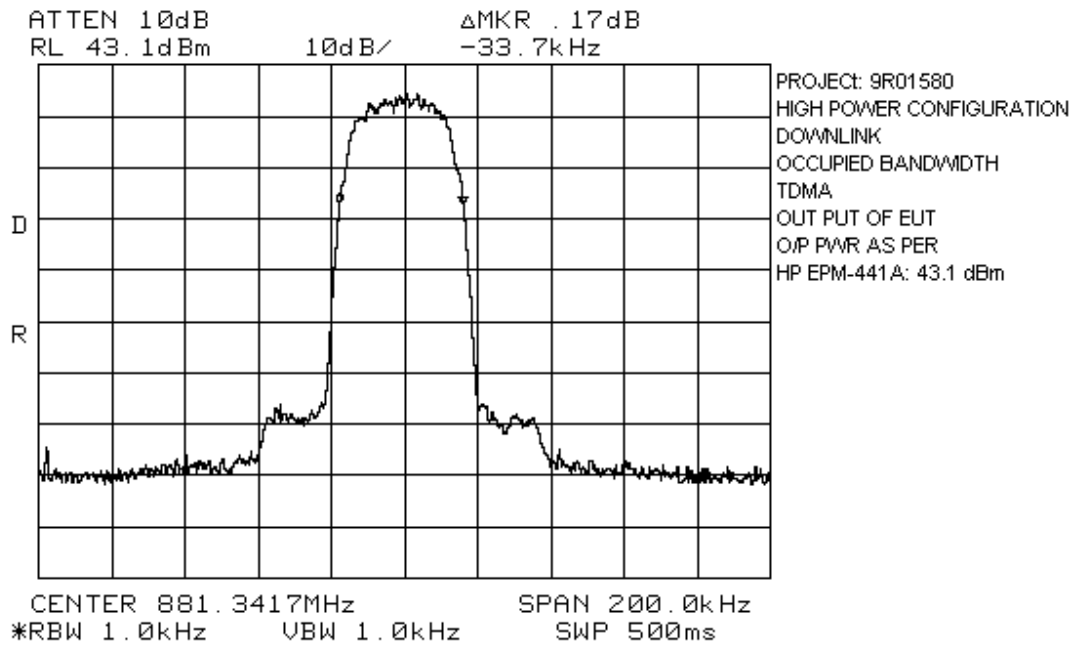
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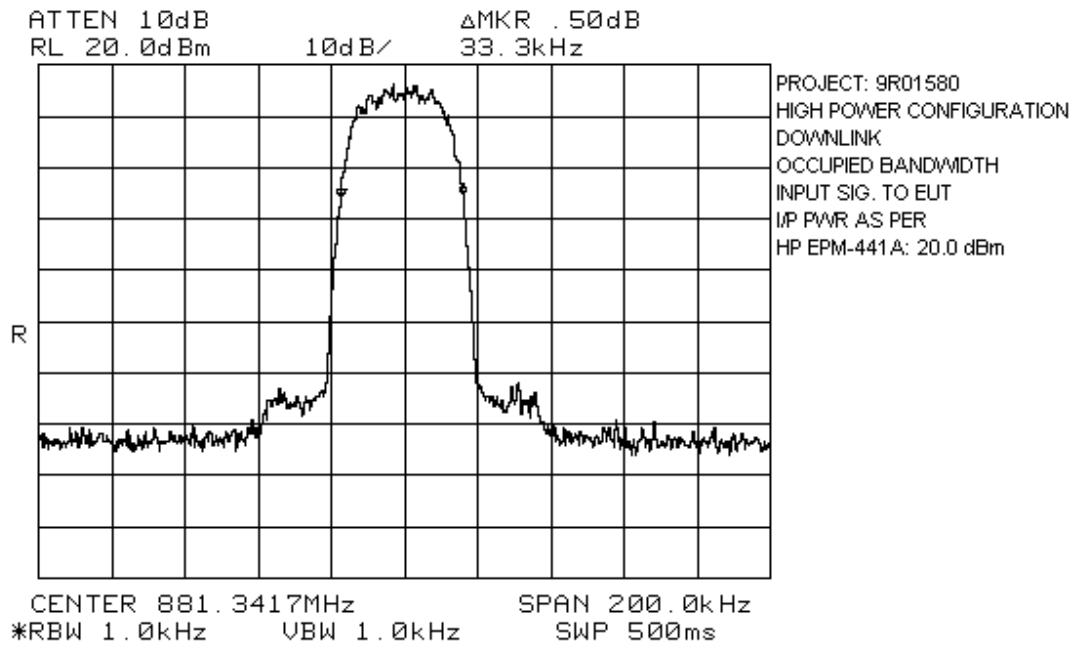
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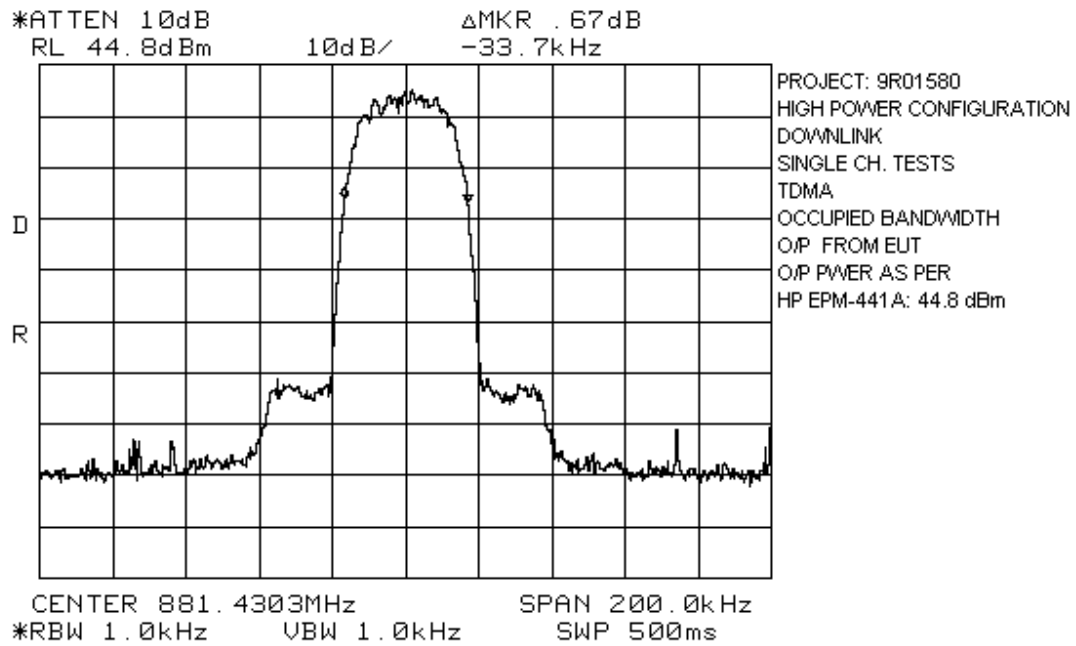
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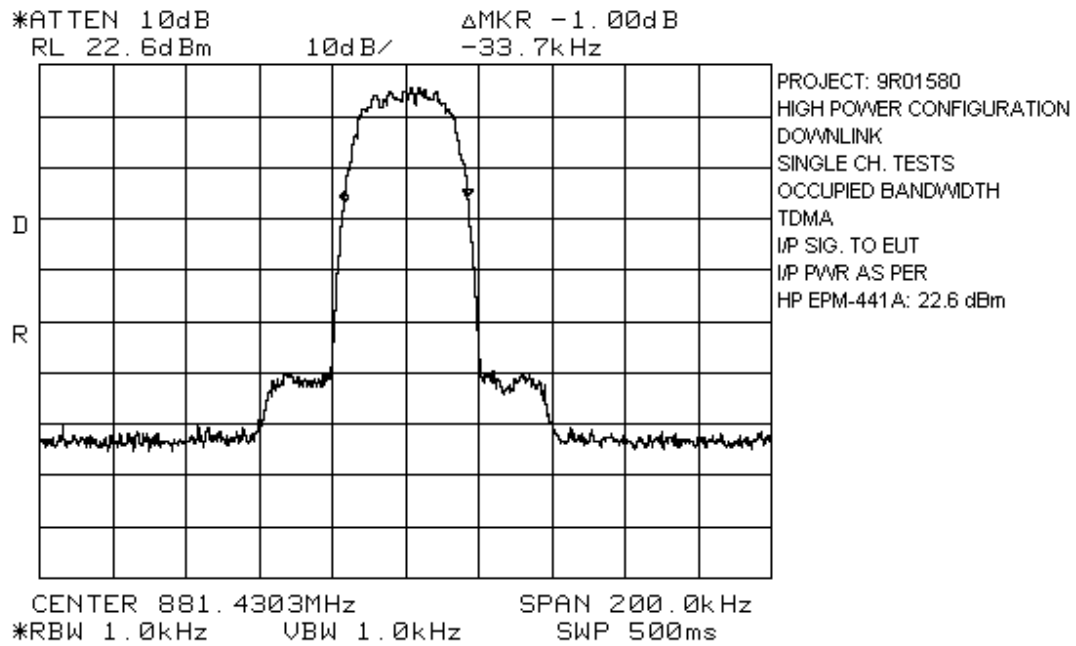
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EQUIPMENT: RF Booster System
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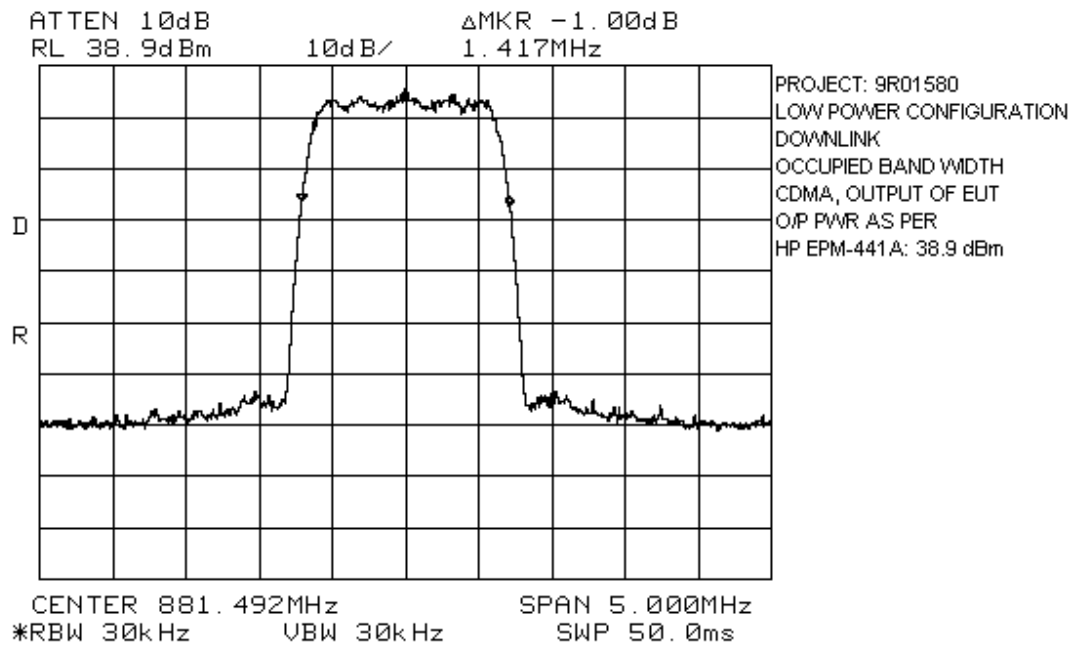


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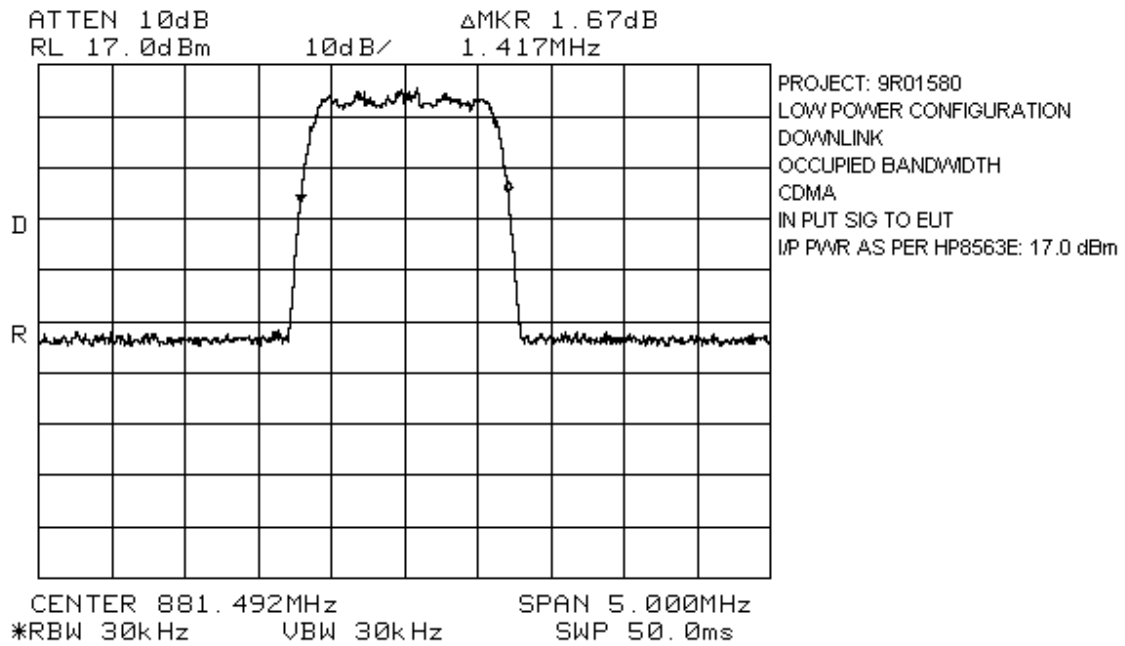


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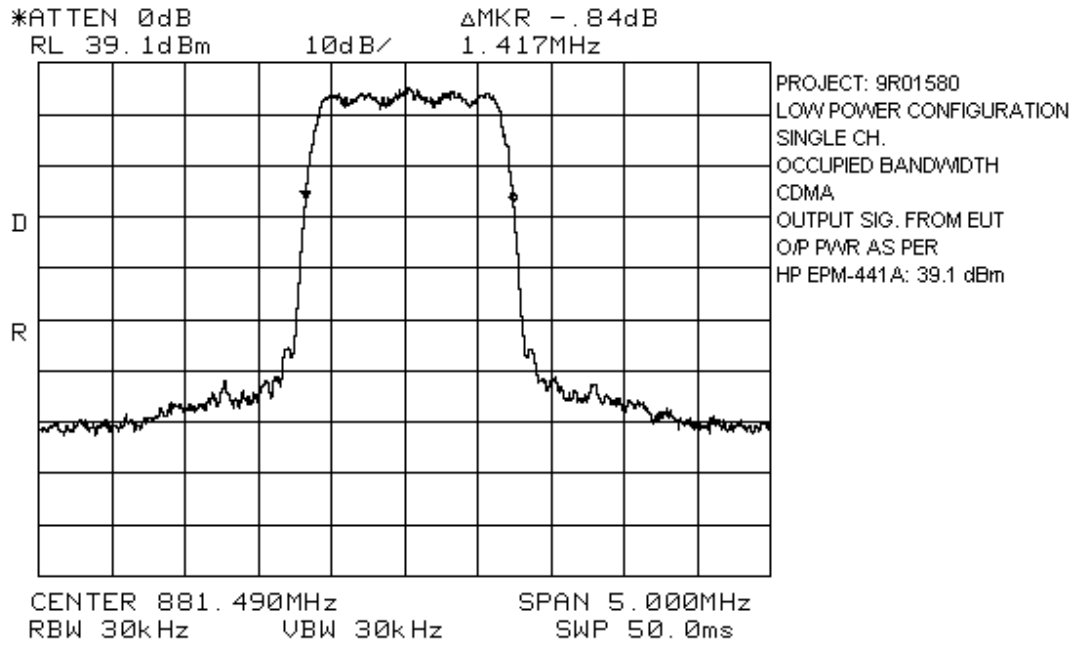
Digital Modulation – Low Power



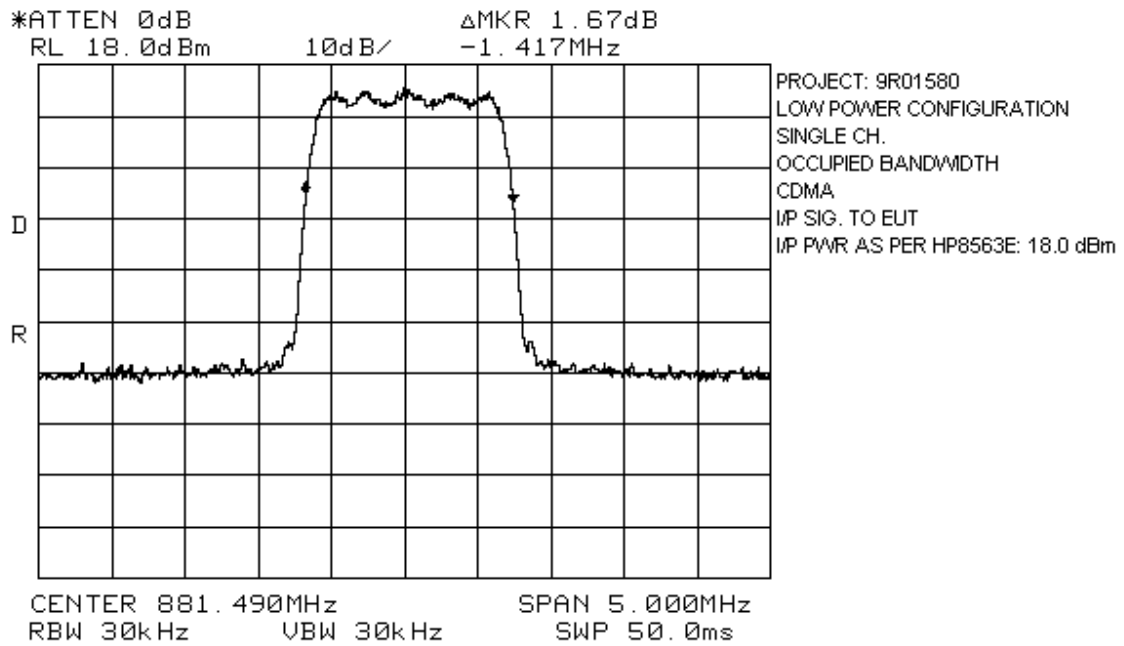
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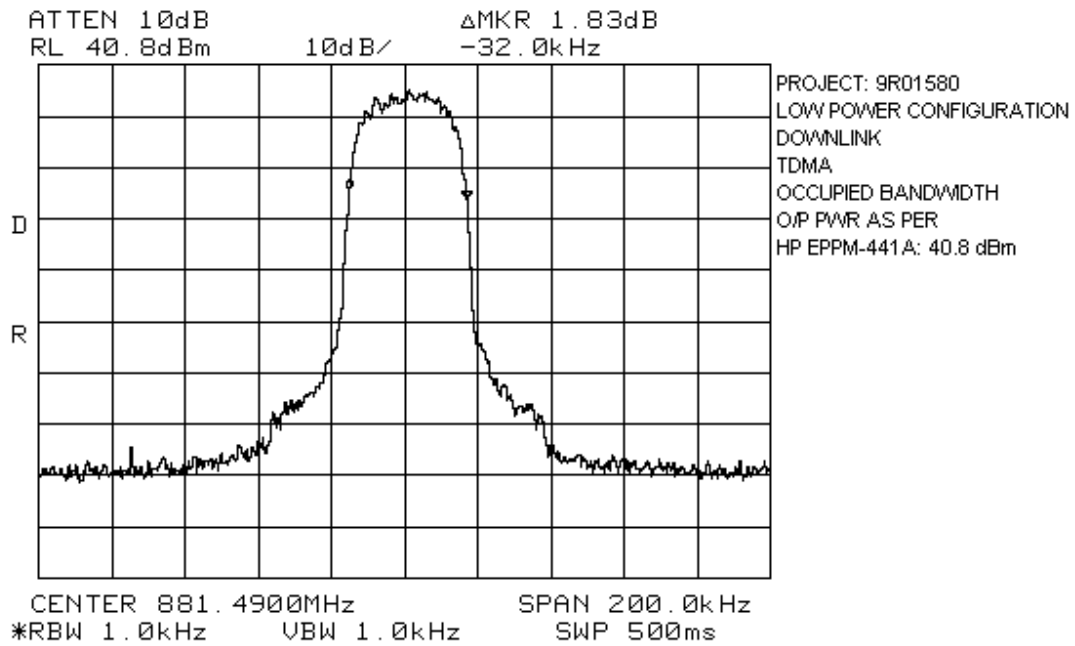
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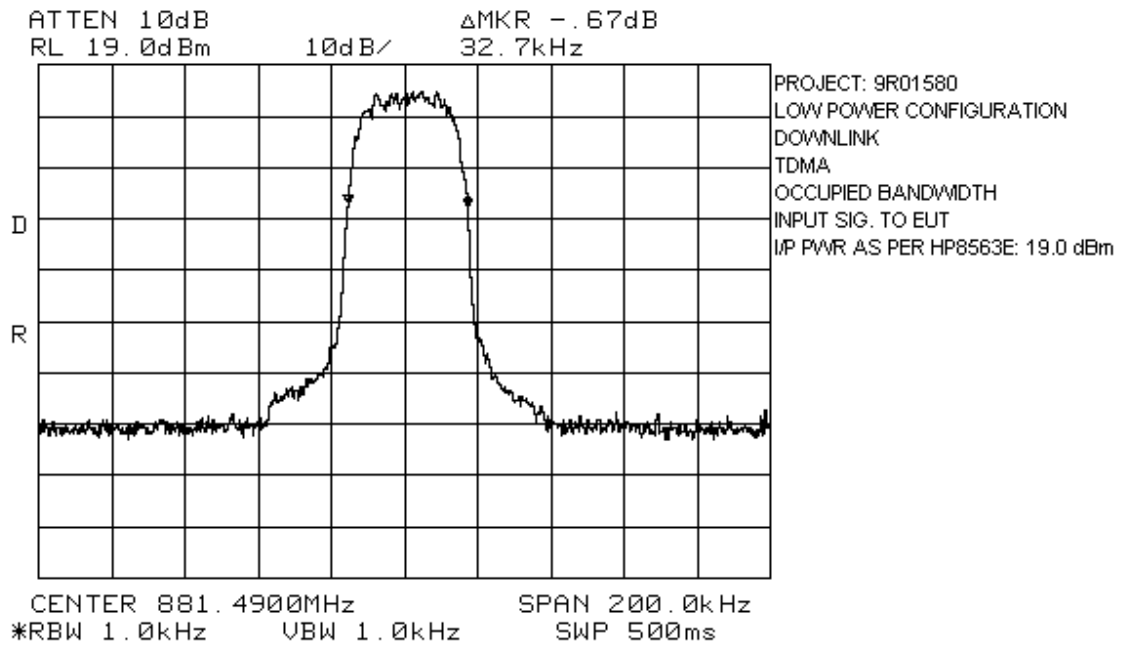
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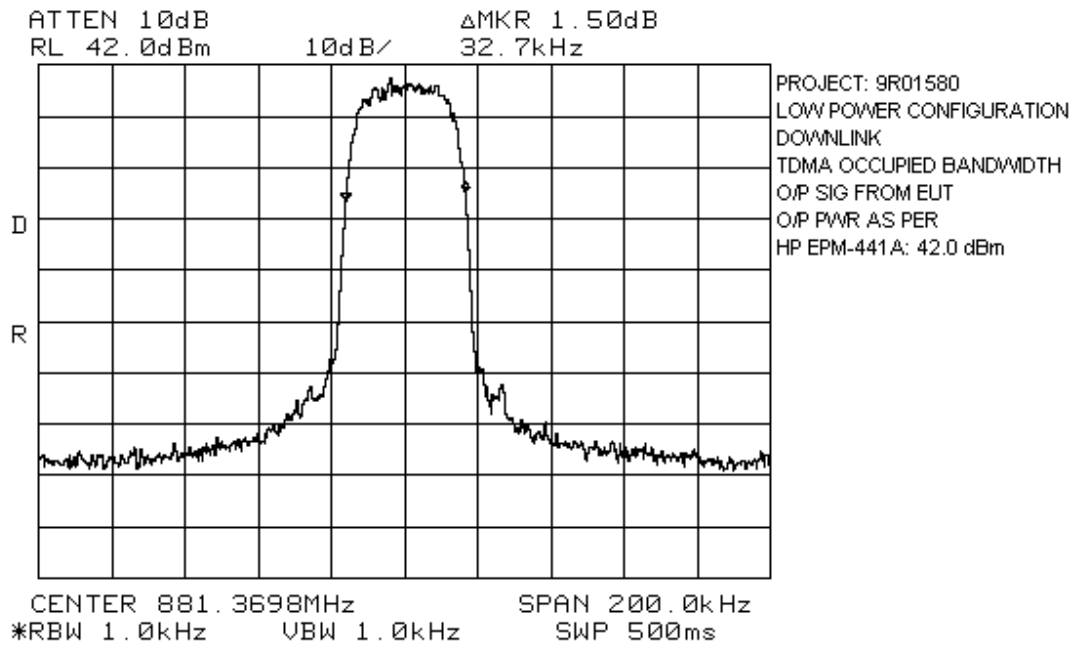
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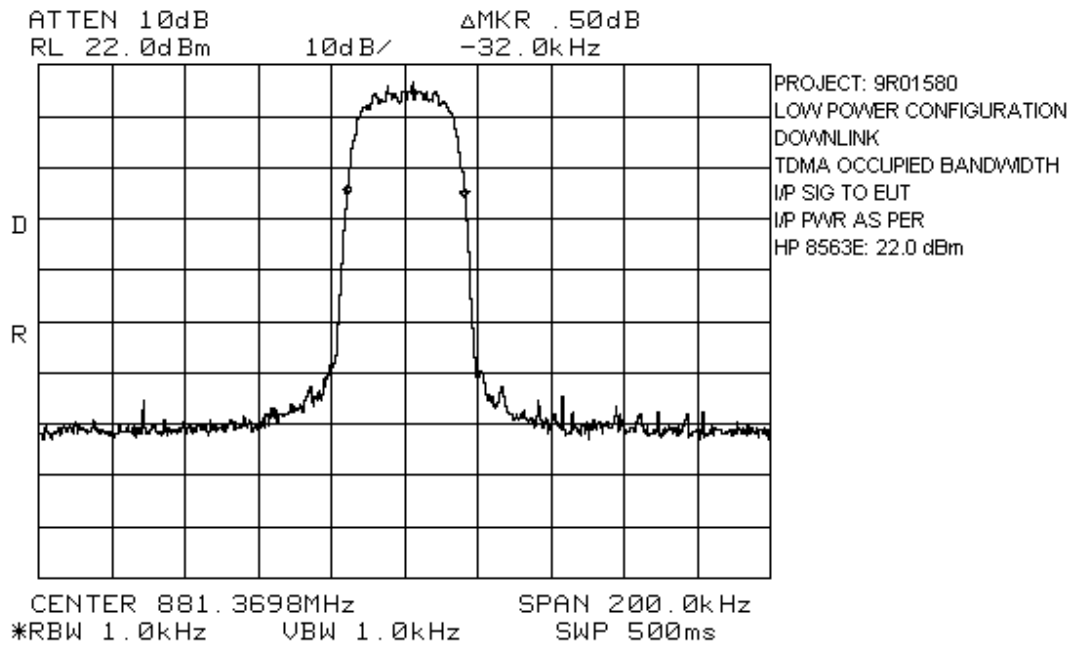
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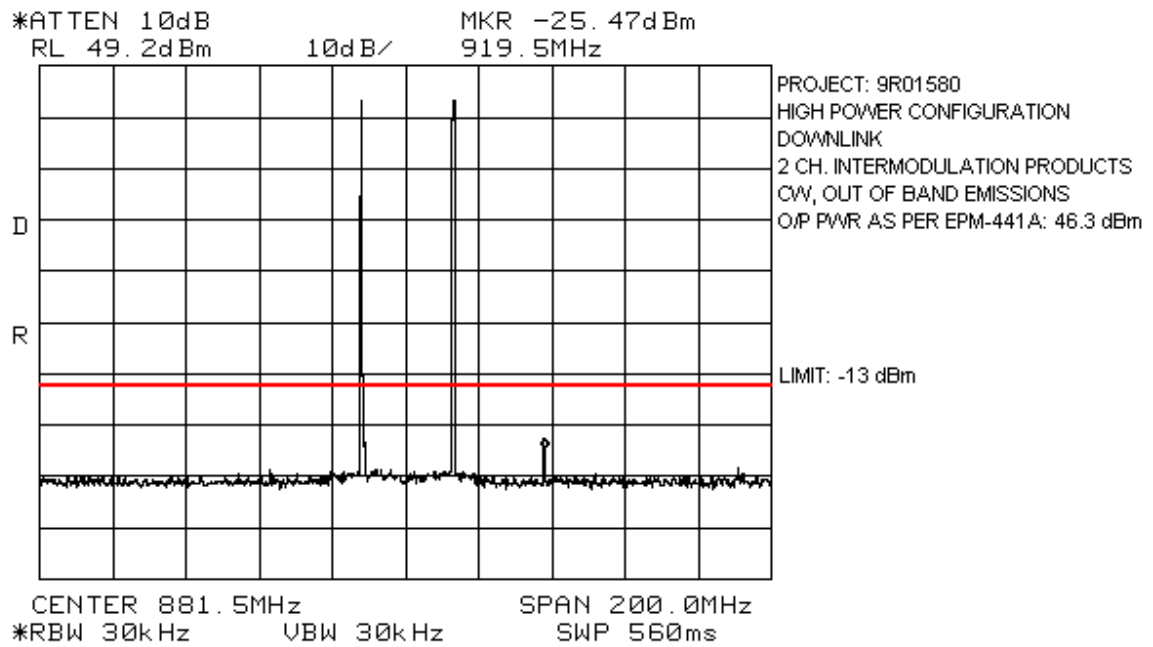
Section 5. Spurious Emissions At Antenna Terminals

NAME OF TEST: Spurious Emissions At Antenna Terminals	PARA. NO.: 2.1051
TESTED BY: Kevin Carr	DATE: June 25, 1999

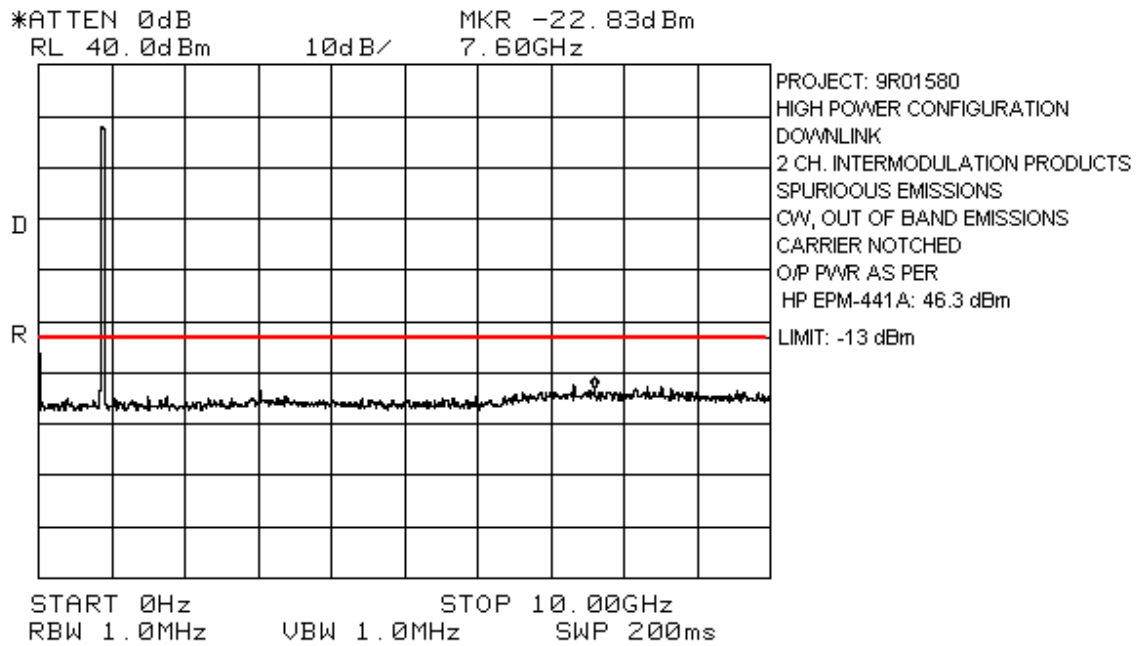
Test Results: Complies.

Test Data: See attached graphs.

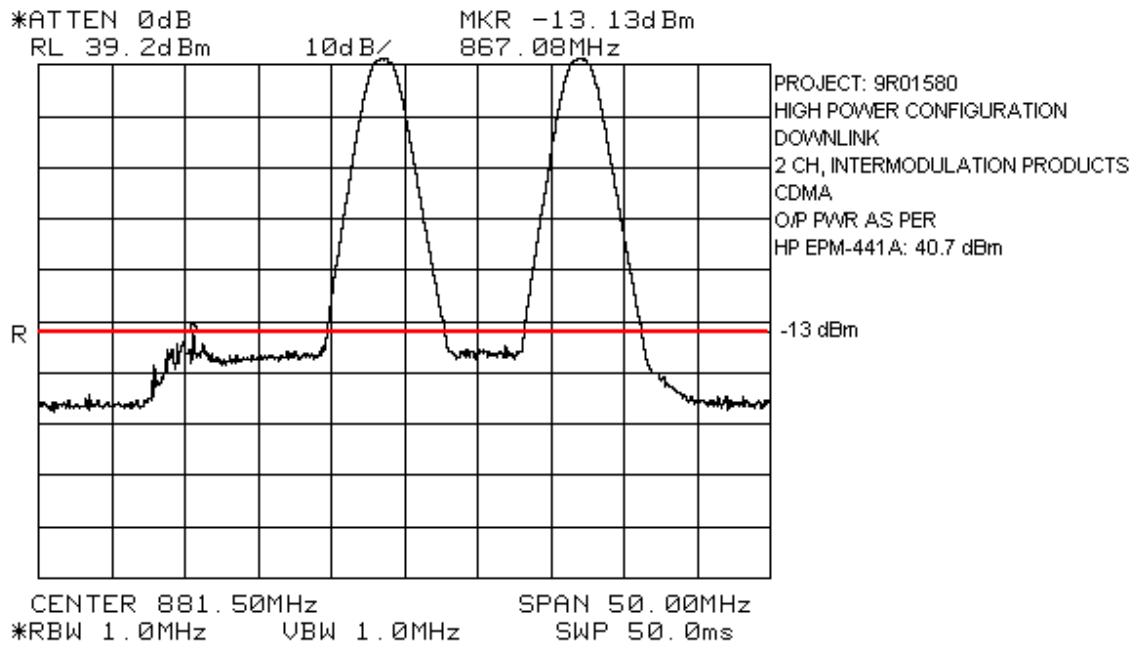
EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

Spurious Emissions At Antenna Terminals: High Power

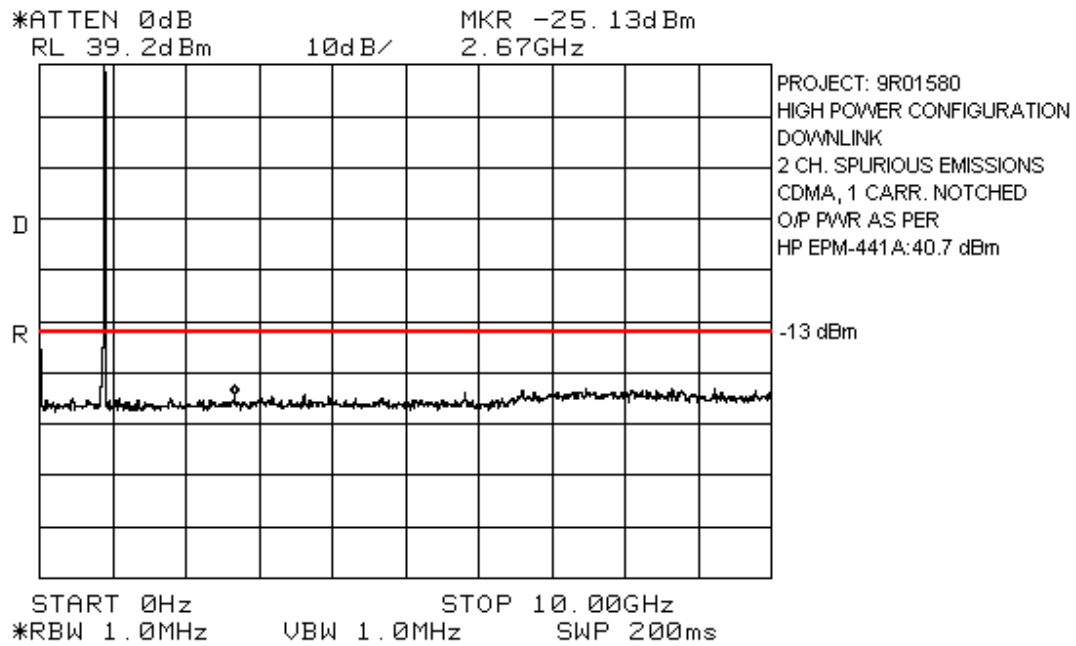
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FCC ID: BCR-MRB-CELL



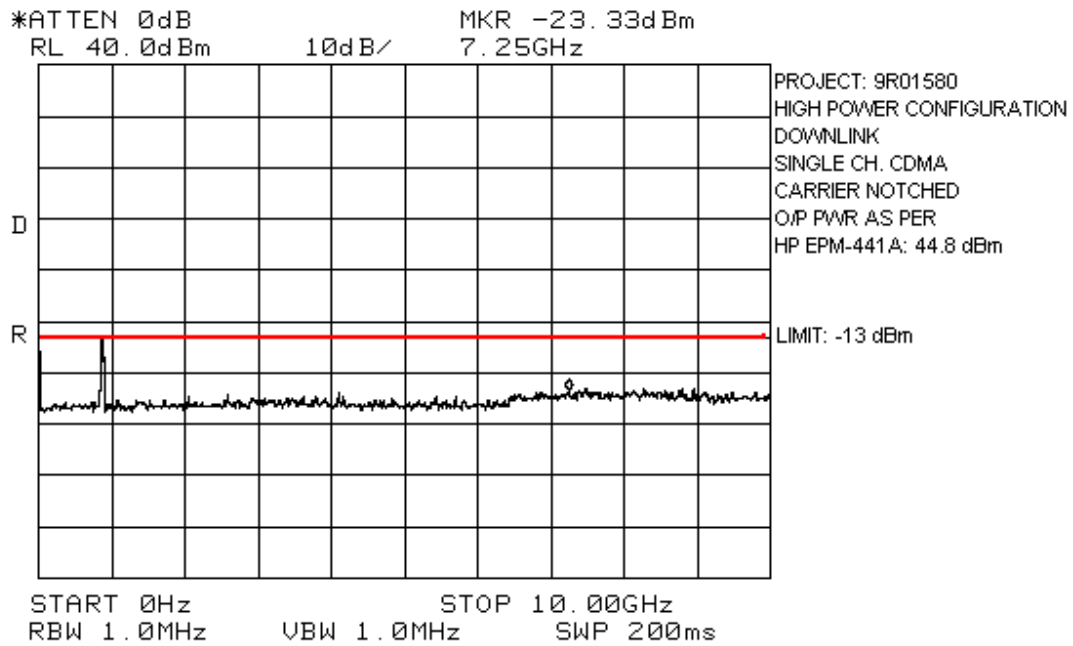
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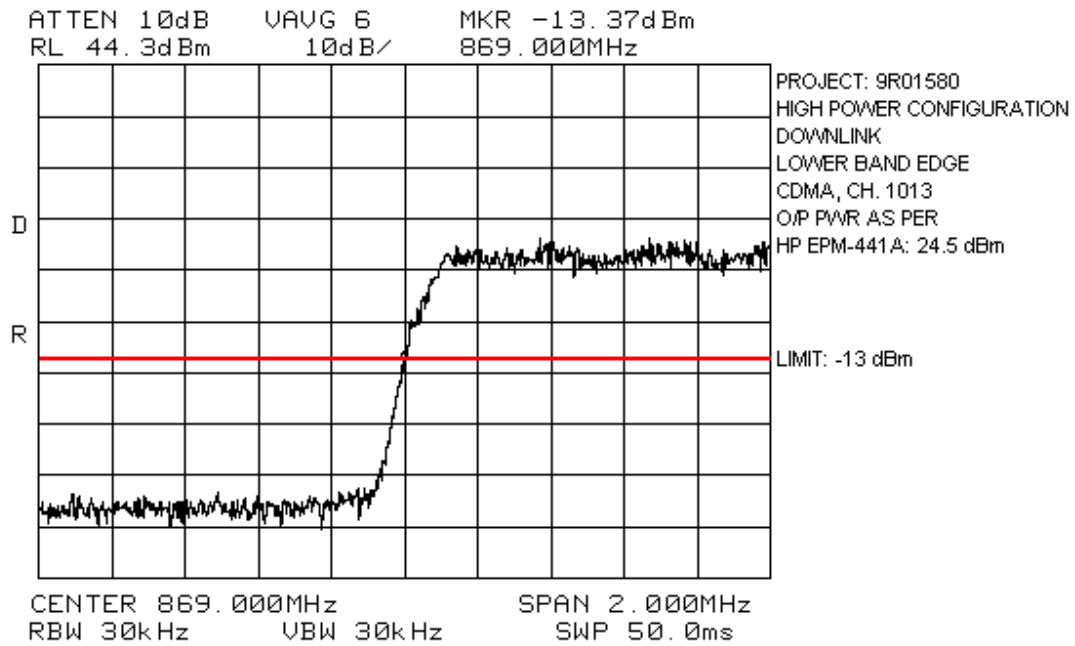
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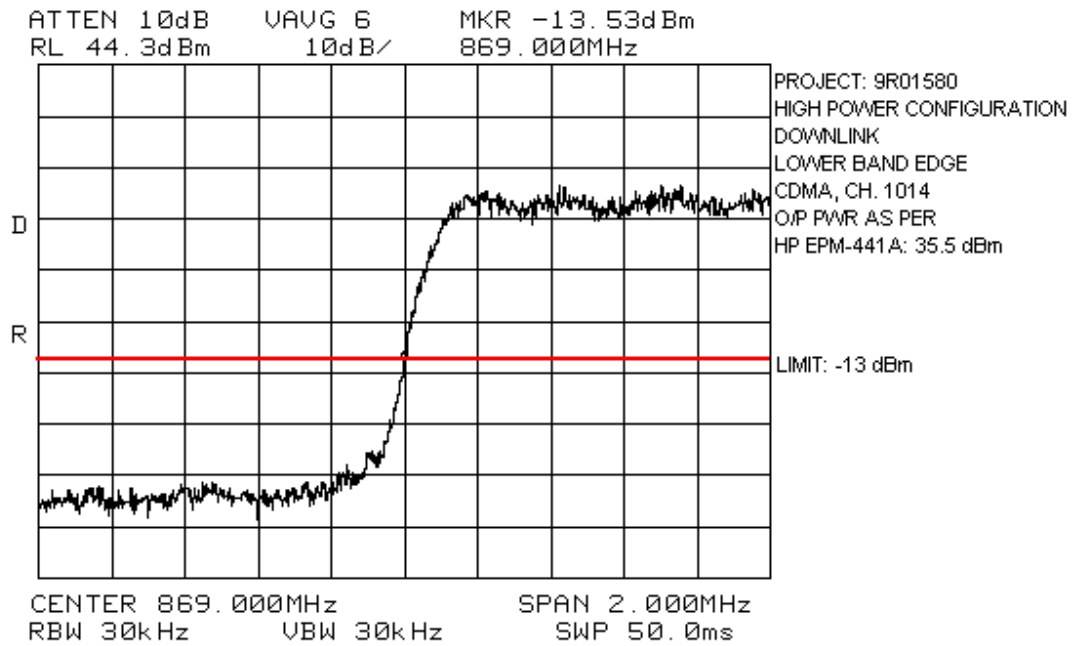
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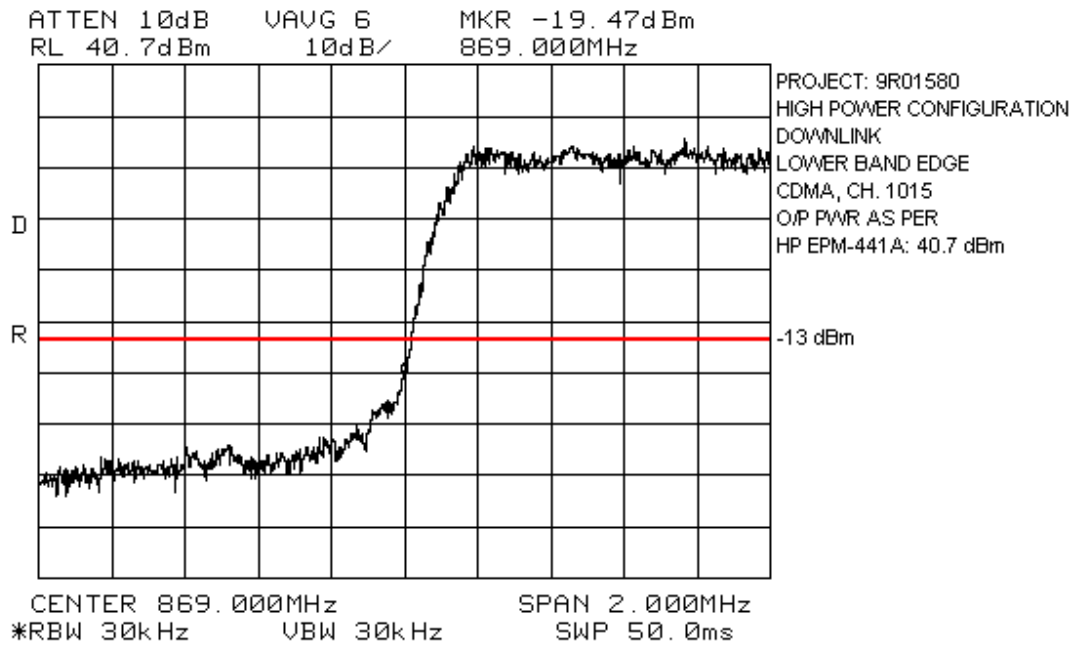
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FCC ID: BCR-MRB-CELL



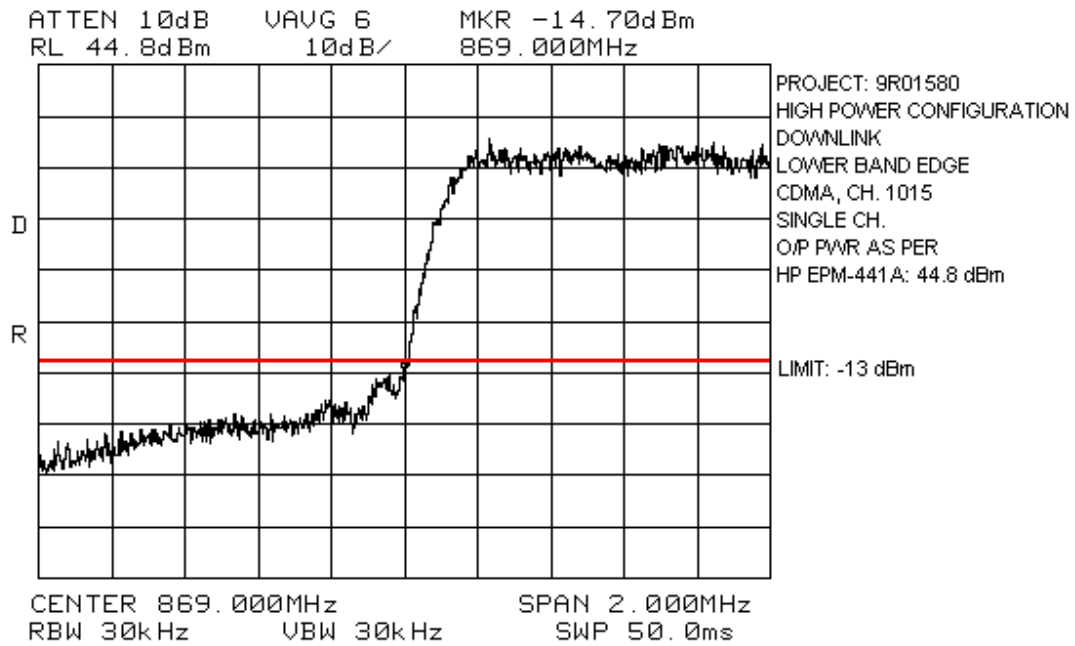
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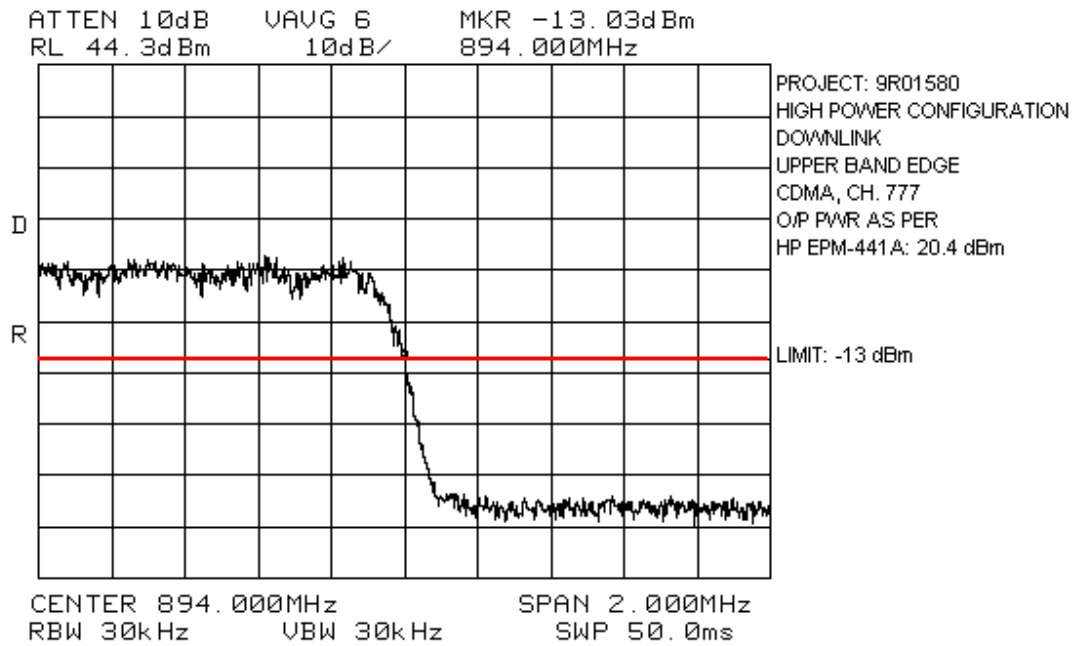
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FCC ID: BCR-MRB-CELL



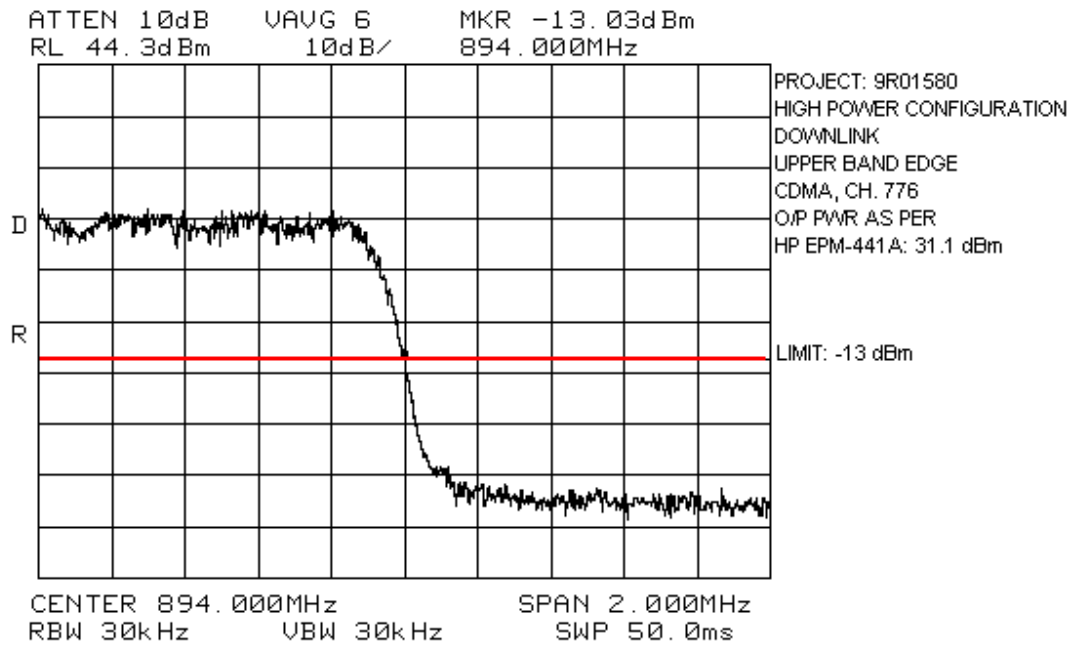
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FCC ID: BCR-MRB-CELL



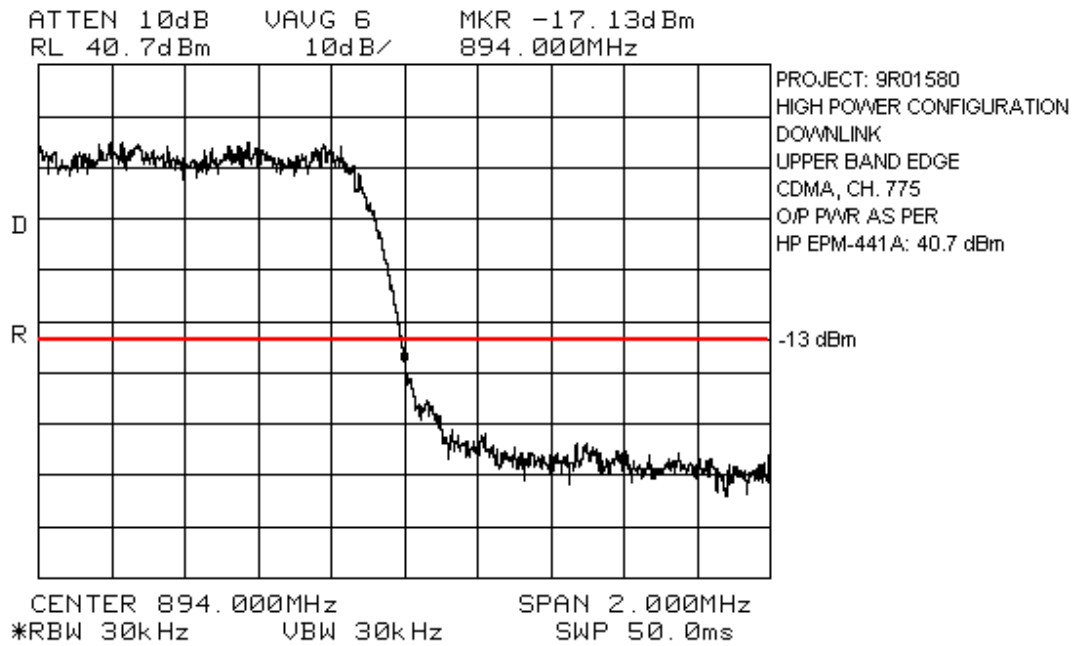
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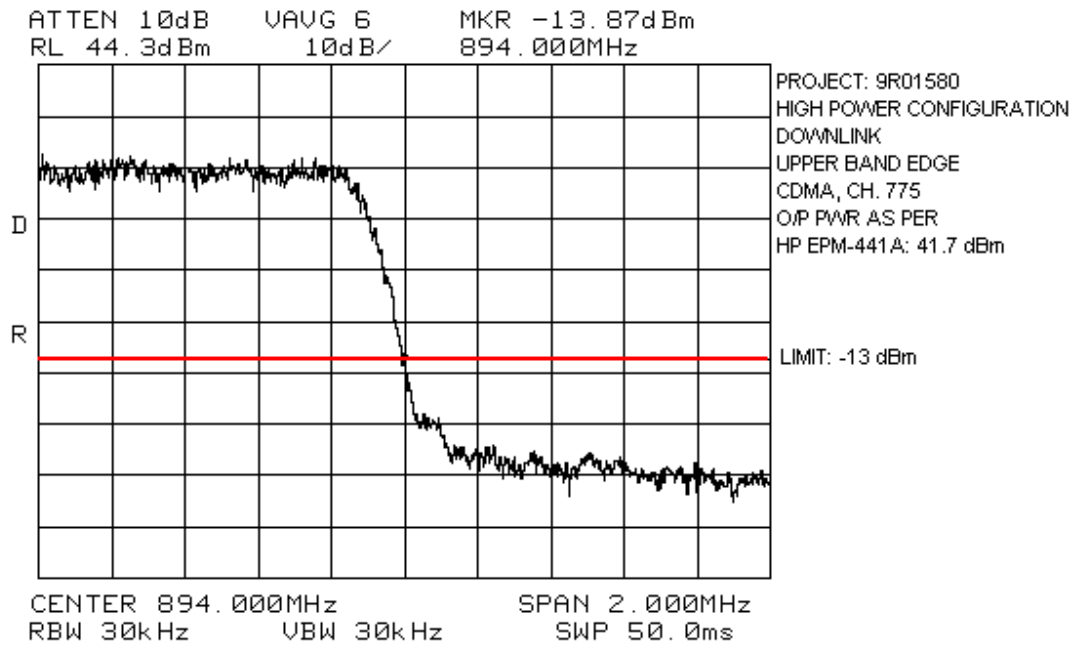
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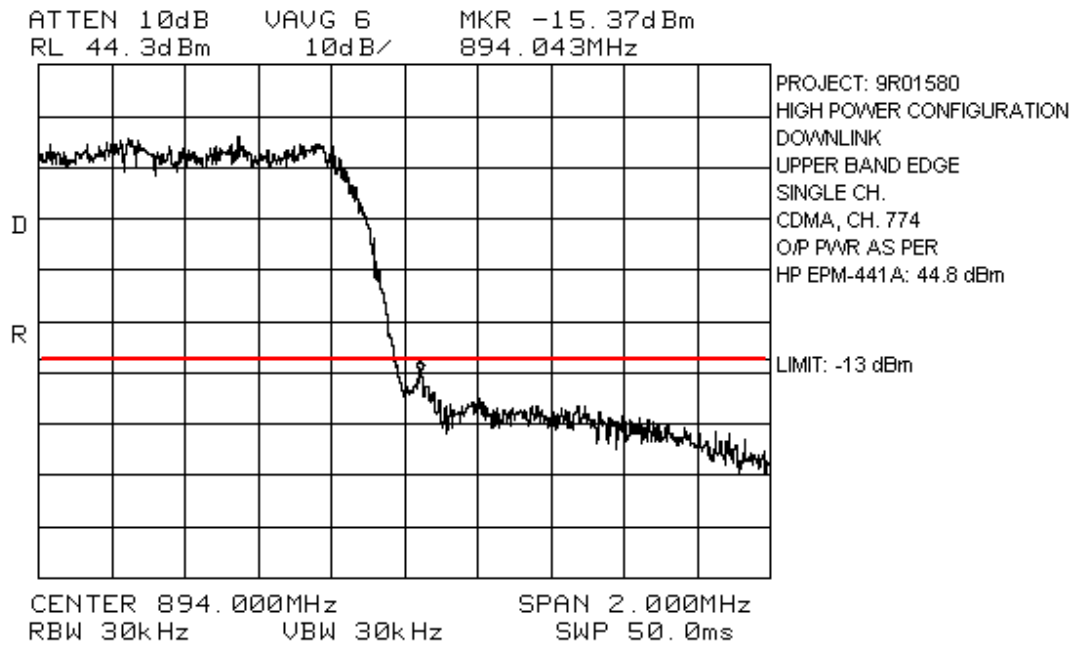
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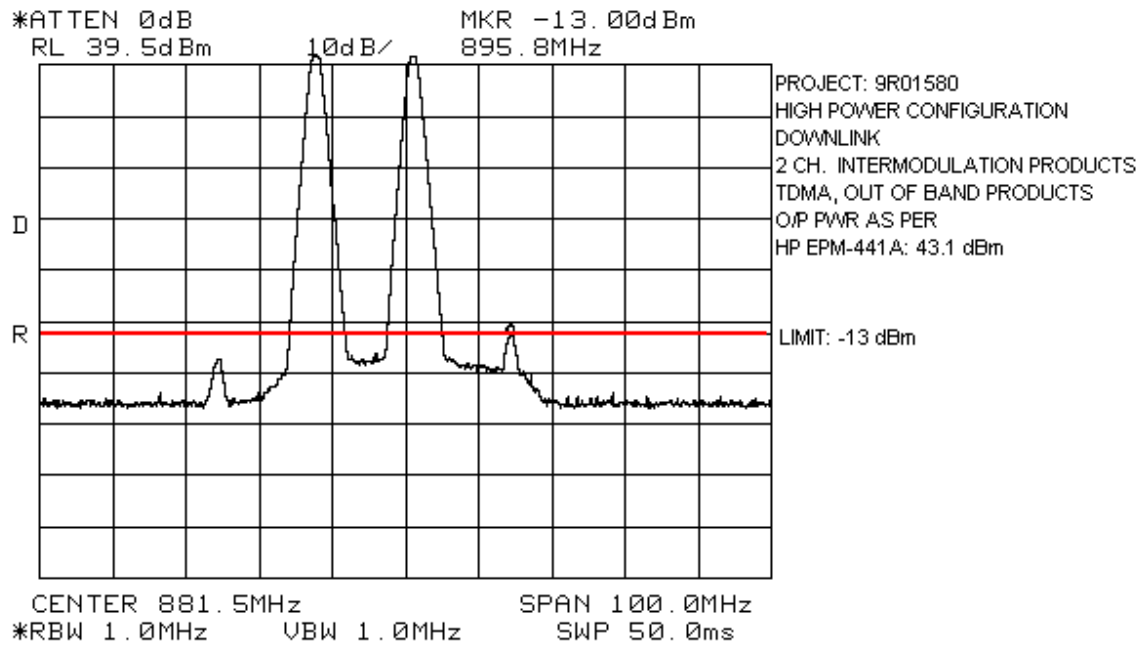
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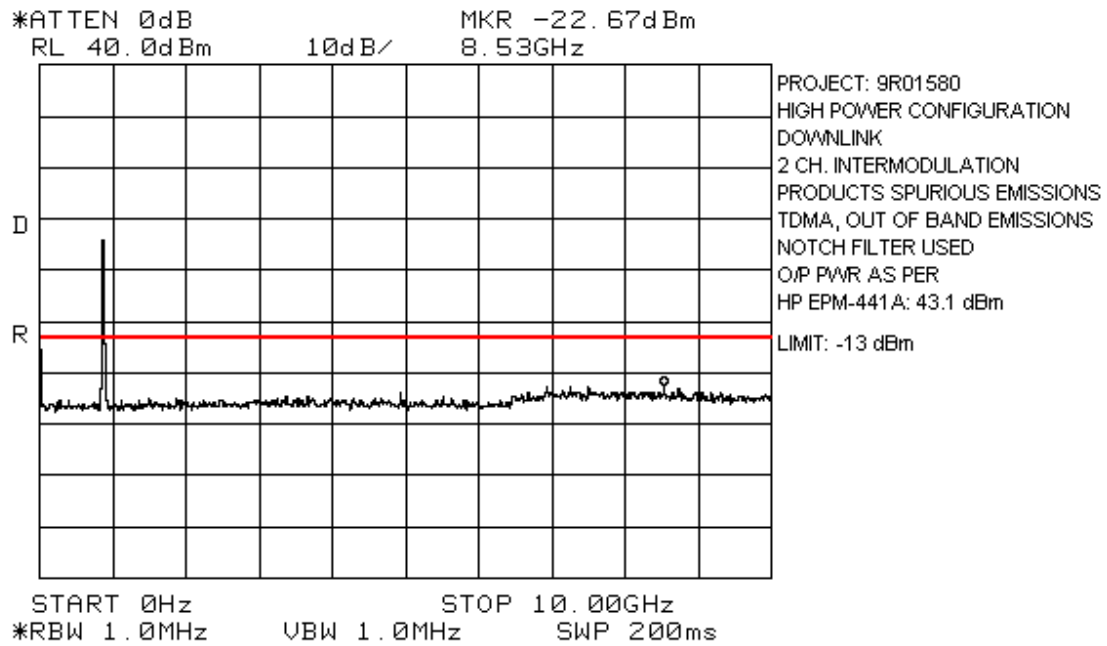
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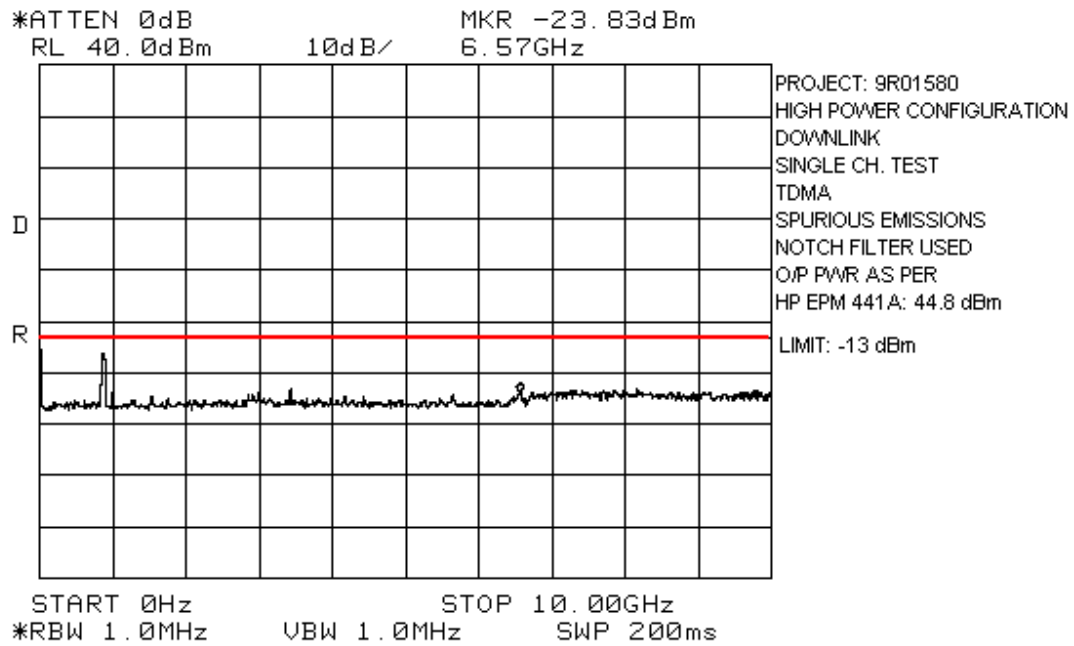
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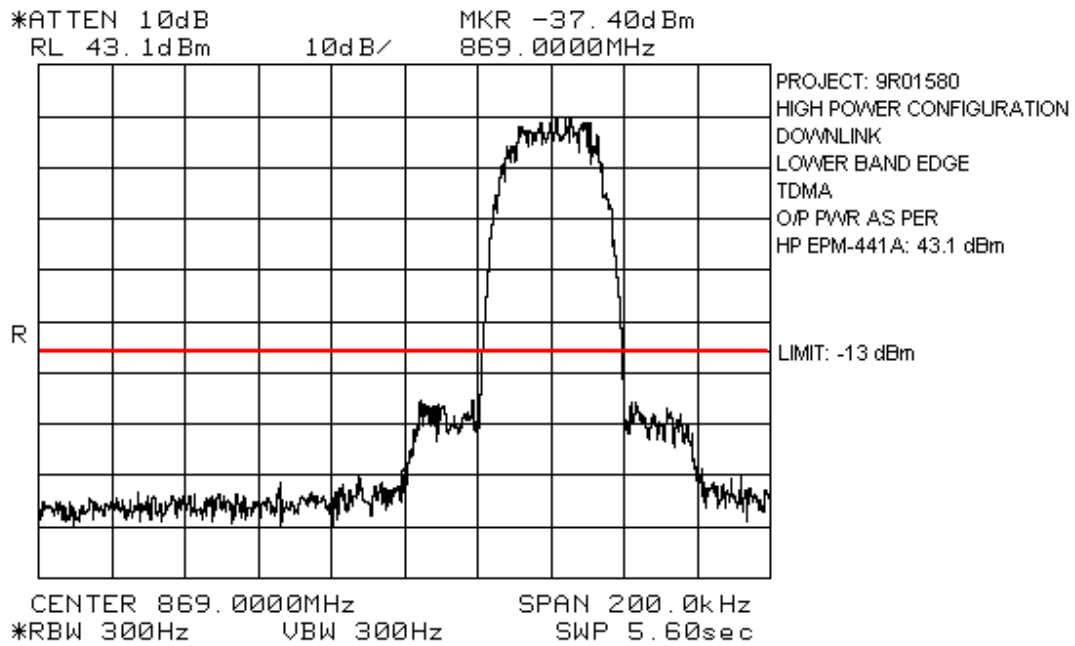
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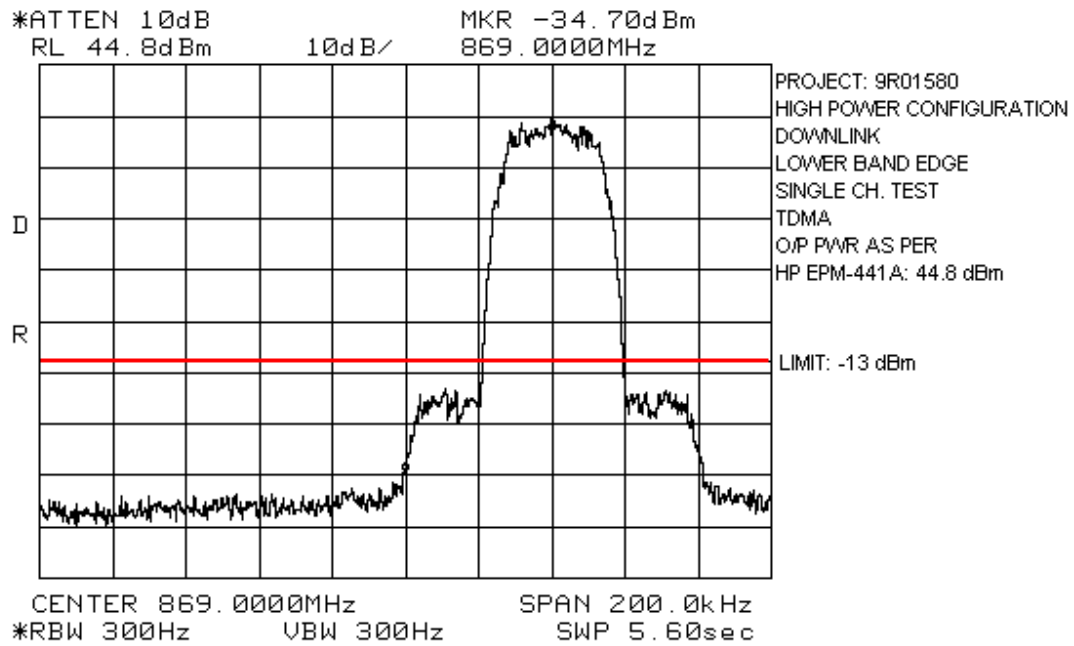
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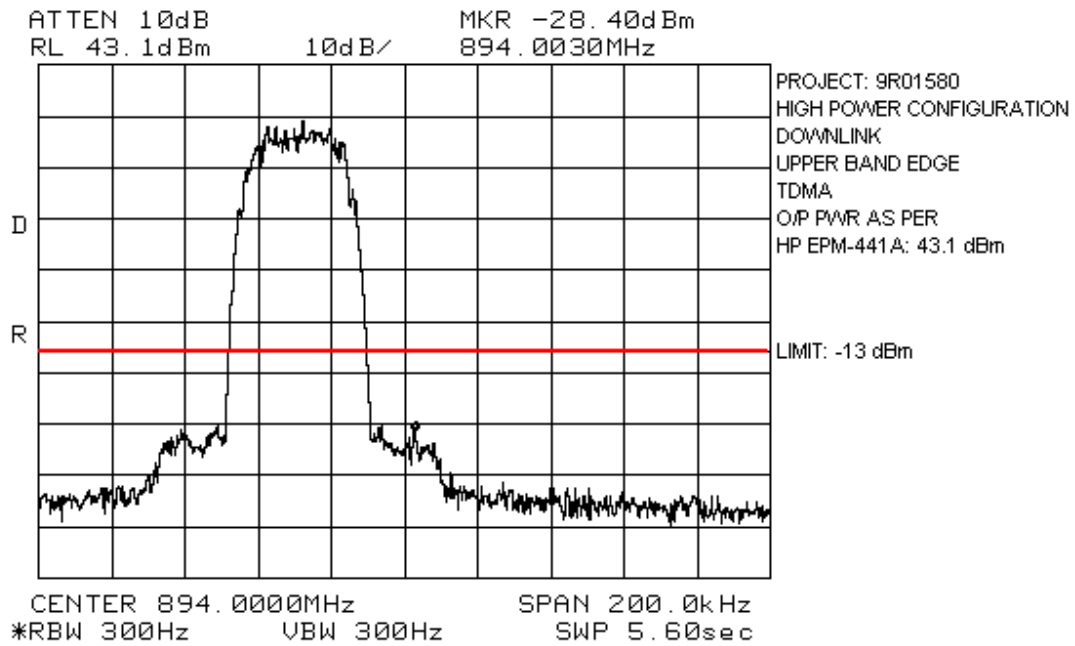
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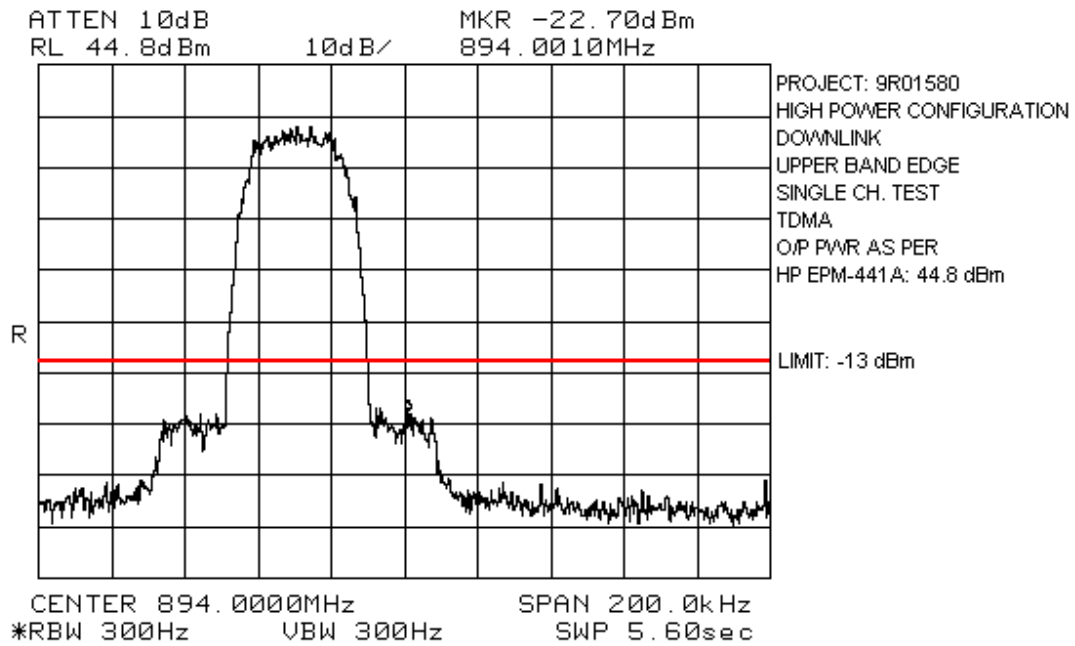
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EQUIPMENT: RF Booster System
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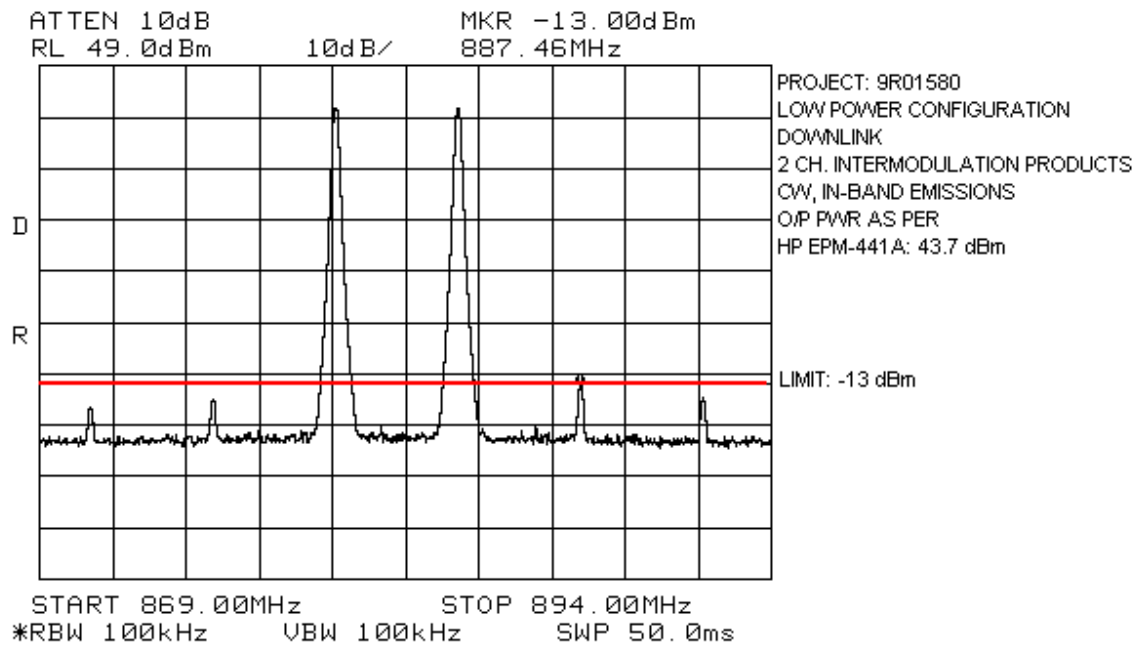


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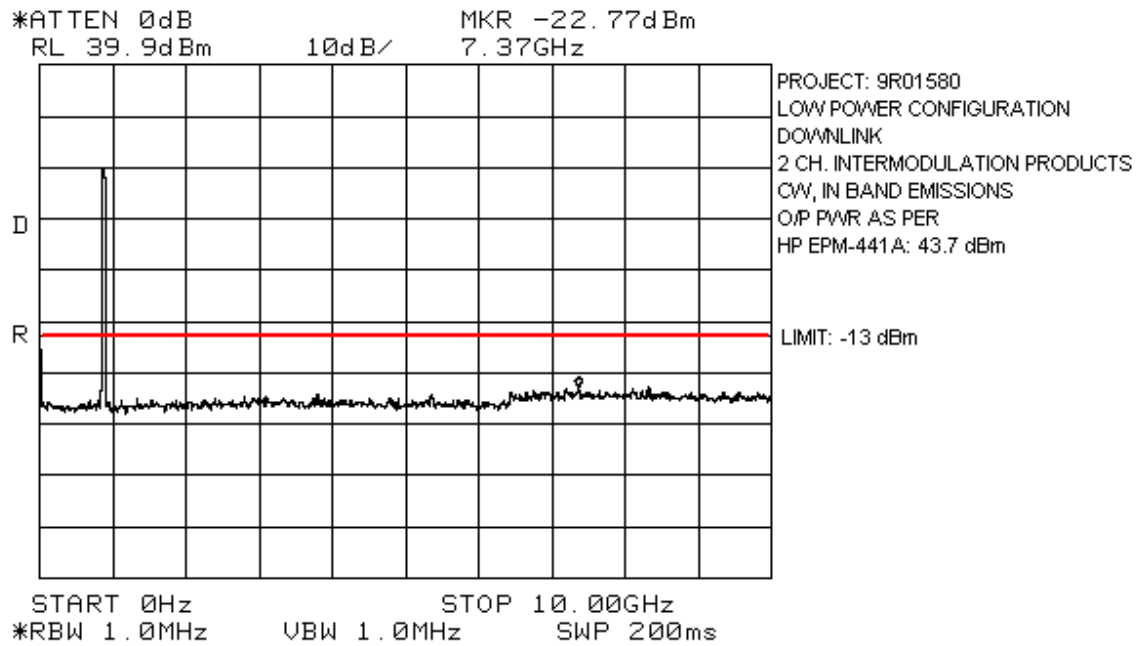


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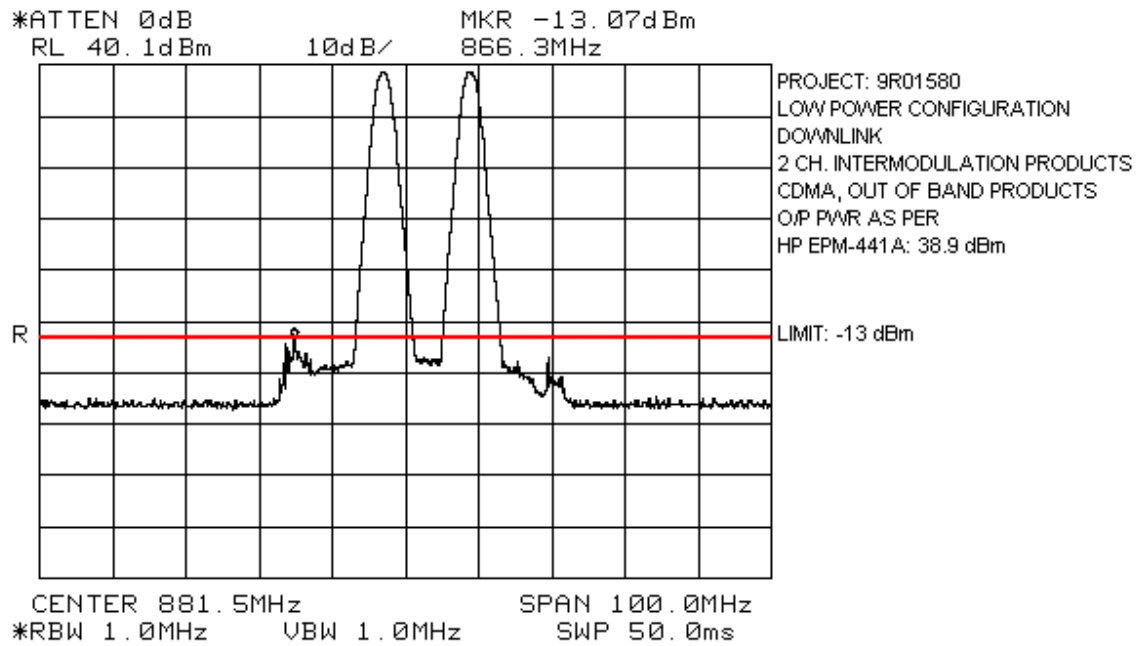
Spurious Emissions At Antenna Terminals: Low Power



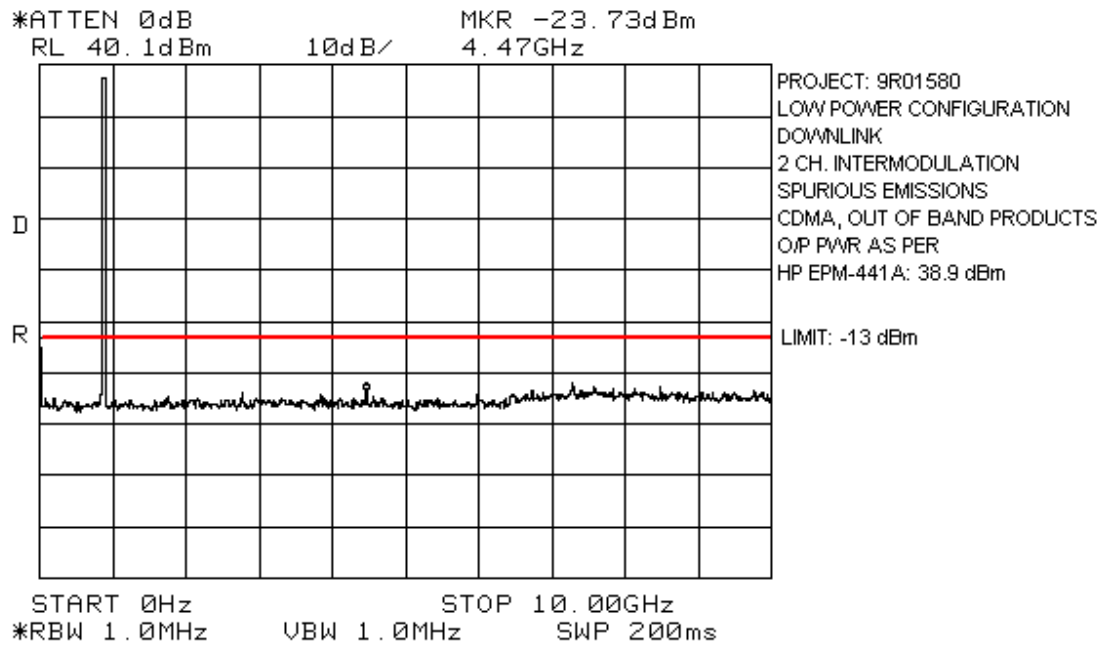
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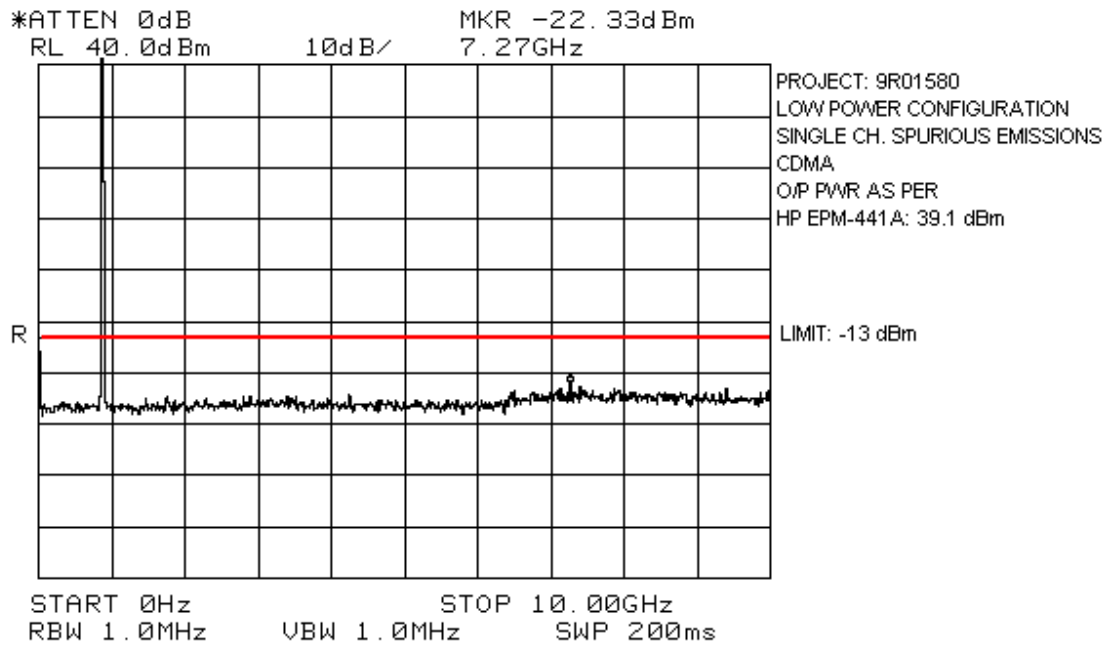
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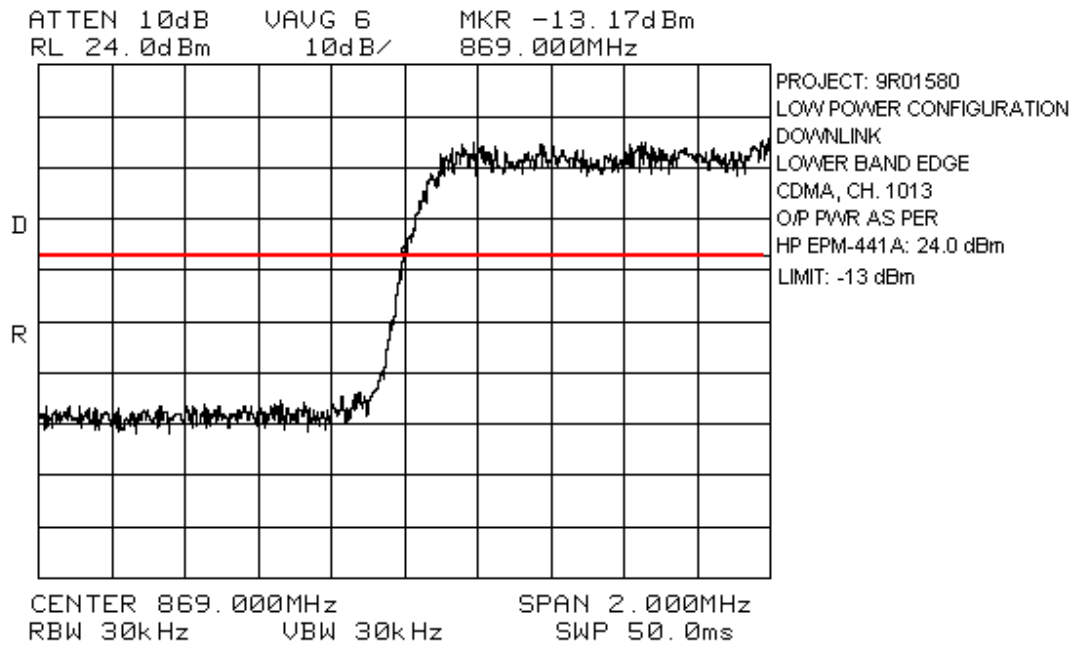
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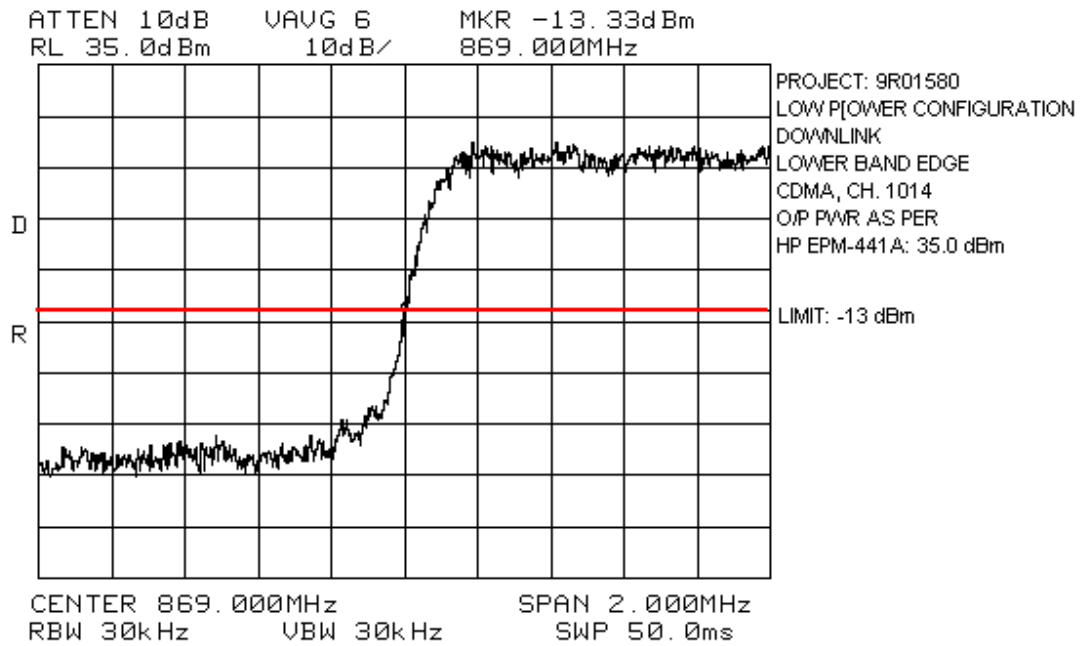
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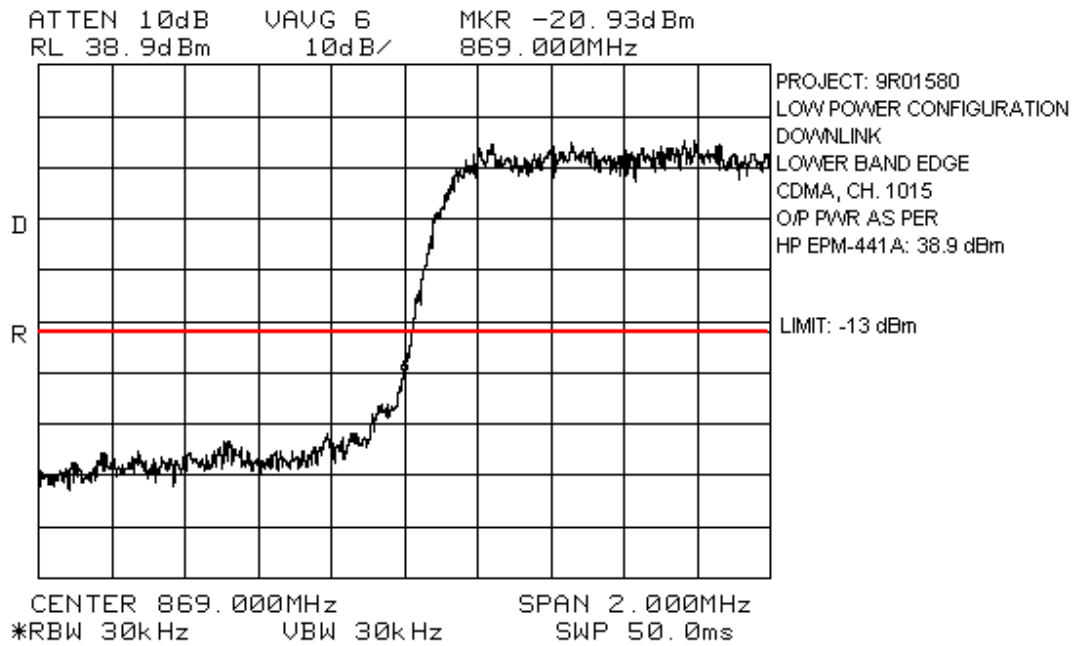
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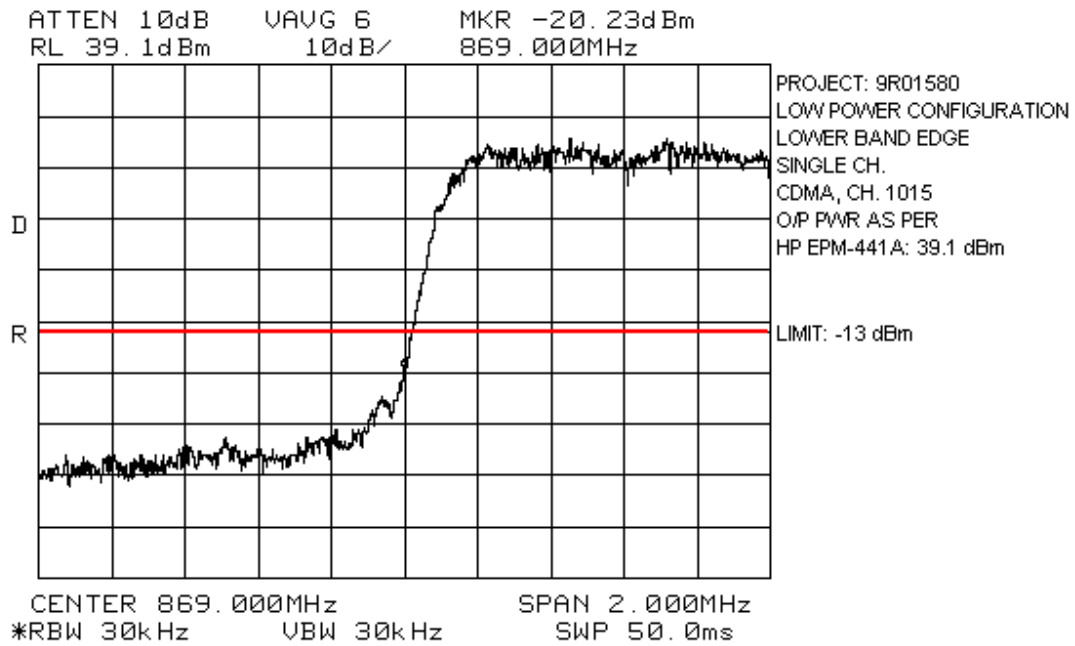
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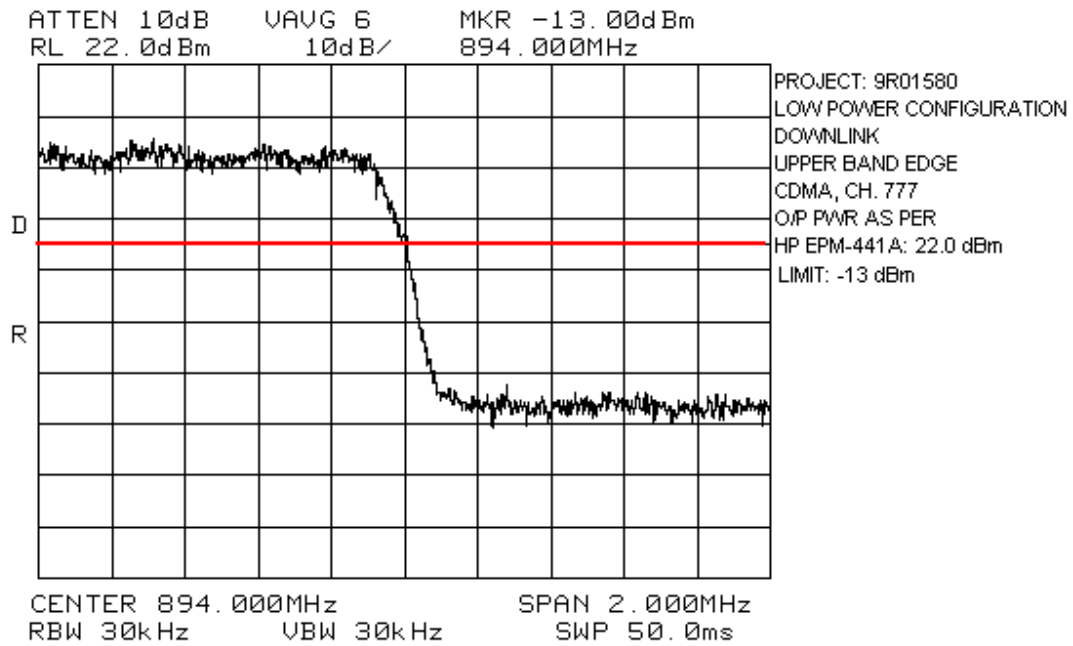
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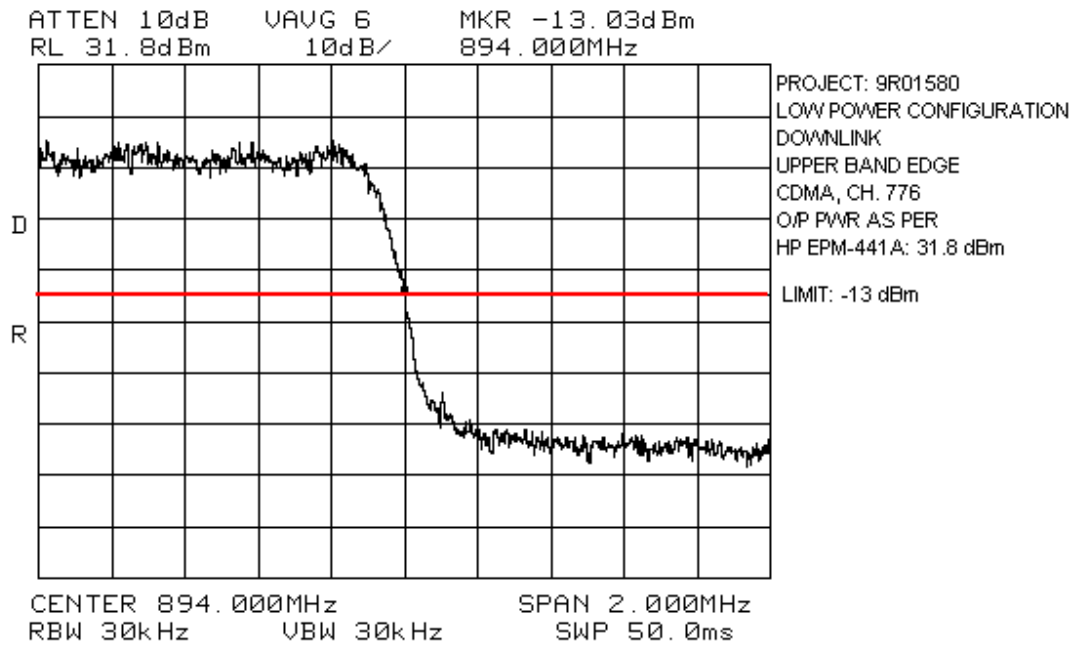
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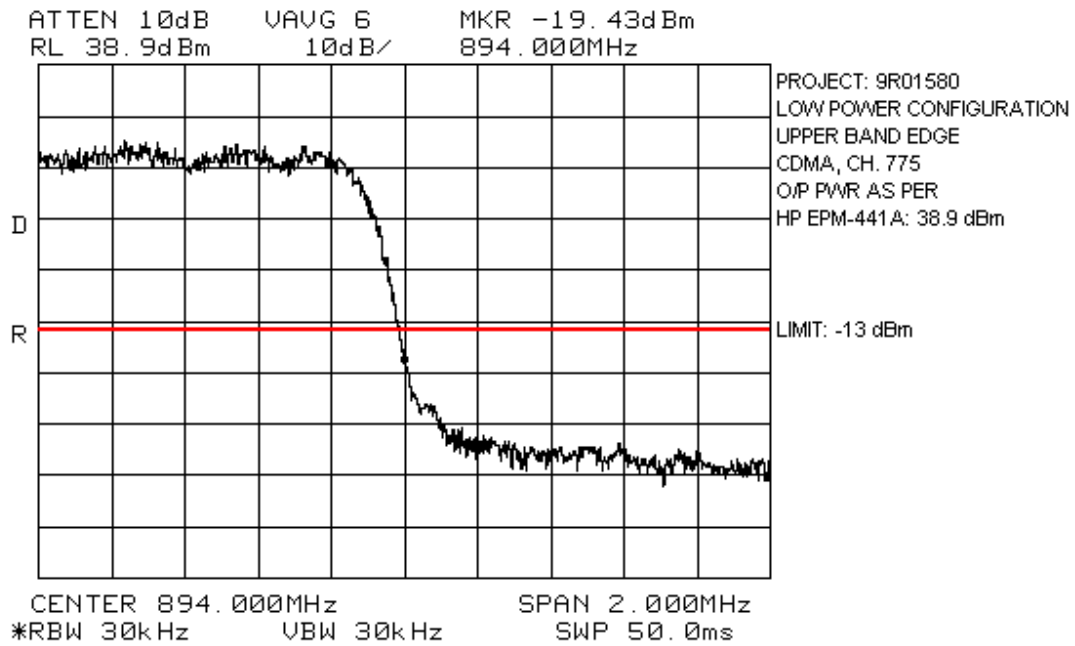
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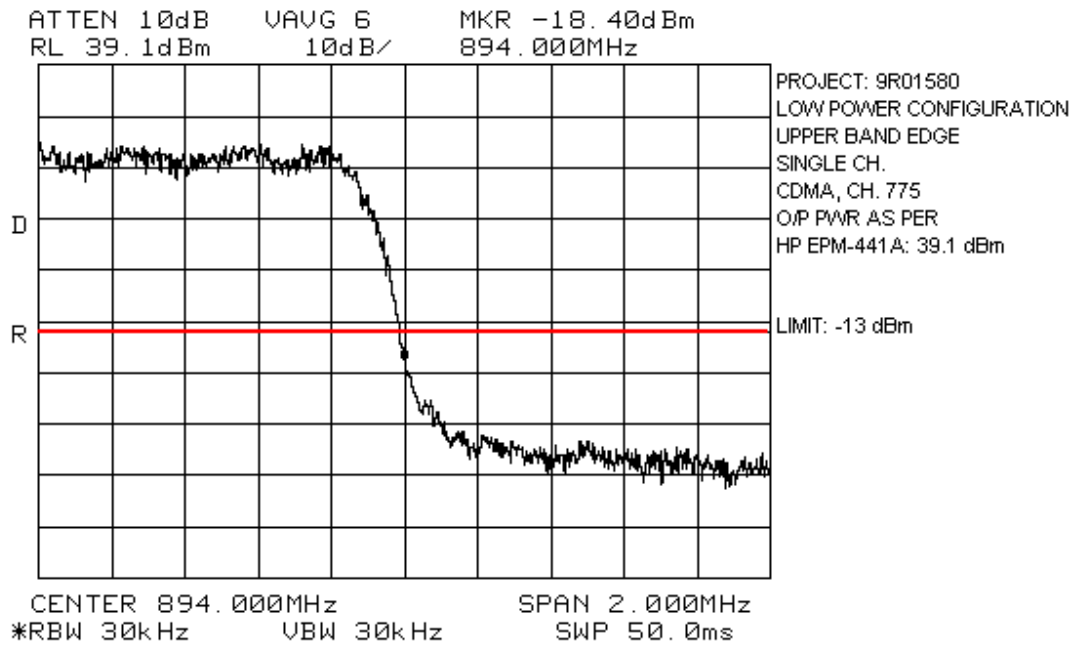
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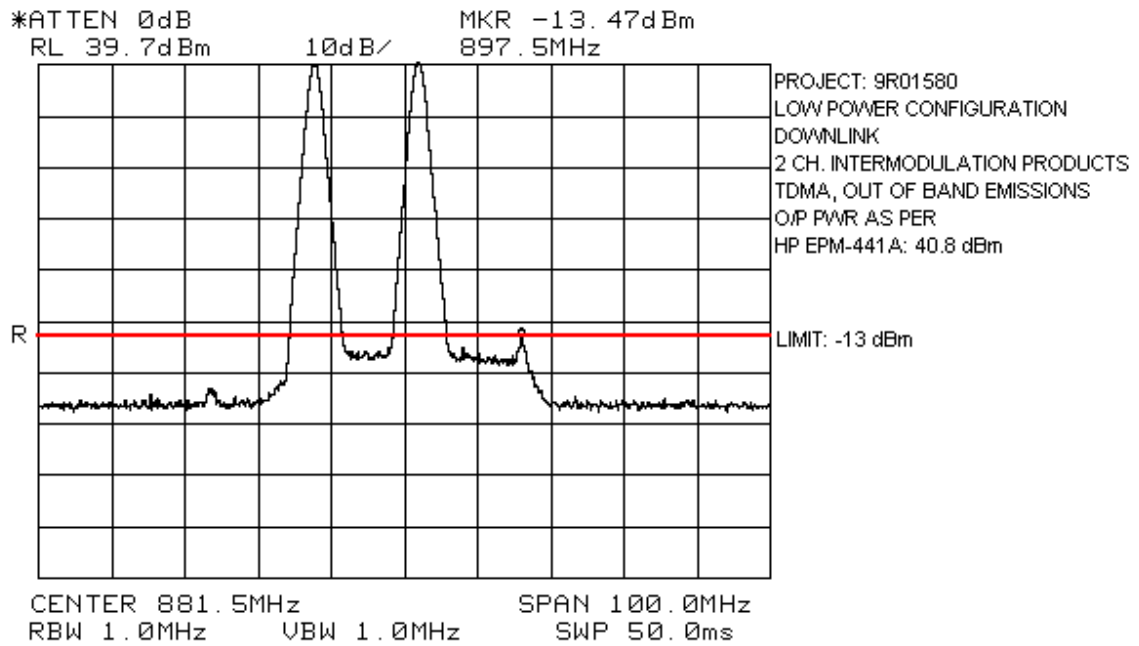
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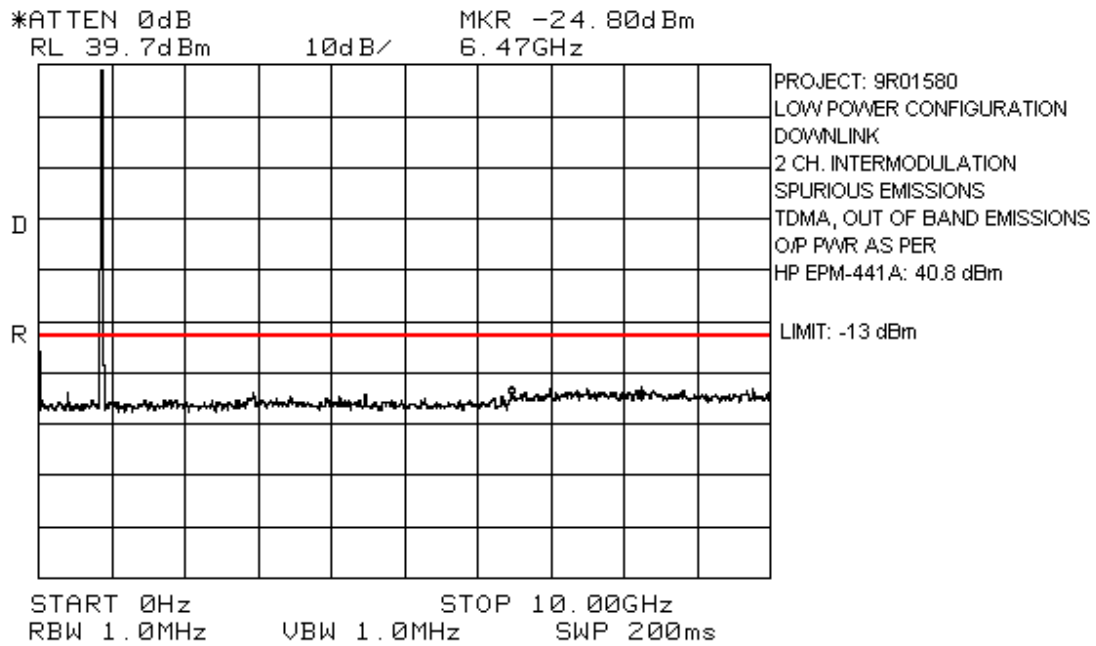
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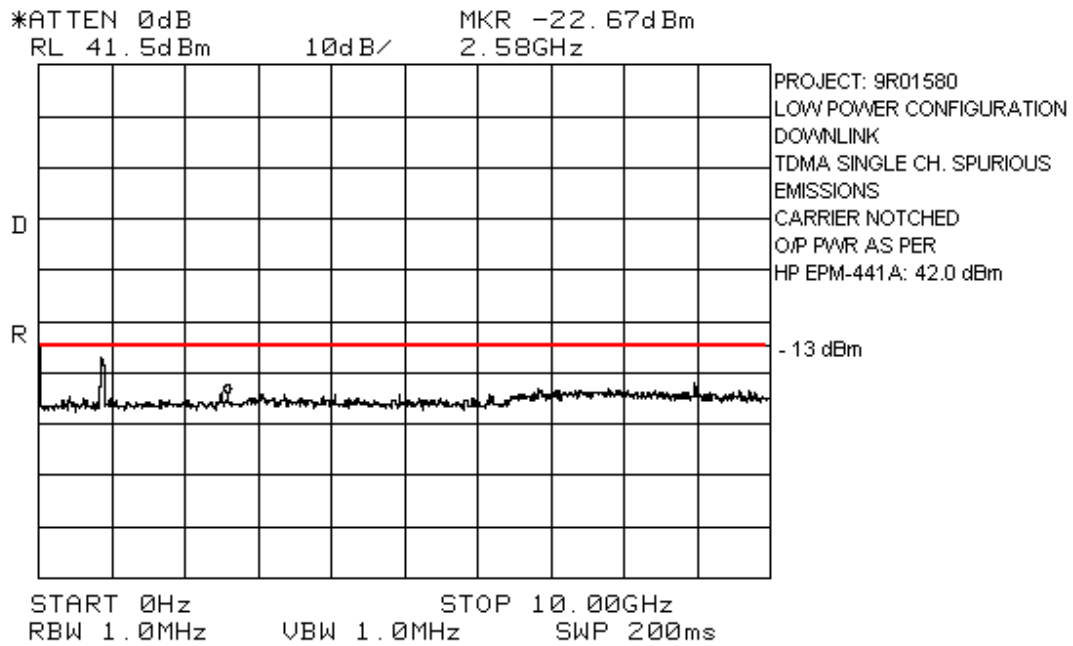
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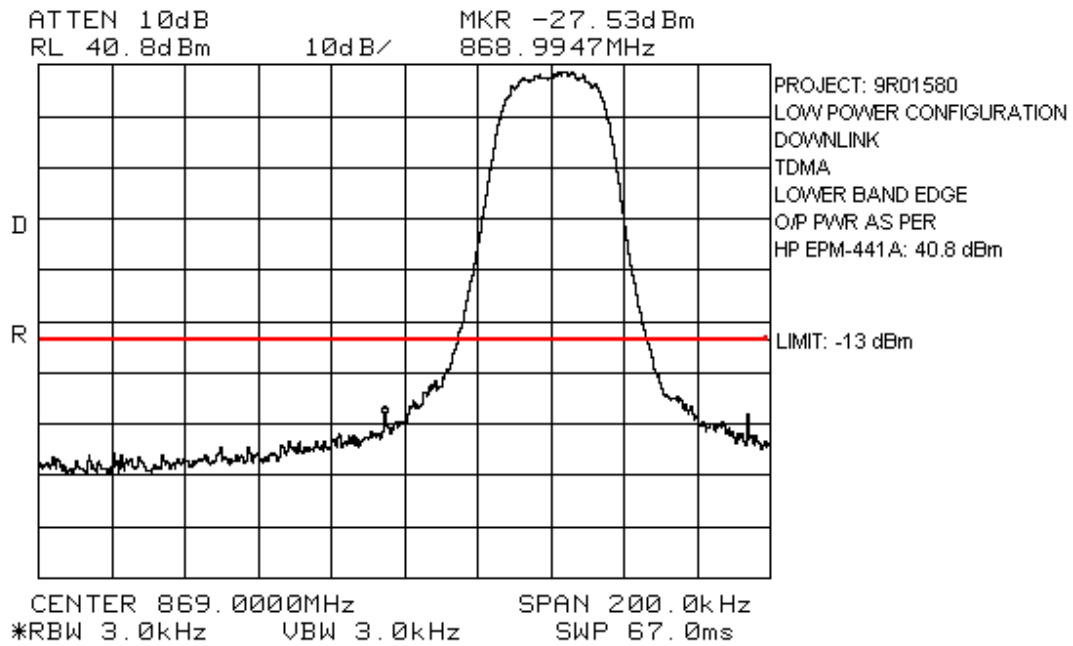
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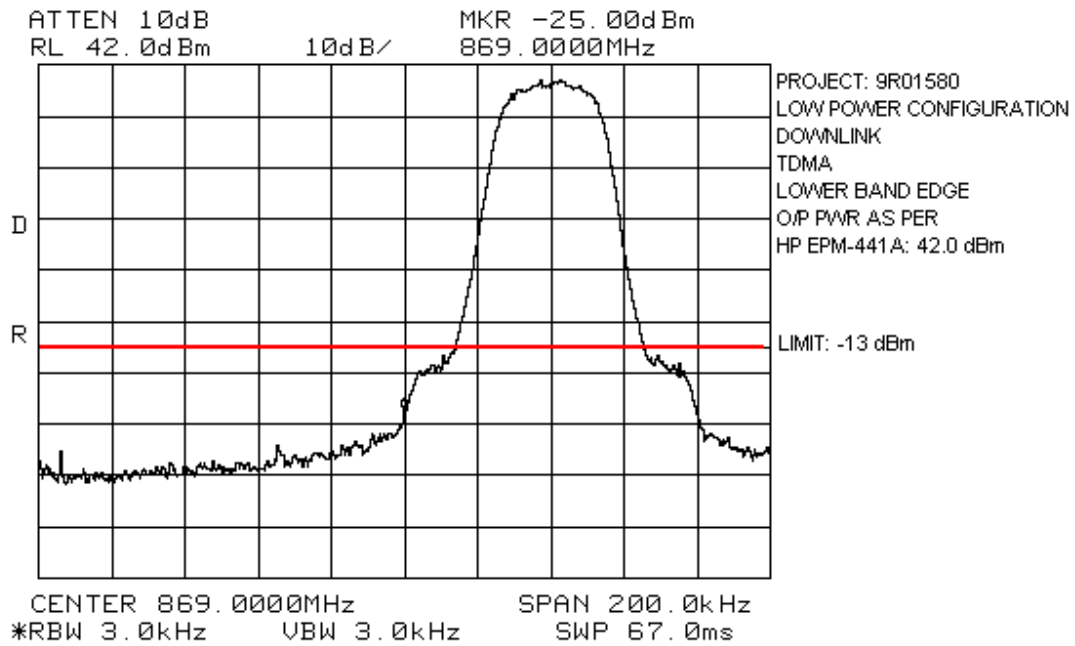
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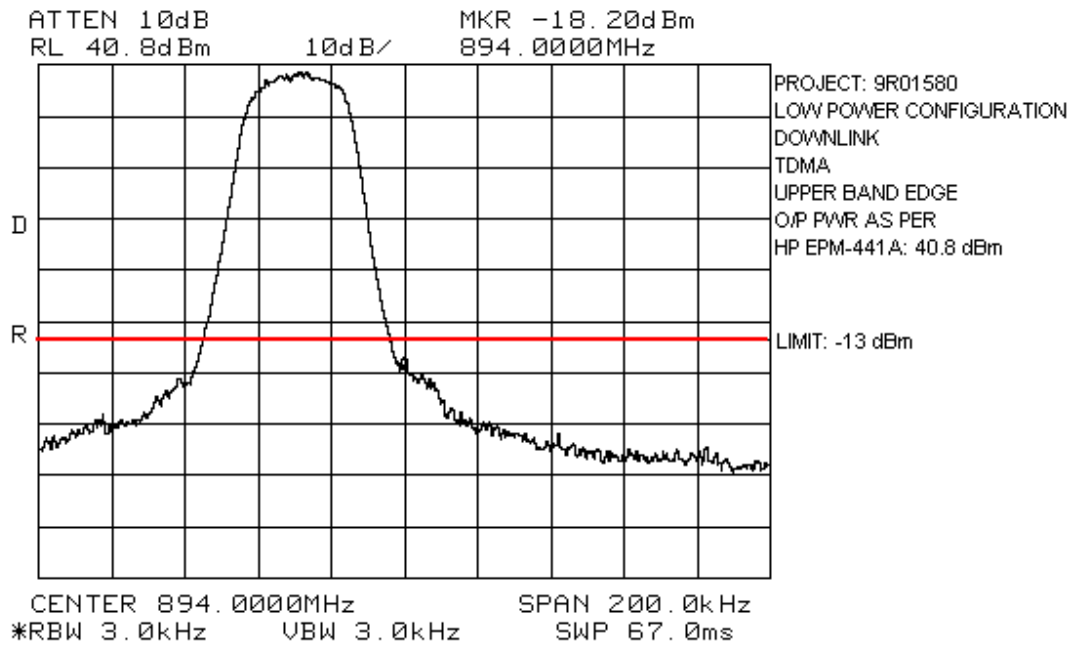
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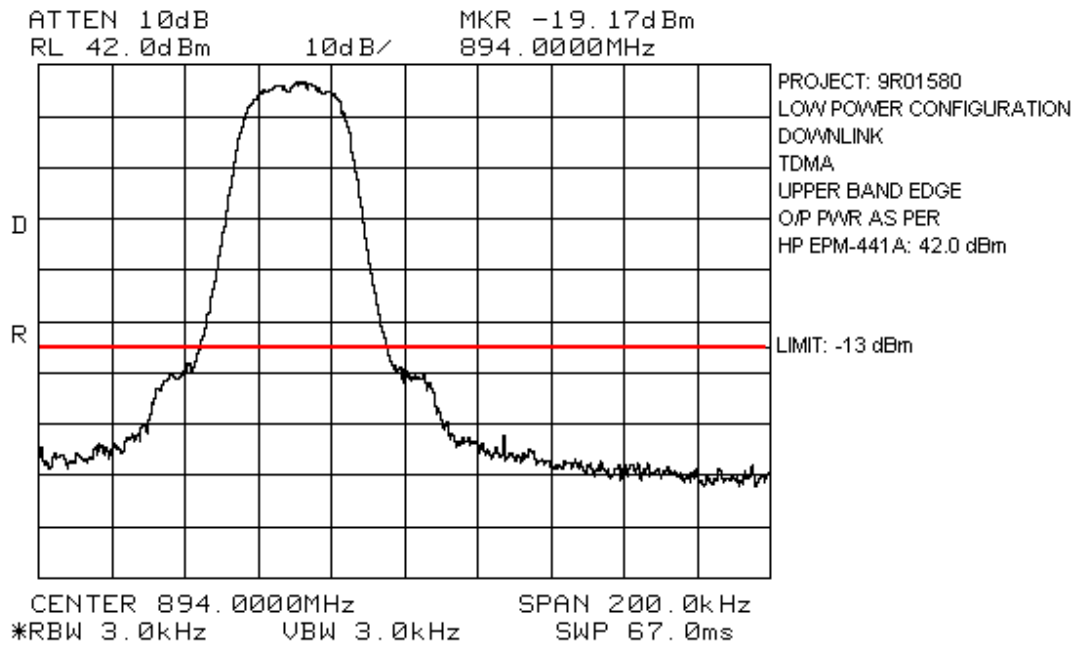
EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL



EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL



EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL



EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious	PARA. NO.: 2.1053
TESTED BY: Kevin Carr	DATE: July 8, 1999

Test Results: Complies.
The maximum field strength is 59.7 dB μ V/m @ 3525.97 MHz
at 3m.

Test Data: See attached tables.

EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

Test Data - Radiated Emissions

Test Distance (meters) : 3		Range: A Tower		Receiver: 014		RBW (1 MHz): VBW (3 MHz)		Detector: 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)
1762.98	Hrn2	V			54.6	29.8	-43.2		41.2	82.3	41.1
1763.02	Hrn2	H			54.1	29.8	-43.2		40.7	82.3	41.6
2644.47	Hrn2	V			55.9	31.6	-45.5		42.0	82.3	40.3
2644.51	Hrn2	H			50.1	31.6	-45.5		36.2	82.3	46.1
3525.97	Hrn2	V			66.6	35.3	-42.2		59.7	82.3	22.6
3526.0	Hrn2	H			55.1	35.3	-42.2		48.2	82.3	34.1
4407.46	Hrn2	V			62.8	37.1	-43.2		56.7	82.3	25.6
4407.5	Hrn2	H			58.0	37.1	-43.2		51.9	82.3	30.4
5288.96	Hrn2	V			31.1	39.8	-44.0		26.9	82.3	55.4
5289.0	Hrn2	H			30.8	39.8	-44.0		26.6	82.3	55.7
6170.45	Hrn2	V			39.6	42.5	-40.8		41.3	82.3	41.0
6170.4	Hrn2	H			30.8	42.5	-40.8		32.5	82.3	49.8
7051.94	Hrn2	V			27.6	44.1	-42.6		29.1	82.3	53.2
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.											

EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

Photographs of Test Setup

Front View



Rear View



EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

Section 7. Frequency Stability

NAME OF TEST: Frequency Stability	PARA. NO.: 1055
TESTED BY:	DATE:

Test Results: Complies/Does Not Comply.

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

NOT APPLICABLE

EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL**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	July 24/99	
1 Year	Attenuator	Narda	765-20	9510	July 24/98	July 24/99	
1 Year	Attenuator	Narda	768-10	9704	July 24/98	July 24/99	
1 Year	Insertion Unit	Rohde & Schwarz	URV5-Z4	FA000905	July 23/98	July 23/99	
1 Year	RF Millivoltmeter	Rohde & Schwarz	URV5	FA000420	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	EMCO	LPA-25	1141	July 27/98	July 27/99	
	50 Ω Termination	Wiltron	26N50	605248	N/A	N/A	
1 Year	Directional Coupler	Hewlett Packard	765D	228	July 21/98	July 21/99	
1 Year	50 ohm Combiner Pad	Mini Circuits	ZA3PD-2	9746	July 23/98	July 23/99	
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	Hewlett Packard	8660C	2044A03304	July 21/98	July 21/99	
2 Year	Spectrum Analyzer (Rental)	Hewlett Packard	HP8563E	862205	Jan.22/98	Jan.22/00	
1 Year	Power Head (Rental)	Hewlett Packard	8781A	909238	Feb. 5/99	Feb. 5/00	
1 Year	Power Meter (Rental)	Hewlett Packard	EPM-441A	837896	Oct.1/98	Oct.1/99	
3 Year	RF Generator	Rohde & Schwarz	SME3	DE14439	June 29/96	June 29/99	
1 Year	RF Generator	Rohde & Schwarz	SIMIQ03E	DE24154	Sept. 28/98	Sept. 28/99	
	Power Supply	Hewlett Packard	6274B	2552A-08243	NCR	NCR	
1 Year	Notch Filter	K&L	3TNF-500/1000	137	Jan 5/99	Jan. 5/00	
1 Year	RF Amplifier	ENI	603L	709285	May 5/99	May 5/00	
NCR	RF Amplifier	ComTest	GPA301	8C5320-1040	NCR	NCR	

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

KTL Ottawa

FCC PART 22, SUBPART H
800 MHz CELLULAR SUBSCRIBER UNITS
PROJECT NO.: 9R01580
ANNEX A

EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

ANNEX A
TEST METHODOLOGIES

EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

NAME OF TEST: RF Power Output

PARA. NO.: 1.1046

Minimum Standard:

Para. No. 22.913(a). The E.R.P. of mobile transmitter and auxiliary test transmitter must not exceed 7 watts.

EIA is 19B Para. No. 3.2.1.3. The transmitter shall be compiled of 8 distinct power levels.

The output power shown above shall be maintained within the range of +2 dB, -4 dB of nominal dBW value

PL	I	II	III
0	+6	+2	-2
1	+2	+2	-2
2	-2	-2	-2
3	-6	-6	-6
4	-10	-10	-10
5	-14	-14	-14
6	-18	-18	-18
7	-22	-22	-22

Method Of Measurement:

Detachable Antenna:

The power at antenna terminals is measured using an in-line power meter.

Integral Antenna:

If the antenna is not detachable from the circuit then the Power Output is derived from the 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 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 a halfwave dipole antenna

*EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL*

NAME OF TEST: Audio Frequency Response	PARA. NO.: 2.1047
---	--------------------------

Minimum Standard:

Para. No. 15-19-B. From 300 to 3000 Hz the audio frequency response shall not vary more than +1 to -3 dB from a true 6dB octave pre-emphasis characteristic as referred to 1000 Hz level (with the exception of a permissible 6dB per octave roll-off from 2500 to 3000 Hz).

Method Of Measurement:

Operate the transmitter with the compressor disabled, and monitor the output with a frequency deviation meter or standard test receiver without standard 750-microsecond de-emphasis, with expander disabled, and without C-message weighted filter (see 6.6.2). Apply a sine wave audio input to the transmitter external audio input port, vary the modulating frequency from 300 to 3000 Hz and observe the input levels necessary to maintain a constant ± 2.9 kHz system deviation.

EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

NAME OF TEST: Audio Low Pass Filter Response	PARA. NO.: 2.1047
---	--------------------------

Minimum Standard:

Para. No. 22.915 (d). For mobile stations, signals must be attenuated as a function of frequency as follows:

- i. In the frequency ranges 3.0 to 5.9 Hz and 6.1 to 15 kHz, $40 \log (f/3)$ dB.
- ii. In the frequency range 5.9 to 6.1 kHz, 35 dB
- iii. In the frequency range above 15 kHz, 28 dB.

Method Of Measurement:

Adjust the audio input frequency to 1000 Hz and adjust the input level to 20 dB greater than that required to produce ± 8 kHz deviation. Note the output level on the frequency deviation meter or standard test receiver. Using the output level as reference (0dB), vary the modulating frequency from 3000 Hz to 30,000 Hz and observe the change in output while maintaining a constant audio input level.

EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

NAME OF TEST: Modulation Limiting**PARA. NO.: 2.1047****Minimum Standard:** 22.915(b)

The levels of the modulating signals must be set to the values specified below and must be maintained within $\pm 10\%$ of these values.

Voice: ± 12 kHzSAT: ± 2 kHzWideband Data: ± 8 kHzST: ± 8 kHz**Method Of Measurement:**

Voice: A 1 kHz audio tone is injected at levels between -45 and +20 dBVrms. The peak deviation is noted. This is repeated with a 300 Hz tone and a 3 kHz tone.

SAT: A SAT tone is generated by the mobile station and the peak deviation is measured.

Wideband Data: Wideband data is generated by the mobile station and the peak deviation is measured.

ST: ST data is generated by the mobile station and the peak deviation is measured.

EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

NAME OF TEST: Occupied Bandwidth (Voice & SAT)	PARA. NO.: 2.1049
---	--------------------------

Minimum Standard: 22.917(b) 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 20 kHz but not more than 45 kHz: at least 26 dB
- (ii) On any frequency removed from the carrier frequency by more than 45 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: 100 kHz
Sweep: Auto
Mask: CELLF3E

Input Signal Characteristics (F3E/F3D):

AF1 frequency: 2.5 kHz
AF1 level: 16 dB above the level sufficient to produce ± 6 kHz deviation with a 1 kHz tone.
SAT: 6000 Hz SAT
SAT level: sufficient to produce ± 2 kHz deviation.

EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

NAME OF TEST: Occupied Bandwidth (WBD & SAT)	PARA. NO.: 21049
---	-------------------------

Minimum Standard: 22.917(d) 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

10 kbps WBD + DAT

ST

EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

NAME OF TEST: Spurious Emission at Antenna Terminals	PARA. NO.: 2.1051
---	--------------------------

Minimum Standard: Para. No. 22.917(b). 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: RF Booster System
FCC ID: BCR-MRB-CELL

NAME OF TEST: Field Strength of Spurious Radiation	PARA. NO.: 2.1053
--	-------------------

Minimum Standard:

Para. No. 22.917(b). 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: RF Booster System
FCC ID: BCR-MRB-CELL

NAME OF TEST: Frequency Stability**PARA. NO.: 2.1055****Minimum Standard:**

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

Freq. Range (MHz)	Mobile > 3 W	Mobile ≤ 3 W
821 to 896	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

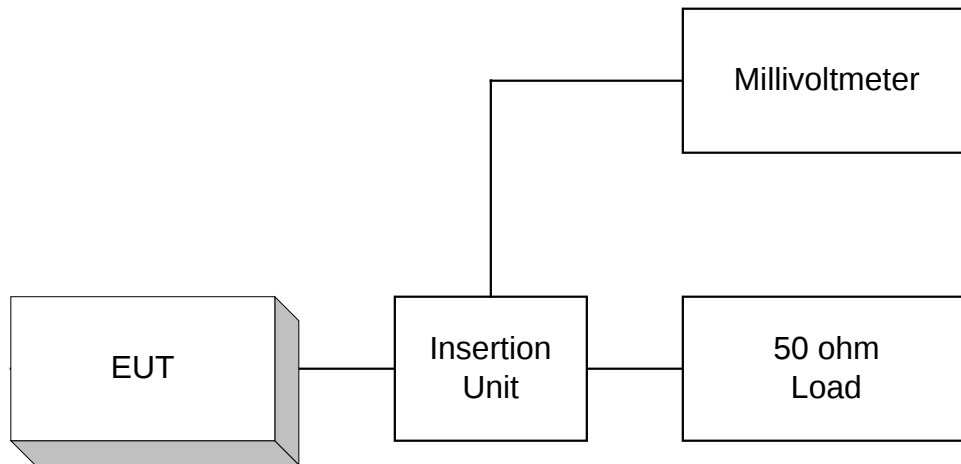
FCC PART 22, SUBPART H
800 MHz CELLULAR SUBSCRIBER UNITS
PROJECT NO.: 9R01580
ANNEX B

EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

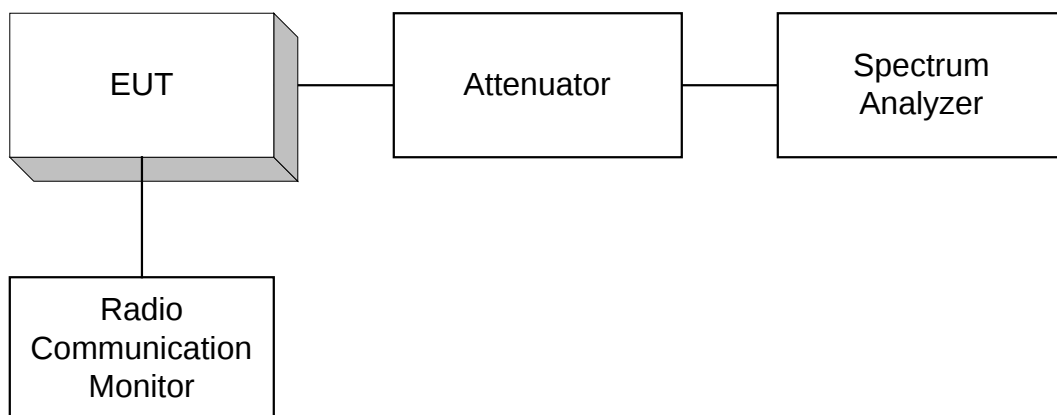
ANNEX B
TEST DIAGRAMS

EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

Para. No. 2.1046 - R.F. Power Output

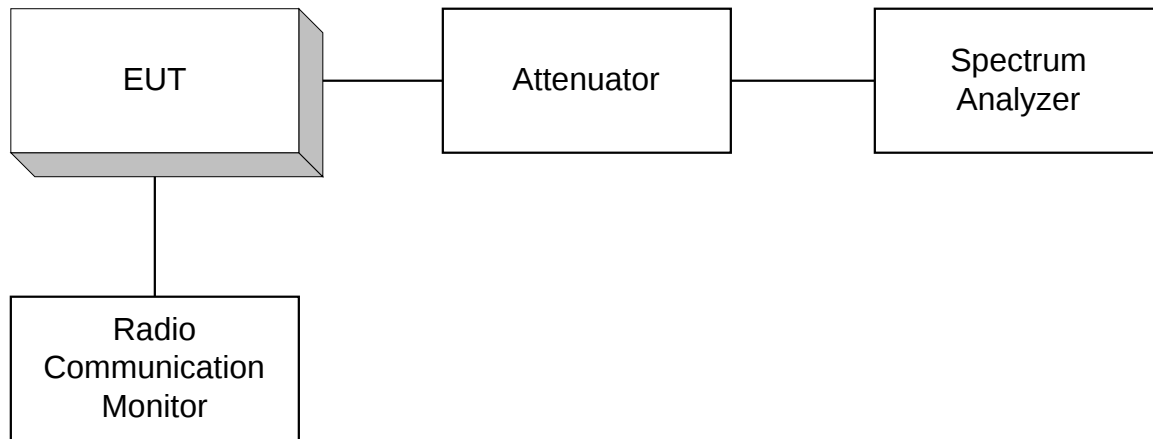


Para. No. 2.1049 - Occupied Bandwidth

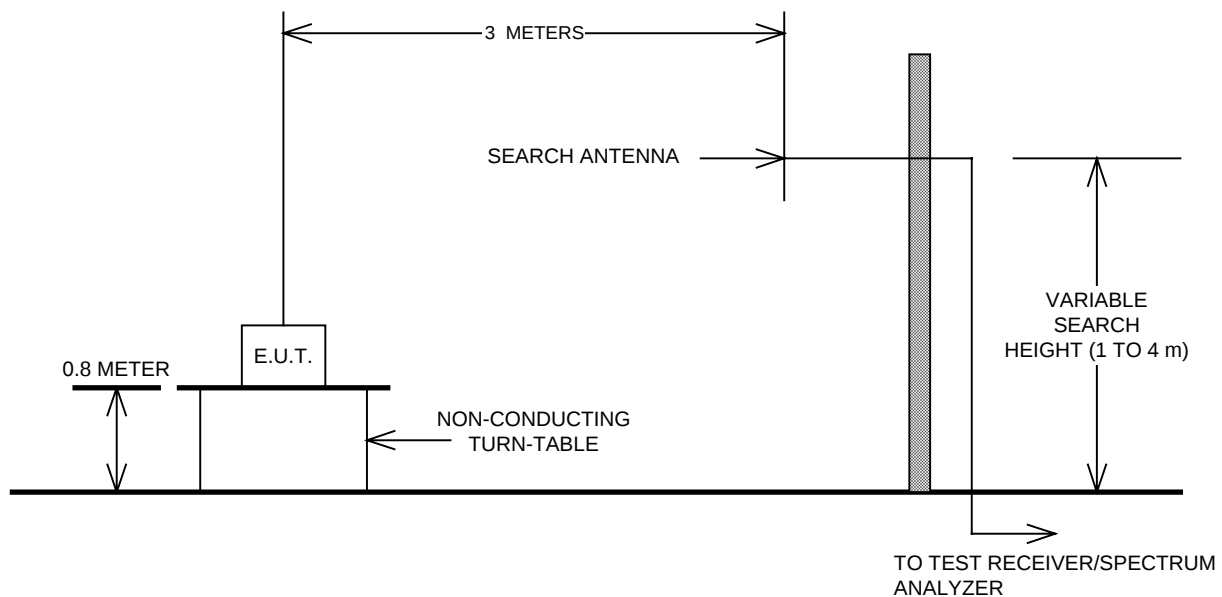


EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

Para. No. 2.1051 Spurious Emissions at Antenna Terminals

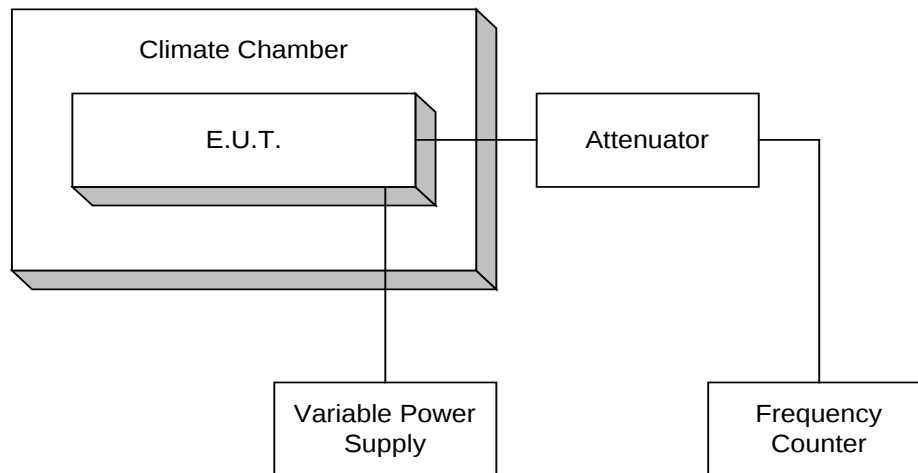


Para. No. 2.1053 - Field Strength of Spurious Radiation



EQUIPMENT: RF Booster System
FCC ID: BCR-MRB-CELL

Para. No. 2.1055 - Frequency Stability



**Para. No. 2.1045 – Audio Frequency Response, Audio Low Pass Filter Response
And Modulation Limiting**

