Application for Type Acceptance
for an RF Power Amplifier

TPL Communications
3370 San Fernando Rd. # 206
Los Angeles, CA 90065

RF Power Amplifier:

Part # RS3-2AC-AIR

FCC ID: BBD3-2AC-A

Report # RA054492/80112

This report was prepared in accordance with the requirements of FCC rules and regulations Part 2, Subpart J, 2.981 thru 2.1005, Part 22, Part 90, and other applicable sections of the rules as indicated herein.

Prepared By:

Jake Tynes

DNB ENGINEERING, INC.
3535 W. Commonwealth Ave.
Fullerton, Ca 92833

04 May 1998

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1.0 ADMINISTRATIVE DATA

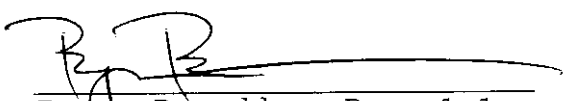
1.1 Certifications and Qualifications

I certify that the tests performed in order to obtain the technical data presented in this application were performed by **DNB ENGINEERING, INC**. Also, based on the results of the enclosed data, I have concluded that the equipment tested meets or exceeds the requirements of the Rules and Regulations governing this application.

1.2 Measurement Repeatability Information

The test data presented in this report has been acquired using the guidelines set forth in FCC Part 2.981 through 2.1005, Part 22, and Part 90. The test results presented in this document are valid only for the equipment identified herein under the test conditions described. Repeatability of these test results will only be achieved with identical measurement conditions. These conditions include the same test distance, EUT height, measurement site characteristics, and the same EUT and system components. The system must have the same interconnecting cables arranged in identical placement to that shown in the setup photos, with the system and/or EUT functioning in the identical mode of operation (i.e. software and so on) as on the date of the test. Any deviation from the test conditions and environment on the date of test may result in measurement repeatability difficulties.

All changes made to the EUT during the course of testing as identified in this report must be incorporated in the EUT or identical models to ensure compliance with the FCC regulations.



Bryan Broaddus Par. 1.1
Manager, Test Department
DNB ENGINEERING, INC.
Phone # (714) 870-7781

2.983(a) Request For Type Acceptance

Name of Applicant: TPL Communications
3370 San Fernando Rd. # 206
Los Angeles, CA 90065

Applicant is:
_X_ Manufacturer
____ Vendor
____ Licensee
____ Prospective Licensee
____ Other

Name of Manufacturer: TPL Communications

2.983(b) Equipment Description

The EUT is an RF Power Amplifier.

Part Number: RS3-2AC-AIR

FCC ID: BBD3-2AC-A

2.983(c) Anticipated Production Quantity

____ One Unit
_X_ Multiple Units

2.983(d) **Technical Description**

See the Service Manual Included in Appendix B herein for the complete description.

2.983(d)(1) **Type(s) of Emissions**

A3E

2.983(d)(2) **Frequency Range**

118 - 136 MHz

2.983(d)(3) **Operating Power Level**

50 Watts

2.983(d)(4) **Maximum Power Allowed in Applicable Part(s) of the Rules**

Rules Part	Maximum Power (Watts)
Part 87	200 Watts

2.983(d)(5) **Final RF Amplifier Input Power**

5 Watts

2.983(d)(6) **Function of all Active Circuit Devices**

Please refer to Appendix B.

2.983(d)(7) **Circuit Diagram**

Refer to Figure in Appendix B.

2.983(d)(8) **Instruction Book(s)**

See Appendix B

2.983(d)(9) **Tune-Up Procedure**

Refer to Appendix B.

Circuit Diagram
2.983(d)(7)

SEE FIGURE IN APPENDIX B

2.983(e) **Test Data**

Refer to 2.983(e)(1) through 2.983(e)(7)

2.983(e)(1) **Measurement of RF Power Output per 2.985**

Definition: For RF Power Amplifiers.

Test Method: See Figure 2.
Output power is measured across a precision 50 ohm load with a wide-band sampling RF voltmeter.

Test Results:

	POWER OUTPUT		
Frequency	Nominal Voltage 26 VDC	85% Voltage 22.1 VDC	115% Voltage 29.3 VDC
136 MHz	50.0 W	41 W	47.7 W

2.983(e)(2) **Measurement of Modulation Characteristics per 2.987(b)(1)**

This EUT is a power amplifier and contains no circuitry to modify the RF signal provided by the driver except to raise the power level.

2.983(e)(3) **Measurement of Occupied Bandwith per 2.989**

Definition: Occupied bandwith, that is the frequency bandwith such that, below its lower and above its upper frequency limits, the mean power radiated by a given emission.

Test Method: Connect the equipment per Figure 3.

Measurements were made with the modulating signal at 2.5 kHz with 5 kHz of FM deviation.

Test Results: See Plots following Figure 3.

The center frequency of the signal did not shift with modulation. The spectrum bandwith was well within the limits specified in the FCC regulations

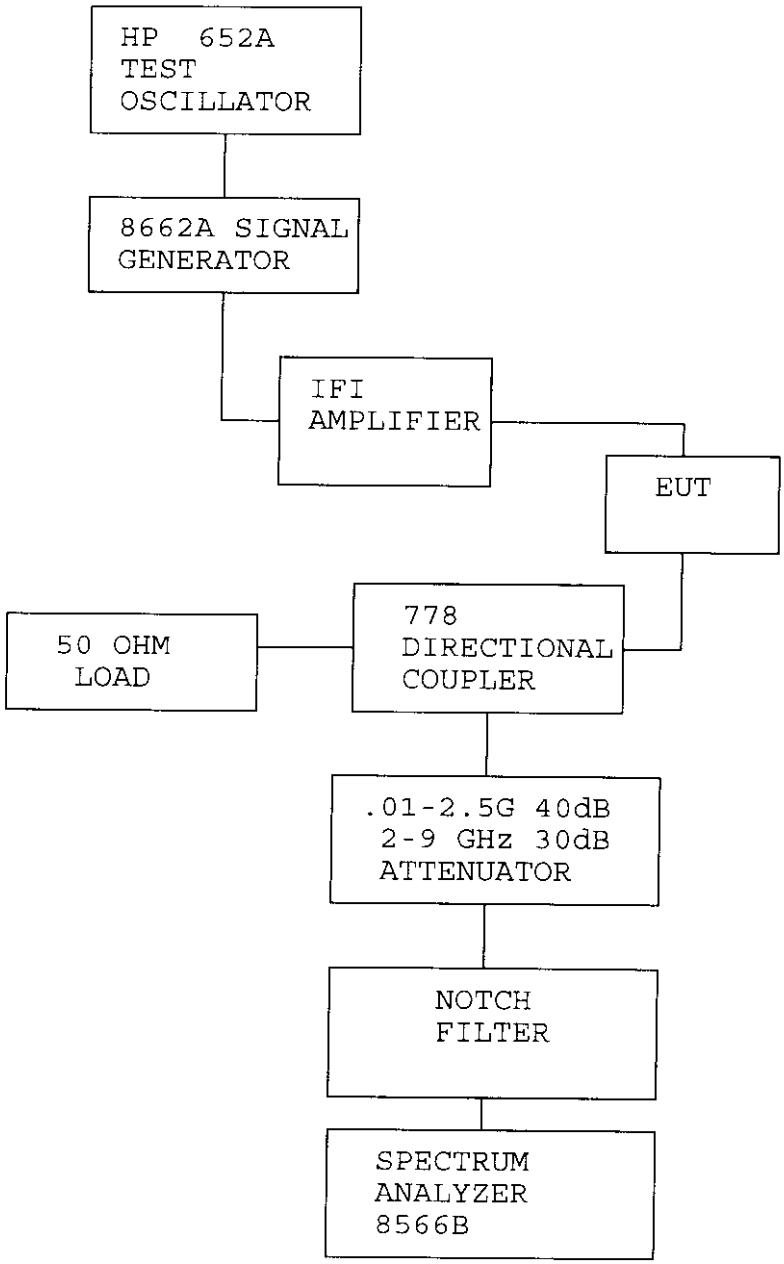


FIGURE 2. BLOCK DIAGRAM.
(POWER INPUT/OUTPUT TESTS)

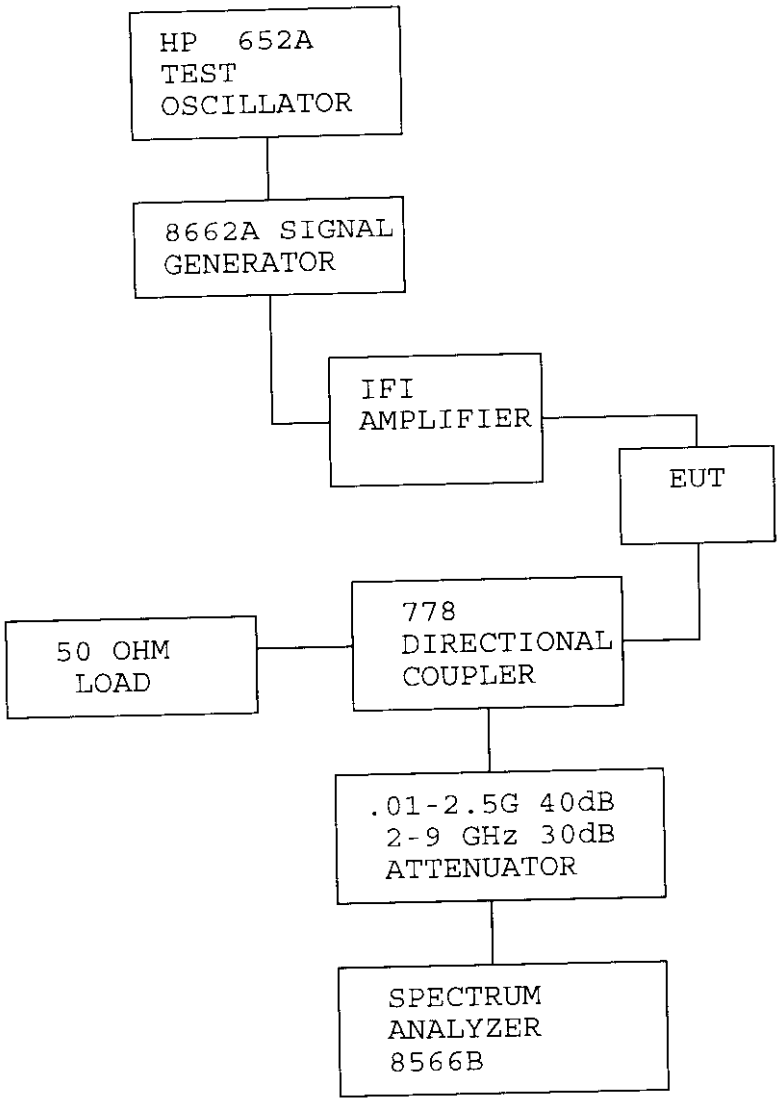
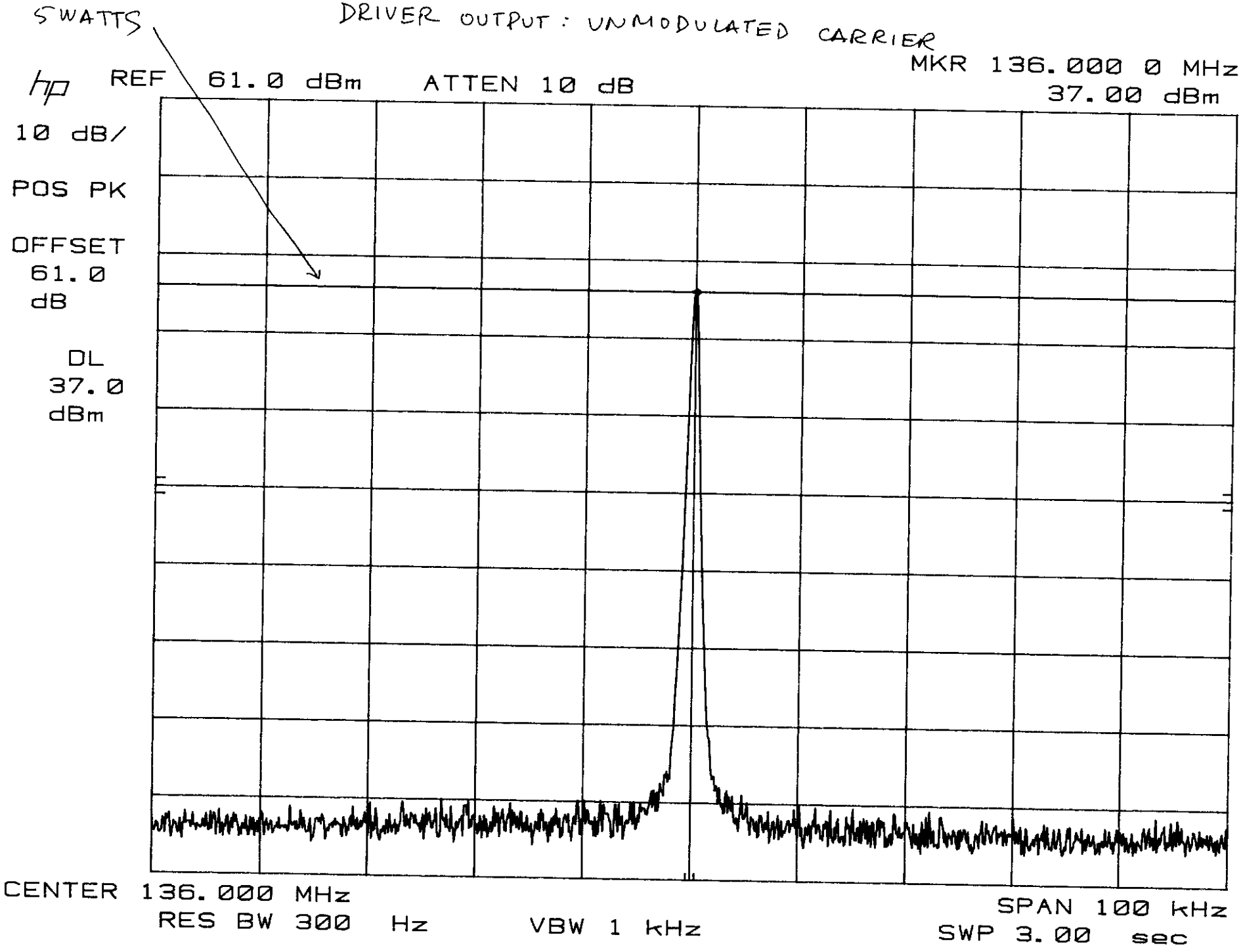
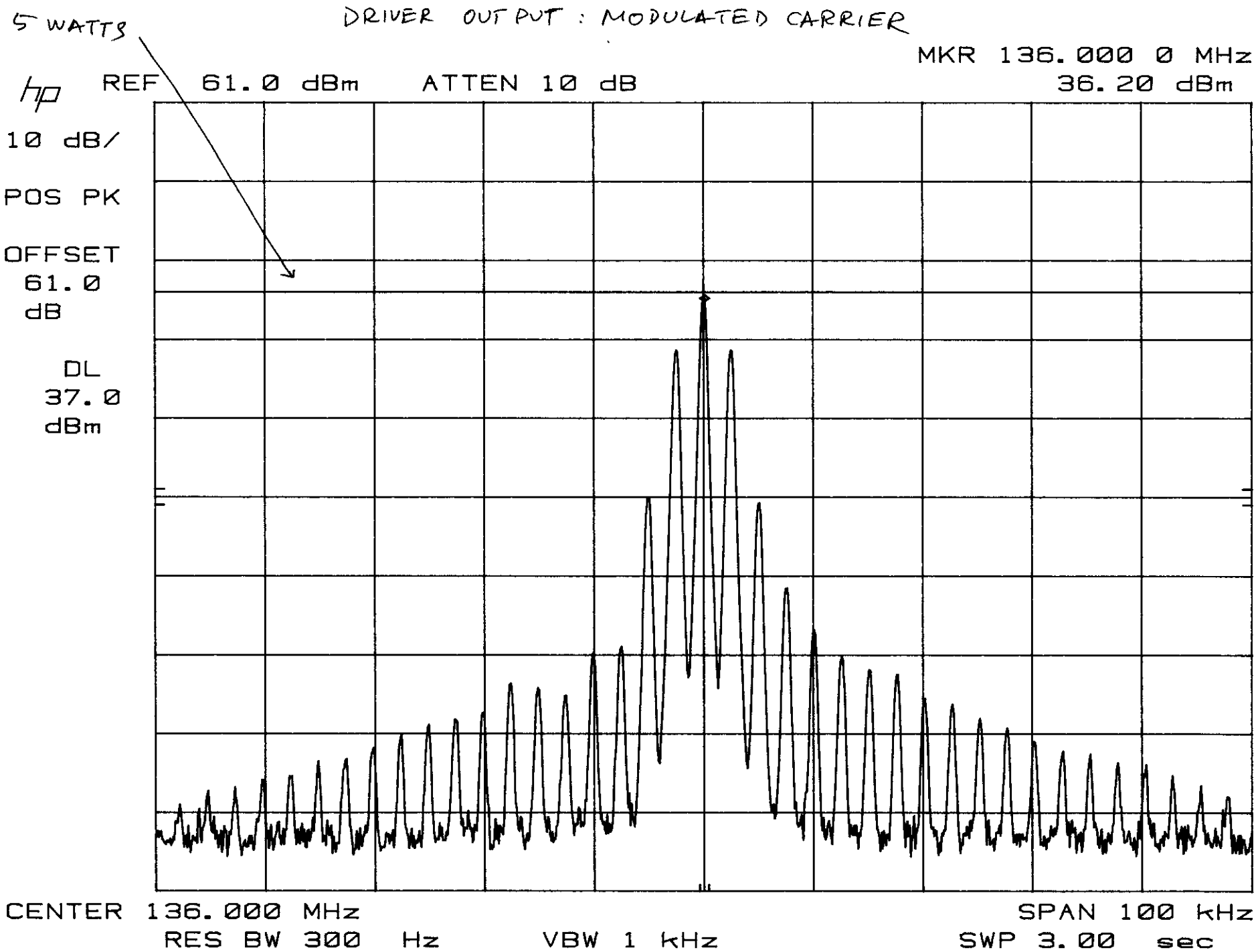
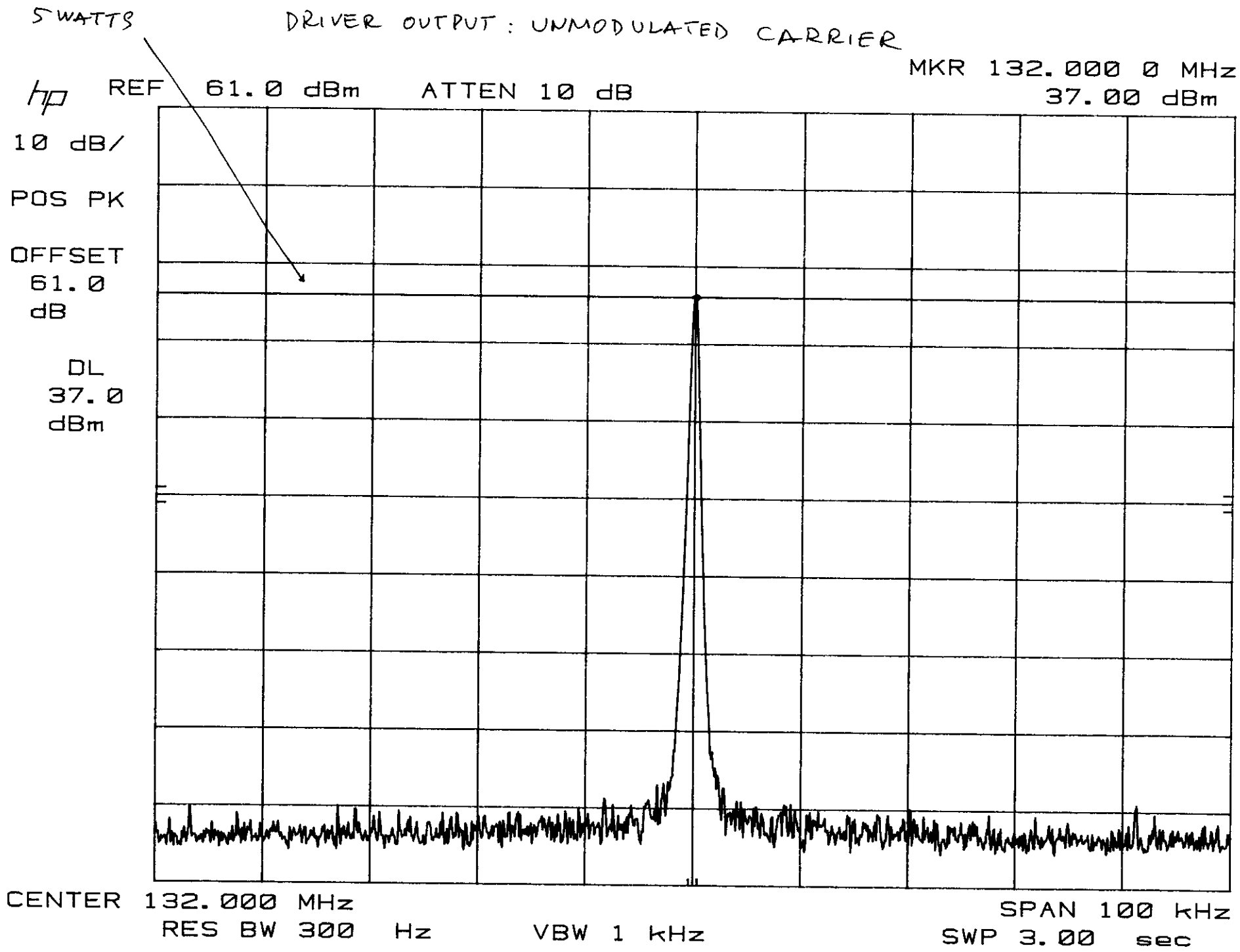
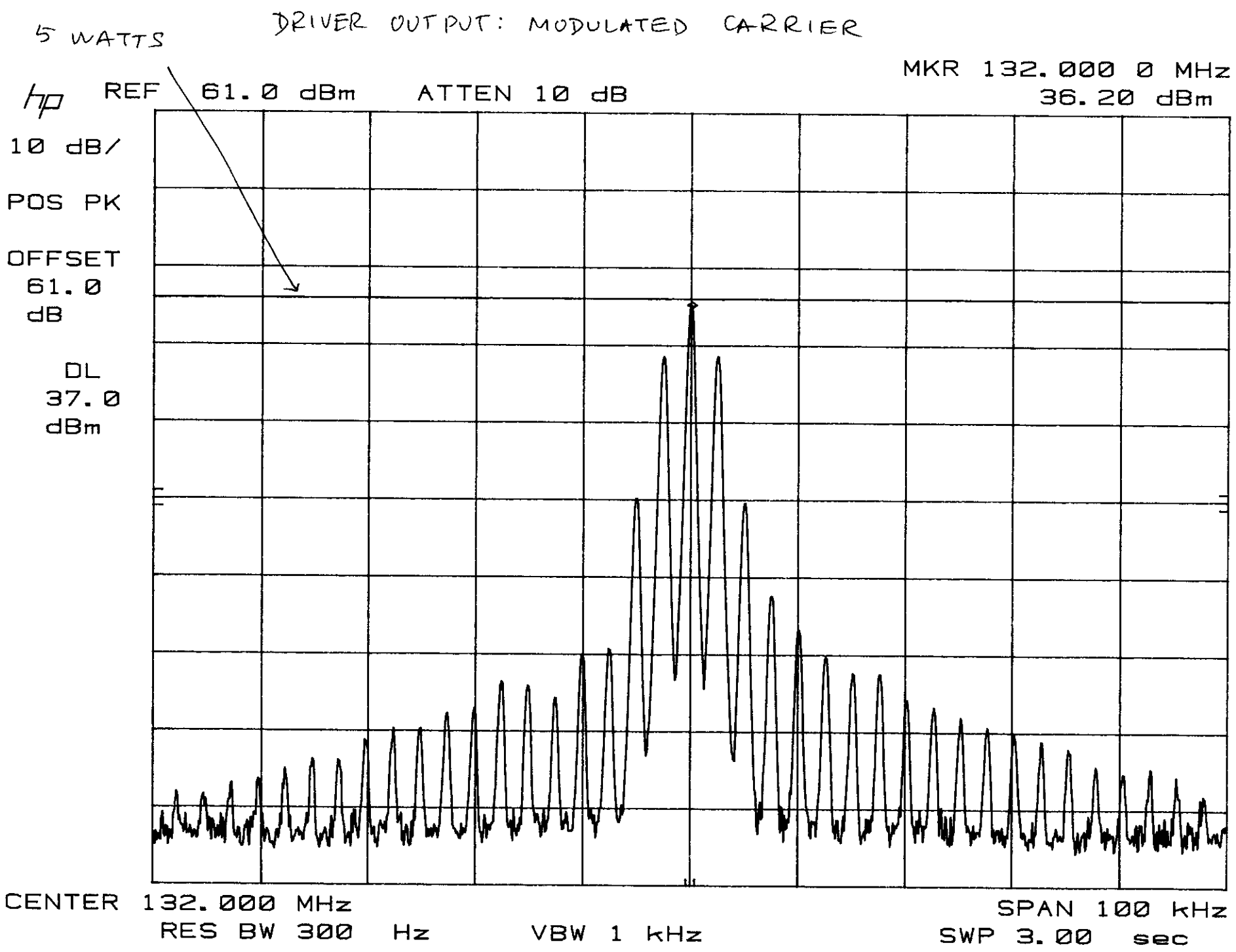


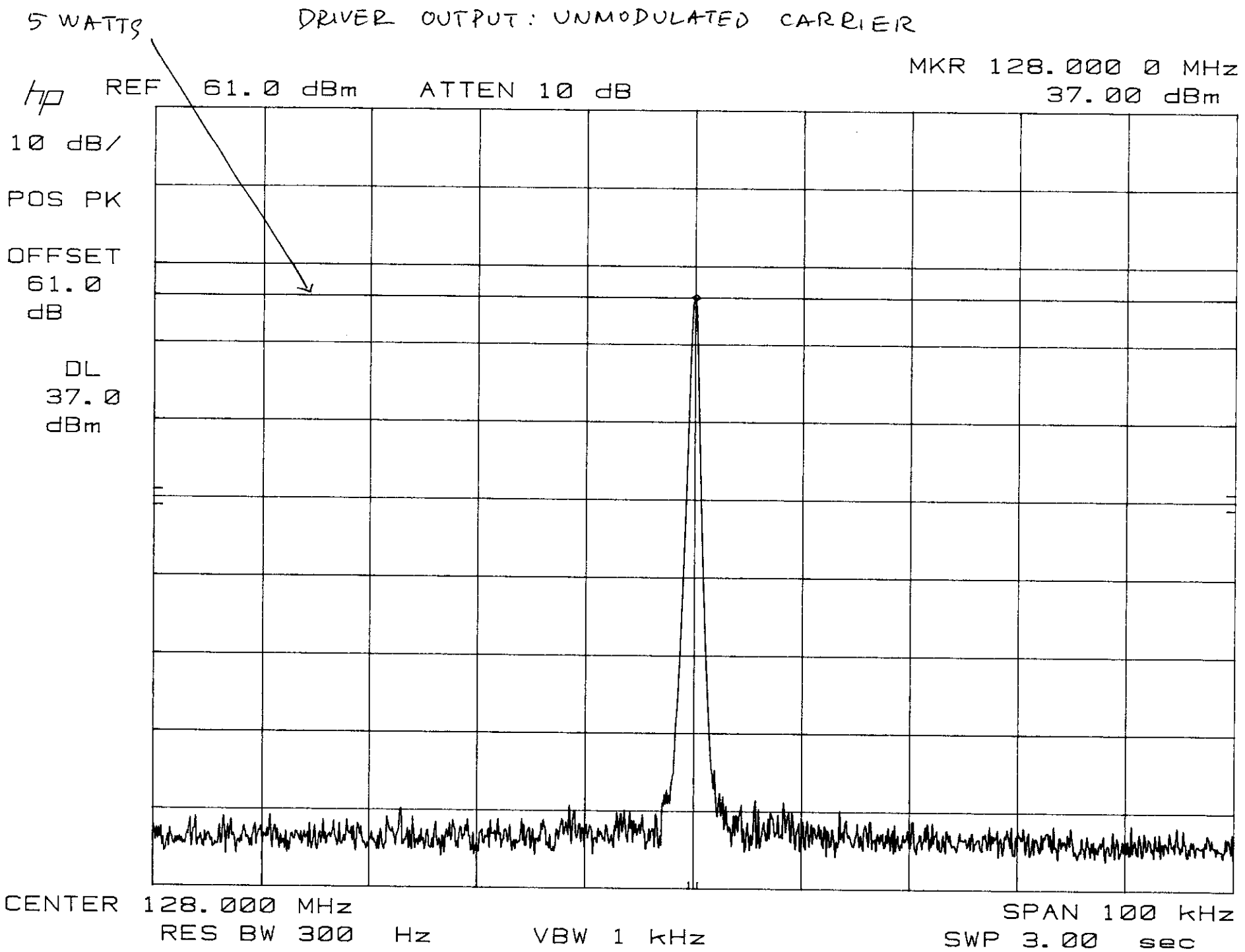
FIGURE 3. BLOCK DIAGRAM.
(OCCUPIED BANDWITH)


5 WATTS
DRIVER OUTPUT : UNMODULATED CARRIER
hp
REF 61.0 dBm
ATTEN 10 dB
MKR 136.000 0 MHz
37.00 dBm
10 dB/
POS PK
OFFSET
61.0
dB
DL
37.0
dBm
CENTER 136.000 MHz
RES BW 300 Hz
VBW 1 kHz
SPAN 100 kHz
SWP 3.00 sec


5 WATTS
DRIVER OUTPUT : MODULATED CARRIER
MKR 136.000 0 MHz
REF 61.0 dBm
ATTEN 10 dB
36.20 dBm
10 dB/
POS PK
OFFSET
61.0
dB
DL
37.0
dBm
CENTER 136.000 MHz
SPAN 100 kHz
RES BW 300 Hz
VBW 1 kHz
SWP 3.00 sec


5 WATTS
DRIVER OUTPUT : UNMODULATED CARRIER
hp
REF 61.0 dBm
ATTEN 10 dB
MKR 132.000 0 MHz
37.00 dBm
10 dB/
POS PK
OFFSET
61.0
dB
DL
37.0
dBm
CENTER 132.000 MHz
RES BW 300 Hz
VBW 1 kHz
SPAN 100 kHz
SWP 3.00 sec


5 WATTS
DRIVER OUTPUT: MODULATED CARRIER
MKR 132.000 0 MHz
36.20 dBm
REF 61.0 dBm
ATTEN 10 dB
10 dB/
POS PK
OFFSET
61.0
dB
DL
37.0
dBm
CENTER 132.000 MHz
RES BW 300 Hz
VBW 1 kHz
SPAN 100 kHz
SWP 3.00 sec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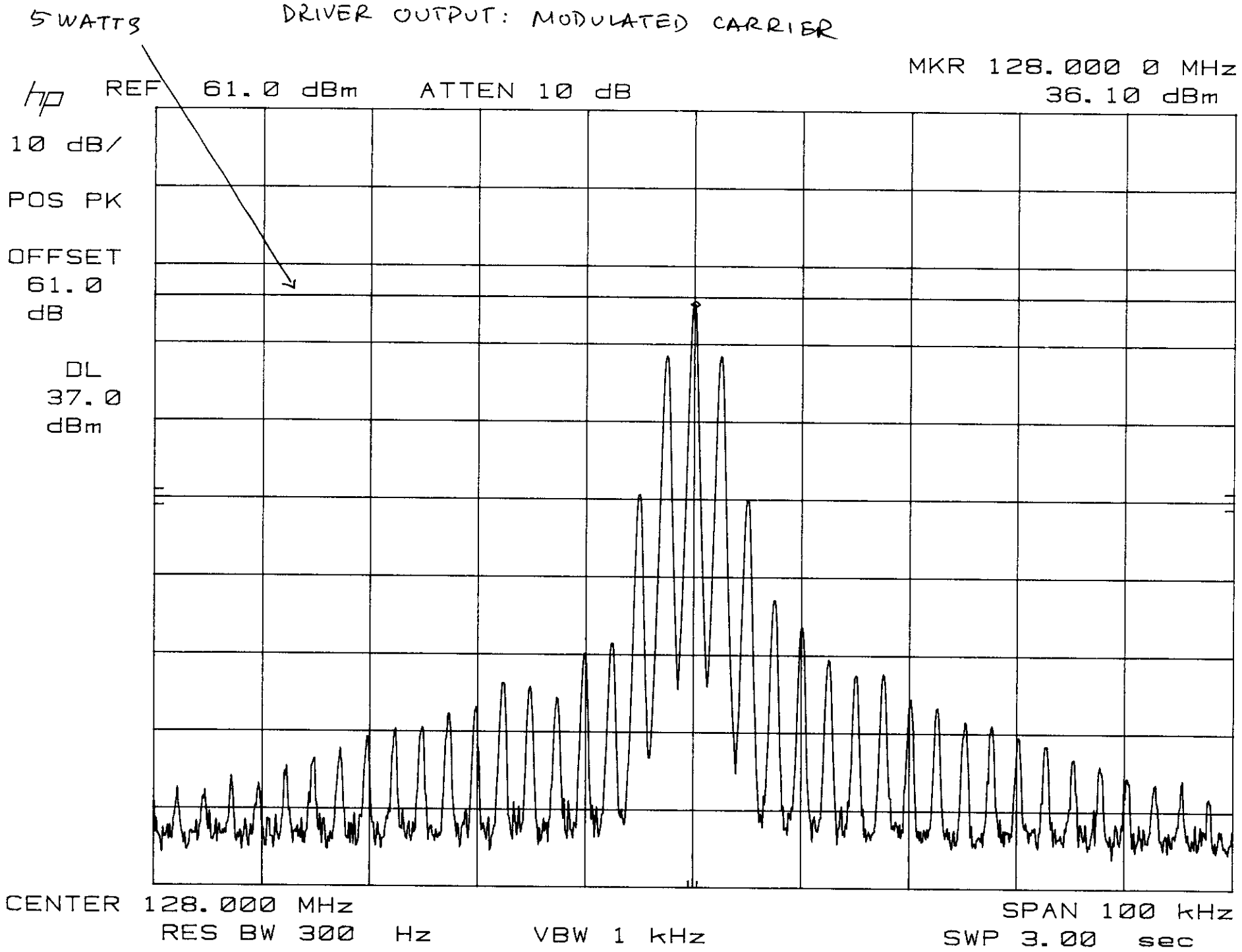
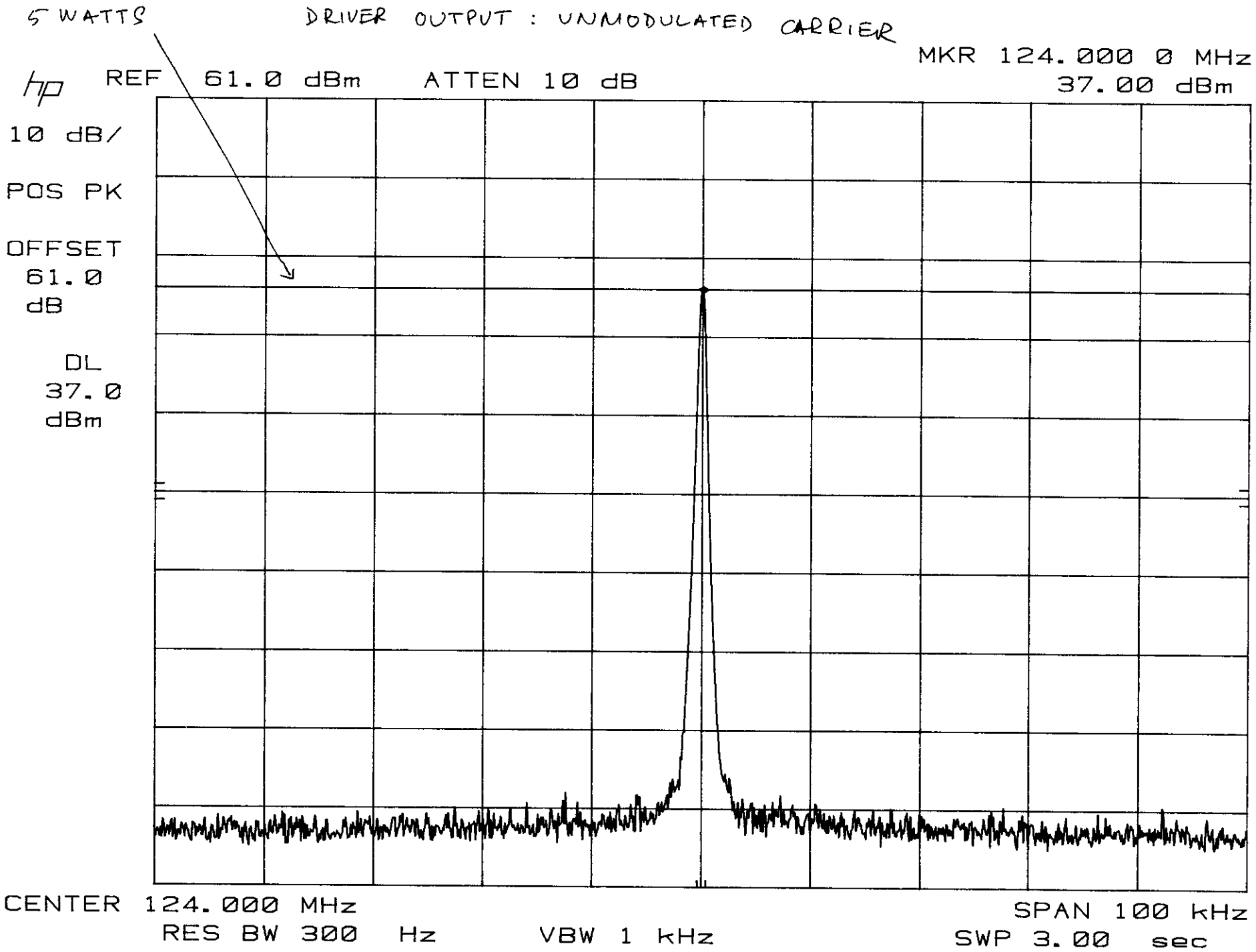
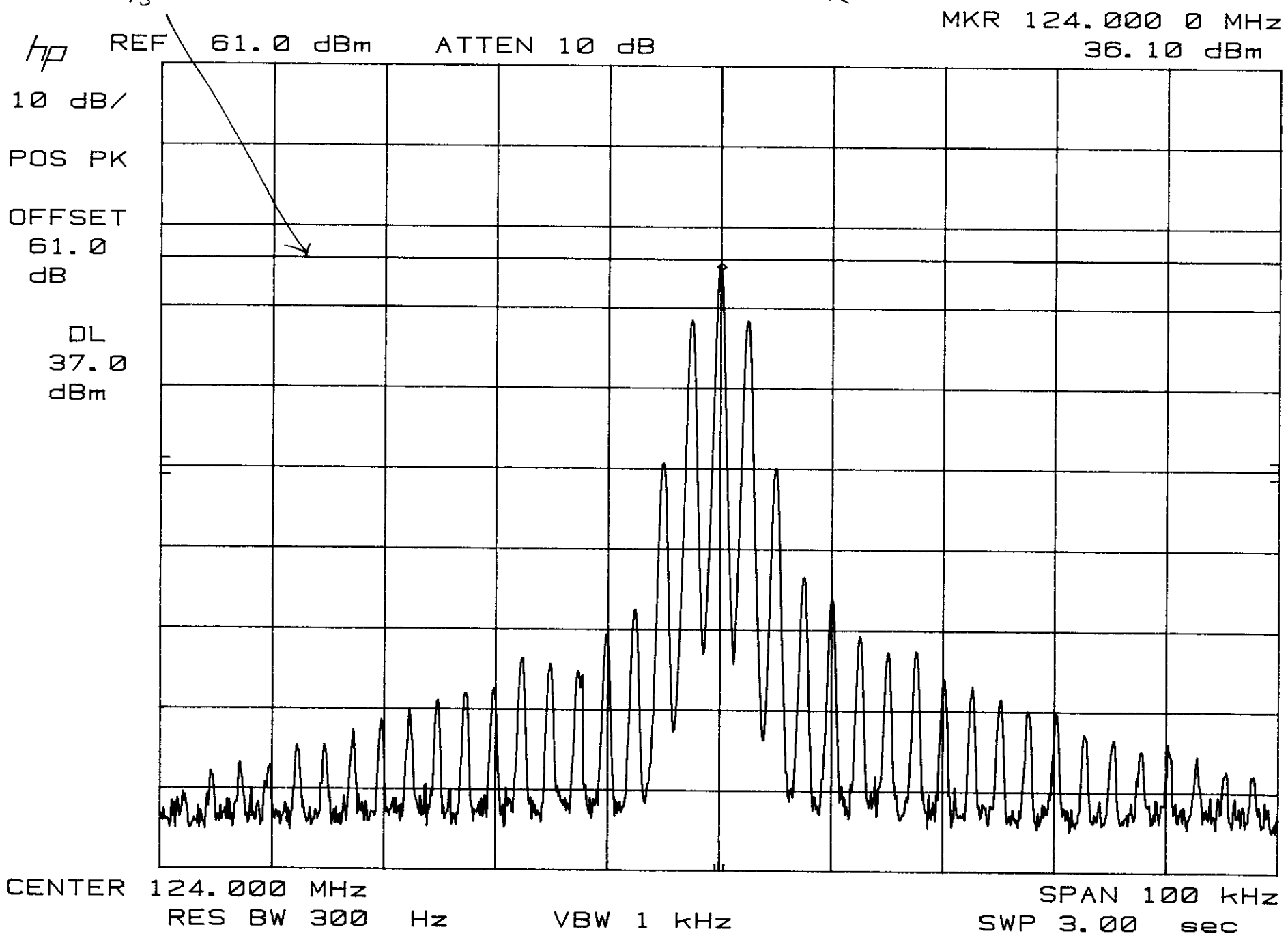
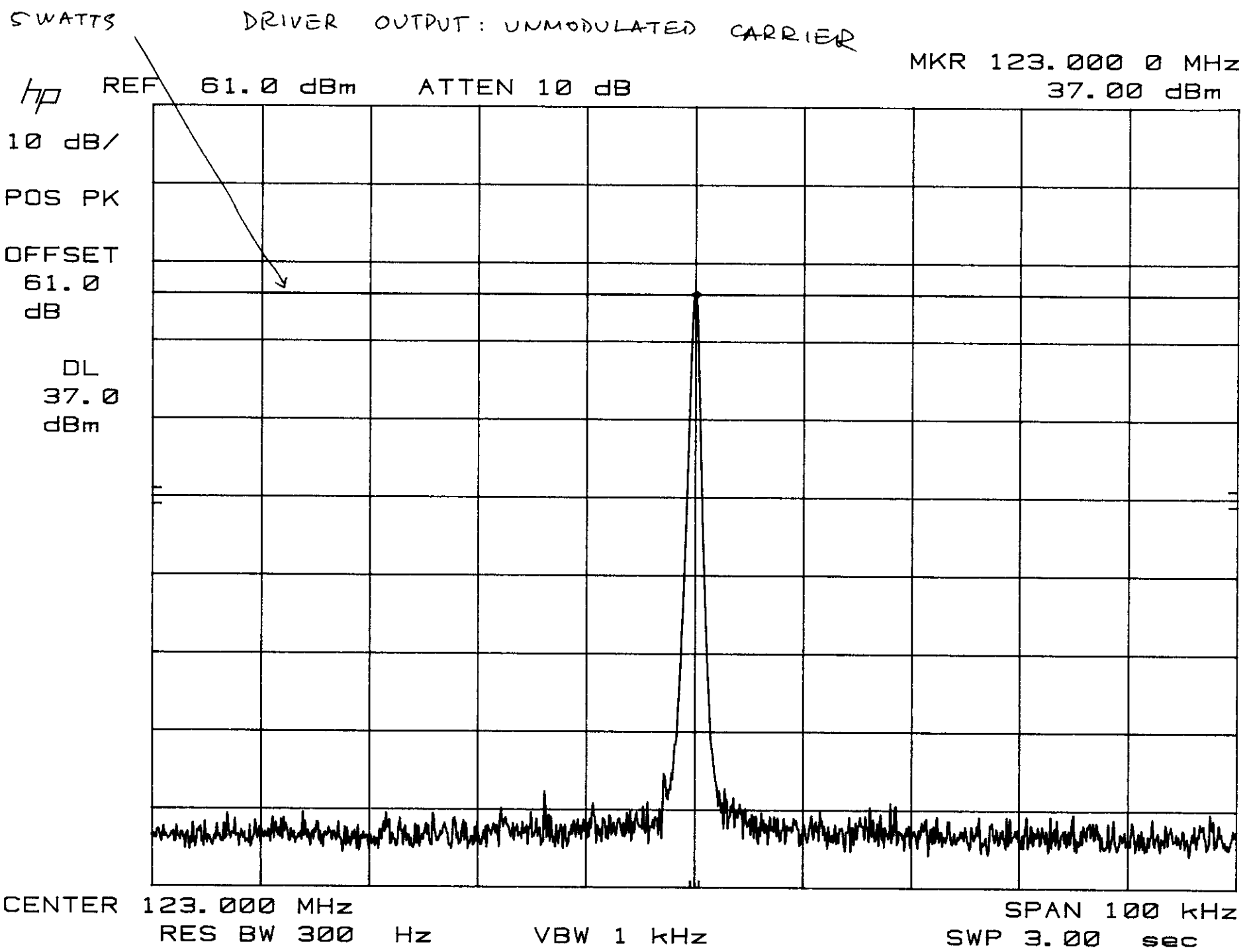
DRIVER OUTPUT: UNMODULATED CARRIER
hp
REF 61.0 dBm
ATTEN 10 dB
MKR 128.000 0 MHz
37.00 dBm
10 dB/
POS PK
OFFSET
61.0
dB
DL
37.0
dBm
CENTER 128.000 MHz
RES BW 300 Hz
VBW 1 kHz
SPAN 100 kHz
SWP 3.00 sec


5 WATTS
DRIVER OUTPUT: MODULATED CARRIER
MKR 128.000 0 MHz
36.10 dBm
REF 61.0 dBm
ATTEN 10 dB
10 dB/
POS PK
OFFSET
61.0
dB
DL
37.0
dBm
CENTER 128.000 MHz
RES BW 300 Hz
VBW 1 kHz
SPAN 100 kHz
SWP 3.00 sec

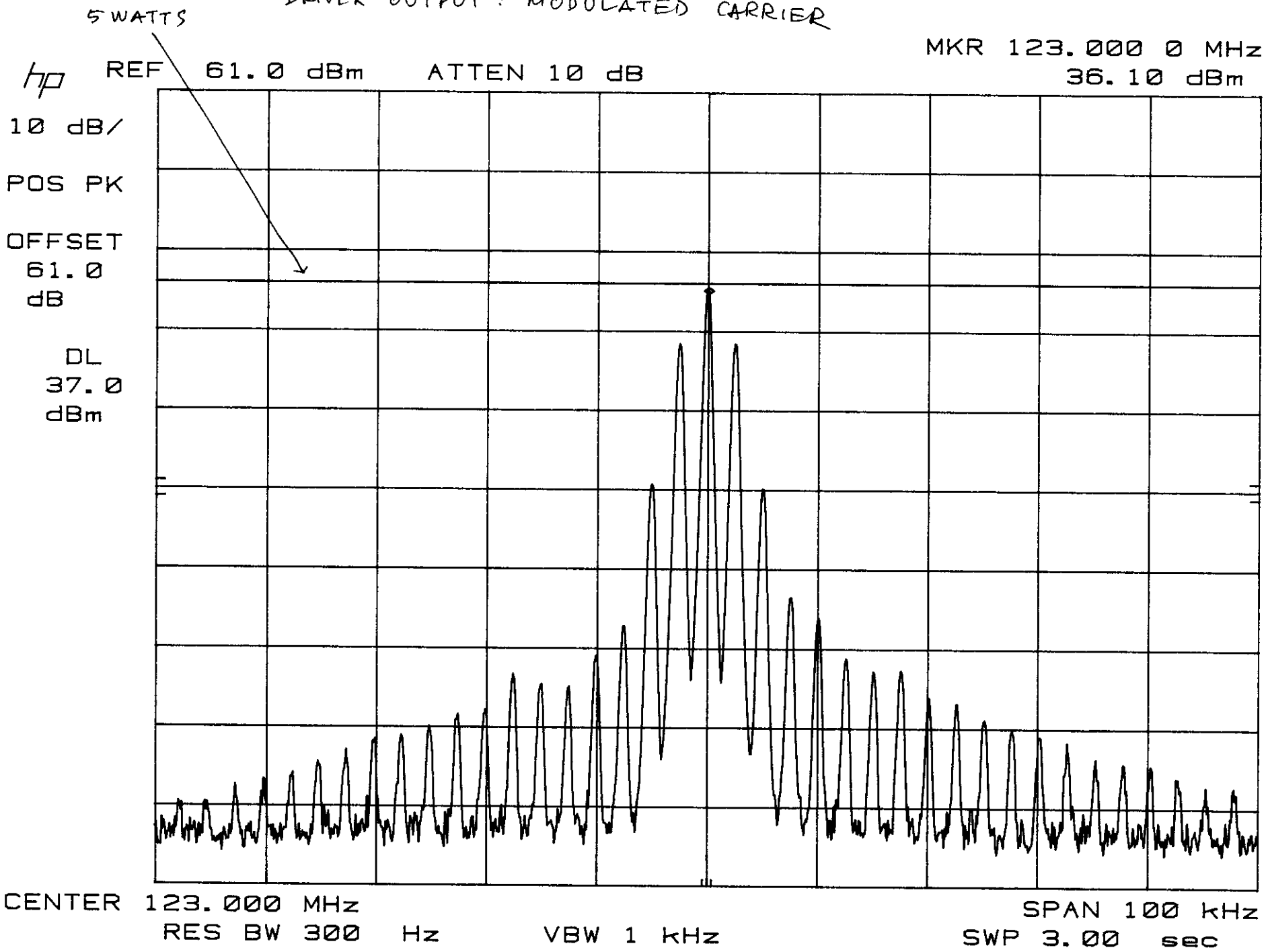

5 WATTS
DRIVER OUTPUT : UNMODULATED CARRIER
hp
REF 61.0 dBm
ATTEN 10 dB
MKR 124.000 0 MHz
37.00 dBm
10 dB/
POS PK
OFFSET
61.0
dB
DL
37.0
dBm
CENTER 124.000 MHz
RES BW 300 Hz
VBW 1 kHz
SPAN 100 kHz
SWP 3.00 sec

DRIVER OUTPUT : MODULATED CARRIER



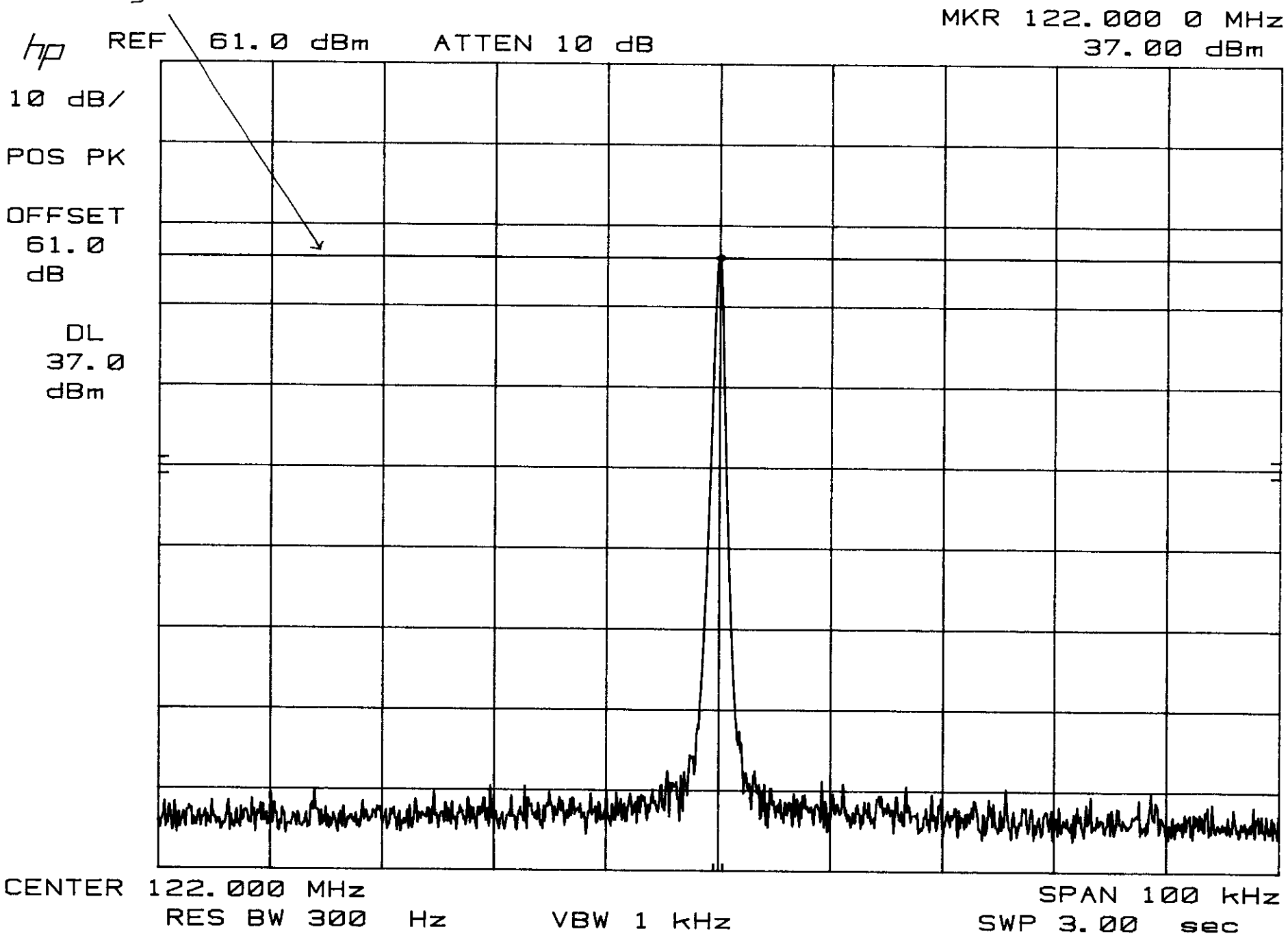

5 WATTS
DRIVER OUTPUT: UNMODULATED CARRIER
MKR 123.000 0 MHz
37.00 dBm
REF 61.0 dBm
ATTEN 10 dB
10 dB/
POS PK
OFFSET
61.0
dB
DL
37.0
dBm
CENTER 123.000 MHz
RES BW 300 Hz
VBW 1 kHz
SPAN 100 kHz
SWP 3.00 sec

DRIVER OUTPUT : MODULATED CARRIER

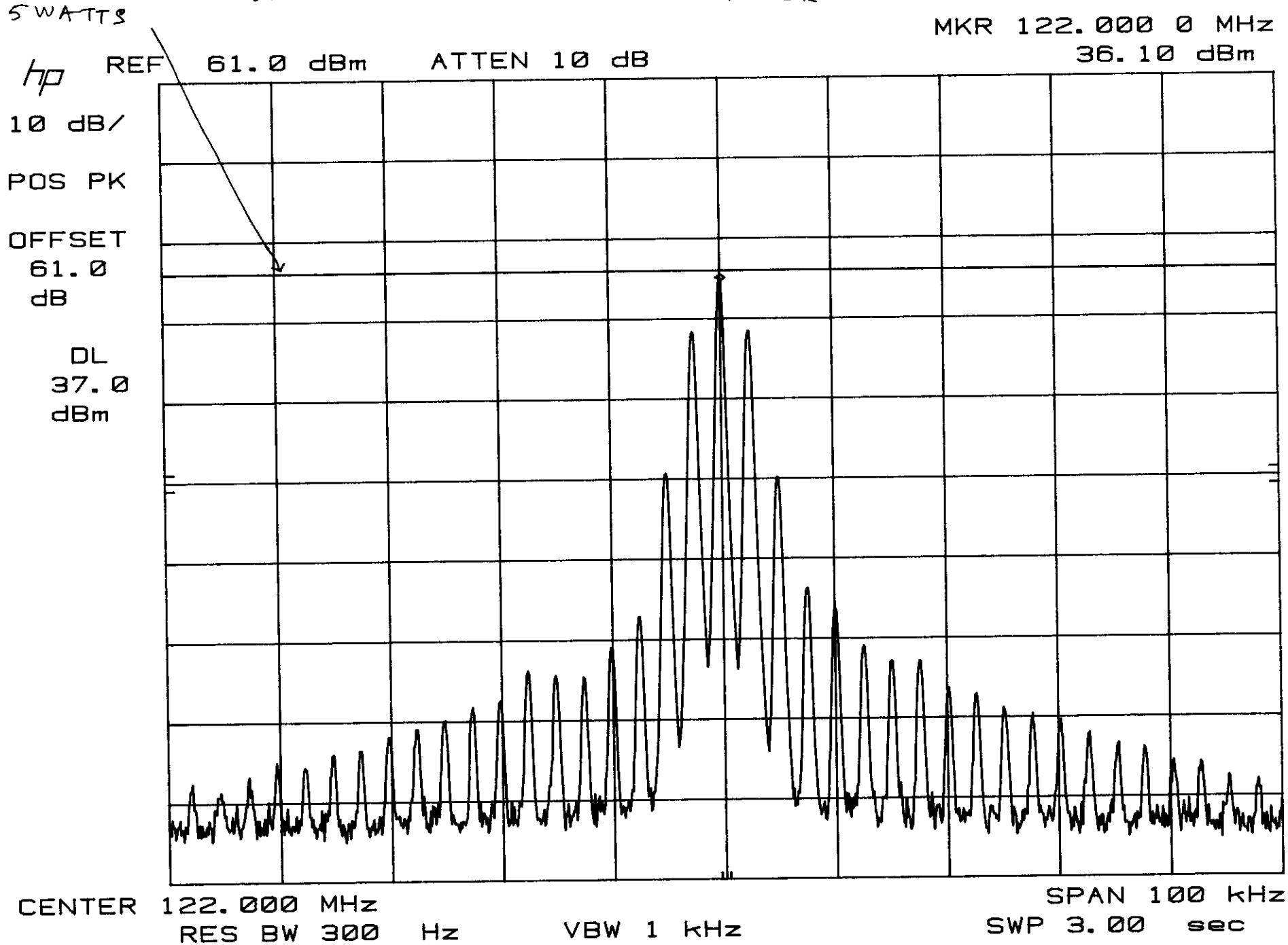


DRIVER OUTPUT : UNMODULATED CARRIER

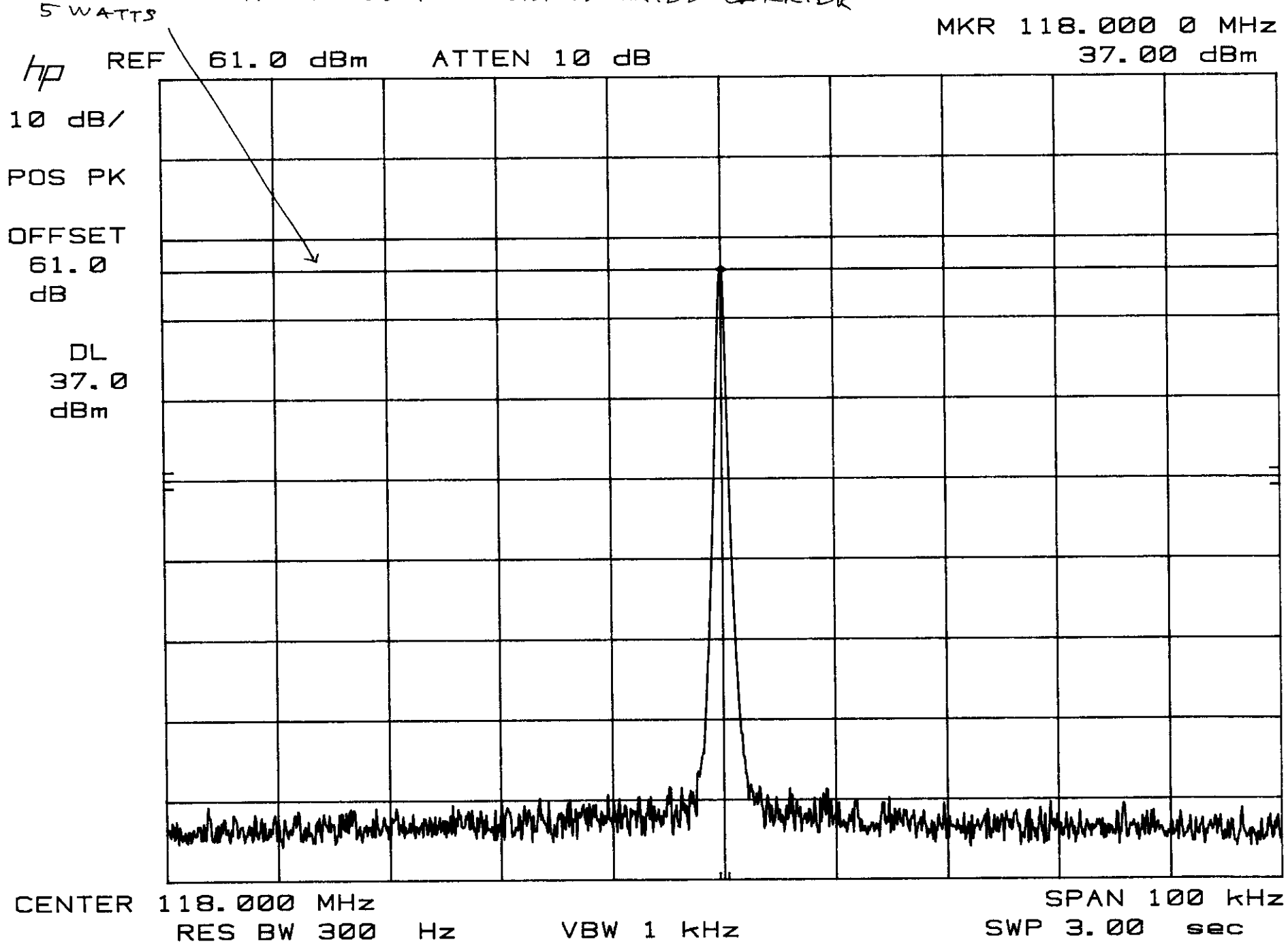
5 WATTS



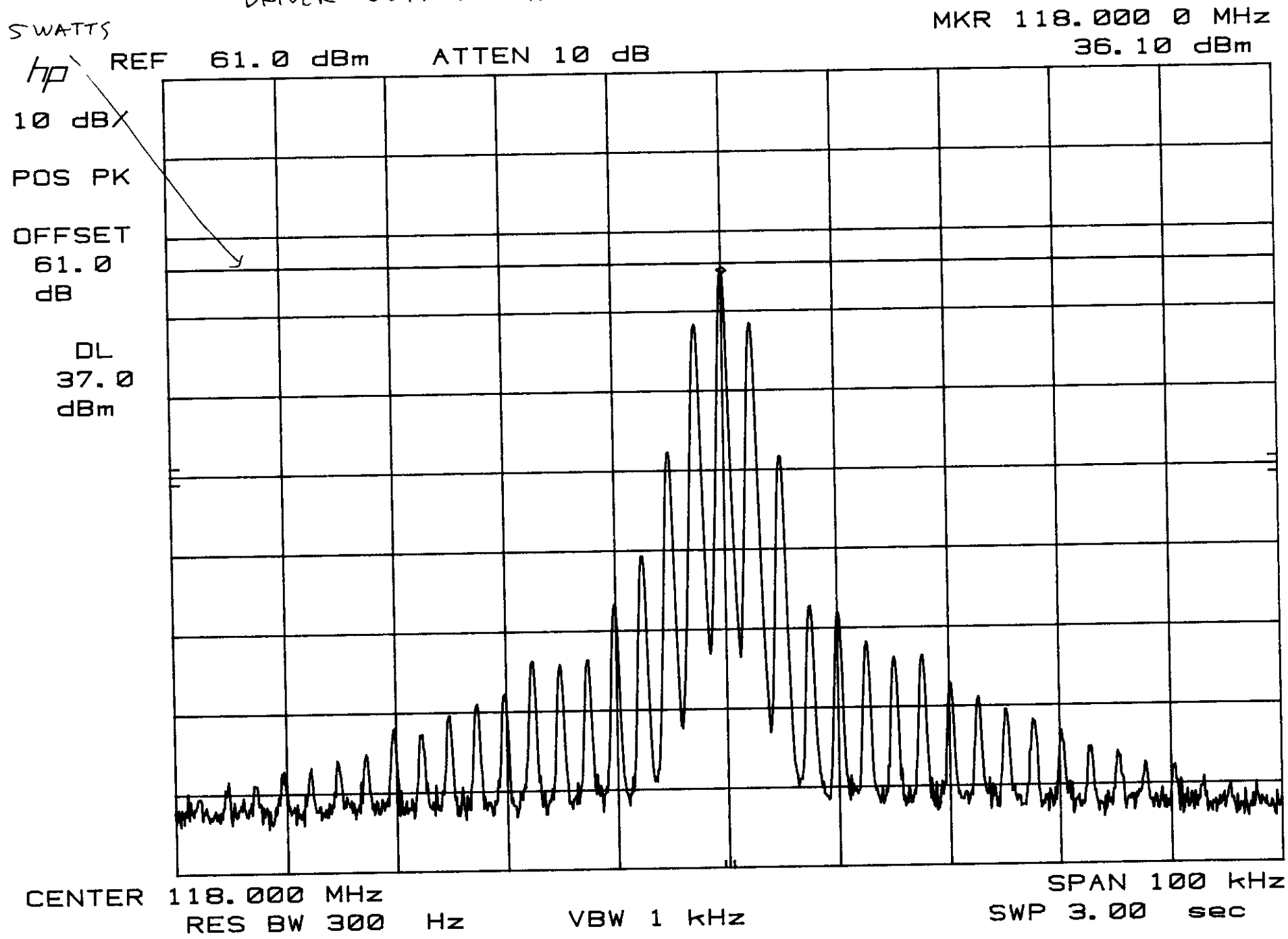
DRIVER OUTPUT: MODULATED CARRIER



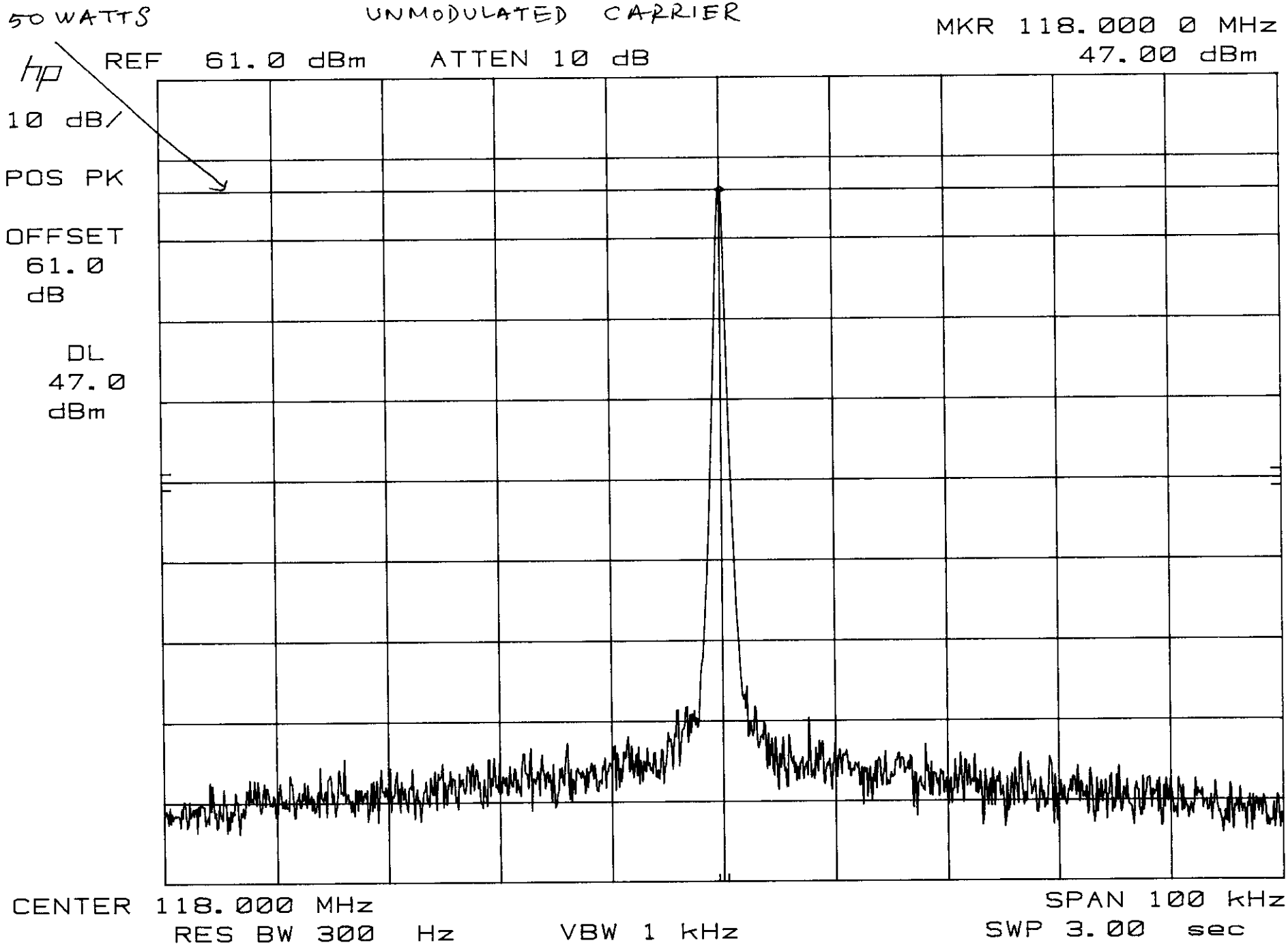
DRIVER OUTPUT : UNMODULATED CARRIER

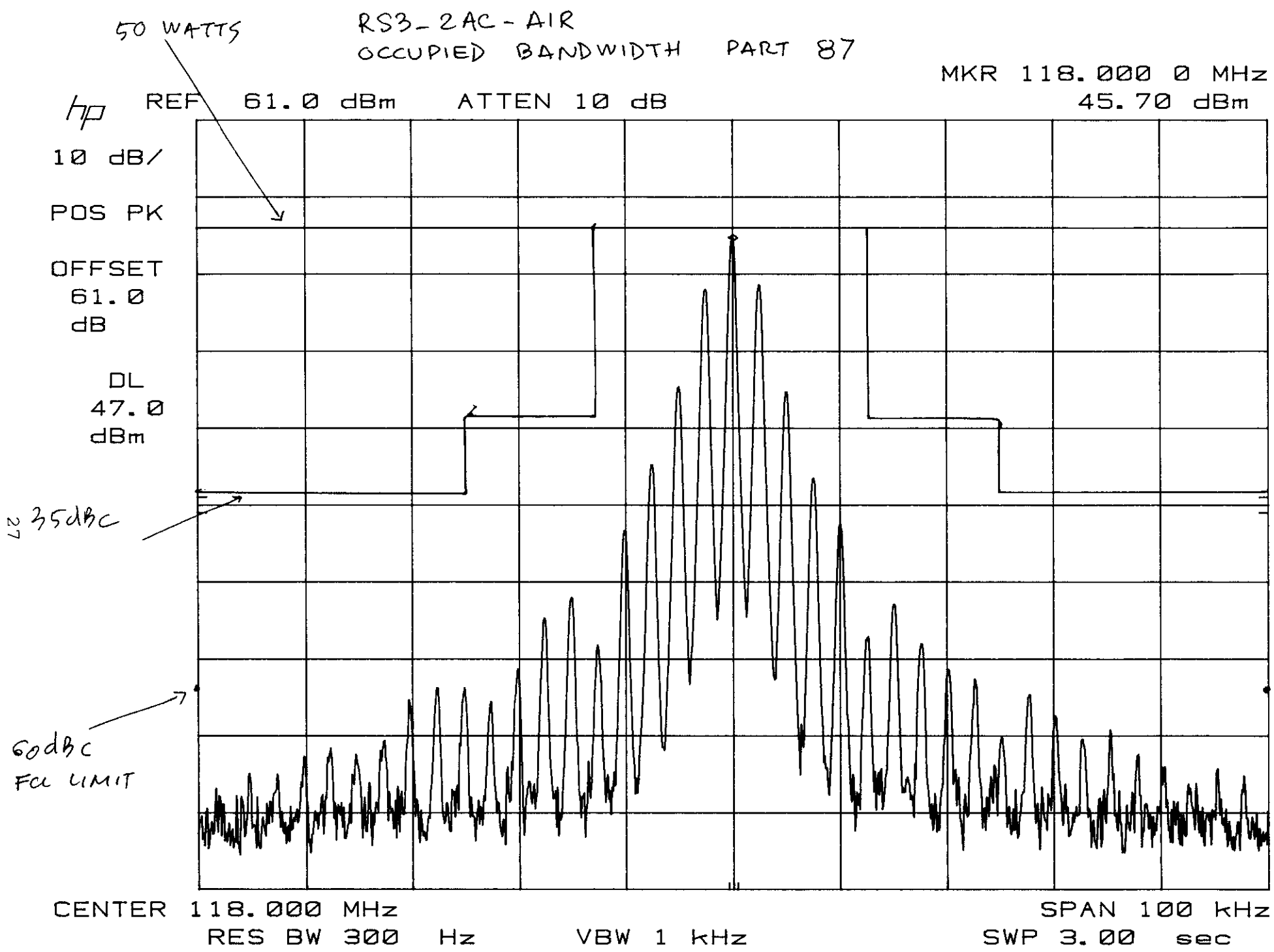


DRIVER OUTPUT: MODULATED CARRIER

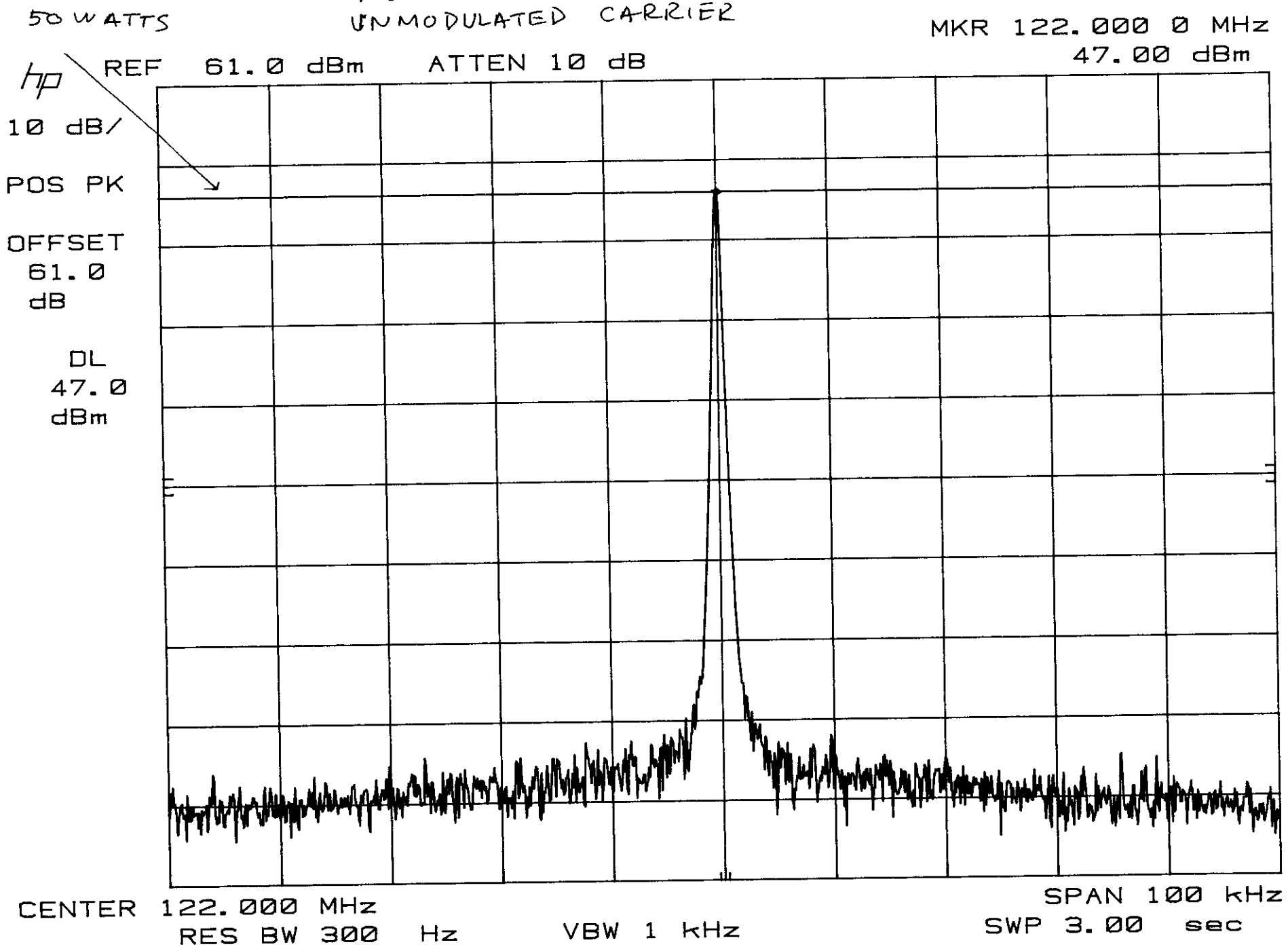


RS3-2AC_AIR
UNMODULATED CARRIER

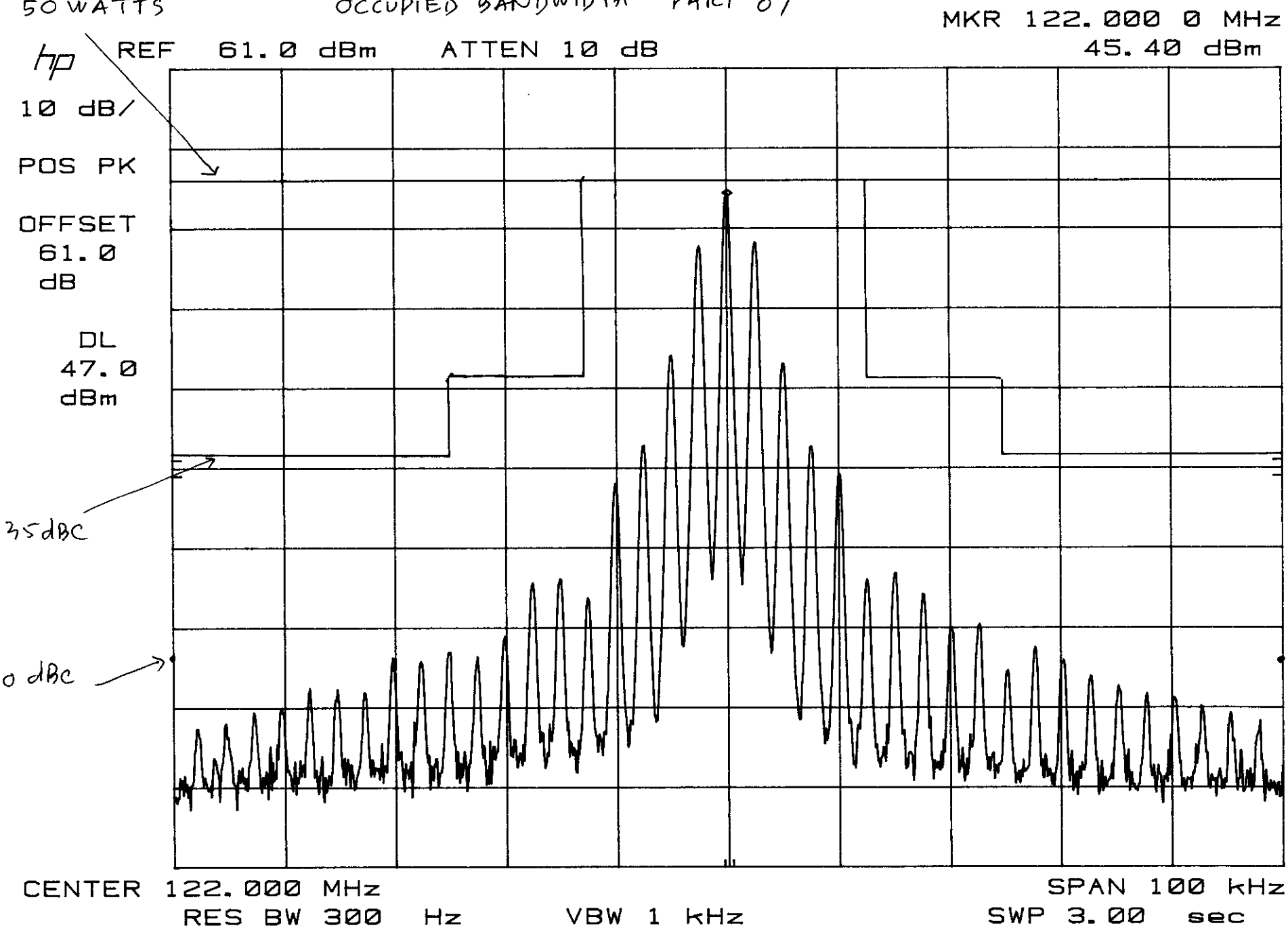



50 WATTS
RS3-2AC-AIR
OCCUPIED BANDWIDTH PART 87
MKR 118.000 0 MHz
REF 61.0 dBm
ATTEN 10 dB
45.70 dBm
10 dB/
POS PK
OFFSET
61.0
dB
DL
47.0
dBm
35dBc
60dBc
FCC LIMIT
CENTER 118.000 MHz
SPAN 100 kHz
RES BW 300 Hz
VBW 1 kHz
SWP 3.00 sec

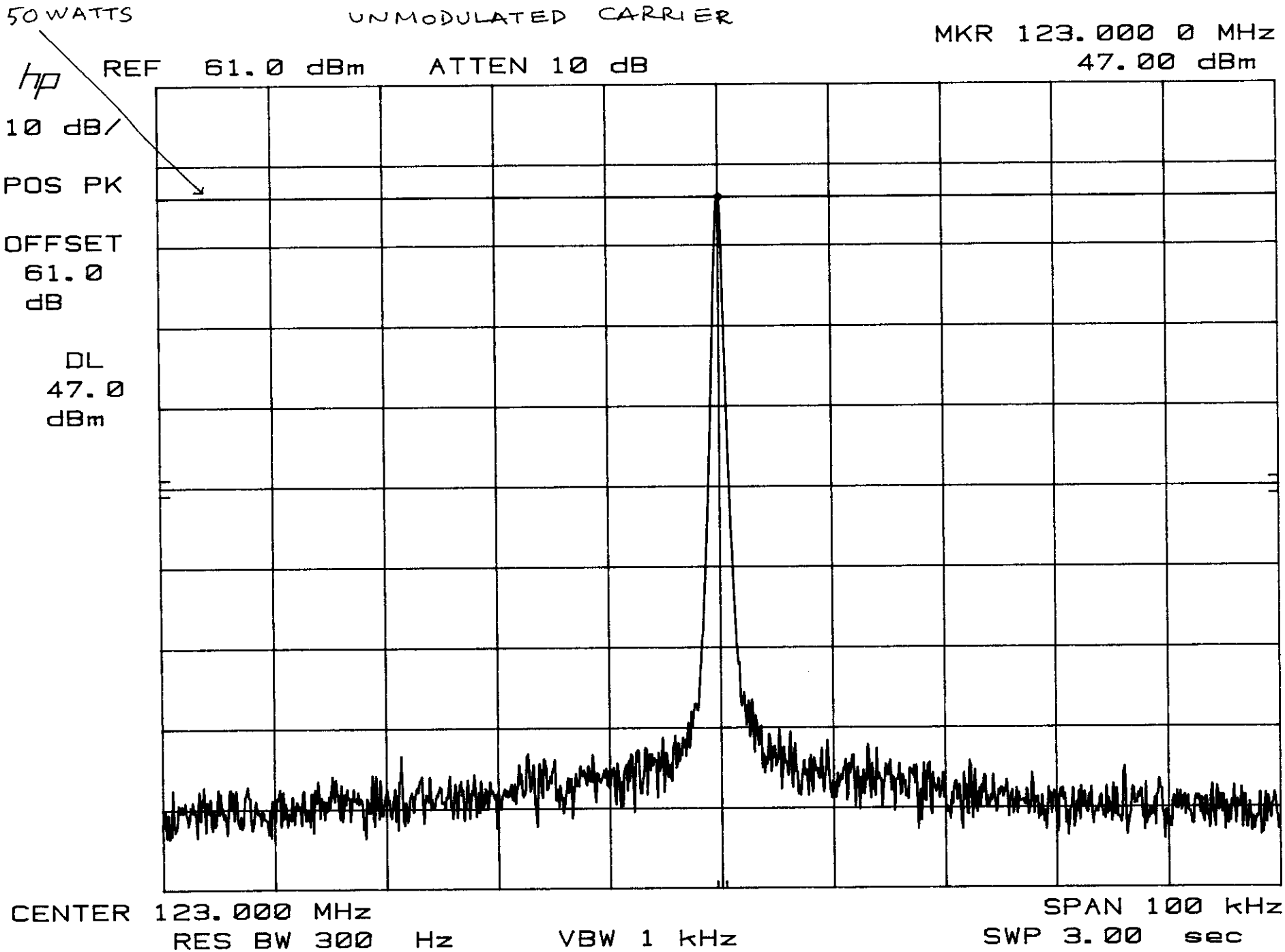
RS3-2AC-AIR
UNMODULATED CARRIER



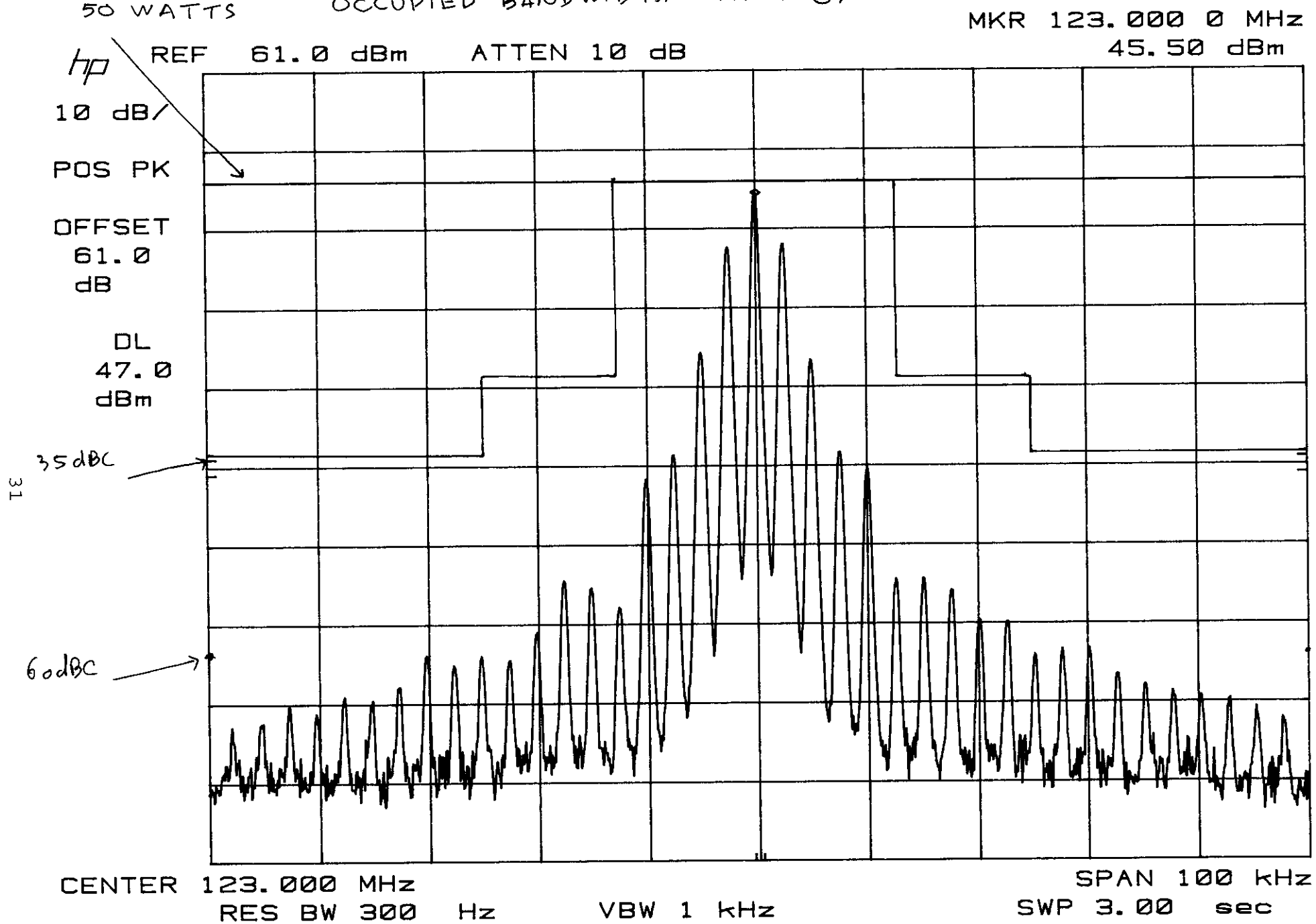
RSB-2AC-AIR
OCCUPIED BANDWIDTH PART 87



RS3-2AC-AIR
UNMODULATED CARRIER

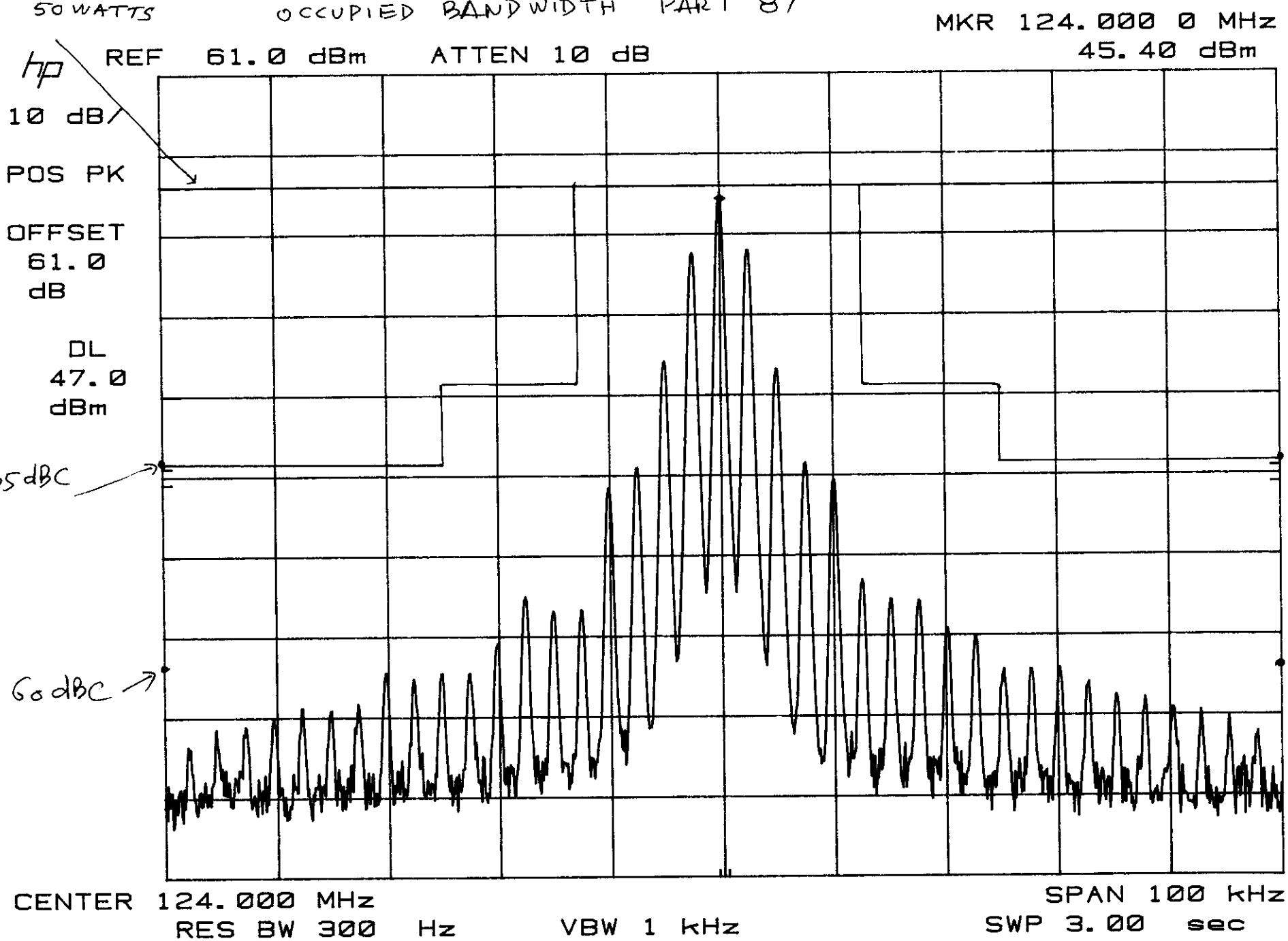


RS3-2AC. AIR
OCCUPIED BANDWIDTH PART 87

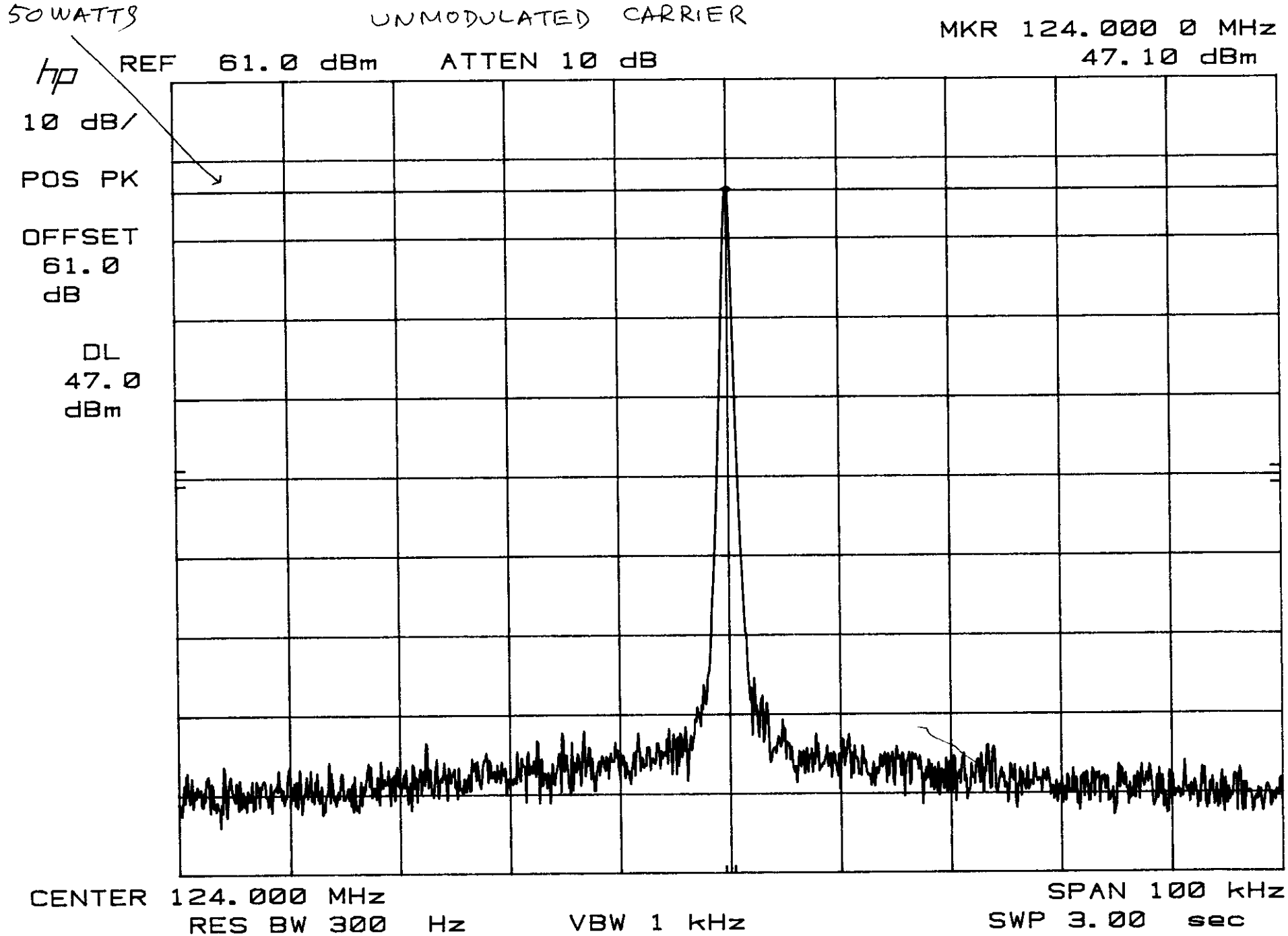


RS3-2AC - AIR.

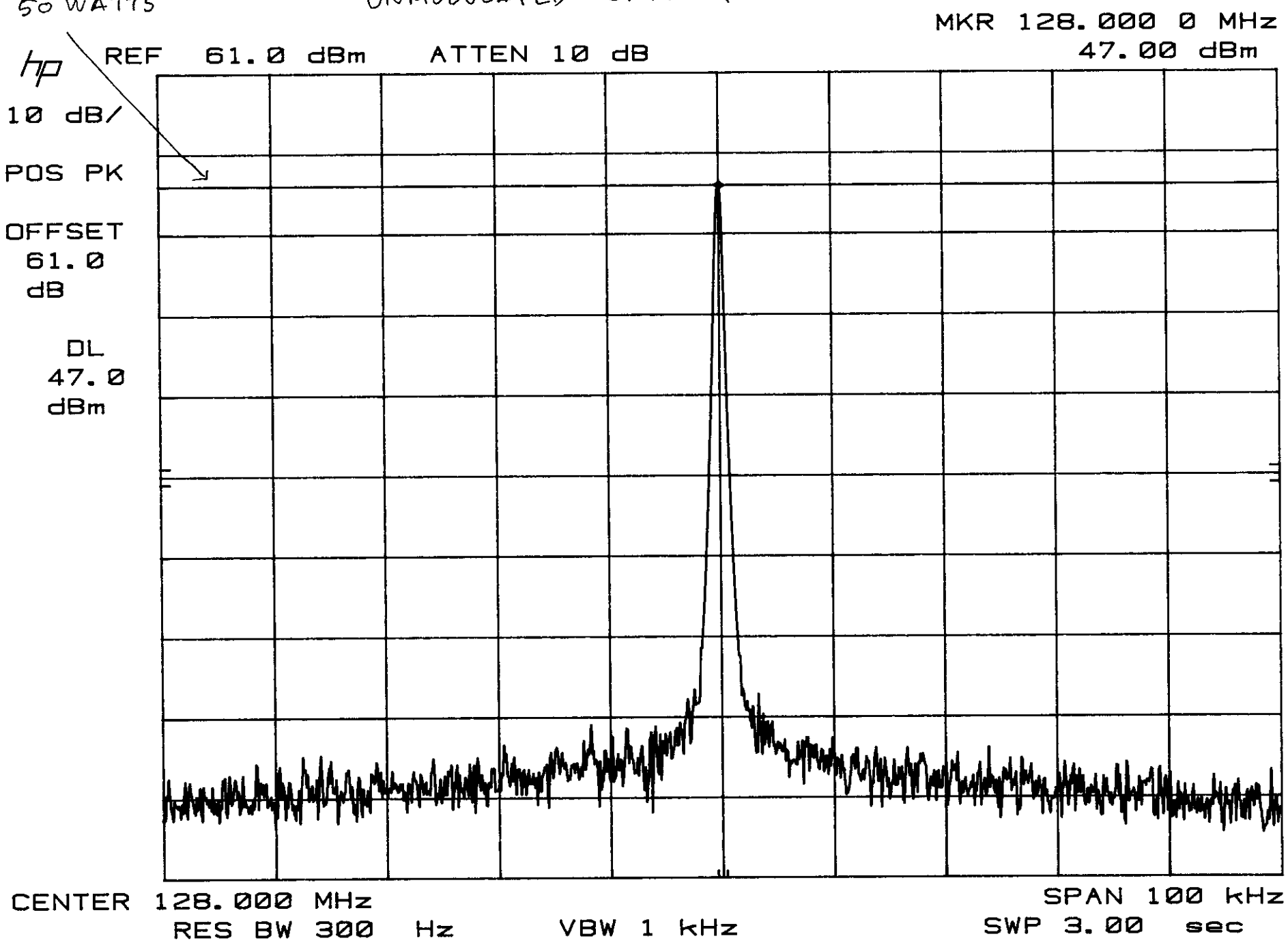
OCCUPIED BANDWIDTH PART 87



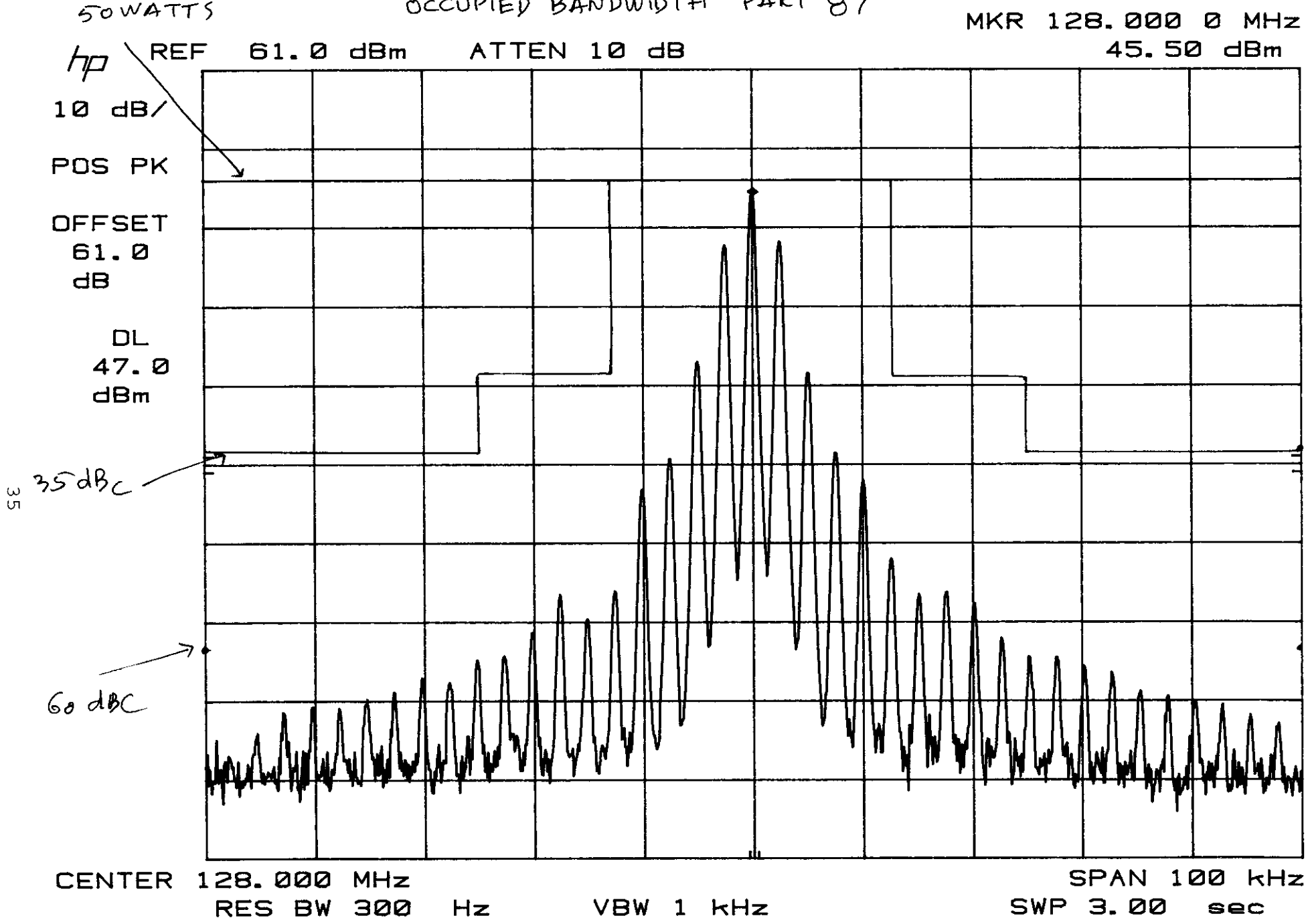
RS3-2AC-AIR.
UNMODULATED CARRIER



RS3 - 2AC - AIR
UNMODULATED CARRIER

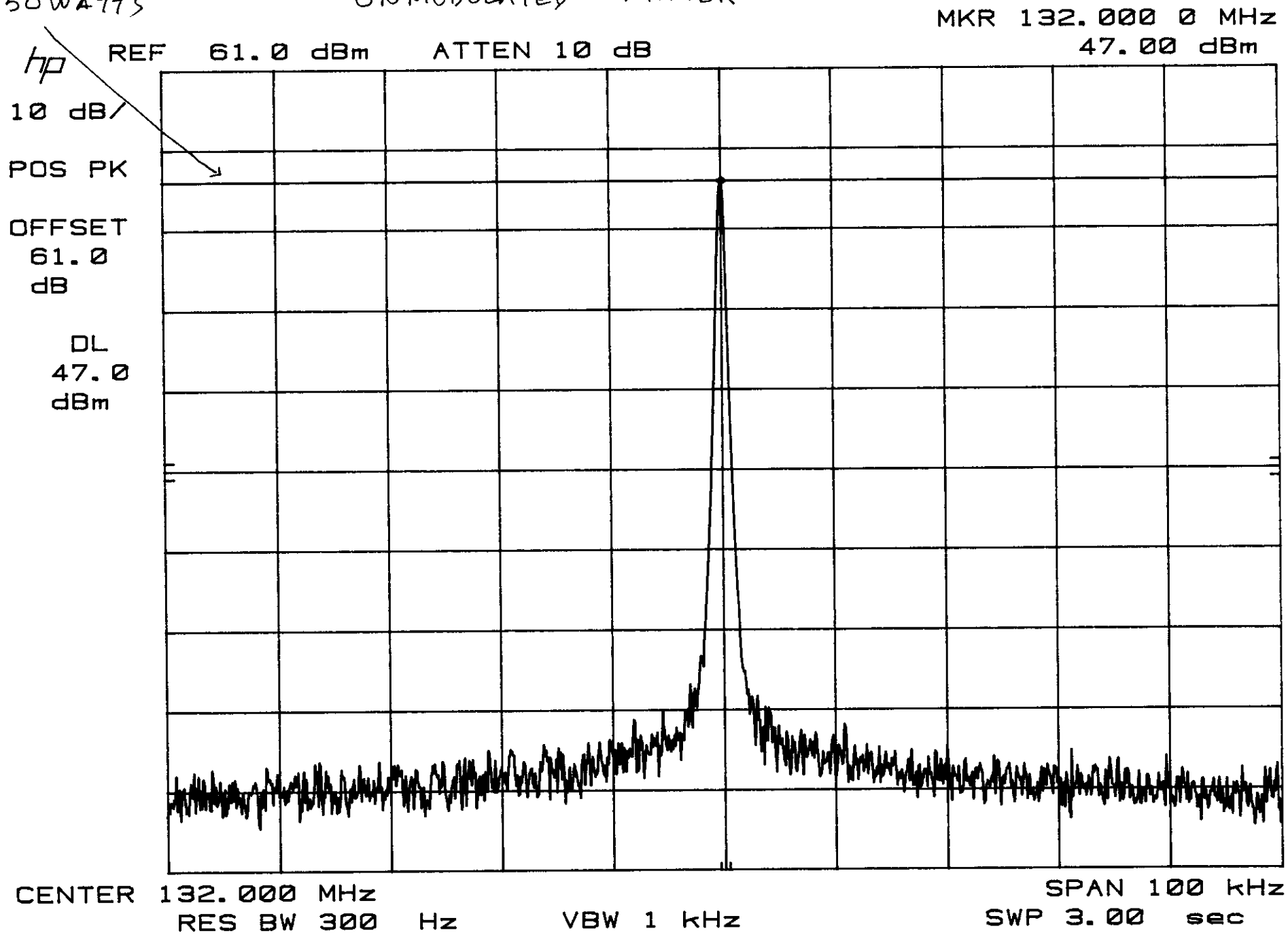


RS3-2AC - AIR
OCCUPIED BANDWIDTH PART 87



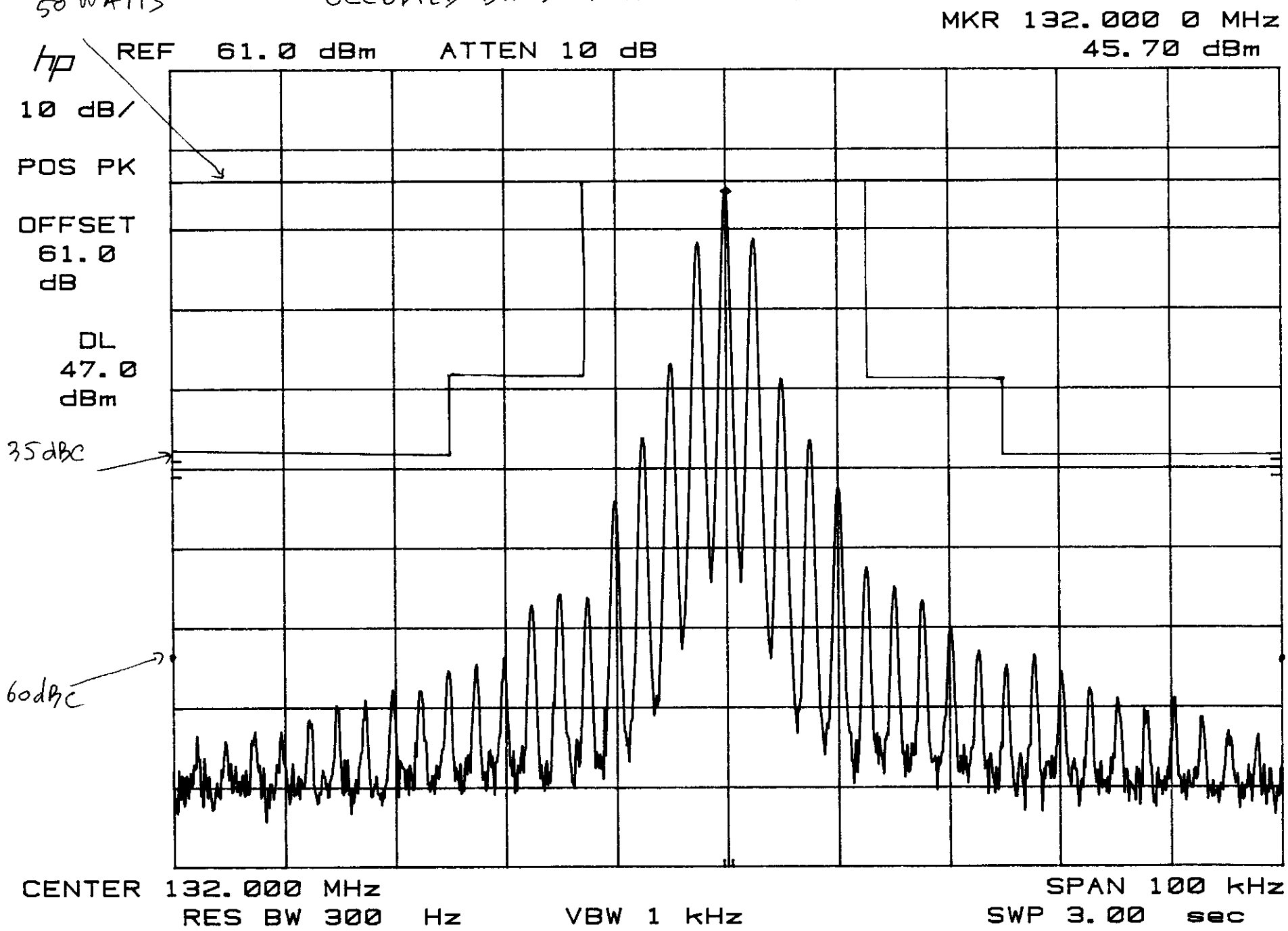
35

RS3-2AC - AIR
UNMODULATED CARRIER



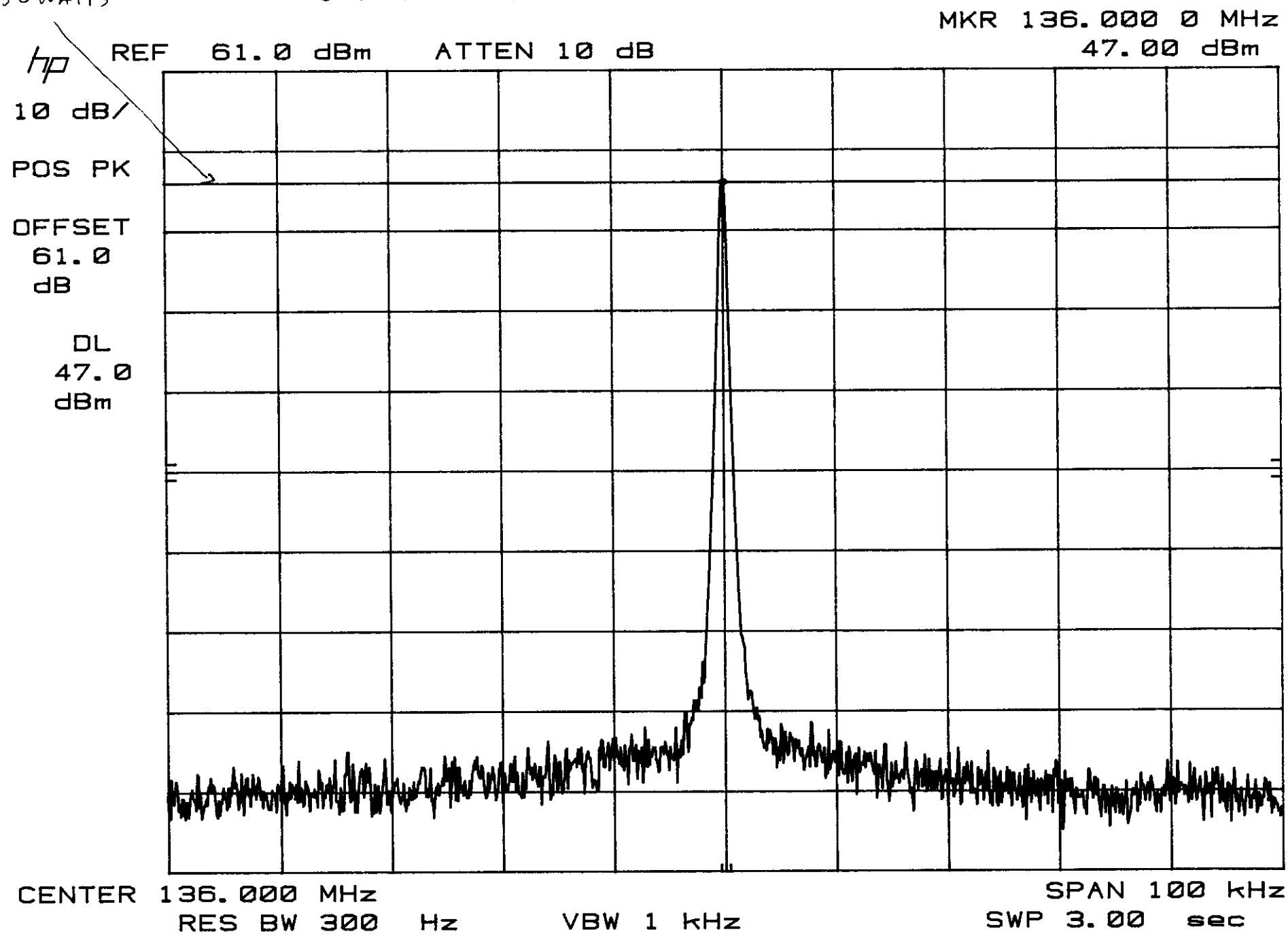
RS3 - 2AC - AIR

OCCUPIED BANDWIDTH PART 87

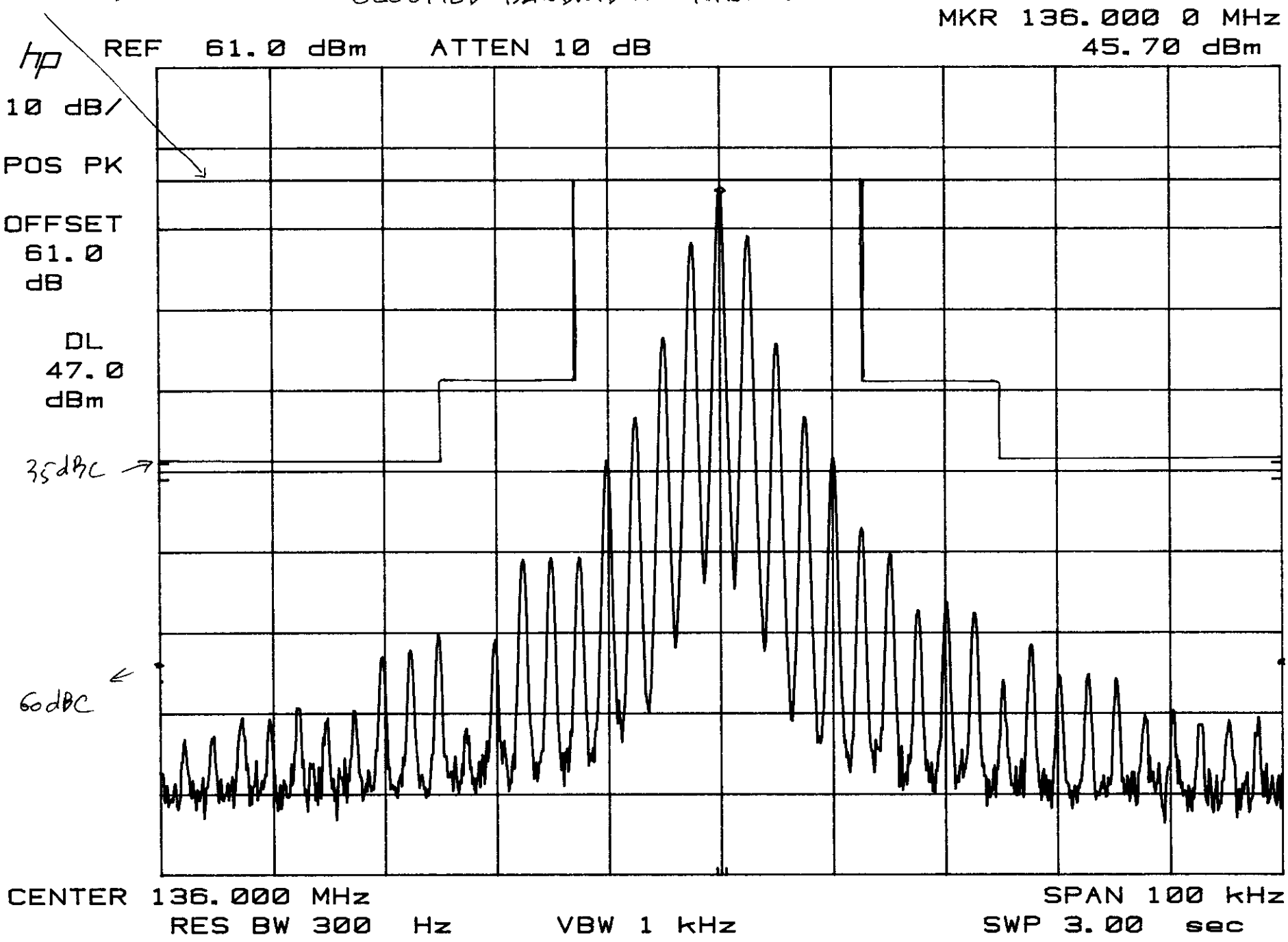


RS3-2AC-AIR.
UNMODULATED CARRIER

50 WATTS



RS3-2AC-AIR
OCCUPIED BANDWIDTH PART 87



2.983(e)(4) **Measurement of Antenna Conducted Spurious Emissions Per 2.991**

Definition: Conducted Spurious Emissions are emissions at the antenna terminals on a frequency or frequencies which are outside an occupied band sufficient to ensure transmission of information of required quality for the class of communication desired. The reduction in the level of these spurious emissions will not affect the quality of the information being transmitted.

Conducted spurious emissions shall be attenuated below the maximum level of the carrier frequency in accordance with the following formula:

Spurious attenuation in dB = $43 + 10 \log_{10} Po$

Where Po = output in watts

$= 43 + 10 \log_{10} (50)$

$= 59.0$ dB

Test Method: Per EIA RS 152-B, Paragraph 4.

Connect the equipment as shown in FIGURE 4.

Adjust the audio oscillator so that the frequency deviation of the transmitter is 5 kHz at a modulation frequency of 2.5 kHz. Adjust the spectrum analyzer to display the modulated carrier.

Scan the frequency spectrum from the lowest radio frequency generated in the equipment through the 10th harmonic of the carrier frequency.

Test Results: See Plots Following Figure 4.

All spuirious antenna conducted emissions are below the FCC specifications.

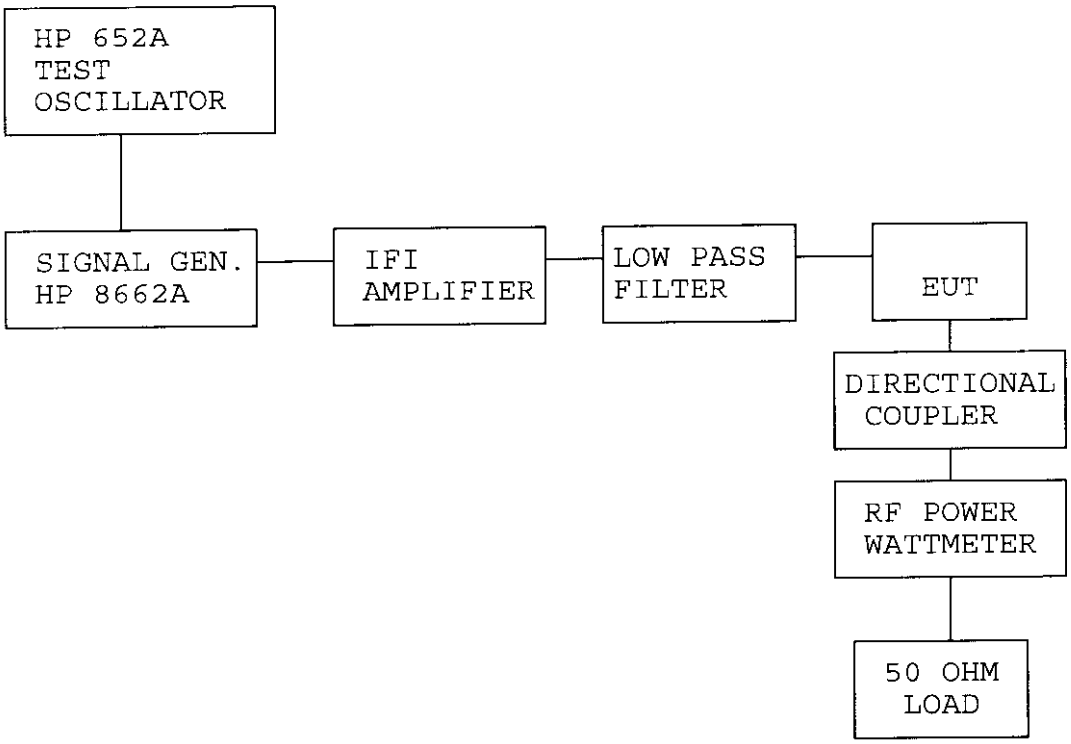
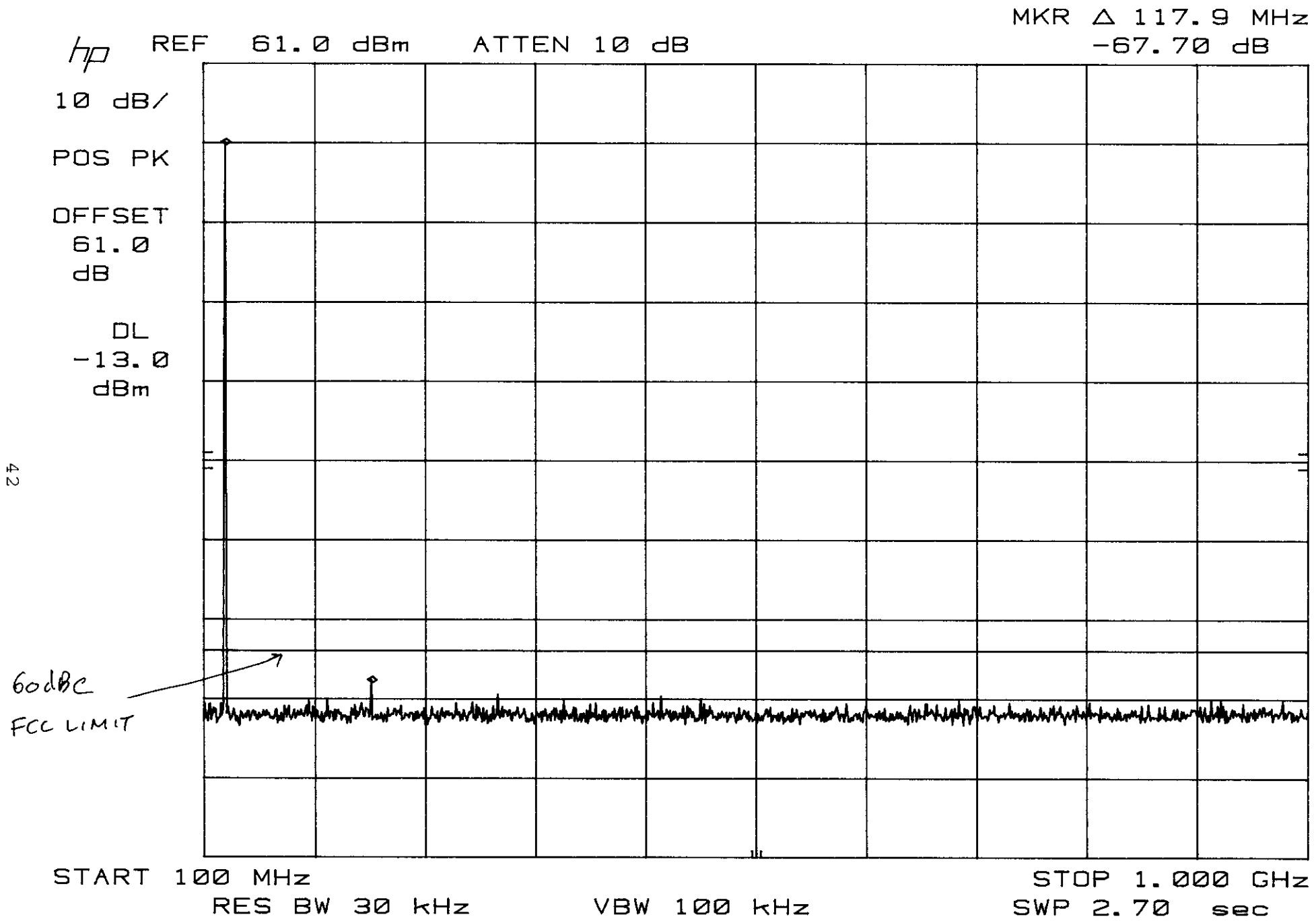
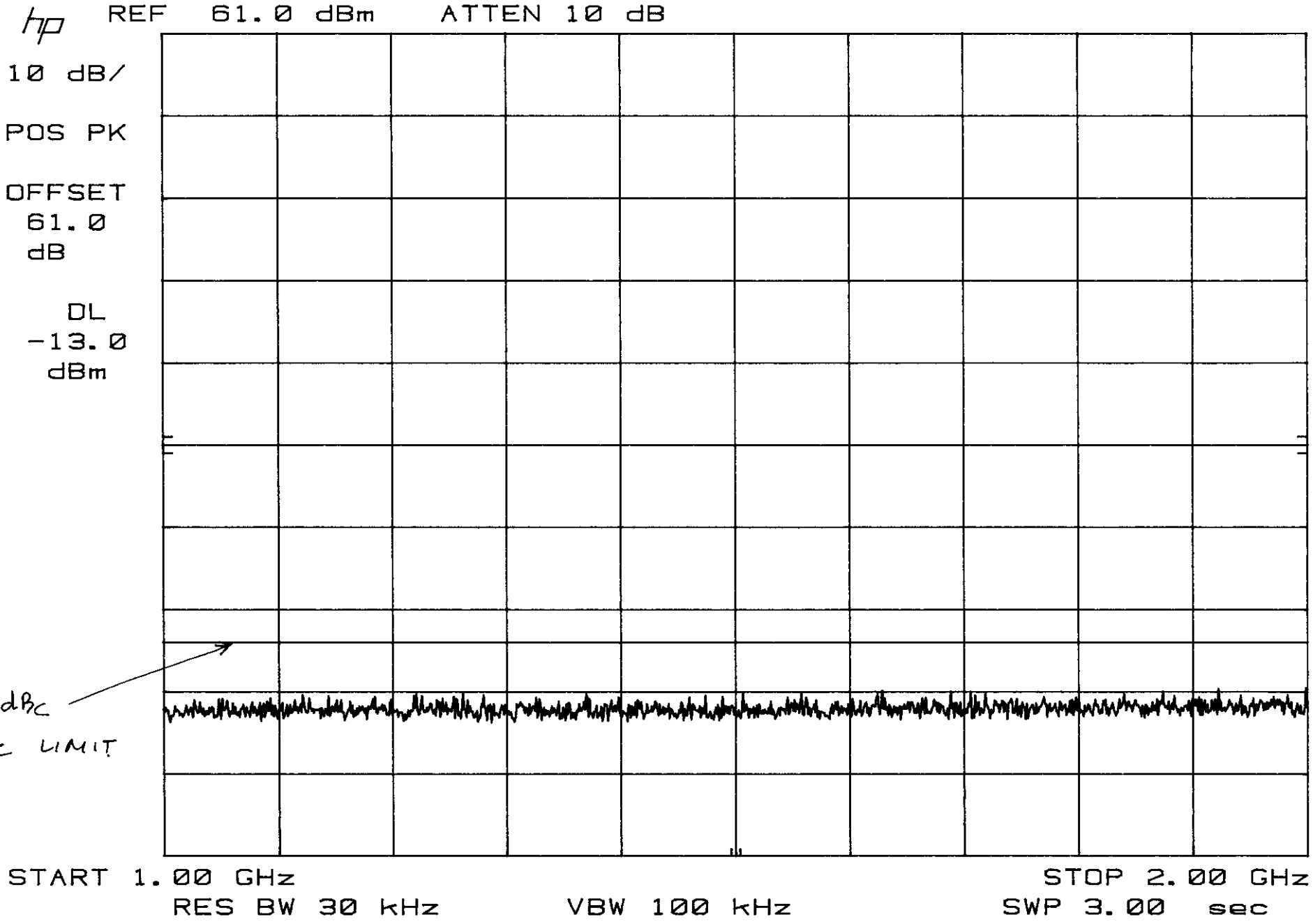


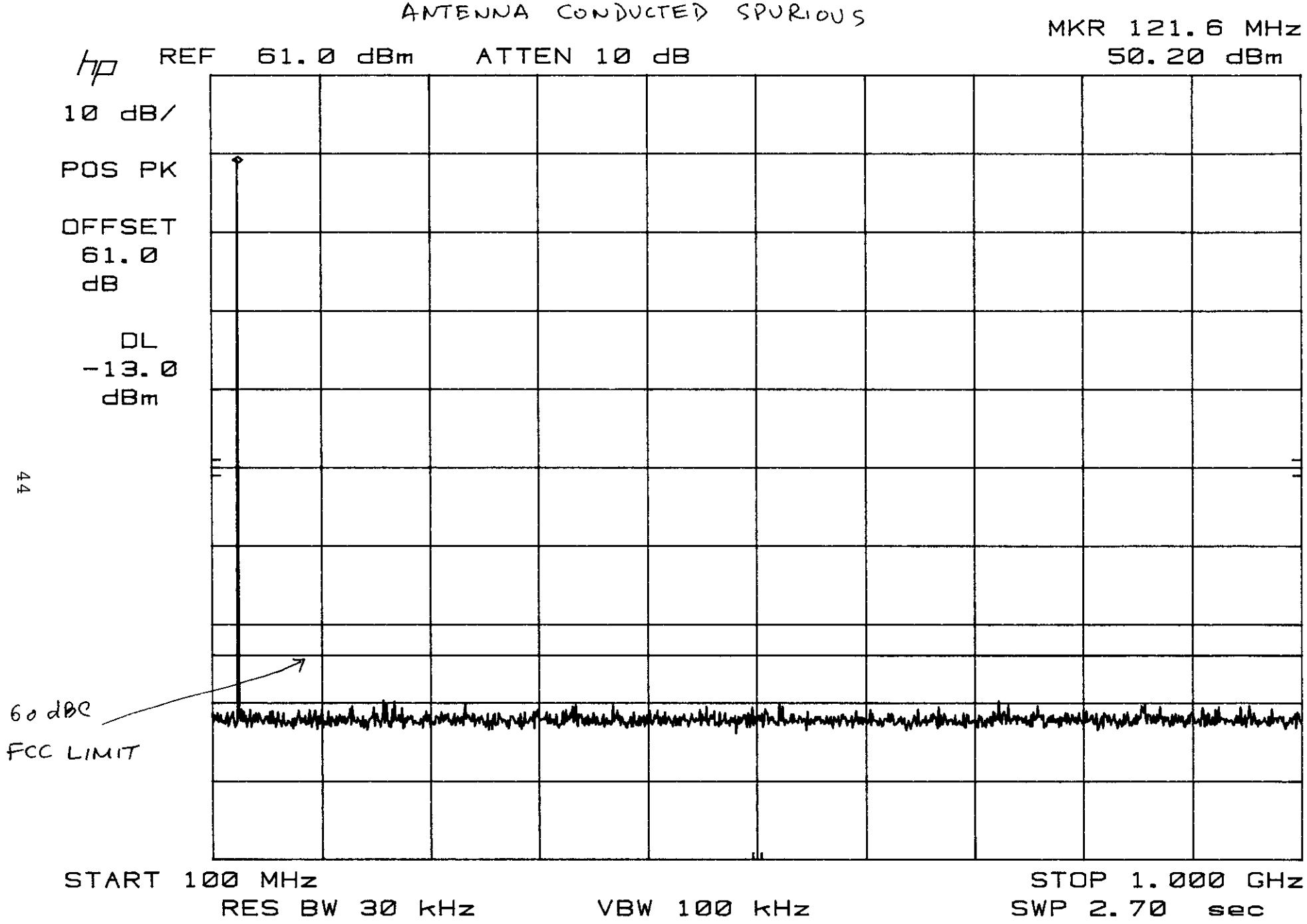
FIGURE 4. BLOCK DIAGRAM.
(SPURIOUS EMISSIONS TEST)


MKR Δ 117.9 MHz
-67.70 dB
REF 61.0 dBm
ATTEN 10 dB
10 dB/
POS PK
OFFSET
61.0
dB
DL
-13.0
dBm
60dBc
FCC LIMIT
START 100 MHz
STOP 1.000 GHz
RES BW 30 kHz
VBW 100 kHz
SWP 2.70 sec

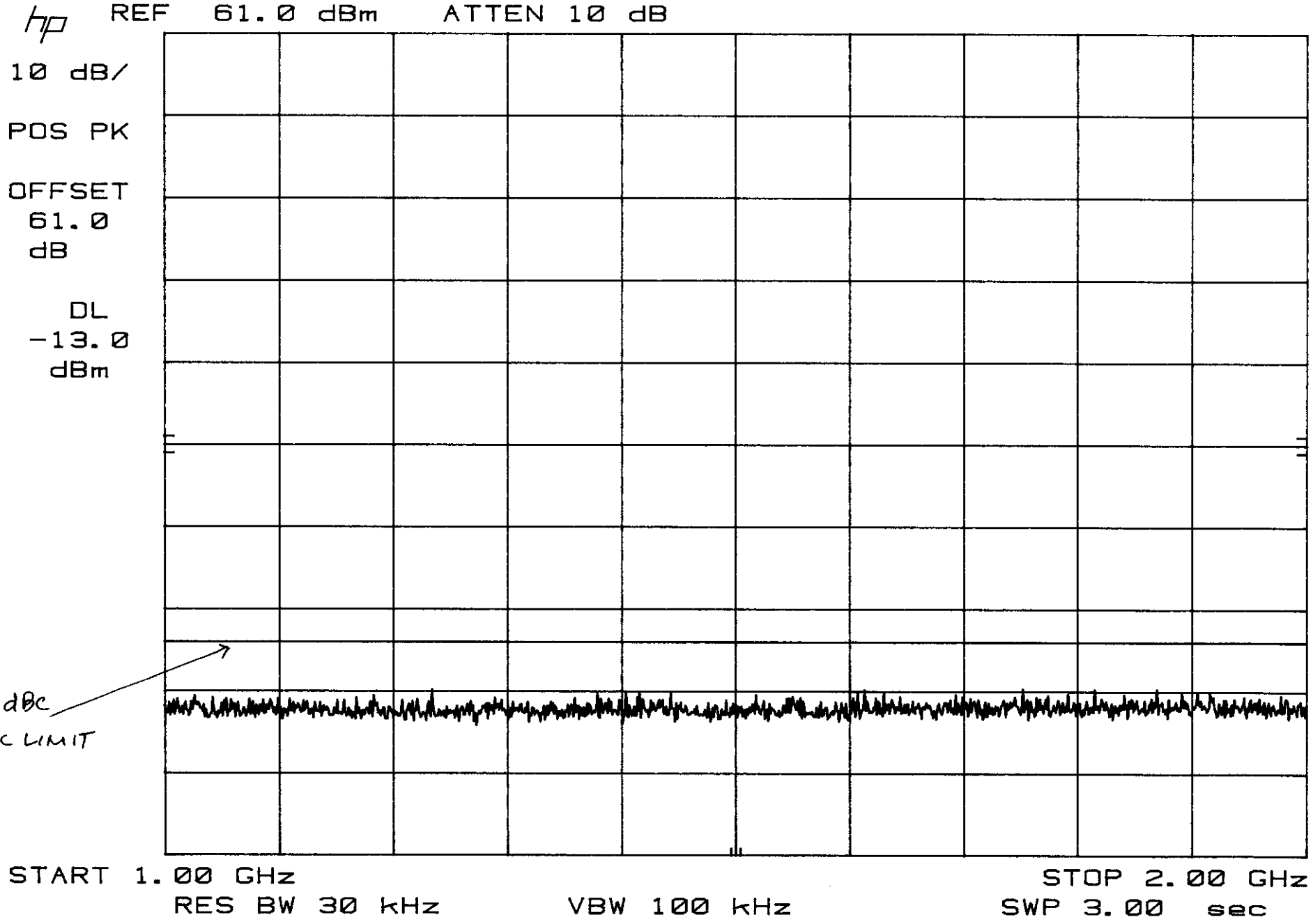

hp
REF 61.0 dBm
ATTEN 10 dB
10 dB/
POS PK
OFFSET
61.0
dB
DL
-13.0
dBm
60dBc
FCC LIMIT
START 1.00 GHz
STOP 2.00 GHz
RES BW 30 kHz
VBW 100 kHz
SWP 3.00 sec

RS3_2AC_AIR

ANTENNA CONDUCTED SPURIOUS

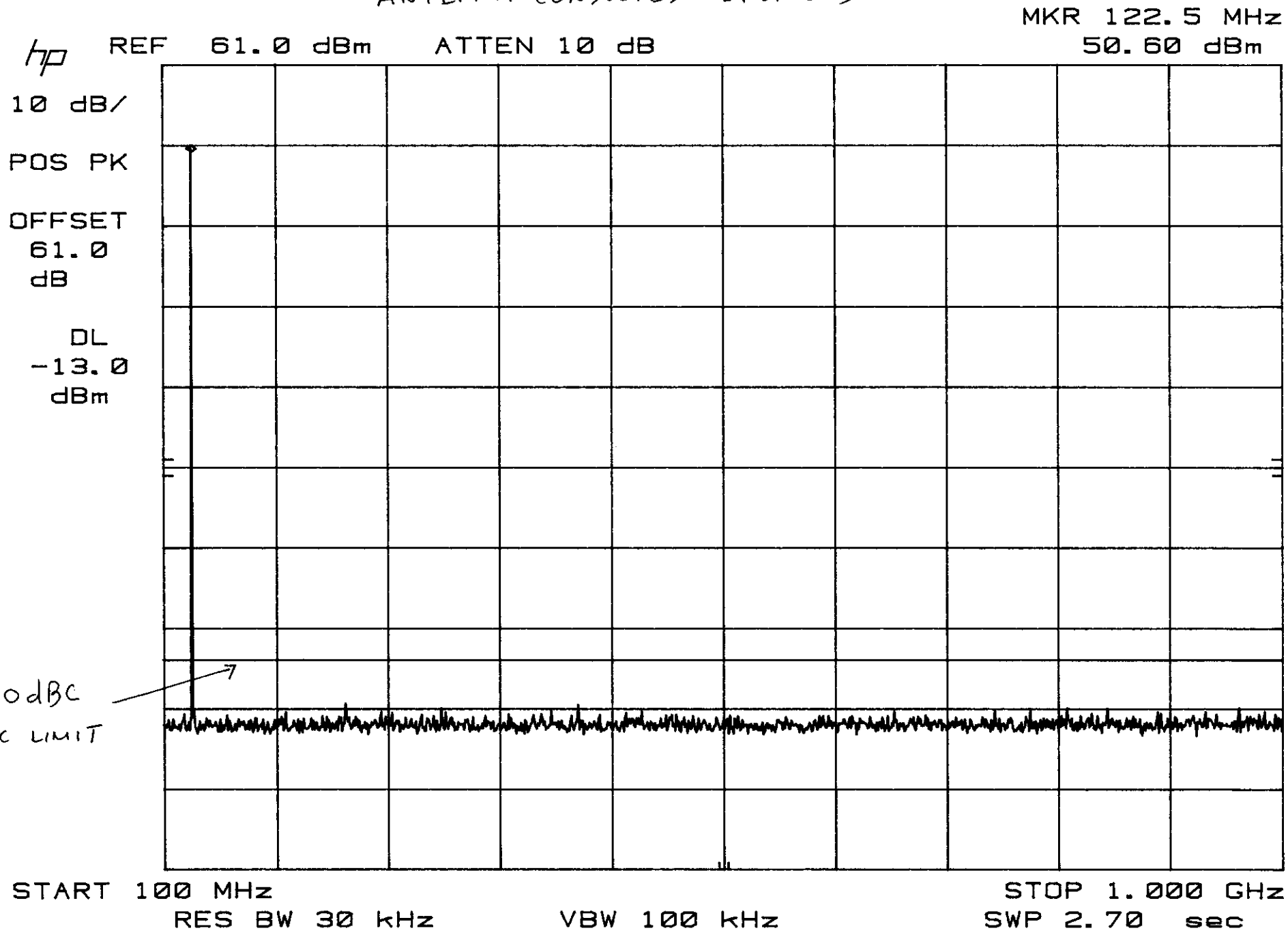


RS3 - 2AC - AIR
ANTENNA CONDUCTED SPURIOUS



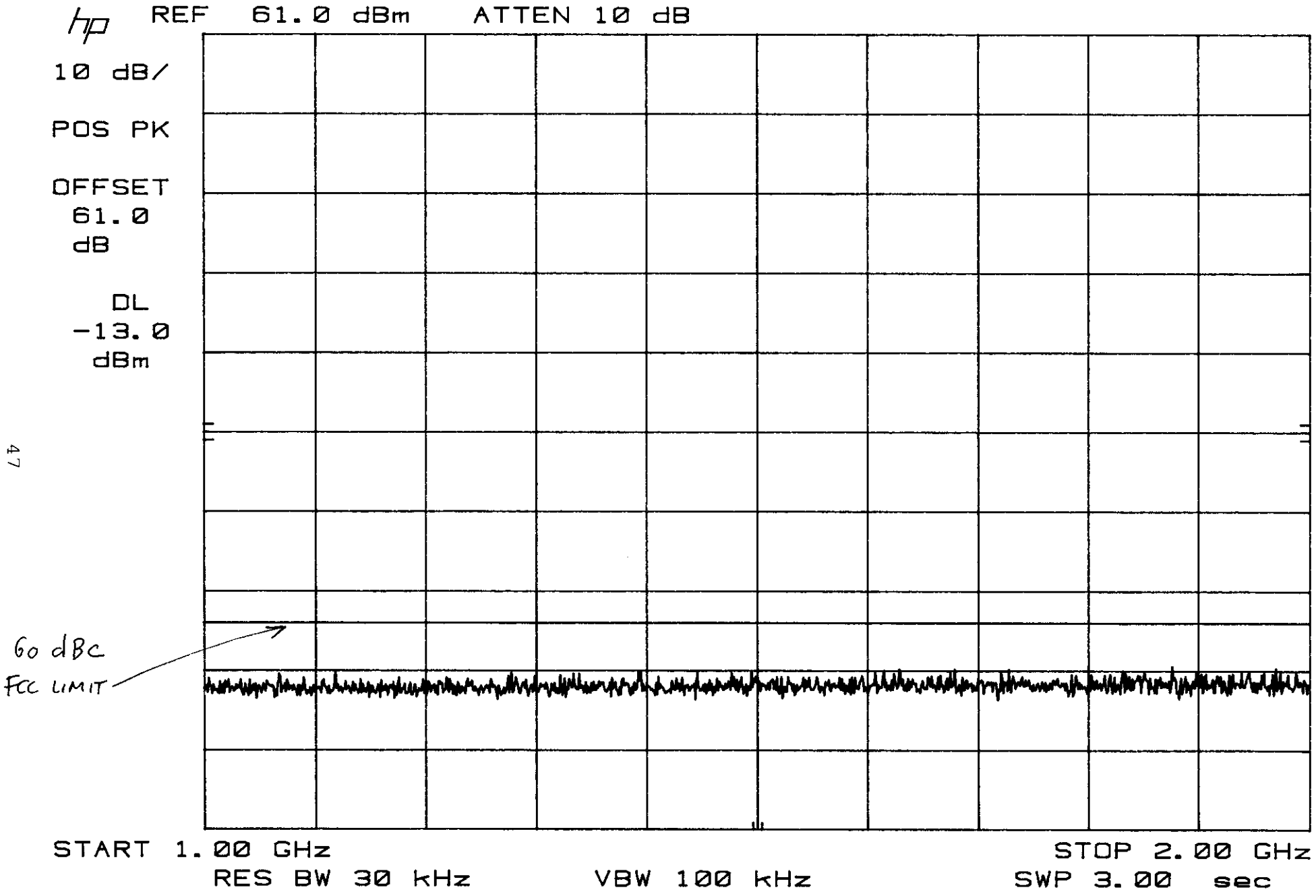
RS3-2AC-AIR

ANTENNA CONDUCTED SPURIOUS



RS3-2AC_ AIR

ANTENNA CONDUCTED SPURIOUS



RS3_2AC_AIR

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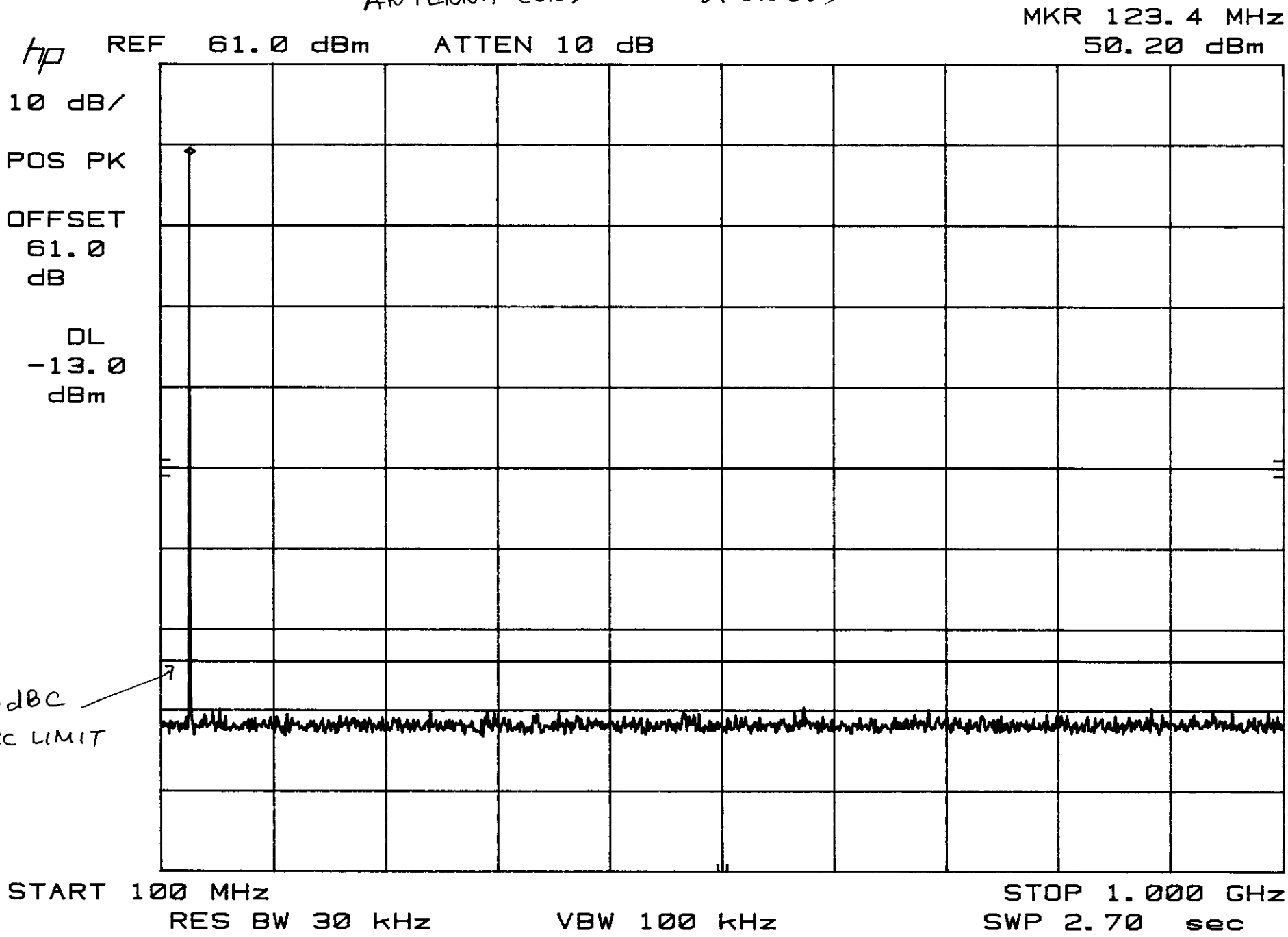

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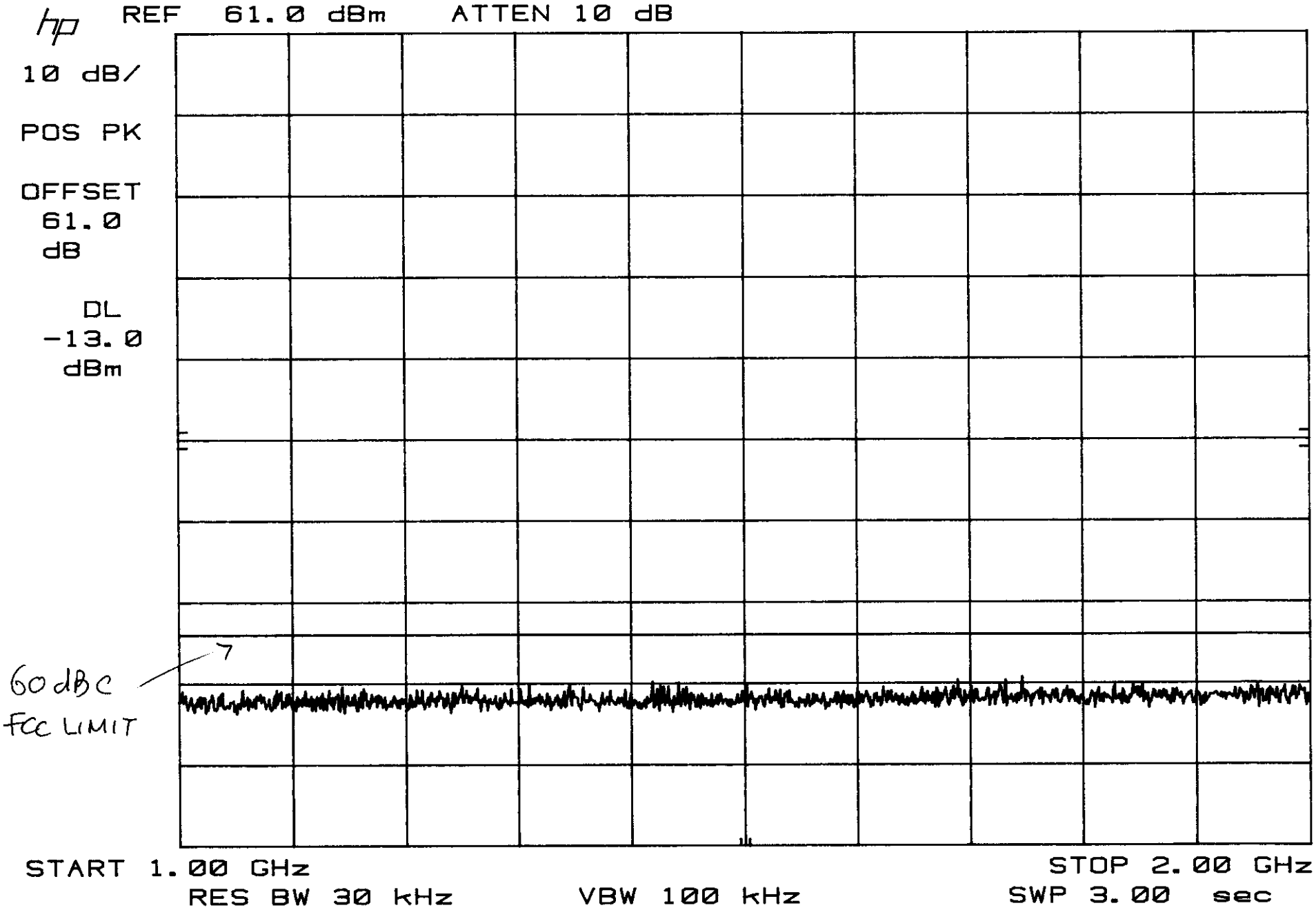

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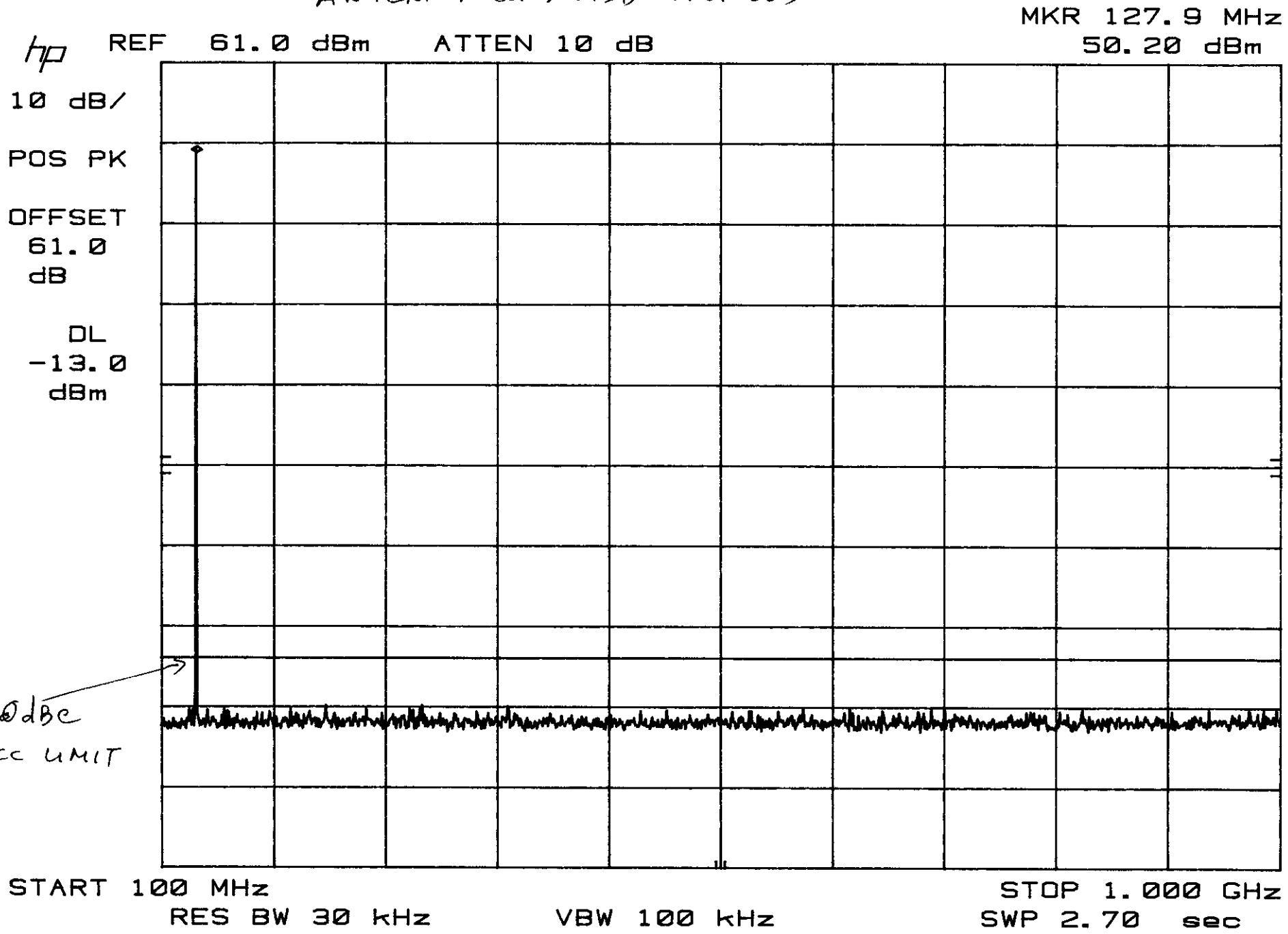

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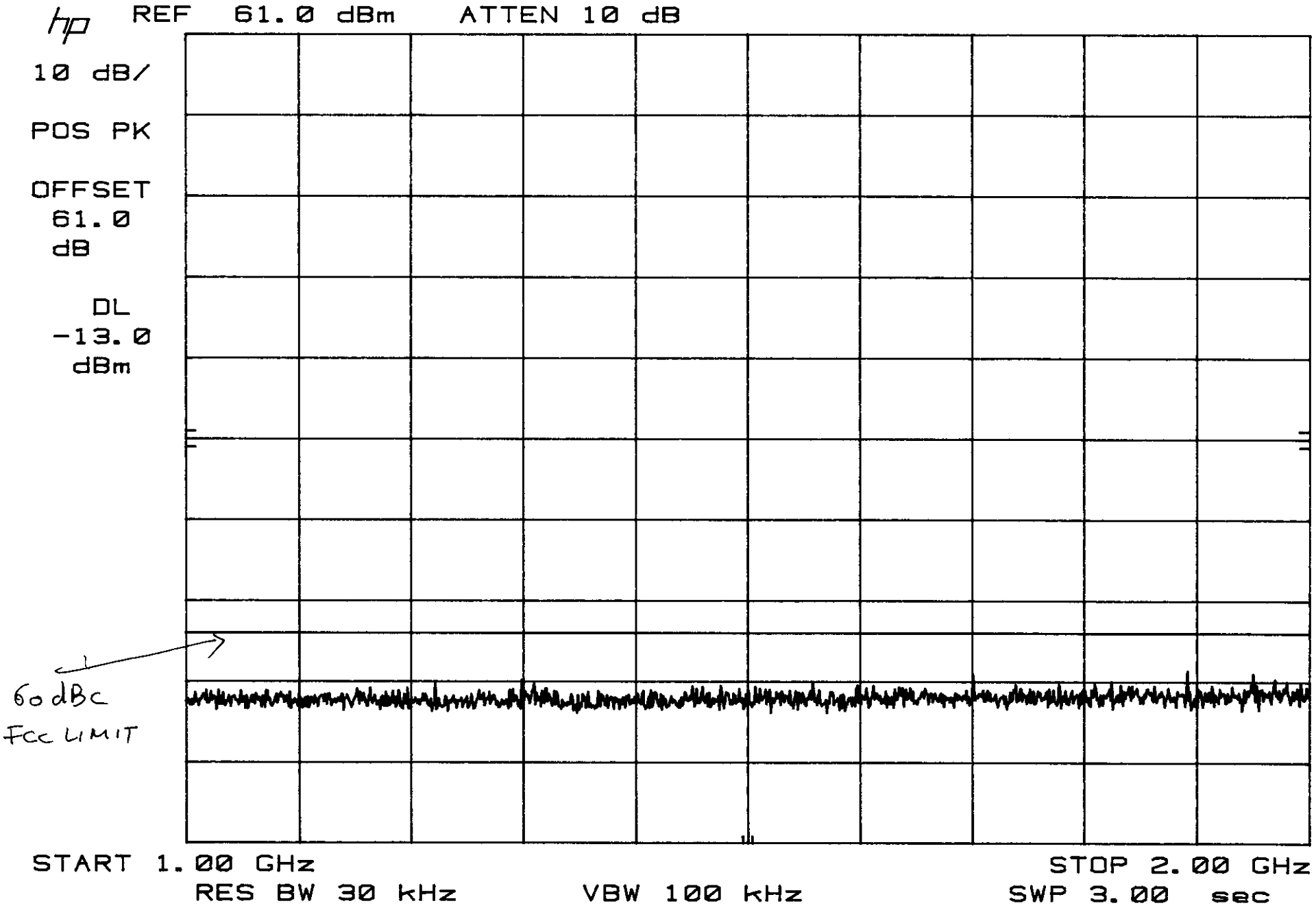
RSS_2AC_AIR
ANTENNA CONDUCTED SPURIOUS



RS3-2AC - AIR
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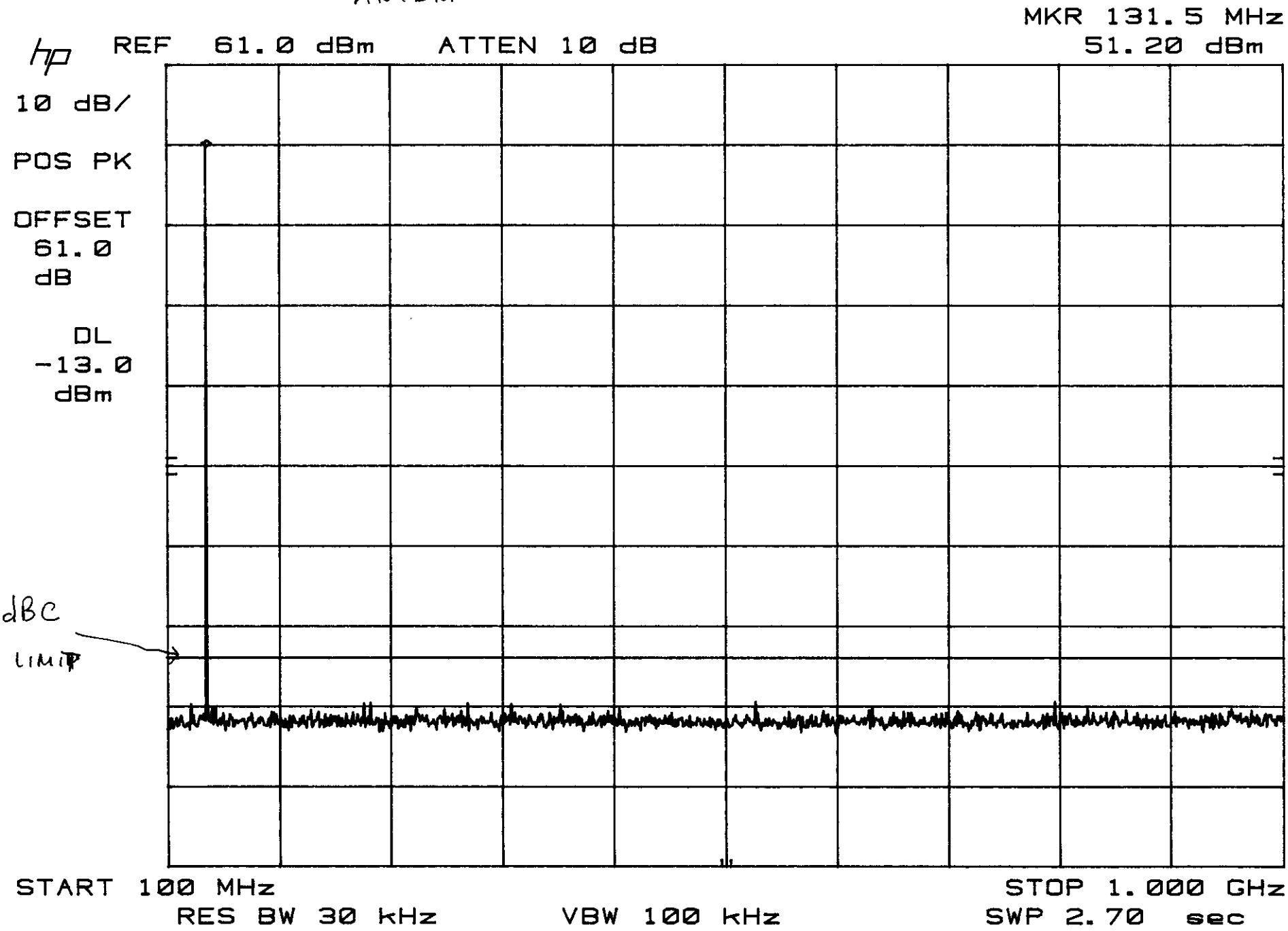

RSS-2Ac - AIR
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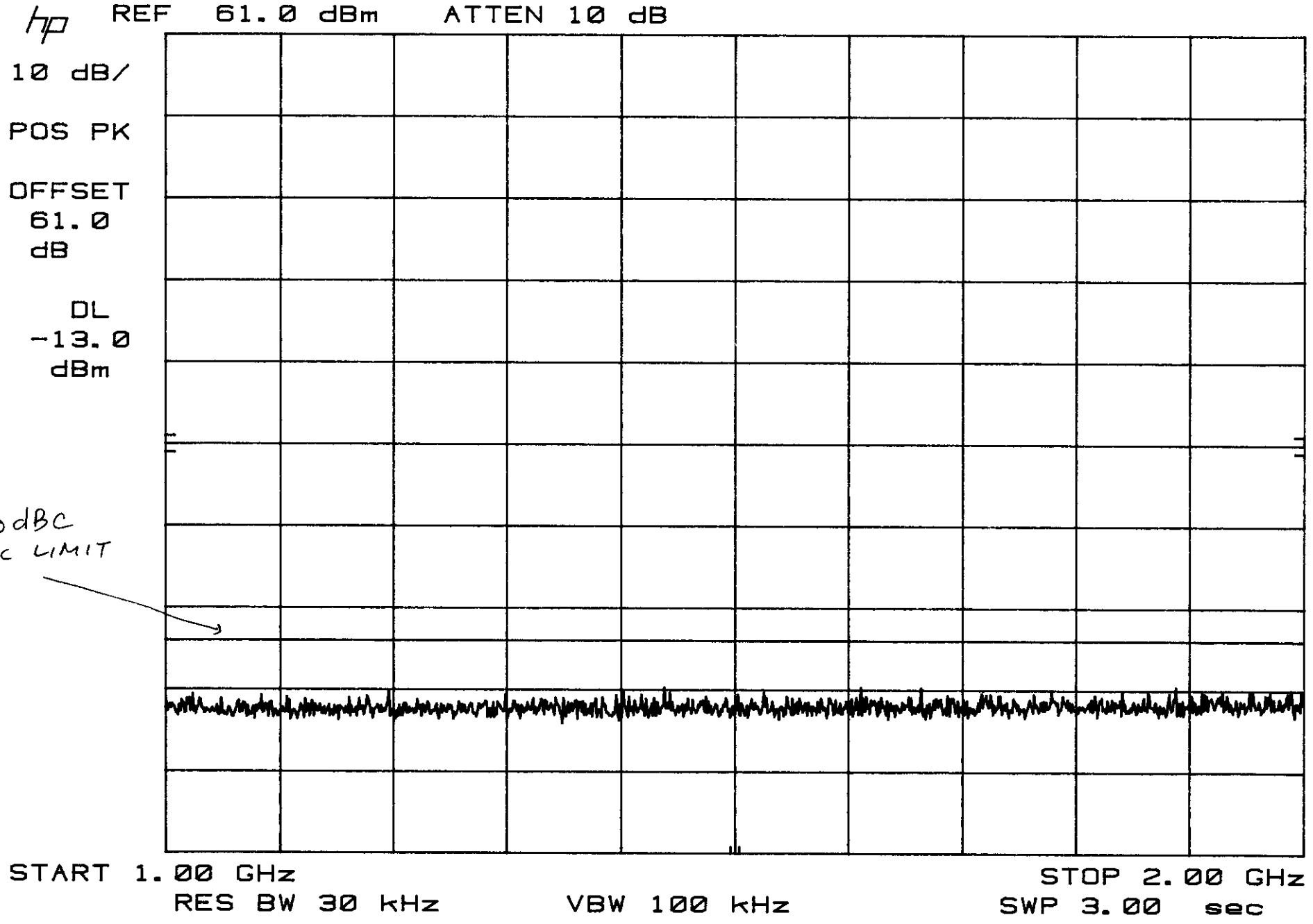

RS3-2AC - AIR
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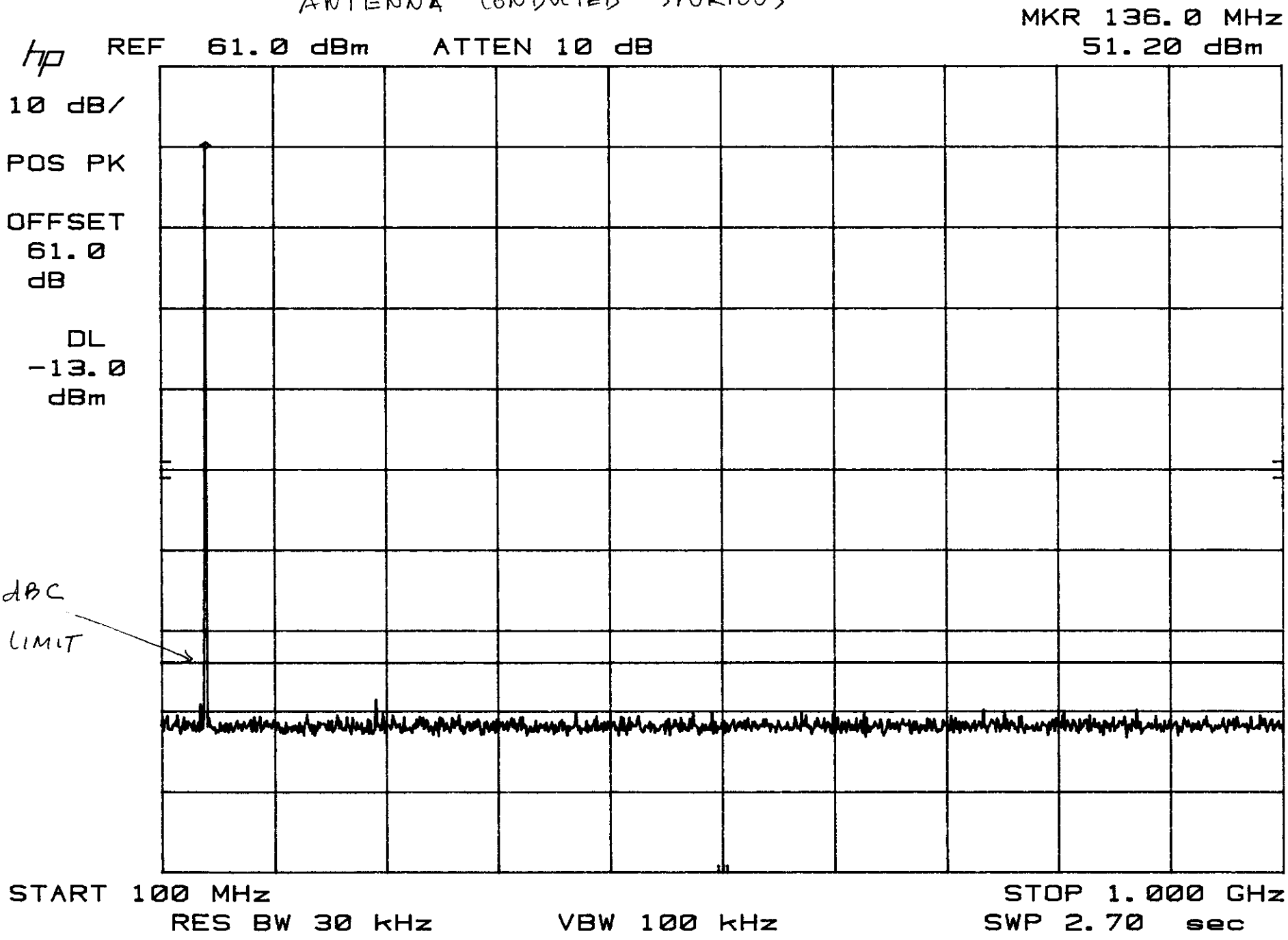
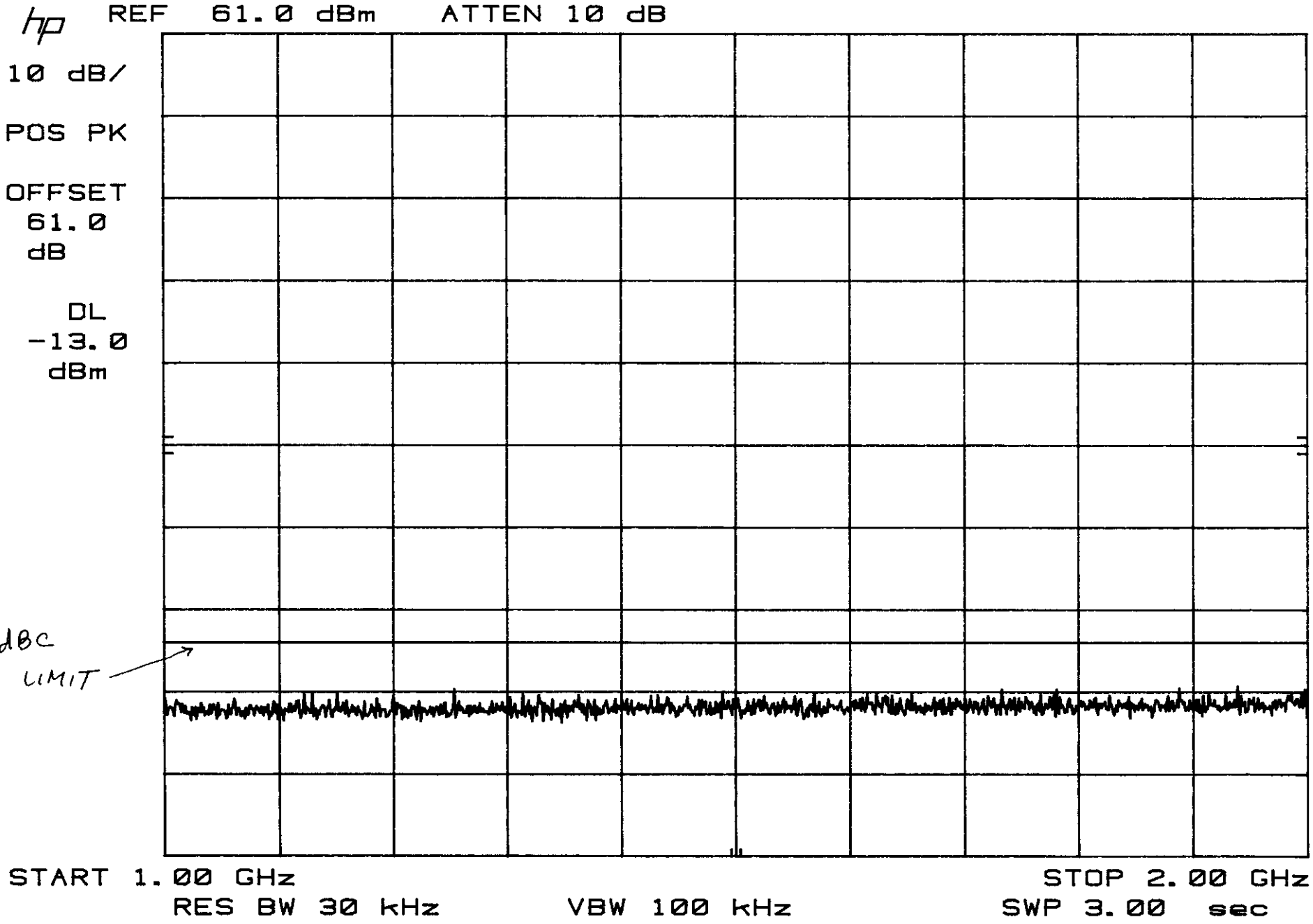


RS3 - 2AC - AIR
ANTENNA CONDUCTED SPURIOUS



2.983(e)(5) **Measurement of Radiated Spurious Emissions Per 2.993**

Definition: Emissions from the equipment when connected into a non-radiating load on a frequency or frequencies which are outside an occupied band sufficient to ensure transmission of information of required quality for the class of communications desired. The reduction in the level of these spurious emissions will not effect the quality of the information being transmitted.

Test Method: Per EIA RS 152-B.

Connect the equipment and follow the procedure described in paragraph 2.2.1.1 and paragraph 5.0. Measure the amplitude of each spurious radiated signal through the 10th harmonic. The level in dBuV/m is calculated on the following page. The spurious signals are then measured on the 3 meter range.

$$\text{Spurious attenuation dB} = 10 \log \frac{\text{Po Watts}}{\text{Calc spurious pwr}}$$

Test Results: See TABLE I.

All Radiated spuirious emissions are below the FCC specifications.

SPURIOUS RADIATED SIGNAL MEASUREMENTS

(Ref: Part 2, Subpart J, 2.991 & 2.993)

Date 3-28-98 Pass X Fail ____ (at Freq. ____)

EUT Power Amplifier Operating Power Saturated

Part No. RS3-2MC-AIR Operating Mode AM

Serial No. ____ Test Engineer Bryan Broadus

FREQUENCY TUNED TO 122 MHz

ANT POL	FREQ MHz	SPECTRUM ANALYZER (dBμV)	ANT. FACTOR (dB)	CABLE LOSS (dB)	AMP GAIN (dB)	dBμV/m	FUND FIELD STRENGTH dBμV/m	SPUR BELOW CARR-IER (dBc)
	122	—	—	—	—	—	144.3	—
H	244	91.5	13.9	3.2	30	78.6		65.7
H	366	89.2	17.0	3.9	30	80.1		64.2
H	488	83.0	19.7	4.3	30	77.0		67.3
V	610	82.2	20.9	5.1	30	78.2		66.1
V	732	75.3	22.8	6.7	30	74.8		69.5
H	854	74.3	23.6	7.6	30	75.5		68.8
V	976	71.3	24.8	8.5	30	74.6		69.7
H	1098	69.8	24.5	9.7	30	74.0		70.3
H	1220	66.2	25.1	10.6	30	71.9		72.4

Fundamental Field Strength (V/m) = 1/3 (Ro x Po)$^{1/2}$ = 16.6 V/m

Ro = Amplifier Output Impedance (Ohms): 50 Ω

Po = Amplifier Output Power (Watts): 50 W

Conversion from μV/m to dBμV/m = (μV/m) $^{\log}$ x 20 = 144.3 dBμV/m

FCC Limit = 43 + 10 · log PO = 59.98 dBc

2.983(e)(6) **Measurement of Frequency Stability Per 2.995**

The EUT is a power amplifier and contains no circuitry for generating or stabilizing the RF signal. The driver will be responsible for this task.

2.983(e)(7) **Frequency Spectrum to be Investigated per 2.997**

The frequency was searched from the lowest radio frequency generated in the equipment through the 10th harmonic of the carrier frequency.

2.983(g) **Photographs and/or drawings showing equipment construction techniques.**

Note: The Main Circuit Board shown in these photos has no components on the reverse side.

Photo 1 Main Circuit Board (View A)

Photo 2 Main Circuit Board (View B)

Photo 3 External Side View

Photo 4 External Side View