

**TEST DATA**

**ON**

**DC-COUPLED, HIGH SPEED**

**2.5 GHz TO 3.0 GHz**

(PMI MODEL NO: DD-20-23)

**AND**

**3.0 GHz TO 3.5 GHz**

(PMI MODEL NO: DD-20-34)

WITH MEASURED DATA FROM 1.5 TO 4.5 GHz

**3 WATT INPUT POWER HANDLING**

**20 dB DIRECTIVITY**

**DIRECTIONAL DETECTOR**

**PMI MODEL Nos:**

**DD-20-23**

SERIAL NUMBERS: PM71119, PM71120

**AND**

**DD-20-34**

SERIAL NUMBER: PM71121

DESIGNED

BY

A. K. GORWARA

TESTED

BY

R. AFABLE

REPORTED

BY

P. D. WOOD

**APRIL 17, 1998**

***PLANAR MONOLITHICS INDUSTRIES, INC.***

ENGINEERING AND CORPORATE OFFICES: 1112 PERKIOMENVILLE ROAD, PERKIOMENVILLE, PA 18074

MANUFACTURING AND SALES OFFICES: 7311-G GROVE ROAD, FREDERICK, MARYLAND 21704

TELEPHONE: 301-662-4700, FAX: 301-662-4958, E-MAIL: AMCPMI@AOL.COM



# DIRECTIONAL DETECTORS

## PMI MODEL No: DD-20-23 & DD-20-34

- 2.5 TO 3.0 GHz & 3.0 TO 3.5 GHz, OTHER FREQUENCY RANGES AVAILABLE
- 50 OHM IMPEDENCE
- LOW LOSS
- SMALL SIZE
- 20 dB DIRECTIVITY (NARROW BAND ONLY)
- 3 WATT POWER HANDLING
- MINIATURE SIZE AVAILABLE

### SPECIFICATIONS

- FREQUENCY RANGE : 2.5 TO 3.0 GHz & 3.0 TO 3.5 GHz  
(USEFUL IN THE 2.0 TO 4.0 GHz RANGE, OTHER MODELS AVAILABLE IN FREQUENCY RANGES OF 1.0 TO 18.0 GHz)
- INSERTION LOSS : 0.5 dB
- INSERTION LOSS VARIATION : 0.2 dB (OVER FREQUENCY)
- VSWR INPUT : 1.25:1
- IMPEDANCE : 50  $\Omega$
- MINIMUM DIRECTIVITY : 20 dB (NARROW BAND ONLY)
- MAXIMUM RF INPUT POWER : 3 WATTS
- DETECTOR OUTPUT VOLTAGE :

RF POWER INPUT	DC VOLTAGE OUTPUT MAXIMUM
+ 26 dBm	135 to 220 mV
+ 23 dBm	94 to 125 mV
+ 20 dBm	58 to 83 mV
+ 16 dBm	31 to 46 mV

- VIDEO BANDWIDTH (IF FREQUENCY) : 10 MHz (VIDEO BANDWIDTHS UP TO 500 MHz ARE AVAILABLE)
- DC POWER SUPPLY :  $\pm 15$  vdc (NOT REQUIRED FOR LOW SENSITIVITY DETECTION UNITS)
- SIZE : 2.44" X 1.50" X 0.77" (MINIATURE SIZE UNITS ARE AVAILABLE, INQUIRE WITH FACTORY FOR DETAILS)
- WEIGHT :  $\leq 4.0$  oz.

### ENVIRONMENTAL CONDITIONS

- TEMPERATURE : -54°C TO + 85°C (OPERATING)  
: -65°C TO +100°C (STORAGE)
- HUMIDITY : MIL-STD-202F, METHOD 103B, CONDITION B
- SHOCK : MIL-STD-202F, METHOD 213B, CONDITION B
- VIBRATION : MIL-STD-202F, METHOD 204D, CONDITION B
- ALTITUDE : MIL-STD-202F, METHOD 105C, CONDITION B
- TEMPERATURE CYCLING : MIL-STD-202F, METHOD 107D, CONDITION A

### ADDITIONAL ENVIRONMENTAL CONDITIONS

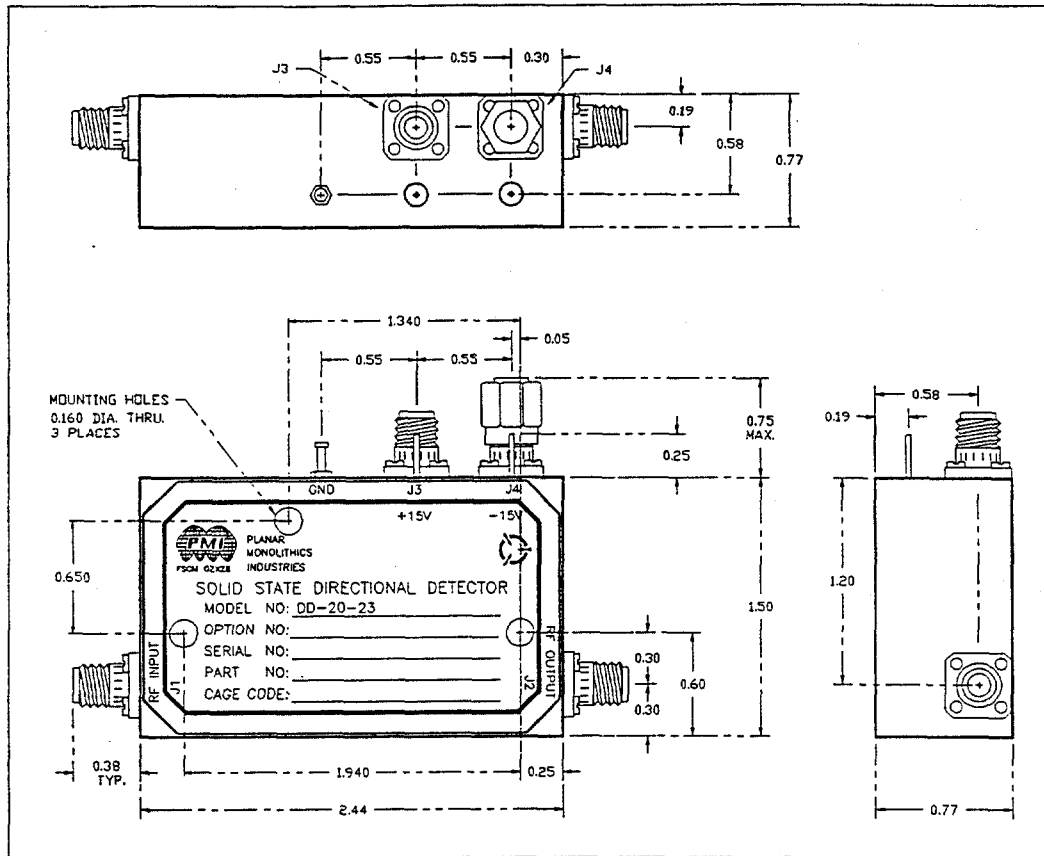
- VIBRATION : STATIC LOAD OF 2.5 G IN VERTICAL AND TRANSVERSE DIRECTIONS AND THE VIBRATION TEST OF TABLE II OF MIL-STD-167-1 OVER 4 - 33 Hz.
- SHOCK : a. @ 3" PEAK DISPLACEMENT  $F_n < 10$ Hz  
b. @ 40 Gs  $10\text{Hz} < F_n < 30\text{Hz}$   
c. @ 40 Gs  $30\text{Hz} < F_n < 50\text{Hz}$

### **PLANAR MONOLITHICS INDUSTRIES, INC.**

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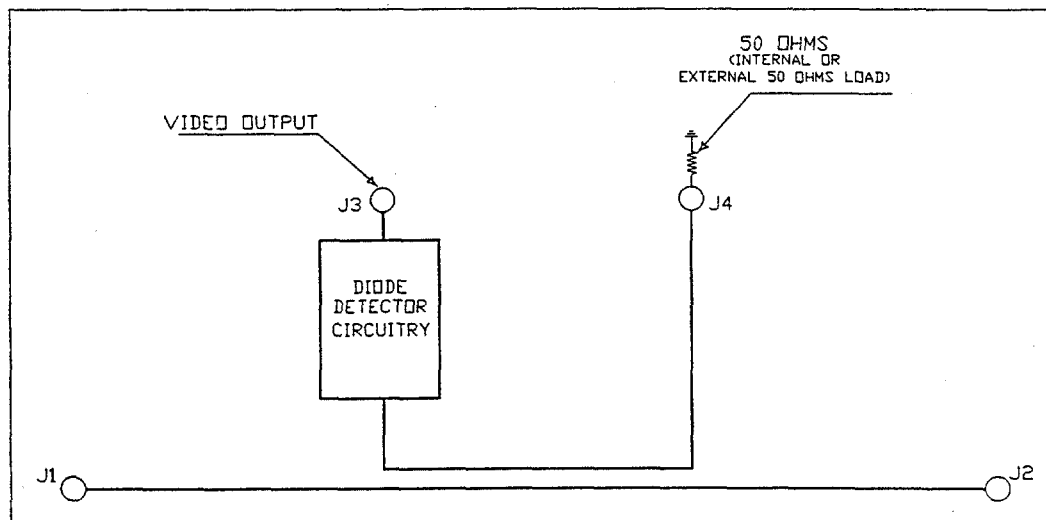


**MECHANICAL OUTLINE**



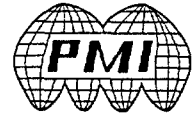
**DIRECTIONAL DETECTORS  
PMI MODEL NOS: DD-20-23 & DD-20-34**

**FUNCTIONAL SCHEMATIC**



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TEST DATA

ON

DC COUPLED, HIGH SPEED

2.5 TO 3.0 GHz

(WITH MEASURED DATA FROM 1.5 TO 4.5 GHz)

ON

3 WATT INPUT POWER HANDLING

20 dB DIRECTIVITY

50  $\Omega$  IMPEDENCE

**DIRECTIONAL DETECTOR**

**PMI MODEL No:**

**DD-20-23**

SERIAL NUMBERS: PM71119 AND PM71121

DESIGNED

BY

A. K. GORWARA

TESTED

BY

R. AFABLE

REPORTED

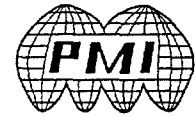
BY

P. D. WOOD

APRIL 17, 1998

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**SUMMARY TEST DATA**  
AS MEASURED FROM 2.5 TO 3.0 GHz  
SERIAL NUMBERS: PM71119

FORM: PROD-6/2397



**SUMMARY TEST DATA**  
**DIRECTIONAL DETECTOR**

MODEL NO: DD-20-23 (DD6502C) OPTION(S): \_\_\_\_\_ JOB NO: P61015E-1  
PARTS LIST NO: 100-4115 REVISION: A SERIAL NO: PM 71119  
DRAWING NO: 300-4114 CUSTOMER: NEARSON HI TECH  
SPECIFICATIONS:  COMMERCIAL  MIL-STD 454  OTHER: \_\_\_\_\_  
TEMPERATURE: 0°C TO 70°C

TEST ITEM NO.	PARAMETERS	SPECIFIED VALUE	MEASURED VALUE	REMARKS QA/QC
1	FREQUENCY	2.5 TO 3.0 GHz	✓	✓
2	INSERTION LOSS	0.25 dB MAX.	-0.42 dB	✓
3	INSERTION LOSS VARIATION OVER FREQUENCY	0.2dBMAX	0.076	✓
4	VSWR	1.25:1 MAX.	-24.01 dB	✓
5	MAX. INPUT POWER	3 WATTS	✓	✓
6	SUPPLY VOLTAGE	±15V	✓	✓
7	IMPEDANCE	50 OHMS	✓	✓
8	MIN. DIRECTIVITY	20 dB min.	✓	✓
9	OUTPUT VOLTAGE VARIATION WITH FREQ. AND TEMP.	±0.2 db MAX.	✓	✓
10	DETECTOR OUTPUT VOLTAGE POWER IN +26dBm +23dBm +20dBm +16dBm	VOLTAGE OUT 150 TO 220mV 94 TO 130mV 58 TO 83mV 31 TO 46mV	-137.9mV -110.6mV -72.3mV -39.4mV	✓
11	VIDEO BANDWIDTH (if Freq.)	10 MHz MIN.	✓	✓

PRODUCTION MANAGER APPROVAL: [Signature] DATED: 11-3-97  
INSP. BY: 01  
QA/QC APPROVAL: \_\_\_\_\_ DATED: 11-3-97



**VIDEO OUTPUT VOLTAGE Vs FREQUENCY**

AS MEASURED AT: 2.5 GHz, 2.75 GHz, 3.0 GHz, 3.5 GHz, AND 4.0 Ghz.  
WITH INPUT POWER LEVELS OF: + 16 dBm, + 20 dBm, + 23 dBm, AND + 26 dBm.

RF POWER INPUT LEVEL	DD-20-23 S/N: PM71119	DD-20-34 S/N: PM71120	DD-20-23 S/N: 71121
<b>2.5 GHz FREQUENCY</b>			
+ 16 dBm	-39.4 mV	-44.6 mV	-33.8 mV
+ 20 dBm	-72.3 mV	-82.6 mV	-63.6 mV
+ 23 dBm	-110.6 mV	-121.7 mV	-101.7 mV
+ 26 dBm	-137.9 mV	-148.6 mV	-144.0 mV
<b>2.75 GHz FREQUENCY</b>			
+ 16 dBm	-38.6 mV	-45.0 mV	-35.8 mV
+ 20 dBm	-71.4 mV	-88.8 mV	-65.3 mV
+ 23 dBm	-111.9 mV	-125.7 mV	-101.7 mV
+ 26 dBm	-140.6 mV	-152.4 mV	-134.5 mV
<b>3.0 GHz FREQUENCY</b>			
+ 16 dBm	-43.2 mV	-43.5 mV	-31.7 mV
+ 20 dBm	-79.7 mV	-85.5 mV	-62.5 mV
+ 23 dBm	-115.9 mV	-122.6 mV	-96.0 mV
+ 26 dBm	-143.6 mV	-153.1 mV	-143.1 mV
<b>3.5 GHz FREQUENCY</b>			
+ 16 dBm	-49.5 mV	-46..5 mV	-37.1 mV
+ 20 dBm	-84.5 mV	-82.6 mV	-68.6 mV
+ 23 dBm	-157.1 mV	-166.7 mV	-135.1 mV
+ 26 dBm	-148.2 mV	-171.2 mV	-147.9 mV
<b>4.0 GHz FREQUENCY</b>			
+ 16 dBm	-47.7 mV	-43.4 mV	-42.4 mV
+ 20 dBm	-87.7 mV	-82.1 mv	-76.4 mV
+ 23 dBm	-125.1 mV	-121.7 mV	-119.4 mV
+ 26 dBm	-150.5 mV	-157.3 mV	-159.8 mV

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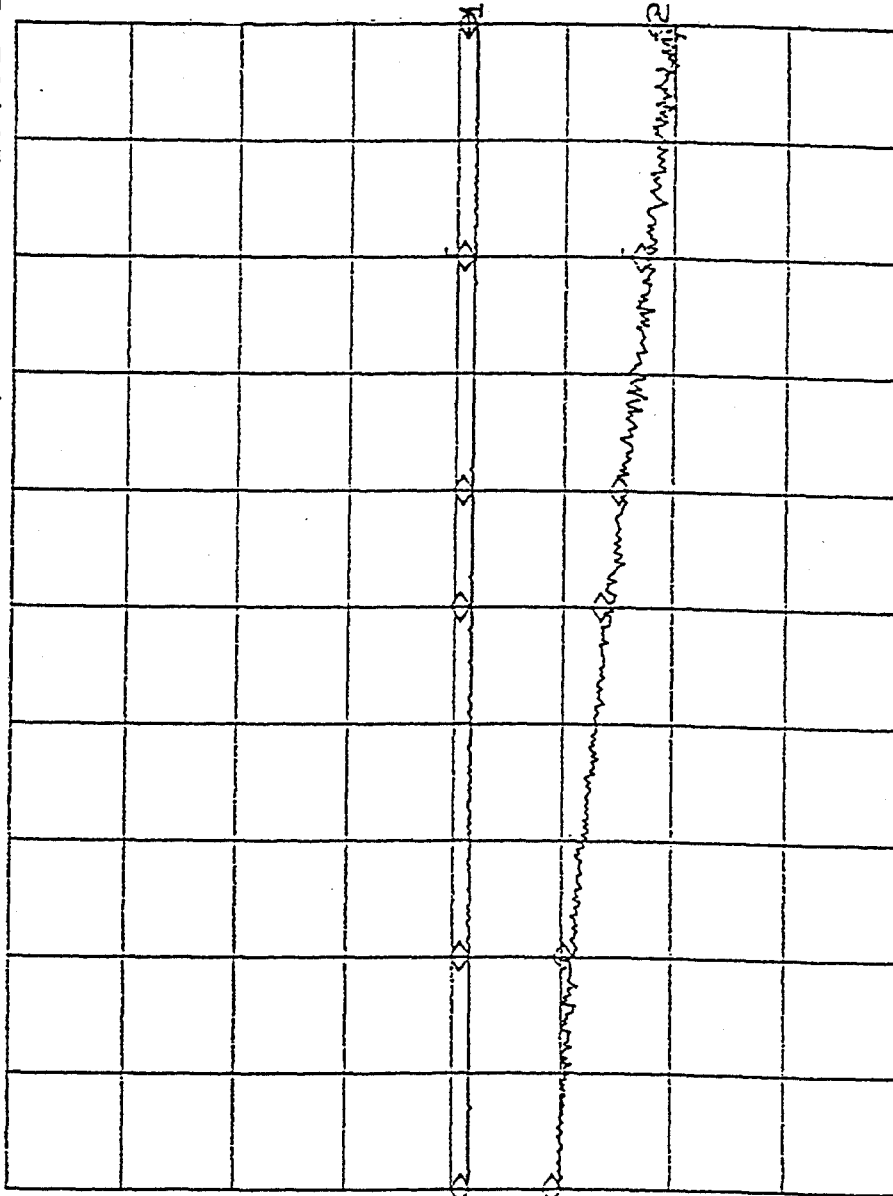


**INSERTION LOSS/VSWR J1-J2**

AS MEASURED FROM 2.5 TO 3.0 GHz  
SERIAL NUMBERS: PM71119

DD-20-23  
INSERTION LOSS/VSWR J1-J2

CH1: R REF - 42 dB CH2: B REF - 28.61 dB  
1.0dB/ REF - 25 dB 5.0dB/ REF - 19.09 dB



START +2.5000GHZ CRSR +3.0000GHZ STOP +3.0000GHZ

MARKERS

#	Freq (GHz)	IL (dB)
#1	2.5 GHz	0.41 dB
#2	2.6 GHz	0.40 dB
#3	2.75 GHz	0.39 dB
#4	2.8 GHz	0.40 dB
#5	2.9 GHz	0.40 dB
#6	3.0 GHz	0.42 dB

CURRENT/DRAW  
+15 V @ 1 mA  
-15 V @ 1 mA

VSWR

#	Freq (GHz)	VSWR (dB)
#1	2.5 GHz	-24.0 -1.13:1
#2	2.6 GHz	-24.5 -1.13:1
#3	2.75 GHz	-26.1 -1.10:1
#4	2.8 GHz	-26.7 -1.10:1
#5	2.9 GHz	-27.7 -1.09:1
#6	3.0 GHz	-28.6 -1.08:1

11/10/97 RA

JOHN P610156  
NEARSON  
S/N: PM71119

**PLANAR MONOLITHICS INDUSTRIES, INC.**

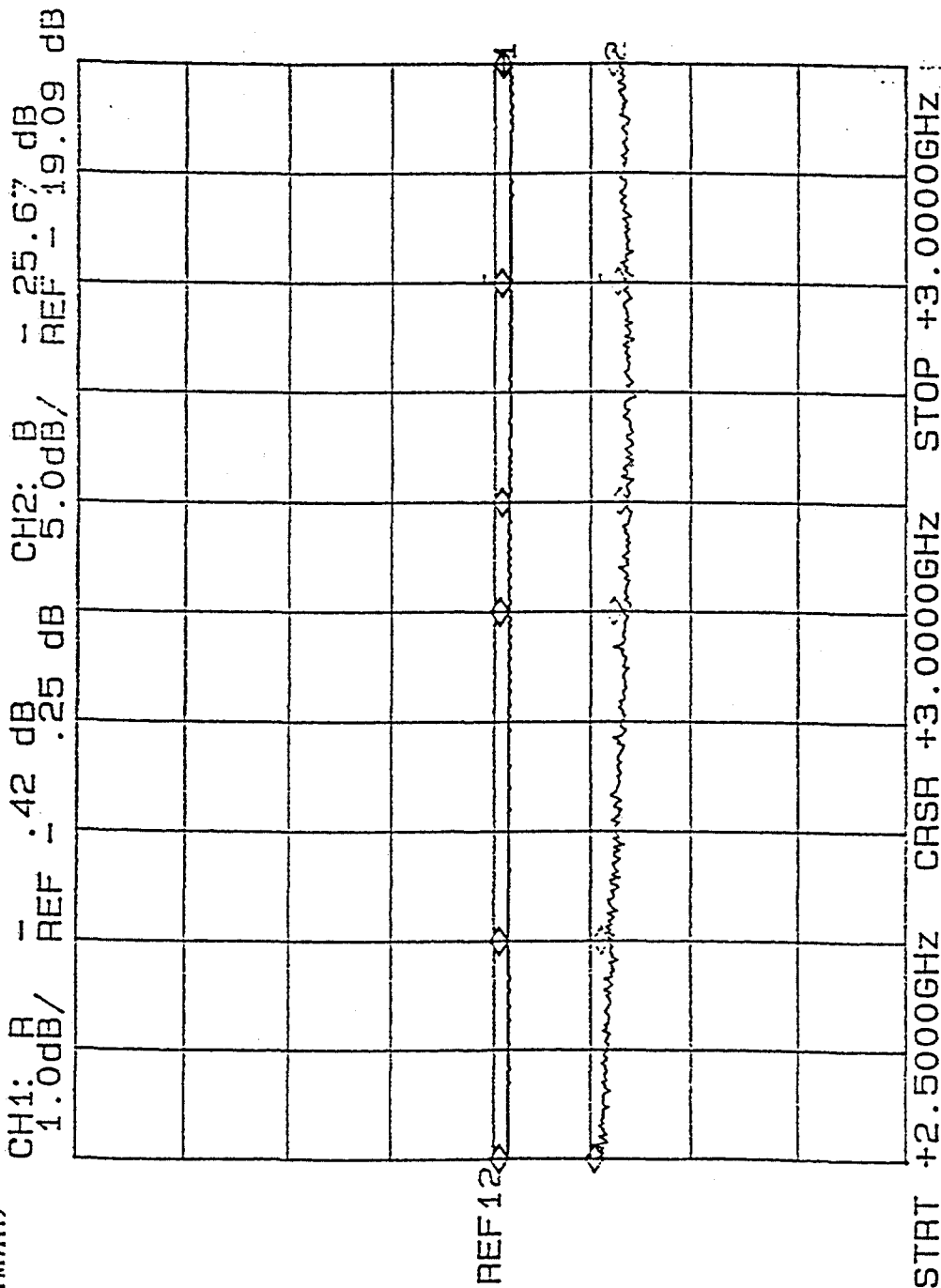
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**INSERTION LOSS/VSWR J2-J1**  
AS MEASURED FROM 2.5 TO 3.0 GHz  
SERIAL NUMBERS: PM71119

DD-20-23  
INSERTION LOSS/VSWR J2J1

11/10/97 RA  
JOB# P610156  
NEARSON  
S/N: PM71119



YSWR

#	Freq (GHz)	dB YSWR
#1	2.5 GHz	-24.7 -1.13:1
#2	2.6 GHz	-25.1 -1.12:1
#3	2.75 GHz	-25.8 -1.11:1
#4	2.8 GHz	-25.9 -1.11:1
#5	2.9 GHz	-25.7 -1.11:1
#6	3.0 GHz	-25.6 -1.11:1

CURRENT/DRAW  
+15 V @ 1 mA  
-15 V @ 1 mA

MARKERS

#	Freq (GHz)	IL (dB)
#1	2.5 GHz	0.38 dB
#2	2.6 GHz	0.38 dB
#3	2.75 GHz	0.38 dB
#4	2.8 GHz	0.39 dB
#5	2.9 GHz	0.40 dB
#6	3.0 GHz	0.42 dB



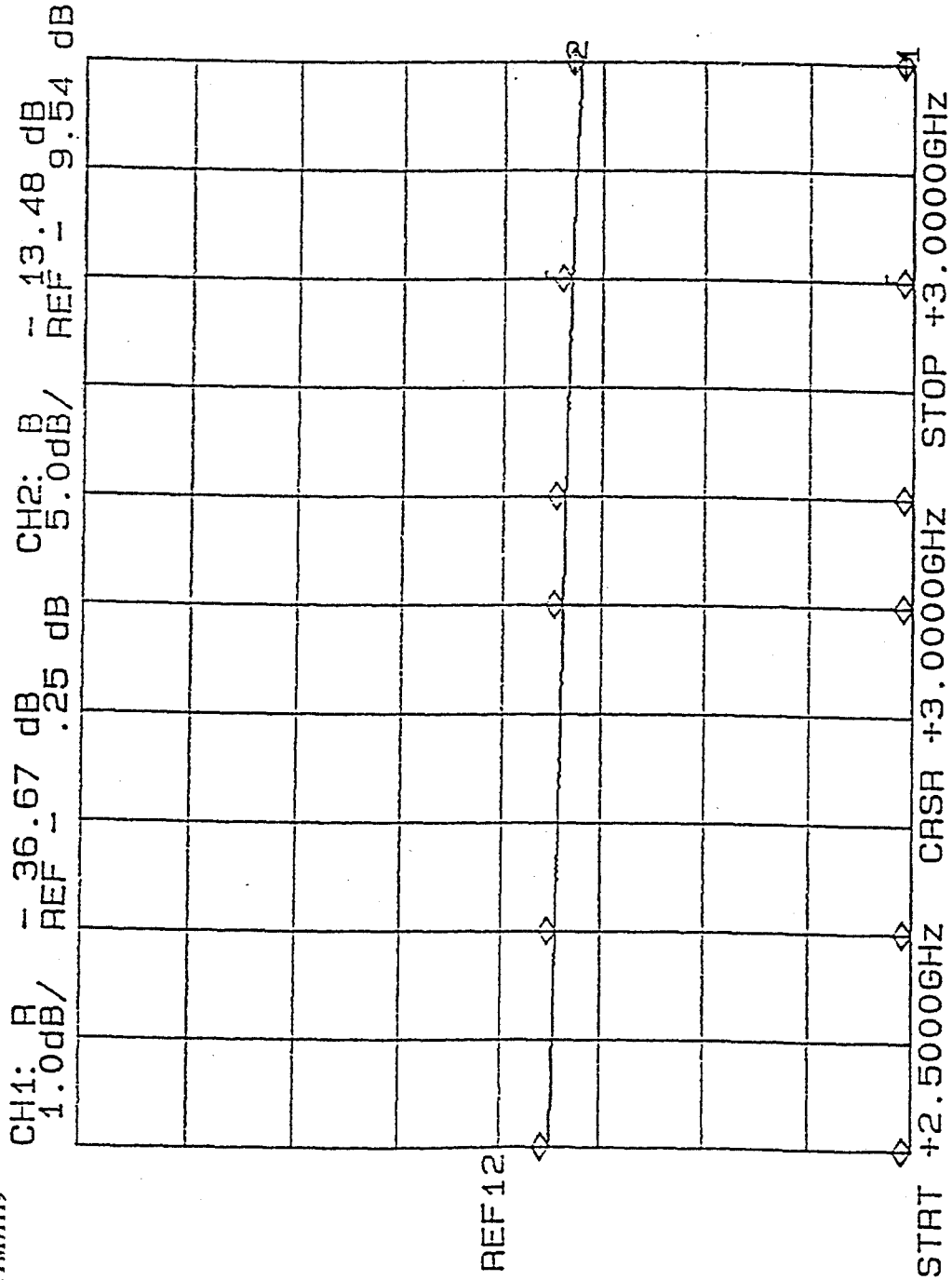


**VSWR J4**  
AS MEASURED FROM 2.5 TO 3.0 GHz  
SERIAL NUMBERS: PM71119

DD-20-23  
VSWR J4

11/10/97 RA

JOHN P61015E  
NEARSON  
S/N: PM71119



CURRENT DRAV -  
+15 V @ 1 mA  
-15 V @ 1 mA

#	Freq	VSWR
#1	2.5 GHz	-12.0 -1.67:1
#2	2.6 GHz	-12.3 -1.64:1
#3	2.75 GHz	-12.6 -1.61:1
#4	2.8 GHz	-12.7 -1.60:1
#5	2.9 GHz	-13.0 -1.58:1
#6	3.0 GHz	-13.4 -1.54:1

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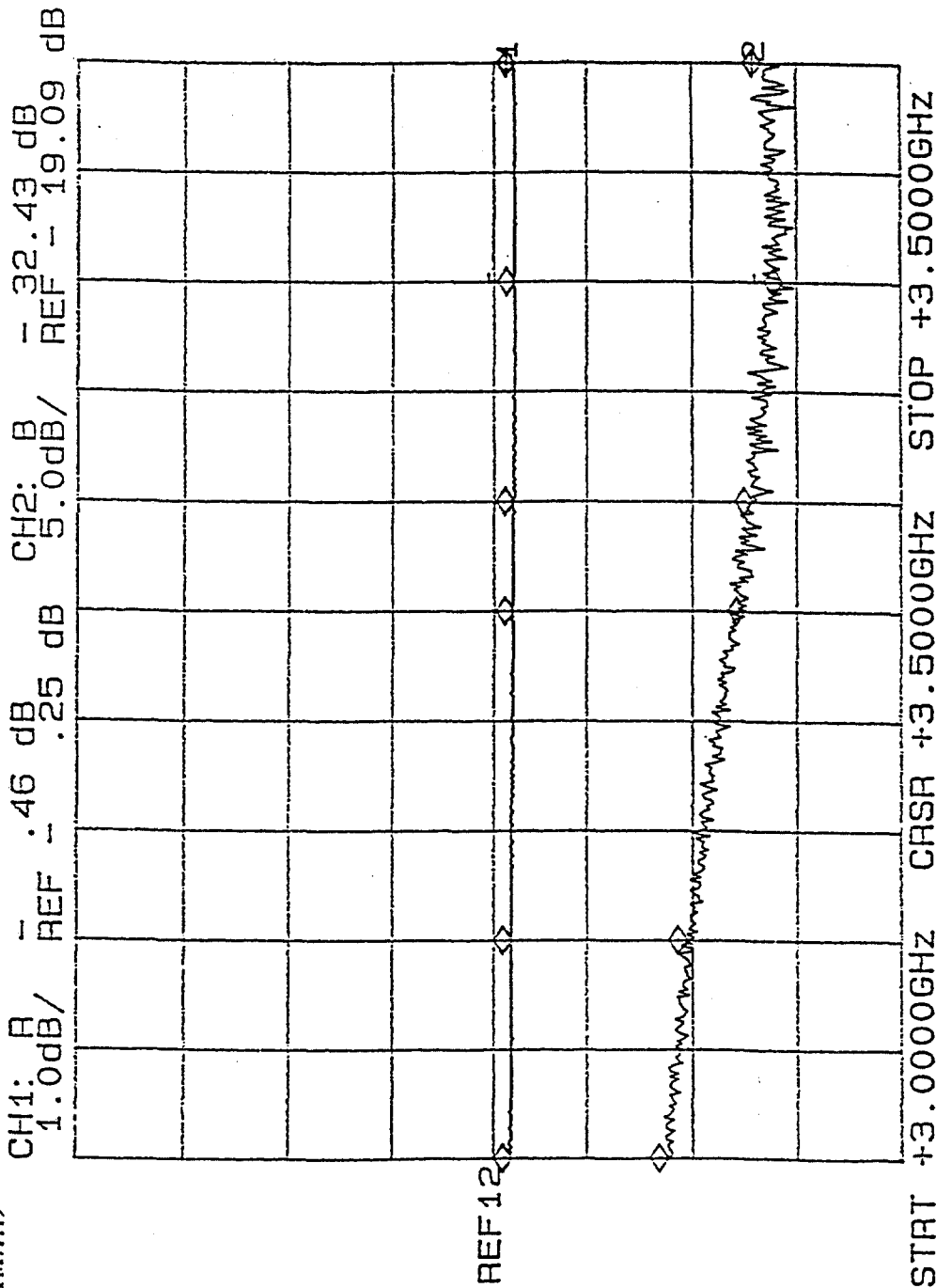


**INSERTION LOSS/VSWR J1-J2**  
AS MEASURED FROM 3.0 TO 3.5 GHz  
SERIAL NUMBERS: PM71119

11/10/97 RA

DD-20-23  
INSERTION LOSS/VSWR J1-J2

JOB# P61015-1E  
NEARSON  
S/N: PM71119



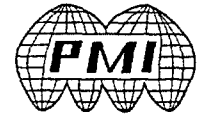
	VSWR	dB	VSWR
#1	3.0 GHz	-28.0	-1.08:1
#2	3.1 GHz	-28.8	-1.08:1
#3	3.25 GHz	-31.0	-1.06:1
#4	3.3 GHz	-32.1	-1.05:1
#5	3.4 GHz	-32.9	-1.05:1
#6	3.5 GHz	-32.4	-1.05:1

CURRENT DRAIN  
+15 V @ 1 mA  
-15 V @ 1 mA

MARKERS	IL
#1	3.0 GHz 0.42 dB
#2	3.1 GHz 0.42 dB
#3	3.25 GHz 0.44 dB
#4	3.3 GHz 0.44 dB
#5	3.4 GHz 0.45 dB
#6	3.5 GHz 0.46 dB

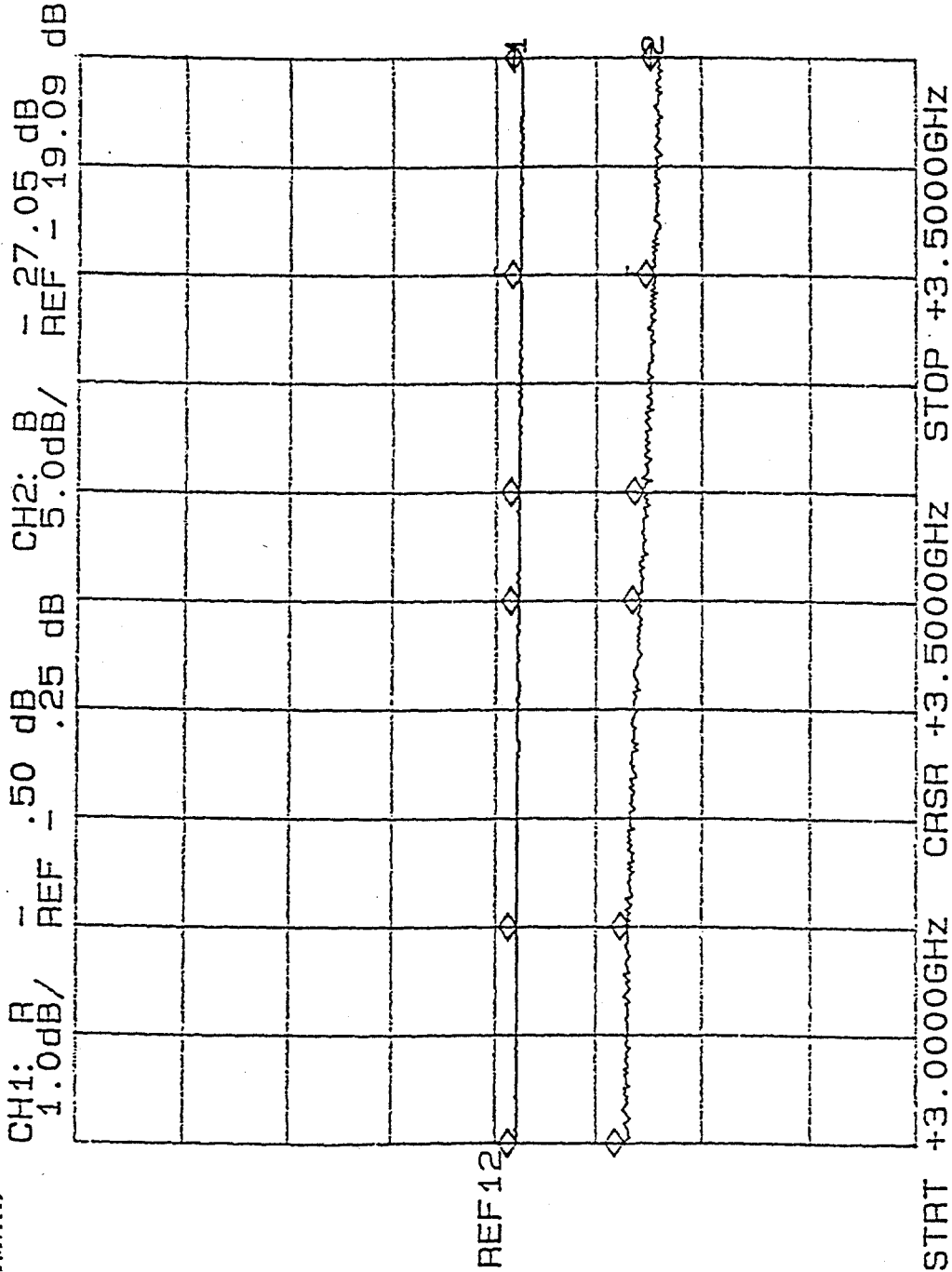
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**INSERTION LOSS/VSWR J2-J1**  
AS MEASURED FROM 3.0 TO 3.5 GHz  
SERIAL NUMBERS: PM71119

DD-20-23  
INSERTION LOSS/VSWR J2-J1



	YSWR	dB	YSWR
#1 3.0 GHz	-24.4	-1.13:1	
#2 3.1 GHz	-25.6	-1.11:1	
#3 3.25 GHz	-26.1	-1.10:1	
#4 3.3 GHz	-26.5	-1.10:1	
#5 3.4 GHz	-26.7	-1.10:1	
#6 3.5 GHz	-27.0	-1.09:1	

CURRENT/DRAIN  
+15V @ 1 mA  
-15V @ 1 mA

MARKERS	IL
#1 3.0 GHz	0.44 dB
#2 3.1 GHz	0.44 dB
#3 3.25 GHz	0.46 dB
#4 3.3 GHz	0.47 dB
#5 3.4 GHz	0.48 dB
#6 3.5 GHz	0.50 dB

11/10/97 RA

JOW# P61015-1E  
NEARSON  
S/N: PM71119

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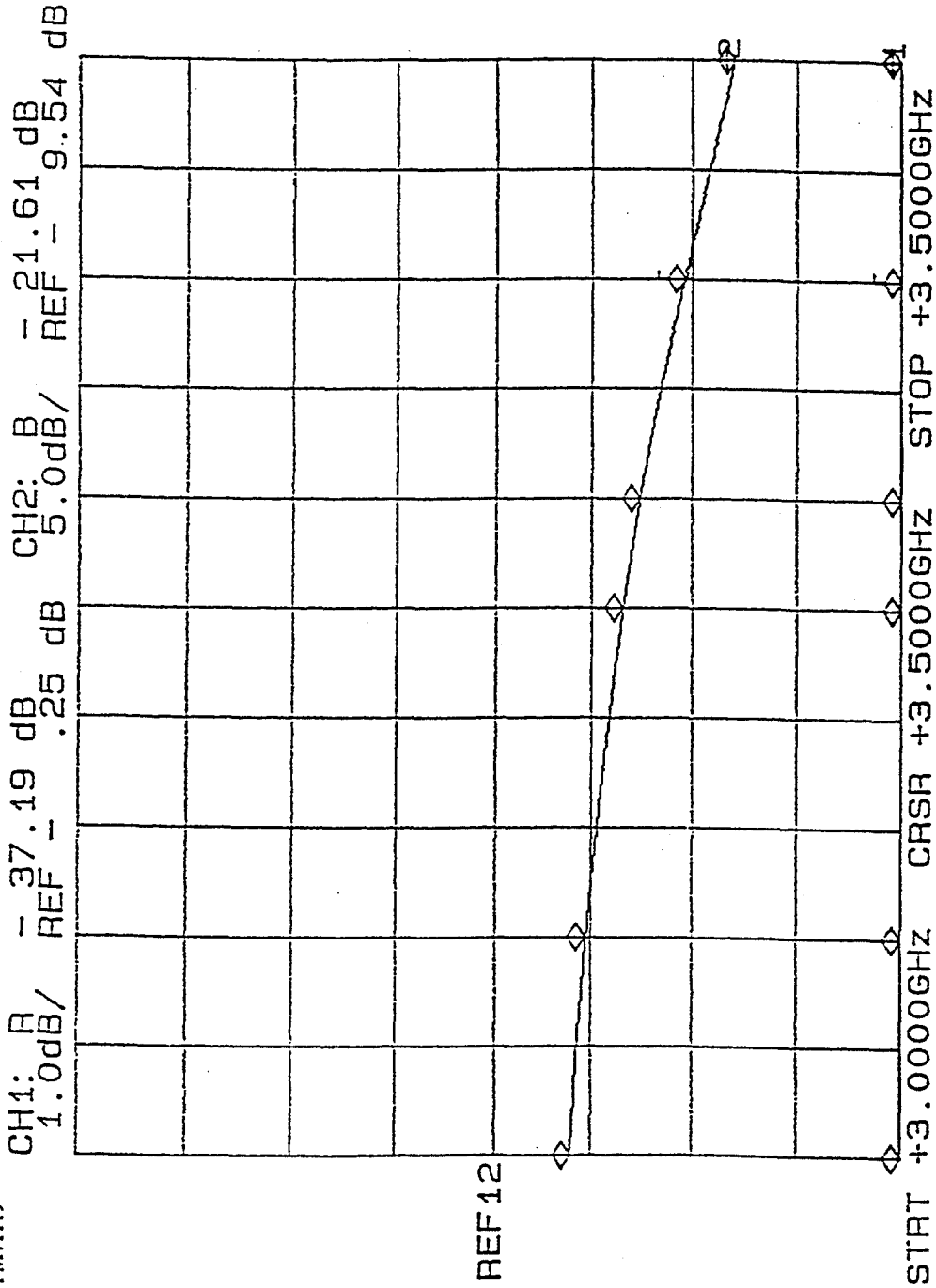


**VSWR J4**  
AS MEASURED FROM 3.0 TO 3.5 GHz  
SERIAL NUMBERS: PM71119

11/10/97 RA

DD-20-23  
VSWR J4

JOM/ P61015-1E  
NEARFIELD  
S/N: PM71119

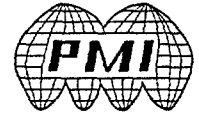


VSWR	dB	VSWR
#1 3.0 GHz	-13.5	-1.58:1
#2 3.1 GHz	-14.2	-1.48:1
#3 3.2 GHz	-16.0	-1.38:1
#4 3.3 GHz	-16.9	-1.33:1
#5 3.4 GHz	-19.1	-1.25:1
#6 3.5 GHz	-21.6	-1.18:1

CURRENT DRAW -  
+15 V @ 1 mA  
-15 V @ 1 mA

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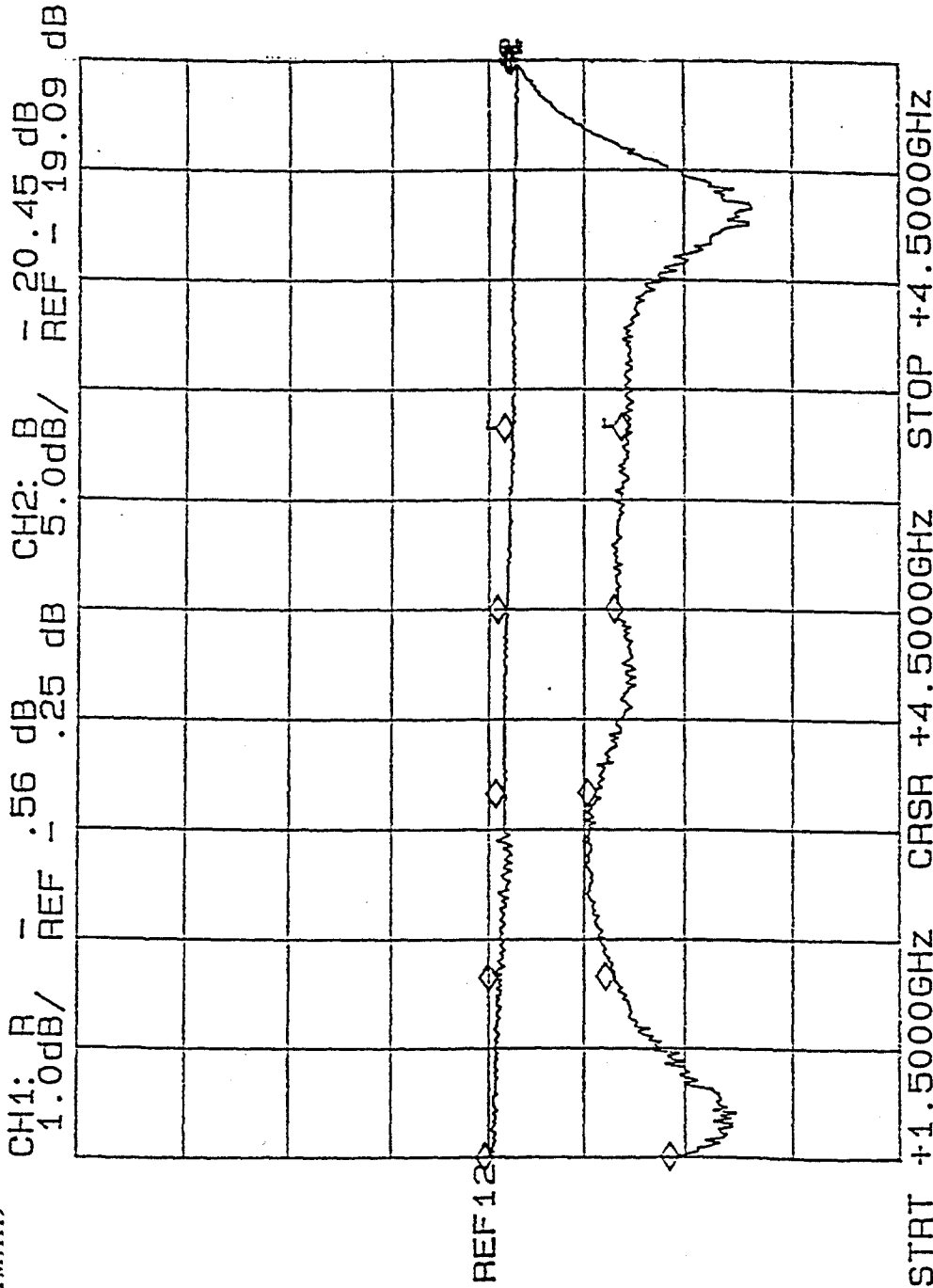


**INSERTION LOSS/VSWR J1-J2**  
AS MEASURED FROM 1.5 TO 4.5 GHz  
SERIAL NUMBERS: PM71119

DD-20-23  
INSERTION LOSS/VSWR J1-J2

11/10/97 RA

JOB# P61015-1E  
NEARSON  
SN: PM71119



Y:SWR

#	Freq	dB	Y:SWR
#1	1.5 GHz	-28.6	-1.08:1
#2	2.0 GHz	-25.5	-1.11:1
#3	2.5 GHz	-24.7	-1.12:1
#4	3.0 GHz	-26.0	-1.11:1
#5	3.5 GHz	-26.4	-1.10:1
#6	4.5 GHz	-20.4	-1.21:1

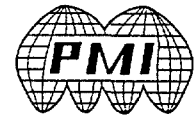
CURRENT DRAIN  
+15 V @ 1 mA  
-15 V @ 1 mA

MARKERS

#	Freq	IL
#1	1.5 GHz	0.30 dB
#2	2.0 GHz	0.36 dB
#3	2.5 GHz	0.40 dB
#4	3.0 GHz	0.42 dB
#5	3.5 GHz	0.49 dB
#6	4.5 GHz	0.56 dB

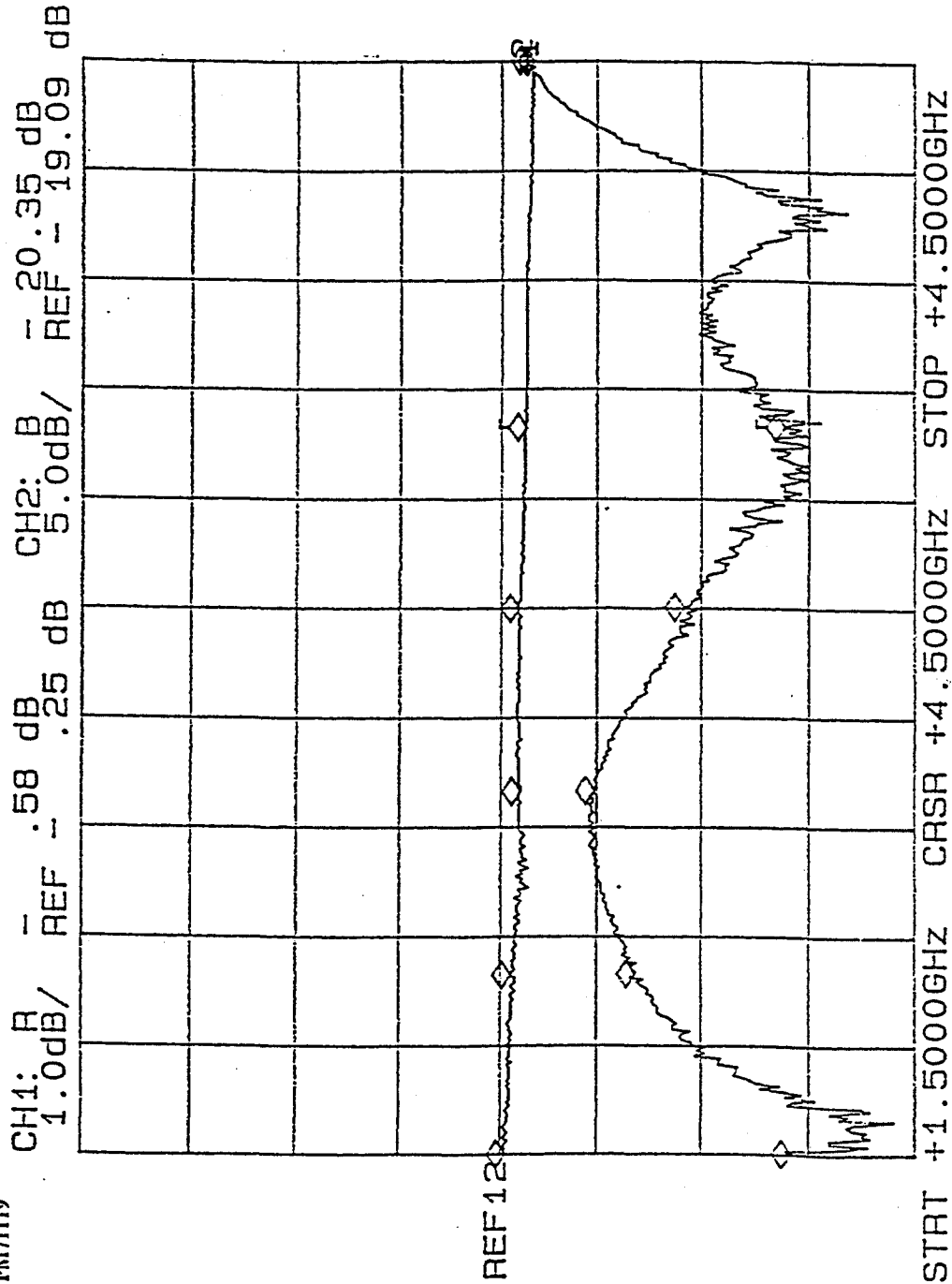
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**INSERTION LOSS/VSWR J2-J1**  
AS MEASURED FROM 1.5 TO 4.5 GHz  
SERIAL NUMBERS: PM71119

DD-20-23  
INSERTION LOSS/VSWR J2-J1



MARKERS	IL
#1	1.5 GHz 0.29 dB
#2	2.0 GHz 0.37 dB
#3	2.5 GHz 0.43 dB
#4	3.0 GHz 0.43 dB
#5	3.5 GHz 0.48 dB
#6	4.5 GHz 0.58 dB

YSWR	dB	YSWR
#1	1.5 GHz	-34.1 -1.04:1
#2	2.0 GHz	-26.6 -1.10:1
#3	2.5 GHz	-23.9 -1.14:1
#4	3.0 GHz	-28.7 -1.08:1
#5	3.5 GHz	-32.5 -1.05:1
#6	4.5 GHz	-20.3 -1.21:1

CURRENT DRAIN  
+15V @ 1 mA  
-15V @ 1 mA

11/10/97 RA

JOHN PEARSON  
NEARSON  
S/N: PM71119

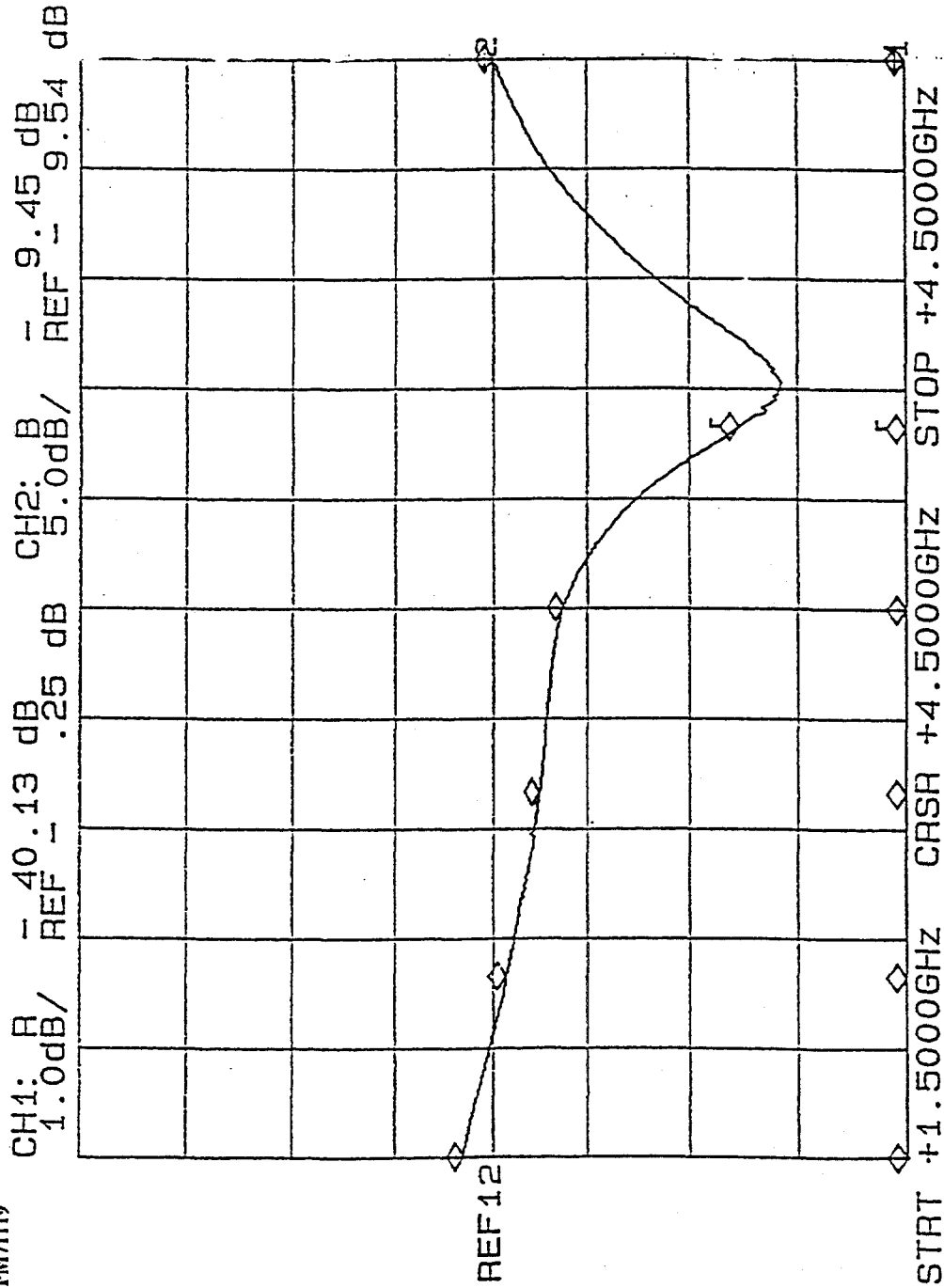


**VSWR J4**  
AS MEASURED FROM 1.5 TO 4.5 GHz  
SERIAL NUMBERS: PM71119

DD-20-23  
VSWR J4

11/10/97 RA

JOB# PG1015-1E  
NEARFIELD  
S/N: PM71119

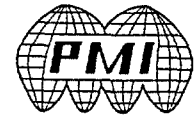


#	Frequency (GHz)	VSWR (dB)	VSWR (Ratio)
#1	1.5 GHz	-7.94	2.35:1
#2	2.0 GHz	-10.1	1.91:1
#3	2.5 GHz	-12.0	1.67:1
#4	3.0 GHz	-13.2	1.56:1
#5	3.5 GHz	-21.8	1.18:1
#6	4.5 GHz	-9.45	2.02:1

CURRENT DRAV—  
+15 V @ 1 mA  
-15 V @ 1 mA

**PLANAR MONOLITHICS INDUSTRIES, INC.**

ENGINEERING AND CORPORATE OFFICES: 1112 PERKIOMENVILLE ROAD, PERKIOMENVILLE, PA 18074  
MANUFACTURING AND SALES OFFICES: 7311-G GROVE ROAD, FREDERICK, MARYLAND 21704  
TELEPHONE: 301-662-4700, FAX: 301-662-4958, E-MAIL: AMCPMI@AOL.COM



**SUMMARY TEST DATA**  
AS MEASURED FROM 2.5 TO 3.0 GHz  
SERIAL NUMBERS: PM71121

FORM: PROD-6/2397



**SUMMARY TEST DATA**  
**DIRECTIONAL DETECTOR**

MODEL NO: DD-20-23 (DD6502C) OPTION(S): \_\_\_\_\_ JOB NO: P61015E-1  
PARTS LIST NO: 100-4115 REVISION: A SERIAL NO: PM 71121  
DRAWING NO: 300-4114 CUSTOMER: NEARSON HI TECH  
SPECIFICATIONS:  COMMERCIAL  MIL-STD 454  OTHER: \_\_\_\_\_  
TEMPERATURE: 0°C TO 70°C

TEST ITEM NO.	PARAMETERS	SPECIFIED VALUE	MEASURED VALUE	REMARKS QA/QC
1	FREQUENCY	2.5 TO 3.0 GHz	✓	
2	INSERTION LOSS	0.25 dB MAX.	-0.40 dB	
3	INSERTION LOSS VARIATION OVER FREQUENCY	0.2dBMAX	0.07 dB	
4	VSWR	1.25:1 MAX.	-20.13 dB	
5	MAX. INPUT POWER	3 WATTS	✓	
6	SUPPLY VOLTAGE	±15V	✓	
7	IMPEDANCE	50 OHMS	✓	
8	MIN. DIRECTIVITY	20 dB min.	✓	
9	OUTPUT VOLTAGE VARIATION WITH FREQ. AND TEMP.	±0.2 db MAX.	✓	
10	DETECTOR OUTPUT VOLTAGE POWER IN	VOLTAGE OUT		
	+26dBm	150 TO 220mV	-144.0mV	
	+23dBm	94 TO 130mV	-101.7mV	
	+20dBm	58 TO 83mV	-63.6mV	
	+16dBm	31 TO 46mV	-33.8mV	
11	VIDEO BANDWIDTH (if Freq.)	10 MHz MIN.	✓	

PRODUCTION MANAGER APPROVAL: \_\_\_\_\_ DATED: \_\_\_\_\_

QA/QC APPROVAL: \_\_\_\_\_ DATED: \_\_\_\_\_





**VIDEO OUTPUT VOLTAGE Vs FREQUENCY**

AS MEASURED AT: 2.5 GHz, 2.75 GHz, 3.0 GHz, 3.5 GHz, AND 4.0 Ghz.  
WITH INPUT POWER LEVELS OF: + 16 dBm, + 20 dBm, + 23 dBm, AND + 26 dBm.

RF POWER INPUT LEVEL	DD-20-23 S/N: PM71119	DD-20-34 S/N: PM71120	DD-20-23 S/N: 71121
<b>2.5 GHz FREQUENCY</b>			
+ 16 dBm	-39.4 mV	-44.6 mV	-33.8 mV
+ 20 dBm	-72.3 mV	-82.6 mV	-63.6 mV
+ 23 dBm	-110.6 mV	-121.7 mV	-101.7 mV
+ 26 dBm	-137.9 mV	-148.6 mV	-144.0 mV
<b>2.75 GHz FREQUENCY</b>			
+ 16 dBm	-38.6 mV	-45.0 mV	-35.8 mV
+ 20 dBm	-71.4 mV	-88.8 mV	-65.3 mV
+ 23 dBm	-111.9 mV	-125.7 mV	-101.7 mV
+ 26 dBm	-140.6 mV	-152.4 mV	-134.5 mV
<b>3.0 GHz FREQUENCY</b>			
+ 16 dBm	-43.2 mV	-43.5 mV	-31.7 mV
+ 20 dBm	-79.7 mV	-85.5 mV	-62.5 mV
+ 23 dBm	-115.9 mV	-122.6 mV	-96.0 mV
+ 26 dBm	-143.6 mV	-153.1 mV	-143.1 mV
<b>3.5 GHz FREQUENCY</b>			
+ 16 dBm	-49.5 mV	-46.5 mV	-37.1 mV
+ 20 dBm	-84.5 mV	-82.6 mV	-68.6 mV
+ 23 dBm	-157.1 mV	-166.7 mV	-135.1 mV
+ 26 dBm	-148.2 mV	-171.2 mV	-147.9 mV
<b>4.0 GHz FREQUENCY</b>			
+ 16 dBm	-47.7 mV	-43.4 mV	-42.4 mV
+ 20 dBm	-87.7 mV	-82.1 mV	-76.4 mV
+ 23 dBm	-125.1 mV	-121.7 mV	-119.4 mV
+ 26 dBm	-150.5 mV	-157.3 mV	-159.8 mV

**PLANAR MONOLITHICS INDUSTRIES, INC.**

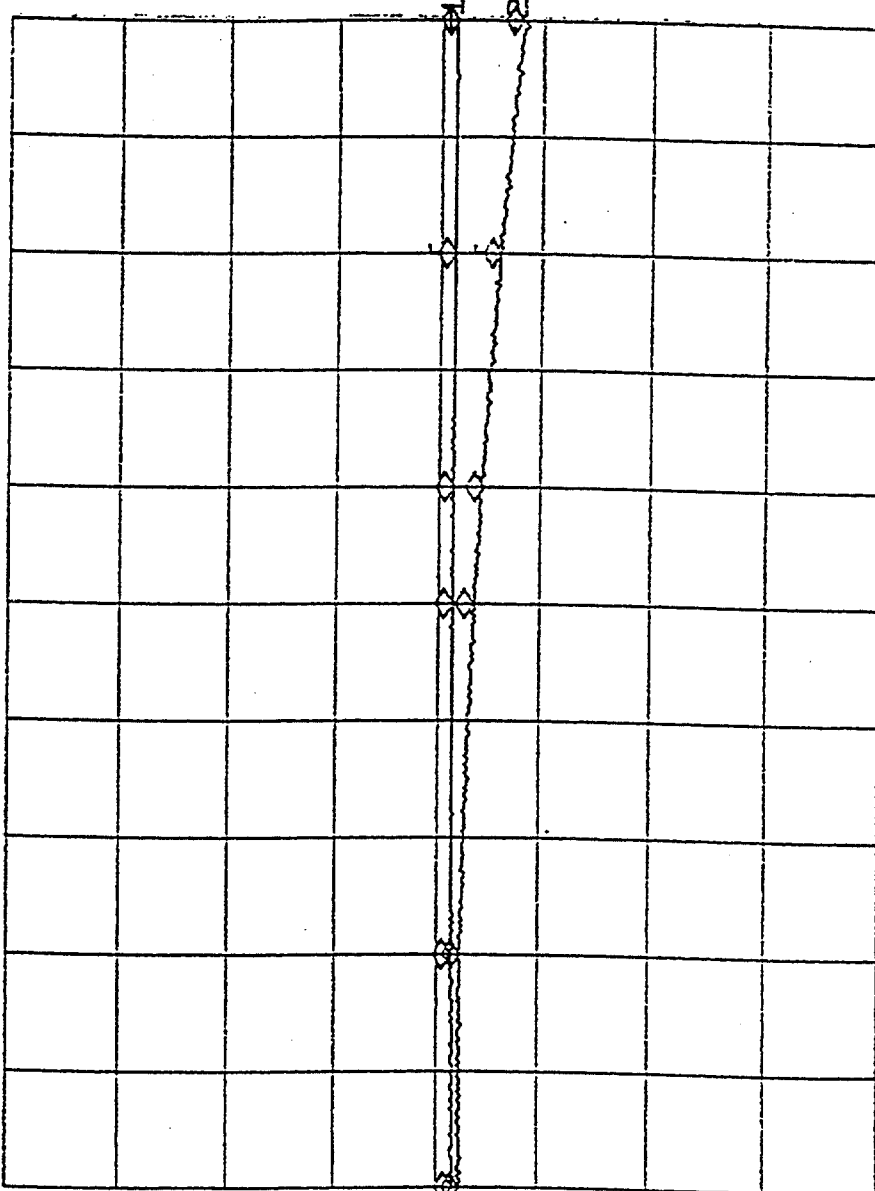
ENGINEERING AND CORPORATATE OFFICES: 1112 PERKIOMENVILLE ROAD, PERKIOMENVILLE, PA 18074  
MANUFACTURING AND SALES OFFICES: 7311-G GROVE ROAD, FREDERICK, MARYLAND 21704  
TELEPHONE: 301-662-4700, FAX: 301-662-4958, E-MAIL: AMCPMI@AOL.COM



**INSERTION LOSS/VSWR J1-J2**  
AS MEASURED FROM 2.5 TO 3.0 GHz  
SERIAL NUMBERS: PM71121

DD-20-23  
INSERTION LOSS/VSWR J1-J2

CH1: R REF: .40 dB  
1.0dB/ REF: .25 dB 5.0dB/ REF: -23.06 dB  
19.09 dB



	Y SWR	dB	Y SWR
#1	2.5 GHz	-20.1	-1.22:1
#2	2.6 GHz	-20.2	-1.22:1
#3	2.75 GHz	-20.8	-1.20:1
#4	2.8 GHz	-21.1	-1.19:1
#5	2.9 GHz	-21.9	-1.17:1
#6	3.0 GHz	-19.0	-1.25:1

CURRENT DRAW  
+15 V @ 1 mA  
-15 V @ 1 mA

MARKERS	IL
#1	2.5 GHz 0.40 dB
#2	2.6 GHz 0.39 dB
#3	2.75 GHz 0.38 dB
#4	2.8 GHz 0.38 dB
#5	2.9 GHz 0.38 dB
#6	3.0 GHz 0.40 dB

11/10/97 RA

JOB# P61015E  
DD-20-23  
S/N: PM71121

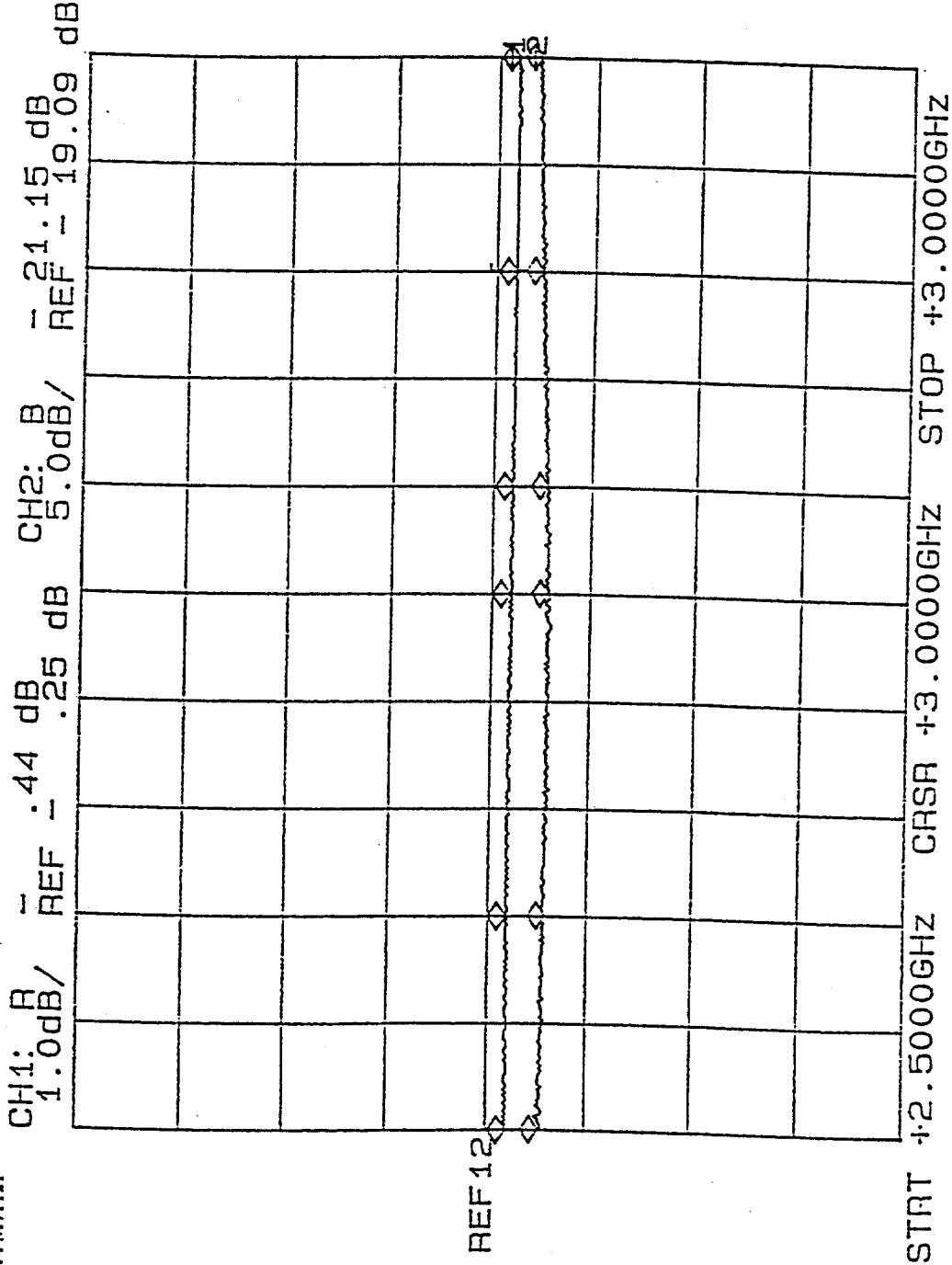
**PLANAR MONOLITHICS INDUSTRIES, INC.**

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MANUFACTURING AND SALES OFFICES: 7311-G GROVE ROAD, FREDERICK, MARYLAND 21704  
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**INSERTION LOSS/VSWR J2-J1**  
AS MEASURED FROM 2.5 TO 3.0 GHz  
SERIAL NUMBERS: PM71121

DD-20-23  
INSERTION LOSS/VSWR J2J1



VSWR

#	Freq	VSWR
#1	2.5 GHz	-1.20:1
#2	2.6 GHz	-1.18:1
#3	2.75 GHz	-1.18:1
#4	2.8 GHz	-1.18:1
#5	2.9 GHz	-1.19:1
#6	3.0 GHz	-1.19:1

CURRENT DRAV  
+15 V @ 1 mA  
-15 V @ 1 mA

MARKERS

#	Freq	IL
#1	2.5 GHz	0.43 dB
#2	2.6 GHz	0.42 dB
#3	2.75 GHz	0.42 dB
#4	2.8 GHz	0.43 dB
#5	2.9 GHz	0.43 dB
#6	3.0 GHz	0.44 dB

11/10/97 RA

JOB# P61015E  
DD-20-23  
S/N: PM71121

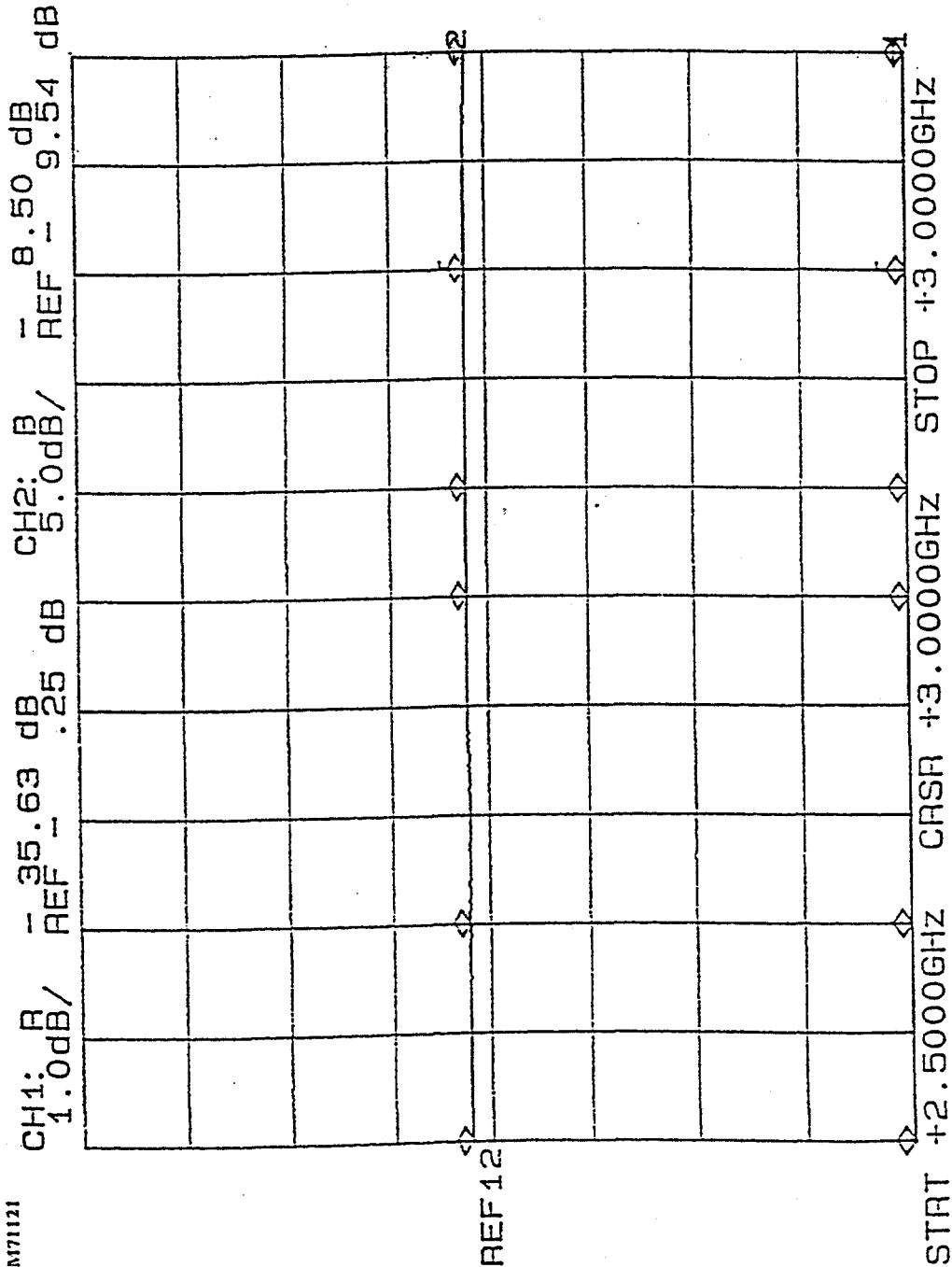


**VSWR J4**  
AS MEASURED FROM 2.5 TO 3.0 GHz  
SERIAL NUMBERS: PM71121

DD-20-23  
VSWR J4

11/10/97 RA

JOHN P61015E  
NEARSON  
S/N: PM71121

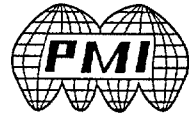


	VSWR	dB	VSWR
#1	2.5 GHz	-8.40	-2.23:1
#2	2.6 GHz	-8.47	-2.21:1
#3	2.75 GHz	-8.47	-2.21:1
#4	2.8 GHz	-8.46	-2.21:1
#5	2.9 GHz	-8.49	-2.21:1
#6	3.0 GHz	-8.50	-2.20:1

CURRENT DRAW—  
+15 V @ 1 mA  
-15 V @ 1 mA

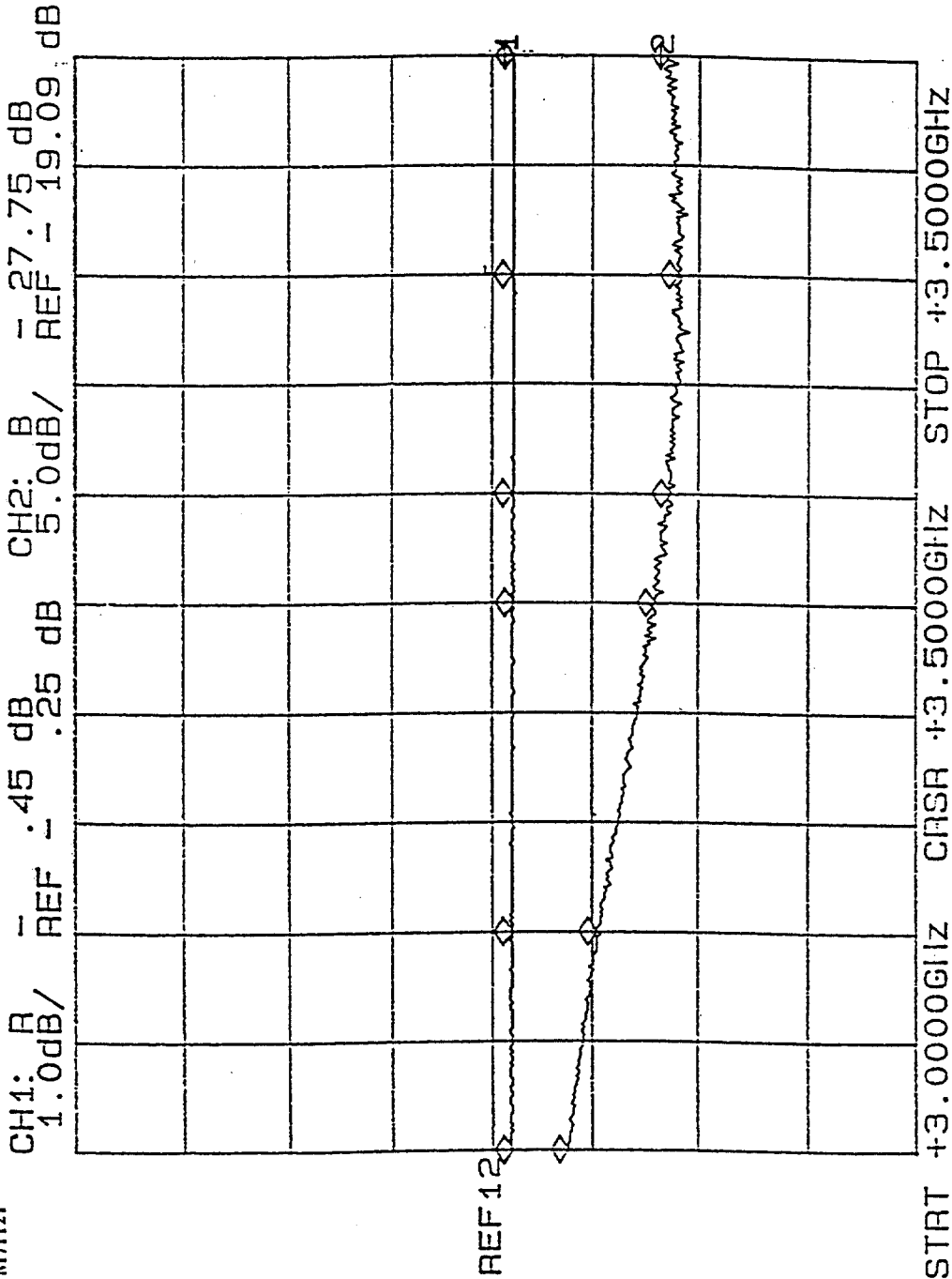
**PLANAR MONOLITHICS INDUSTRIES, INC.**

ENGINEERING AND CORPORATE OFFICES: 1112 PERKIOMENVILLE ROAD, PERKIOMENVILLE, PA 18074  
MANUFACTURING AND SALES OFFICES: 7311-G GROVE ROAD, FREDERICK, MARYLAND 21704  
TELEPHONE: 301-662-4700, FAX: 301-662-4958, E-MAIL: AMCPMI@AOL.COM



**INSERTION LOSS/VSWR J1-J2**  
AS MEASURED FROM 3.0 TO 3.5 GHz  
SERIAL NUMBERS: PM71121

DD-20-23  
INSERTION LOSS/VSWR J1-J2



MARKERS

IL	VSWR
#1 3.0 GHz 0.43 dB	#1 3.0 GHz -23.0 -1.15:1
#2 3.1 GHz 0.43 dB	#2 3.1 GHz -24.4 -1.13:1
#3 3.25 GHz 0.44 dB	#3 3.25 GHz -27.0 -1.09:1
#4 3.3 GHz 0.45 dB	#4 3.3 GHz -27.6 -1.09:1
#5 3.4 GHz 0.44 dB	#5 3.4 GHz -28.0 -1.08:1
#6 3.5 GHz 0.45 dB	#6 3.5 GHz -27.7 -1.09:1

CURRENT DRAW—  
+15 V @ 1 mA  
-15 V @ 1 mA

11/10/97 RA

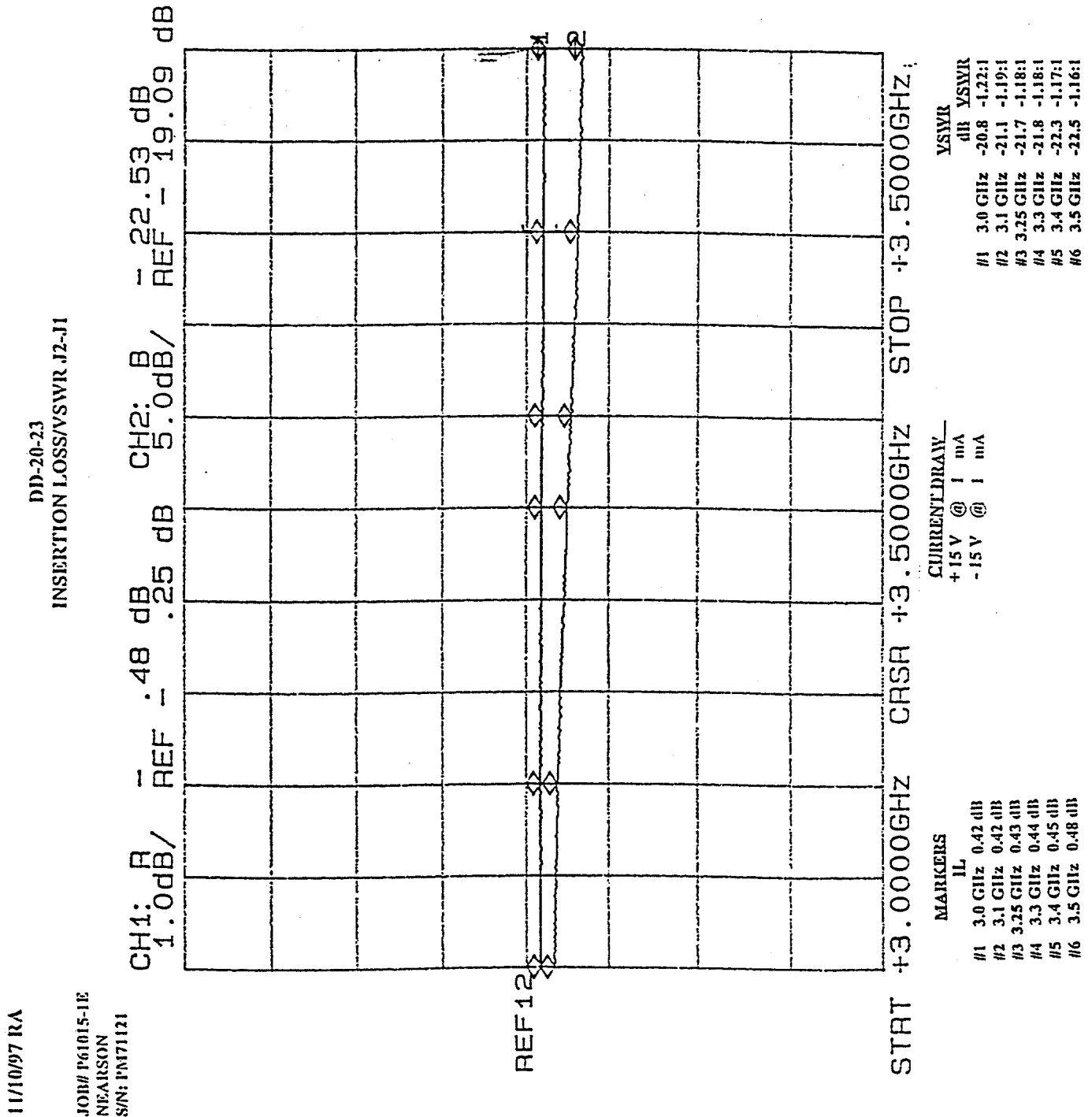
JOB# P61015-1E  
NEARSON  
S/N: PM71121

**PLANAR MONOLITHICS INDUSTRIES, INC.**

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MANUFACTURING AND SALES OFFICES: 7311-G GROVE ROAD, FREDERICK, MARYLAND 21704  
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**INSERTION LOSS/VSWR J2-J1**  
AS MEASURED FROM 3.0 TO 3.5 GHz  
SERIAL NUMBERS: PM71121



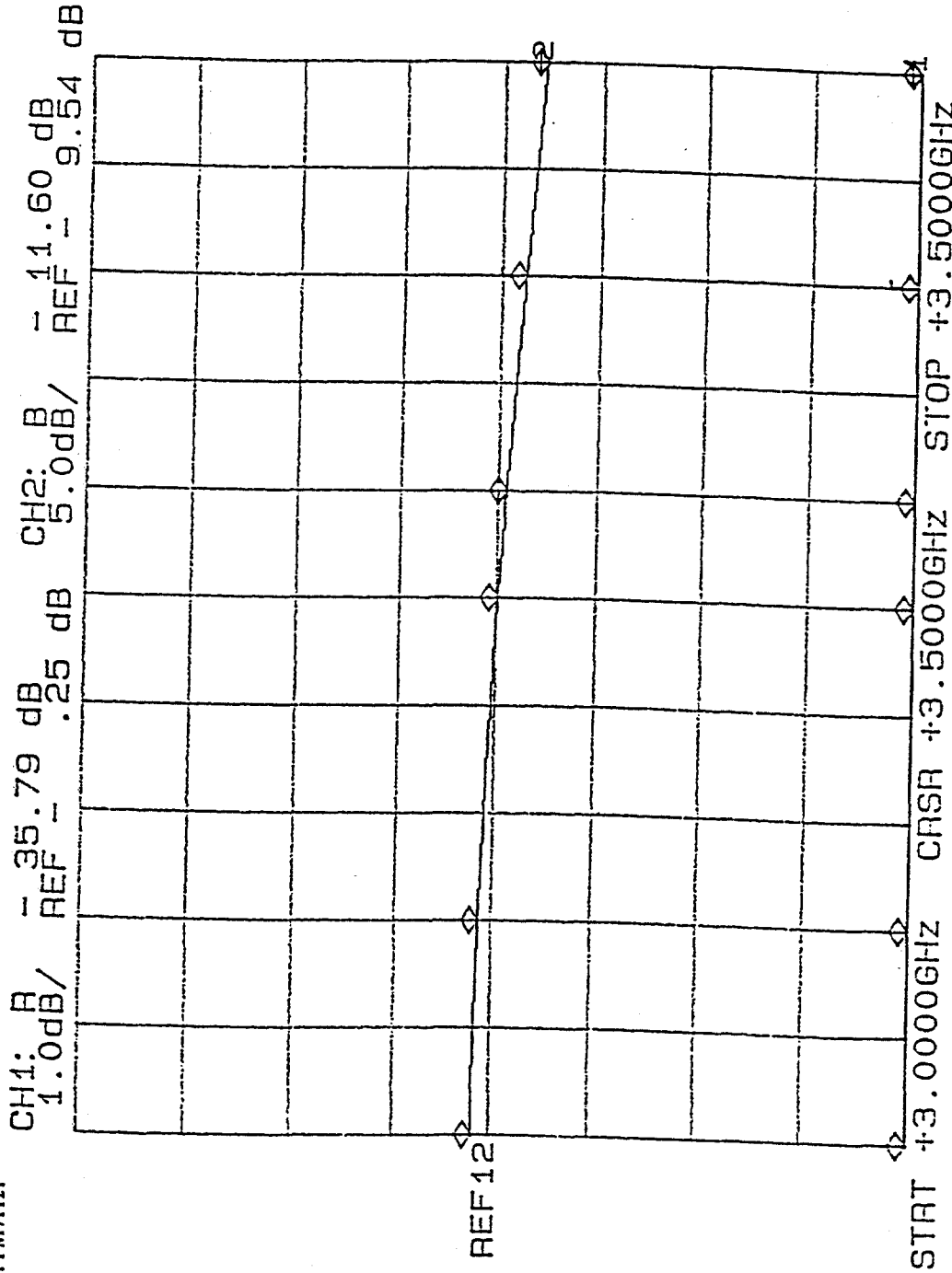
11/10/97 RA

JOB# P61015-1E  
NEARSON  
S/N: PM71121



**VSWR J4**  
AS MEASURED FROM 3.0 TO 3.5 GHz  
SERIAL NUMBERS: PM71121

DD-20-23  
VSWR J4



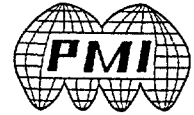
CURRENT DRAIN

VSWR	dB	VSWR
#1 3.0 GHz	-8.58	-2.20:1
#2 3.1 GHz	-8.87	-2.13:1
#3 3.25 GHz	-9.59	-1.99:1
#4 3.3 GHz	-9.92	-1.94:1
#5 3.4 GHz	-10.7	-1.82:1
#6 3.5 GHz	-11.6	-1.71:1

+15V @ 1 mA  
-15V @ 1 mA

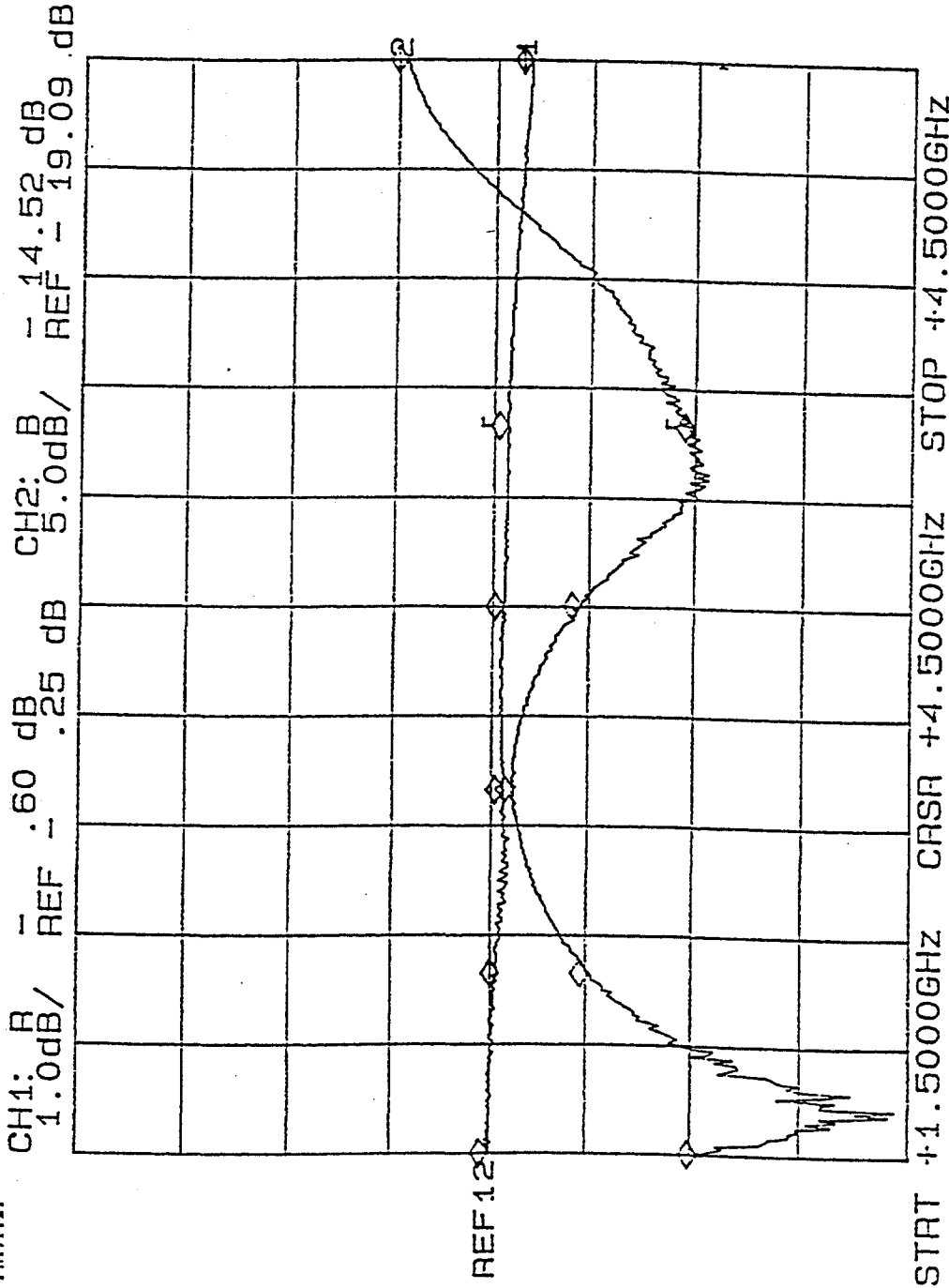
11/10/97 RA

JOB# P61015-1E  
NEARFIELD  
S/N: PM71121



**INSERTION LOSS/VSWR J1-J2**  
AS MEASURED FROM 1.5 TO 4.5 GHz  
SERIAL NUMBERS: PM71121

DD-20-23  
INSERTION LOSS/VSWR J1-J2



Y VSWR

#	Freq (GHz)	dB	VSWR
#1	1.5 GHz	-29.9	-1.07:1
#2	2.0 GHz	-24.1	-1.13:1
#3	2.5 GHz	-20.2	-1.22:1
#4	3.0 GHz	-23.6	-1.14:1
#5	3.5 GHz	-28.9	-1.07:1
#6	4.5 GHz	-14.5	-1.46:1

CURRENT DRAW  
+15 V @ 1 mA  
-15 V @ 1 mA

MARKERS

#	Freq (GHz)	IL (dB)
#1	1.5 GHz	0.21 dB
#2	2.0 GHz	0.32 dB
#3	2.5 GHz	0.36 dB
#4	3.0 GHz	0.35 dB
#5	3.5 GHz	0.39 dB
#6	4.5 GHz	0.60 dB

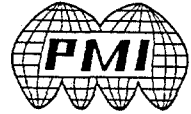
11/10/97 RA

JOB# P61015-1E  
NEARSON  
S/N: PM71121

**PLANAR MONOLITHICS INDUSTRIES, INC.**

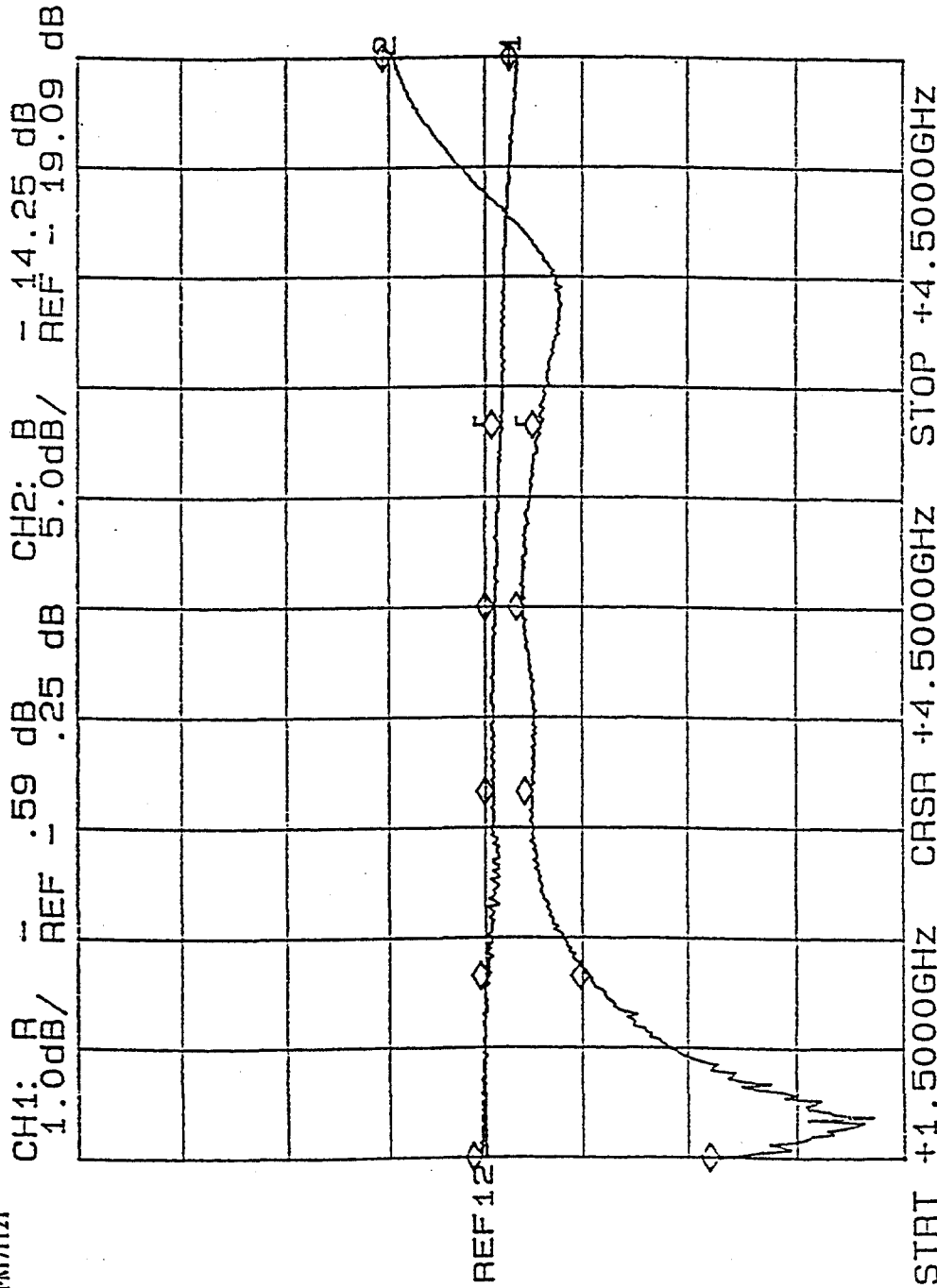
ENGINEERING AND CORPORATE OFFICES: 1112 PERKIOMENVILLE ROAD, PERKIOMENVILLE, PA 18074  
MANUFACTURING AND SALES OFFICES: 7311-G GROVE ROAD, FREDERICK, MARYLAND 21704  
TELEPHONE: 301-662-4700, FAX: 301-662-4958, E-MAIL: AMCPMI@AOL.COM





**INSERTION LOSS/VSWR J2-J1**  
AS MEASURED FROM 1.5 TO 4.5 GHz  
SERIAL NUMBERS: PM71121

DD-20-23  
INSERTION LOSS/VSWR J2-J1



Y:VSWR

#	GHz	dB	VSWR
#1	1.5 GHz	-31.6	-1.06:1
#2	2.0 GHz	-24.2	-1.13:1
#3	2.5 GHz	-21.4	-1.19:1
#4	3.0 GHz	-21.0	-1.20:1
#5	3.5 GHz	-21.9	-1.17:1
#6	4.5 GHz	-14.2	-1.48:1

CURRENT DRAIN  
+15V @ 1 mA  
-15V @ 1 mA

MARKERS

#	GHz	IL
#1	1.5 GHz	0.19 dB
#2	2.0 GHz	0.28 dB
#3	2.5 GHz	0.32 dB
#4	3.0 GHz	0.33 dB
#5	3.5 GHz	0.40 dB
#6	4.5 GHz	0.59 dB

11/10/97 RA

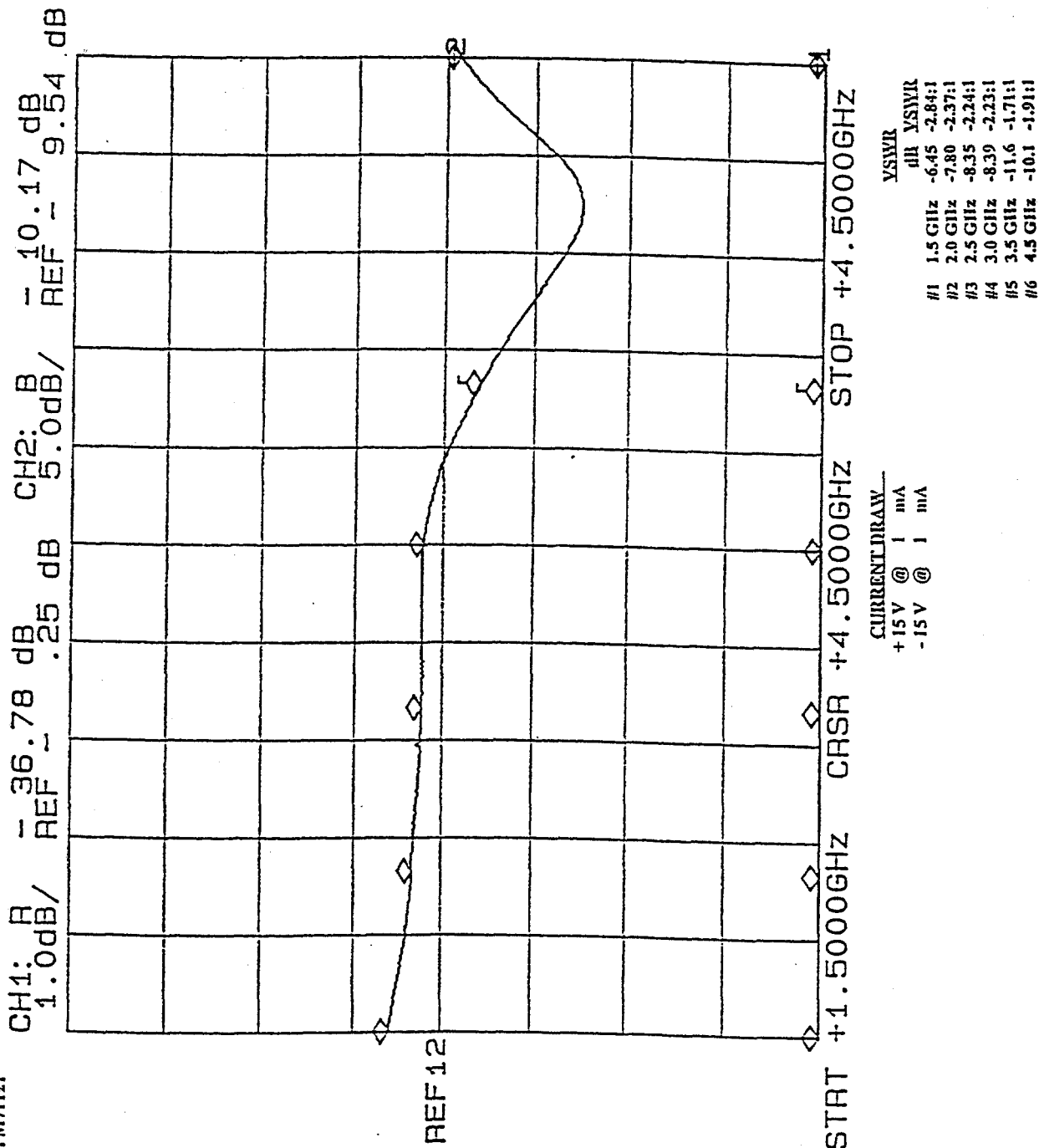
JOB# P61015-1E  
NEARSON  
S/N: PM71121

**PLANAR MONOLITHICS INDUSTRIES, INC.**

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MANUFACTURING AND SALES OFFICES: 7311-G GROVE ROAD, FREDERICK, MARYLAND 21704  
TELEPHONE: 301-662-4700, FAX: 301-662-4958, E-MAIL: AMCPMI@AOL.COM



**VSWR J4**  
AS MEASURED FROM 1.5 TO 4.5 GHz  
SERIAL NUMBERS: PM71121



DD-20-23  
VSWR J4

11/10/97 RA

JOB# P61015-1E  
NEARFIELD  
S/N: PM71121

CURRENT DRAW  
+15 V @ 1 mA  
-15 V @ 1 mA

**PLANAR MONOLITHICS INDUSTRIES, INC.**

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MANUFACTURING AND SALES OFFICES: 7311-G GROVE ROAD, FREDERICK, MARYLAND 21704  
TELEPHONE: 301-662-4700, FAX: 301-662-4958, E-MAIL: AMCPMI@AOL.COM



TEST DATA

ON

DC COUPLED, HIGH SPEED

3.0 TO 3.5 GHz

(WITH MEASURED DATA FROM 1.5 TO 4.5 GHz)

ON

3 WATT INPUT POWER HANDLING

20 dB DIRECTIVITY

50  $\Omega$  IMPEDENCE

**DIRECTIONAL DETECTOR**

**PMI MODEL No:**

**DD-20-34**

SERIAL NUMBERS: PM71120

DESIGNED  
BY  
A. K. GORWARA

TESTED  
BY  
R. AFABLE

REPORTED  
BY  
P. D. WOOD

APRIL 17, 1998

*PLANAR MONOLITHICS INDUSTRIES, INC.*

ENGINEERING AND CORPORATE OFFICES: 1112 PERKIOMENVILLE ROAD, PERKIOMENVILLE, PA 18074  
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TELEPHONE: 301-662-4700, FAX: 301-662-4958, E-MAIL: AMCPMI@AOL.COM



**SUMMARY TEST DATA**  
AS MEASURED FROM 3.0 TO 3.5 GHz  
SERIAL NUMBERS: PM71120

FORM: PROD-6/2397



**SUMMARY TEST DATA**  
**DIRECTIONAL DETECTOR**

MODEL NO: DD-20-34 (DD6501C) OPTION(S): \_\_\_\_\_ JOB NO: P61015E-2  
PARTS LIST NO: 100-4115 REVISION: A SERIAL NO: PM71120  
DRAWING NO: 300-4114 CUSTOMER: NEARSON HI TECH  
SPECIFICATIONS:  COMMERCIAL  MIL-STD 454  OTHER: \_\_\_\_\_  
TEMPERATURE: 0°C TO 70°C

TEST ITEM NO.	PARAMETERS	SPECIFIED VALUE	MEASURED VALUE	REMARKS QA/QC
1	FREQUENCY	3.0 TO 3.5 GHz	✓	✓
2	INSERTION LOSS	0.25 dB MAX.	-0.45 dB	✓
3	INSERTION LOSS VARIATION OVER FREQUENCY	0.2dBMAX	0.07 dB	✓
4	VSWR	1.25:1 MAX.	-28.37 dB	✓
5	MAX. INPUT POWER	3 WATTS	✓	✓
6	SUPPLY VOLTAGE	±15V	✓	✓
7	IMPEDANCE	50 OHMS	✓	✓
8	MIN. DIRECTIVITY	20 dB min.	✓	✓
9	OUTPUT VOLTAGE VARIATION WITH FREQ. AND TEMP.	±0.2 db MAX.	✓	✓
10	DETECTOR OUTPUT VOLTAGE POWER IN +26dBm +23dBm +20dBm +16dBm	VOLTAGE OUT 150 TO 220mV 94 TO 130mV 58 TO 83mV 31 TO 46mV	-148.6mV -121.7mV -82.6mV -44.6mV	✓
11	VIDEO BANDWIDTH (if Freq.)	10 MHz MIN.	✓	✓

PRODUCTION MANAGER APPROVAL: [Signature] DATED: 11-3-97  
INSP. BY: \_\_\_\_\_ DATED: \_\_\_\_\_  
QA/QC APPROVAL: \_\_\_\_\_ DATED: 11-3-97



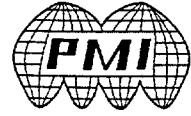
**VIDEO OUTPUT VOLTAGE Vs FREQUENCY**

AS MEASURED AT: 2.5 GHz, 2.75 GHz, 3.0 GHz, 3.5 GHz, AND 4.0 Ghz.  
WITH INPUT POWER LEVELS OF: + 16 dBm, + 20 dBm, + 23 dBm, AND + 26 dBm.

RF POWER INPUT LEVEL	DD-20-23 S/N: PM71119	DD-20-34 S/N: PM71120	DD-20-23 S/N: 71121
<b>2.5 GHz FREQUENCY</b>			
+ 16 dBm	-39.4 mV	-44.6 mV	-33.8 mV
+ 20 dBm	-72.3 mV	-82.6 mV	-63.6 mV
+ 23 dBm	-110.6 mV	-121.7 mV	-101.7 mV
+ 26 dBm	-137.9 mV	-148.6 mV	-144.0 mV
<b>2.75 GHz FREQUENCY</b>			
+ 16 dBm	-38.6 mV	-45.0 mV	-35.8 mV
+ 20 dBm	-71.4 mV	-88.8 mV	-65.3 mV
+ 23 dBm	-111.9 mV	-125.7 mV	-101.7 mV
+ 26 dBm	-140.6 mV	-152.4 mV	-134.5 mV
<b>3.0 GHz FREQUENCY</b>			
+ 16 dBm	-43.2 mV	-43.5 mV	-31.7 mV
+ 20 dBm	-79.7 mV	-85.5 mV	-62.5 mV
+ 23 dBm	-115.9 mV	-122.6 mV	-96.0 mV
+ 26 dBm	-143.6 mV	-153.1 mV	-143.1 mV
<b>3.5 GHz FREQUENCY</b>			
+ 16 dBm	-49.5 mV	-46.5 mV	-37.1 mV
+ 20 dBm	-84.5 mV	-82.6 mV	-68.6 mV
+ 23 dBm	-157.1 mV	-166.7 mV	-135.1 mV
+ 26 dBm	-148.2 mV	-171.2 mV	-147.9 mV
<b>4.0 GHz FREQUENCY</b>			
+ 16 dBm	-47.7 mV	-43.4 mV	-42.4 mV
+ 20 dBm	-87.7 mV	-82.1 mV	-76.4 mV
+ 23 dBm	-125.1 mV	-121.7 mV	-119.4 mV
+ 26 dBm	-150.5 mV	-157.3 mV	-159.8 mV

**PLANAR MONOLITHICS INDUSTRIES, INC.**

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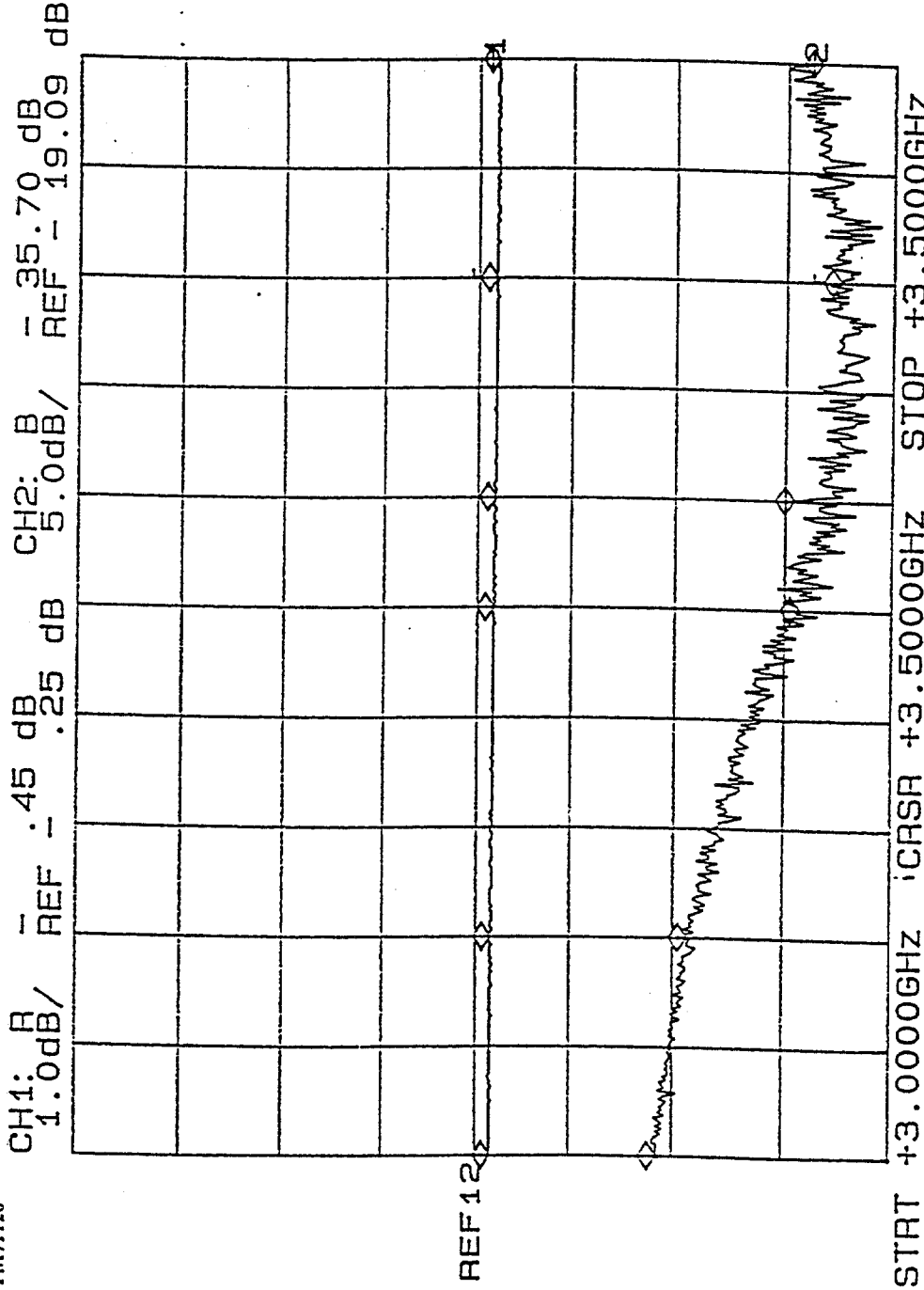


**INSERTION LOSS/VSWR J1-J2**  
AS MEASURED FROM 3.0 TO 3.5 GHz  
SERIAL NUMBERS: PM71120

11/10/97 RA

DD-20-34  
INSERTION LOSS/VSWR J1-J2

JOB# P61015-2E  
NEARSON  
S/N: PM71120



MARKERS	IL	CURRENT DRAW	VSWR
#1	3.0 GHz 0.40 dB	+15 V @ 1 mA	dB VSWR -28.3 -1.08:1
#2	3.1 GHz 0.41 dB	-15 V @ 1 mA	#2 3.1 GHz -29.9 -1.07:1
#3	3.25 GHz 0.42 dB		#3 3.25 GHz -34.7 -1.04:1
#4	3.3 GHz 0.43 dB		#4 3.3 GHz -35.9 -1.03:1
#5	3.4 GHz 0.44 dB		#5 3.4 GHz -36.0 -1.03:1
#6	3.5 GHz 0.45 dB		#6 3.5 GHz -35.7 -1.03:1

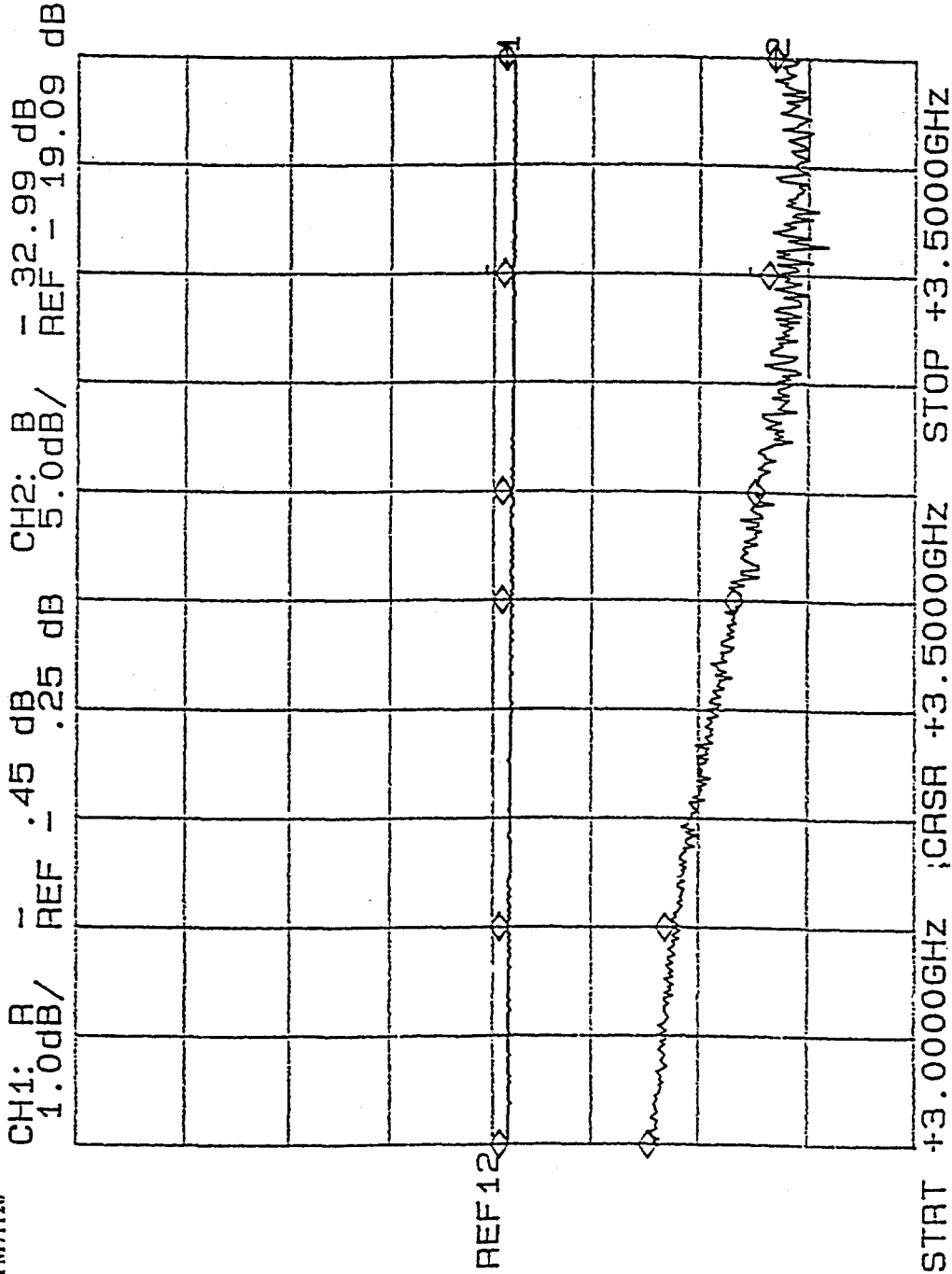


**INSERTION LOSS/VSWR J2-J1**  
AS MEASURED FROM 3.0 TO 3.5 GHz  
SERIAL NUMBERS: PM71120

DD-20-34  
INSERTION LOSS/VSWR J2-J1

11/10/97 RA

JOB# P61015-2E  
NEARSON  
S/N: PM71120



MARKERS	IL
#1	3.0 GHz 0.40 dB
#2	3.1 GHz 0.40 dB
#3	3.25 GHz 0.42 dB
#4	3.3 GHz 0.42 dB
#5	3.4 GHz 0.44 dB
#6	3.5 GHz 0.45 dB

Y SWR	dB	V SWR
#1	3.0 GHz	-27.0 -1.09:1
#2	3.1 GHz	-27.7 -1.09:1
#3	3.25 GHz	-30.6 -1.06:1
#4	3.3 GHz	-31.9 -1.05:1
#5	3.4 GHz	-33.8 -1.04:1
#6	3.5 GHz	-32.9 -1.05:1

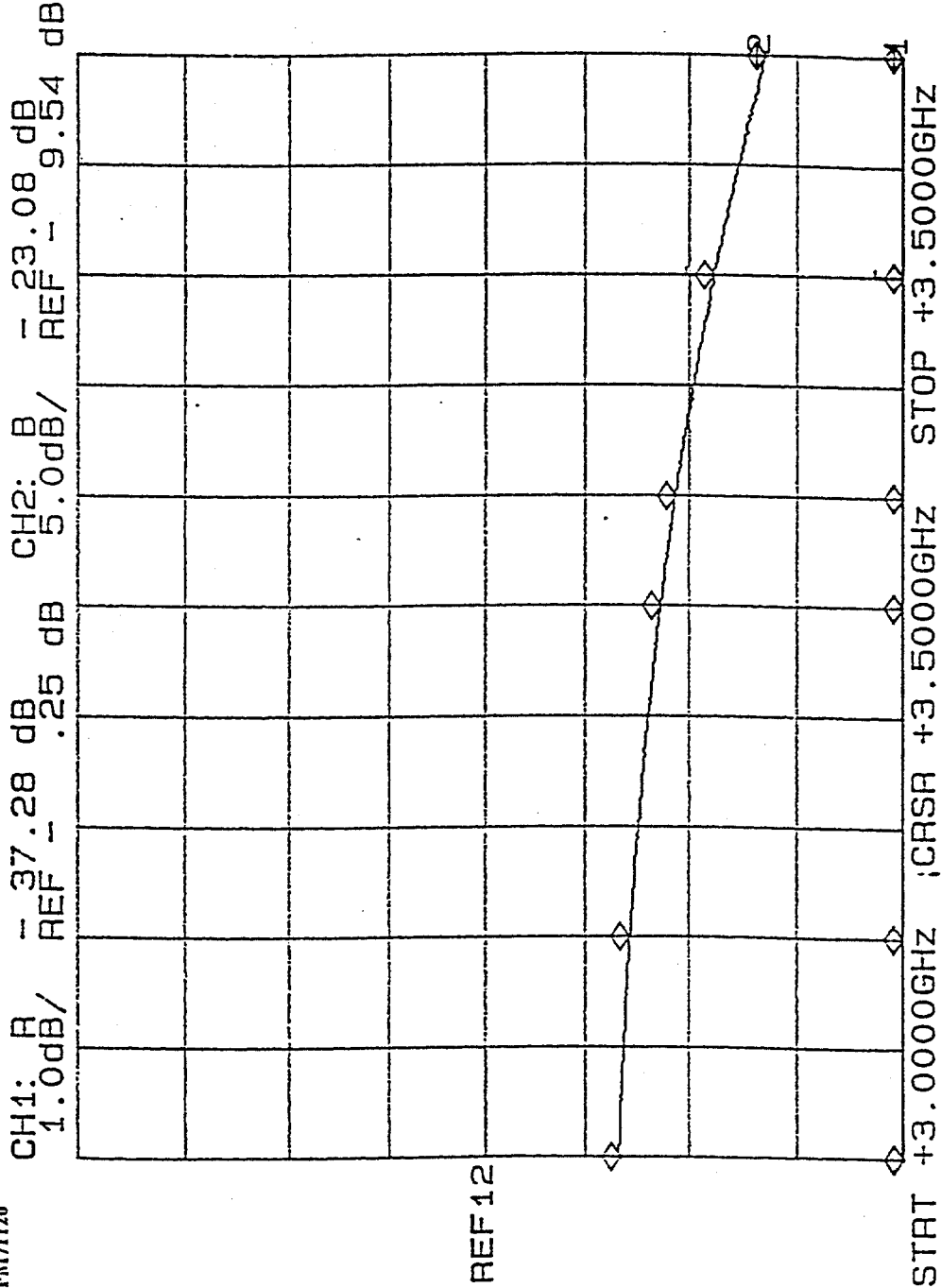
**PLANAR MONOLITHICS INDUSTRIES, INC.**

ENGINEERING AND CORPORATE OFFICES: 1112 PERKIOMENVILLE ROAD, PERKIOMENVILLE, PA 18074  
MANUFACTURING AND SALES OFFICES: 7311-G GROVE ROAD, FREDERICK, MARYLAND 21704  
TELEPHONE: 301-662-4700, FAX: 301-662-4958, E-MAIL: AMCPMI@AOL.COM



**VSWR J4**  
AS MEASURED FROM 3.0 TO 3.5 GHz  
SERIAL NUMBERS: PM71120

DD-20-34  
VSWR J4



YSWR	dB	VSWR
#1	3.0 GHz	-16.1
#2	3.1 GHz	-16.6
#3	3.25 GHz	-18.4
#4	3.3 GHz	-18.8
#5	3.4 GHz	-20.6
#6	3.5 GHz	-23.0

CURRENT DRAW  
+15 V @ 1 mA  
-15 V @ 1 mA

11/10/97 RA

JOB# P61015-2E  
NEARFIELD  
S/N: PM71120

**PLANAR MONOLITHICS INDUSTRIES, INC.**

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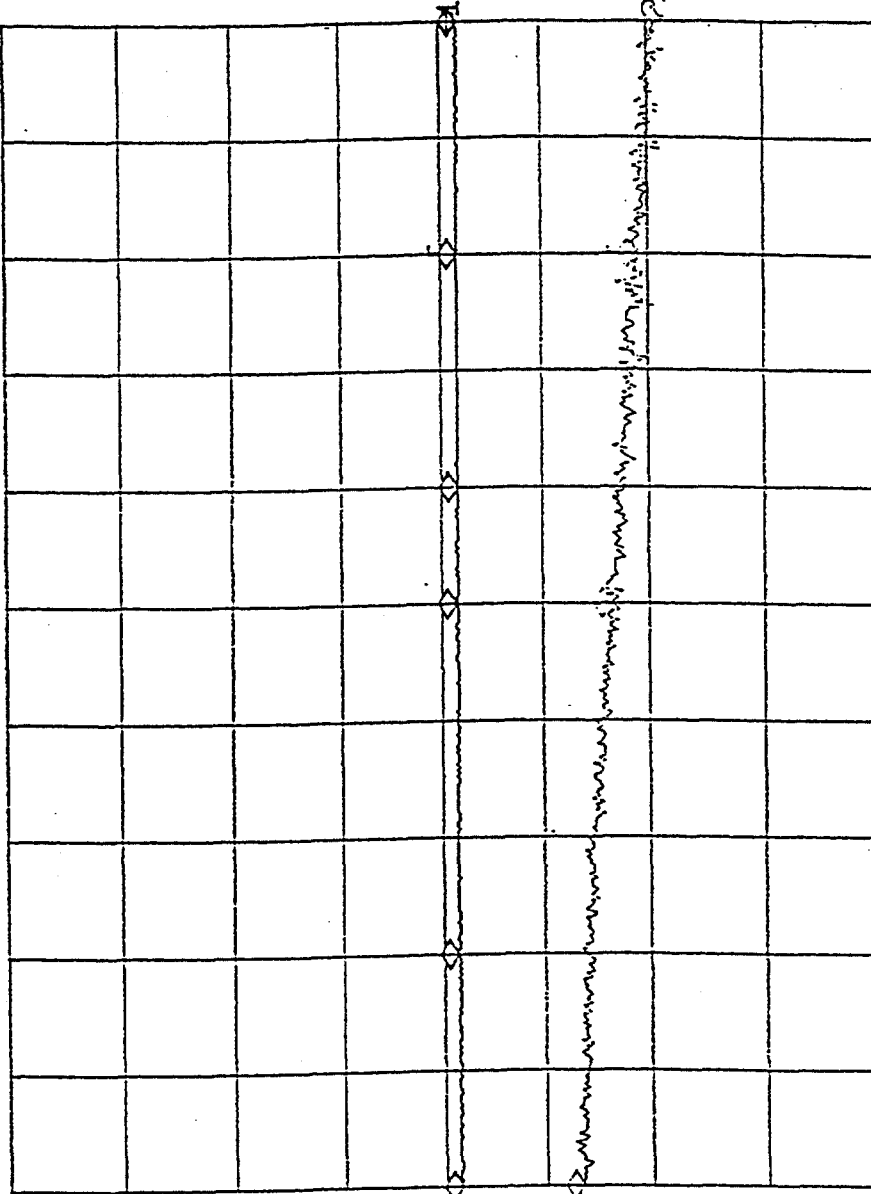
**INSERTION LOSS/VSWR J1-J2**  
AS MEASURED FROM 2.5 TO 3.0 GHz  
SERIAL NUMBERS: PM71120

DD-20-34  
INSERTION LOSS/VSWR J1-J2

11/10/97 RA

JOB# F61015E  
NEARSON  
S/N: PM71120

CH1: R REF: .42 dB CH2: B REF: 29.73 dB  
1.0dB/ REF: .25 dB 5.0dB/ REF: 19.09 dB



REF 1?

START +2.5000GHZ ; CRSR +3.0000GHZ STOP +3.0000GHZ

MARKERS

#	Freq (GHz)	IL (dB)
#1	2.5	0.39
#2	2.6	0.38
#3	2.75	0.39
#4	2.8	0.40
#5	2.9	0.40
#6	3.0	0.42

CURRENT DRAIN  
+15V @ 1 mA  
-15V @ 1 mA

VSWR

#	Freq (GHz)	VSWR (dB)
#1	2.5	-25.9
#2	2.6	-26.4
#3	2.75	-27.8
#4	2.8	-27.7
#5	2.9	-28.9
#6	3.0	-29.7

**PLANAR MONOLITHICS INDUSTRIES, INC.**

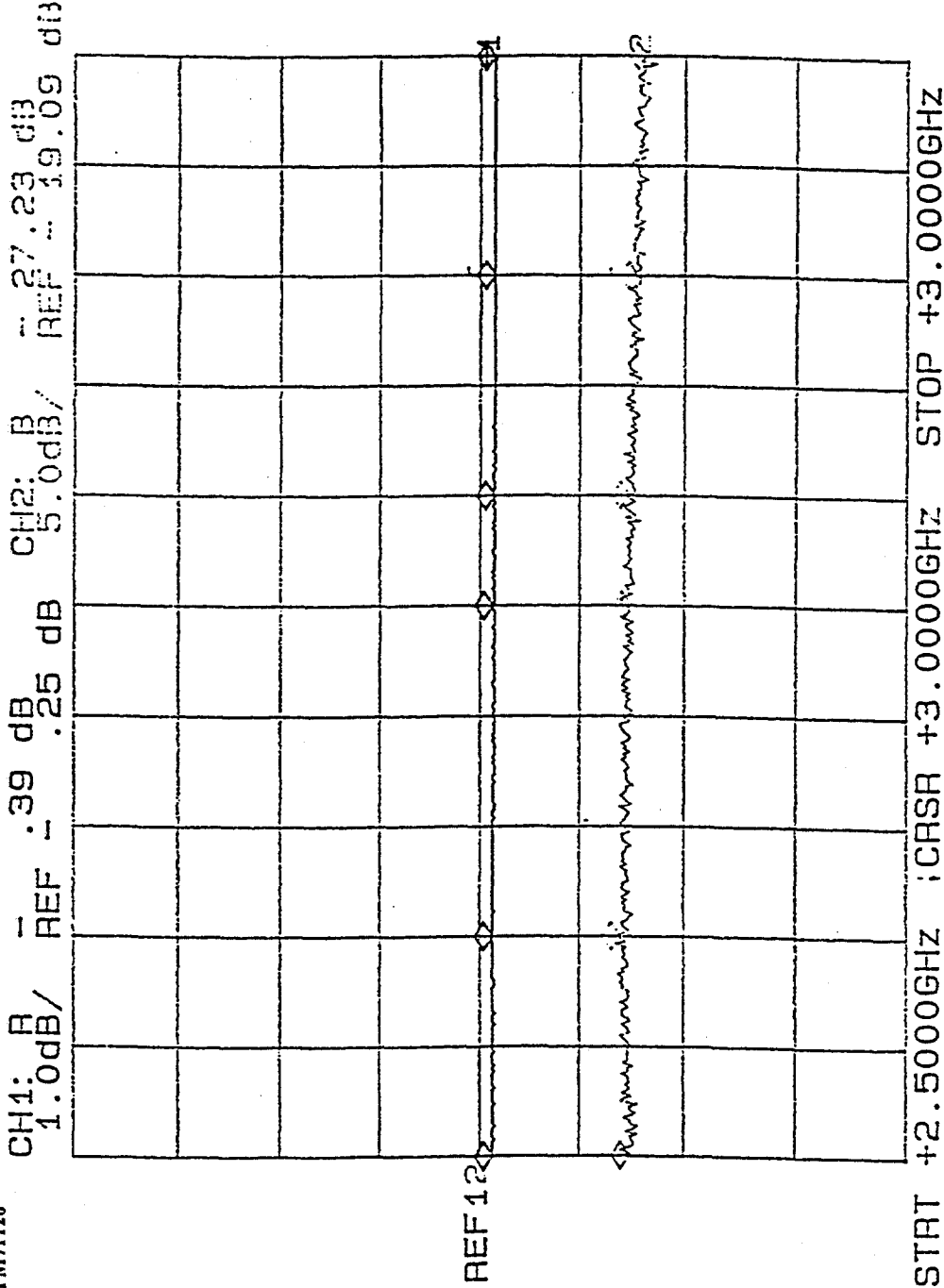
ENGINEERING AND CORPORATE OFFICES: 1112 PERKIOMENVILLE ROAD, PERKIOMENVILLE, PA 18074  
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**INSERTION LOSS/VSWR J2-J1**  
AS MEASURED FROM 2.5 TO 3.0 GHz  
SERIAL NUMBERS: PM71120

11/10/97 RA  
DD-20-34  
INSERTION LOSS/VSWR J2-J1

JOHN P61015E  
NEARSON  
S/N: PM71120



MARKERS	IL	VSWR
#1	2.5 GHz 0.37 dB	2.5 GHz -26.5 -1.1:1
#2	2.6 GHz 0.36 dB	2.6 GHz -26.1 -1.10:1
#3	2.75 GHz 0.37 dB	2.75 GHz -26.5 -1.10:1
#4	2.8 GHz 0.38 dB	2.8 GHz -26.7 -1.10:1
#5	2.9 GHz 0.38 dB	2.9 GHz -27.1 -1.09:1
#6	3.0 GHz 0.39 dB	3.0 GHz -27.2 -1.09:1

CURRENT DRAIN  
+15 V @ 1 mA  
-15 V @ 1 mA

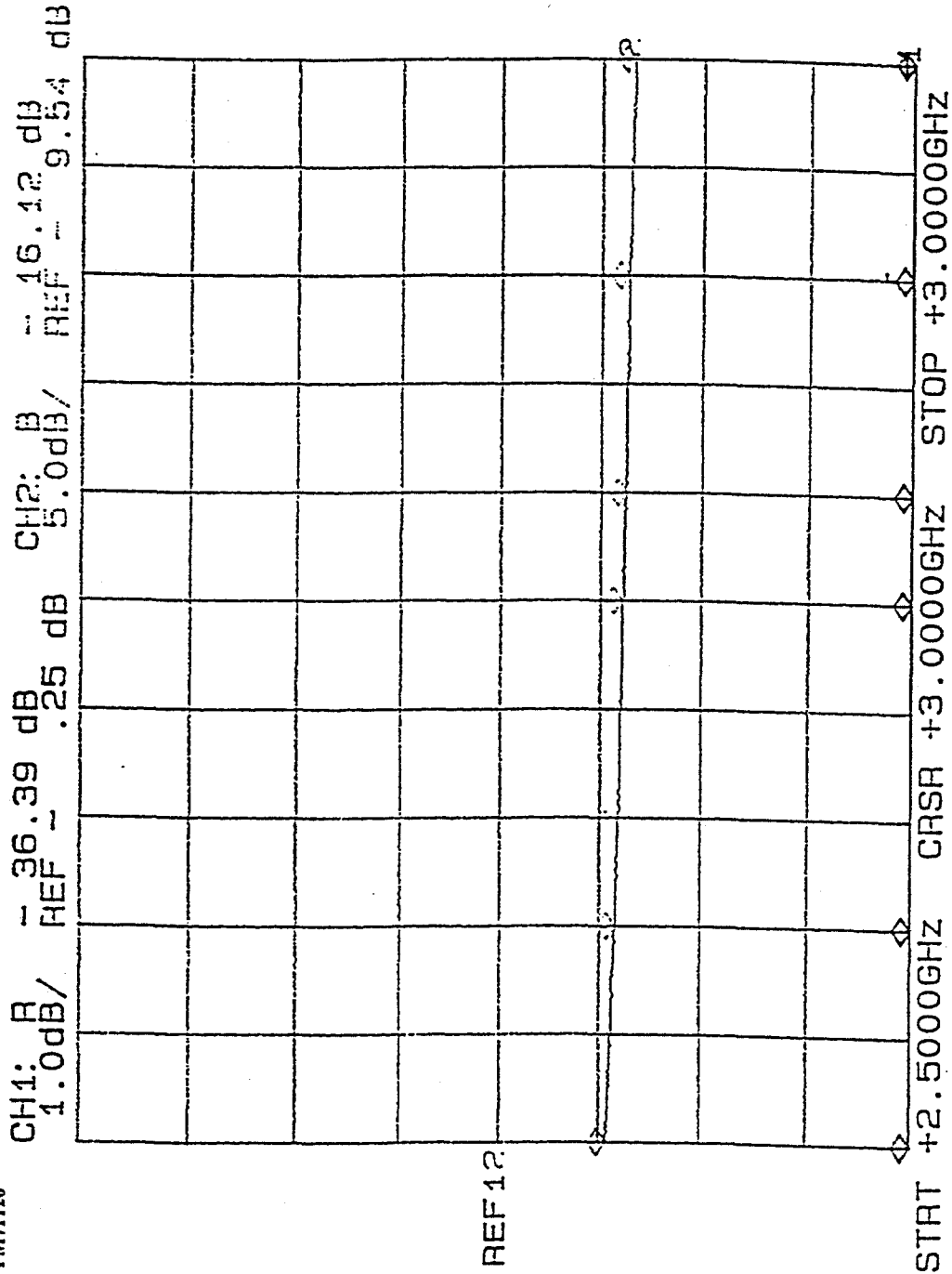


**VSWR J4**  
AS MEASURED FROM 2.5 TO 3.0 GHz  
SERIAL NUMBERS: PM71120

DD-20-34  
VSWR J4

11/10/97 RA

JOB# P61015-2E  
NEARFIELD  
SN: PM71120



CURRENT/DRAW

Y	V	I	mA
15	V	@	1 mA
-15	V	@	1 mA

Y	V	I	mA
15	V	@	1 mA
-15	V	@	1 mA

Y	V	I	mA
15	V	@	1 mA
-15	V	@	1 mA

Y	V	I	mA
15	V	@	1 mA
-15	V	@	1 mA

Y	V	I	mA
15	V	@	1 mA
-15	V	@	1 mA

Y	V	I	mA
15	V	@	1 mA
-15	V	@	1 mA

Y	V	I	mA
15	V	@	1 mA
-15	V	@	1 mA

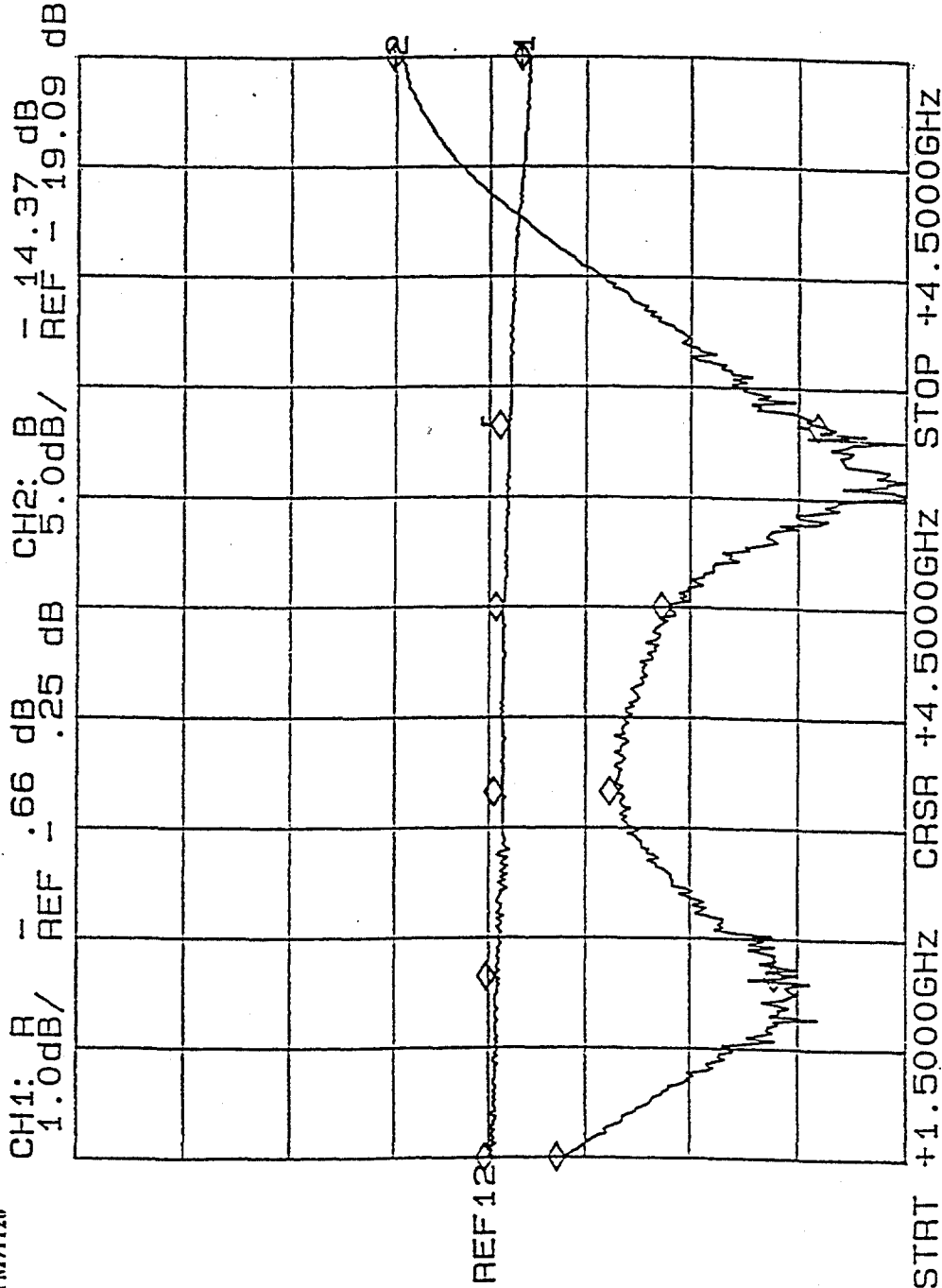
**PLANAR MONOLITHICS INDUSTRIES, INC.**

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**INSERTION LOSS/VSWR J1-J2**  
AS MEASURED FROM 1.5 TO 4.5 GHz  
SERIAL NUMBERS: PM71120

DD-20-34  
INSEKTIION LOSS/VSWR J1-J2



MARKERS	IL	VSWR
#1	1.5 GHz 0.27 dB	1.15:1
#2	2.0 GHz 0.33 dB	1.04:1
#3	2.5 GHz 0.38 dB	1.11:1
#4	3.0 GHz 0.39 dB	1.08:1
#5	3.5 GHz 0.43 dB	1.04:1
#6	4.5 GHz 0.66 dB	1.48:1

CURRENT DRAV	dB	VSWR
+15 V @ 1 mA	-23.2	-1.15:1
-15 V @ 1 mA	-33.9	-1.04:1
	-25.5	-1.11:1
	-28.1	-1.08:1
	-33.2	-1.04:1
	-14.3	-1.48:1

11/10/97 RA  
JOB# P61015-2E  
NEARSON  
S/N: PM71120

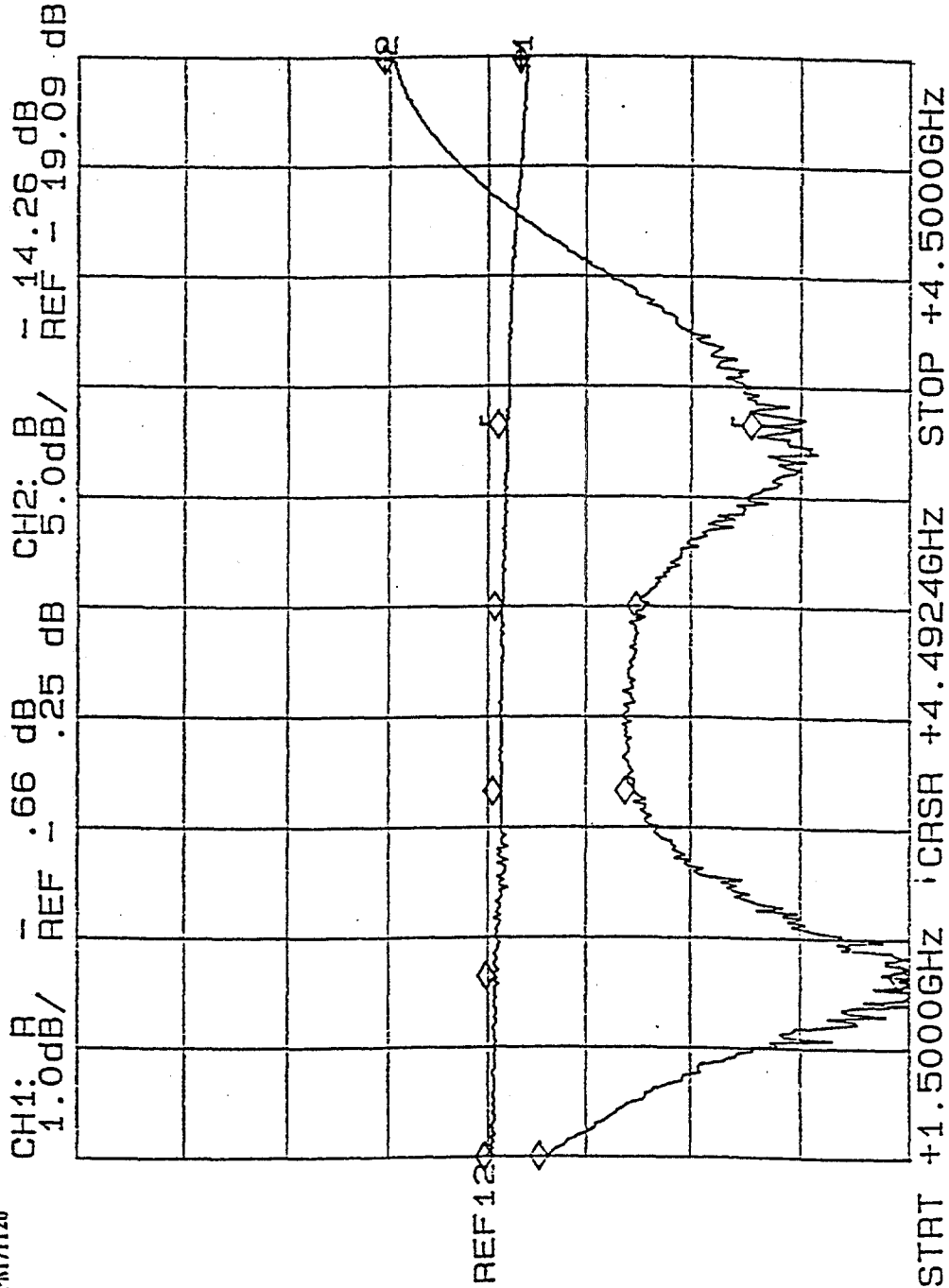


**INSERTION LOSS/VSWR J2-J1**  
AS MEASURED FROM 1.5 TO 4.5 GHz  
SERIAL NUMBERS: PM71120

DD-20-34  
INSERTION LOSS/VSWR J2-J1

11/10/97 RA

JOB# P61015-2E  
NEARSON  
S/N: PM71120



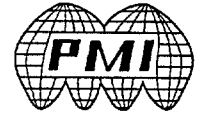
MARKERS

IL	VSWR
#1 1.5 GHz 0.28 dB	#1 1.5 GHz -22.2 -1.17:1
#2 2.0 GHz 0.32 dB	#2 2.0 GHz -37.9 -1.03:1
#3 2.5 GHz 0.38 dB	#3 2.5 GHz -26.3 -1.10:1
#4 3.0 GHz 0.39 dB	#4 3.0 GHz -26.5 -1.10:1
#5 3.5 GHz 0.44 dB	#5 3.5 GHz -33.9 -1.04:1
#6 4.5 GHz 0.66 dB	#6 4.5 GHz -14.2 -1.48:1

CURRENT DRAIN  
+15 V @ 1 mA  
-15 V @ 1 mA

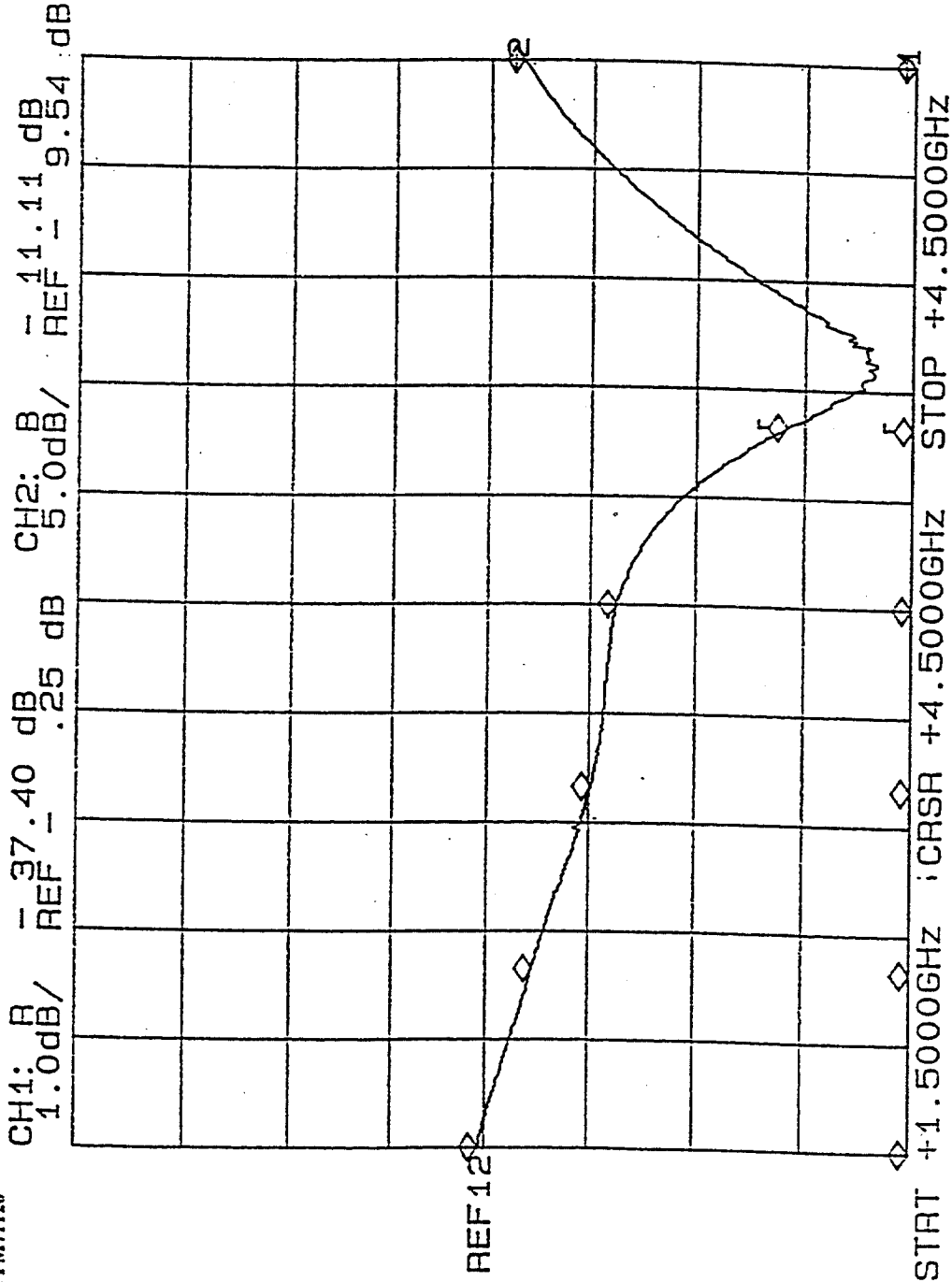
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**VSWR J4**  
AS MEASURED FROM 1.5 TO 4.5 GHz  
SERIAL NUMBERS: PM71120

DD-20-34  
VSWR J4



	VSWR	dB
#1	1.5 GHz	-9.16
#2	2.0 GHz	-11.8
#3	2.5 GHz	-14.6
#4	3.0 GHz	-15.7
#5	3.5 GHz	-23.8
#6	4.5 GHz	-11.1

CURRENT DRAW  
+15 V @ 1 mA  
-15 V @ 1 mA

11/10/97 RA

JOHN P61015-2E  
NEARFIELD  
S/N: PM71120

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