TECHNICAL MANUAL FOR

Advanced Antennas DRG-118G Horn Antenna

1 - 18 GHz Double Ridged Horn Antenna

Advanced Antennas

ADVANCED ANTENNAS

10401 Roselle Street

San Diego, CA 92121

(800) 404-2832

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SECTION 1. GENERAL DESCRIPTION

The DRG-118G (DRG-118/A) is a linearly-polarized wide-band Double-Ridged Horn Antenna. The DRG-118G antenna model number is identical to the old model number DRG-118/A. It is designed to transmit or receive in the frequency band from 1.0 GHz to 18.0 GHz with low VSWR, optimum antenna factor, high gain, uniform E-Plane and H-plane radiation patterns, and high transmit power capability. The antenna may be used with its typical antenna factor characteristic (see Figure 2-3) to make approximate field strength measurements. Greater accuracy requires individual calibration. The antenna is ideally suited for EMC testing, direction finding, surveillance, and antenna gain and pattern measurements.

The antenna has the advantage of small size and light weight, and it can be mounted to a tripod or flat surface using the ¼-20 tapped hole on its mounting bracket, as shown in Figures 1-1, 1-2, 1-3, and 1-4.

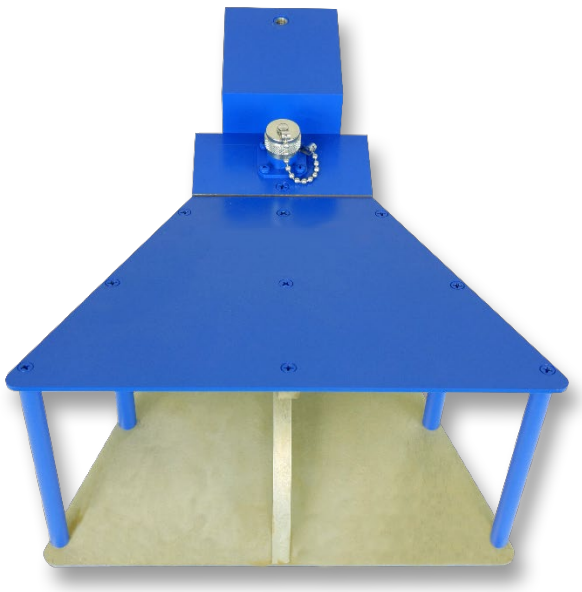

Figure 1-1 The DRG-118G

Figure 1-2 The DRG-118G

Figure 1-3 The DRG-118G

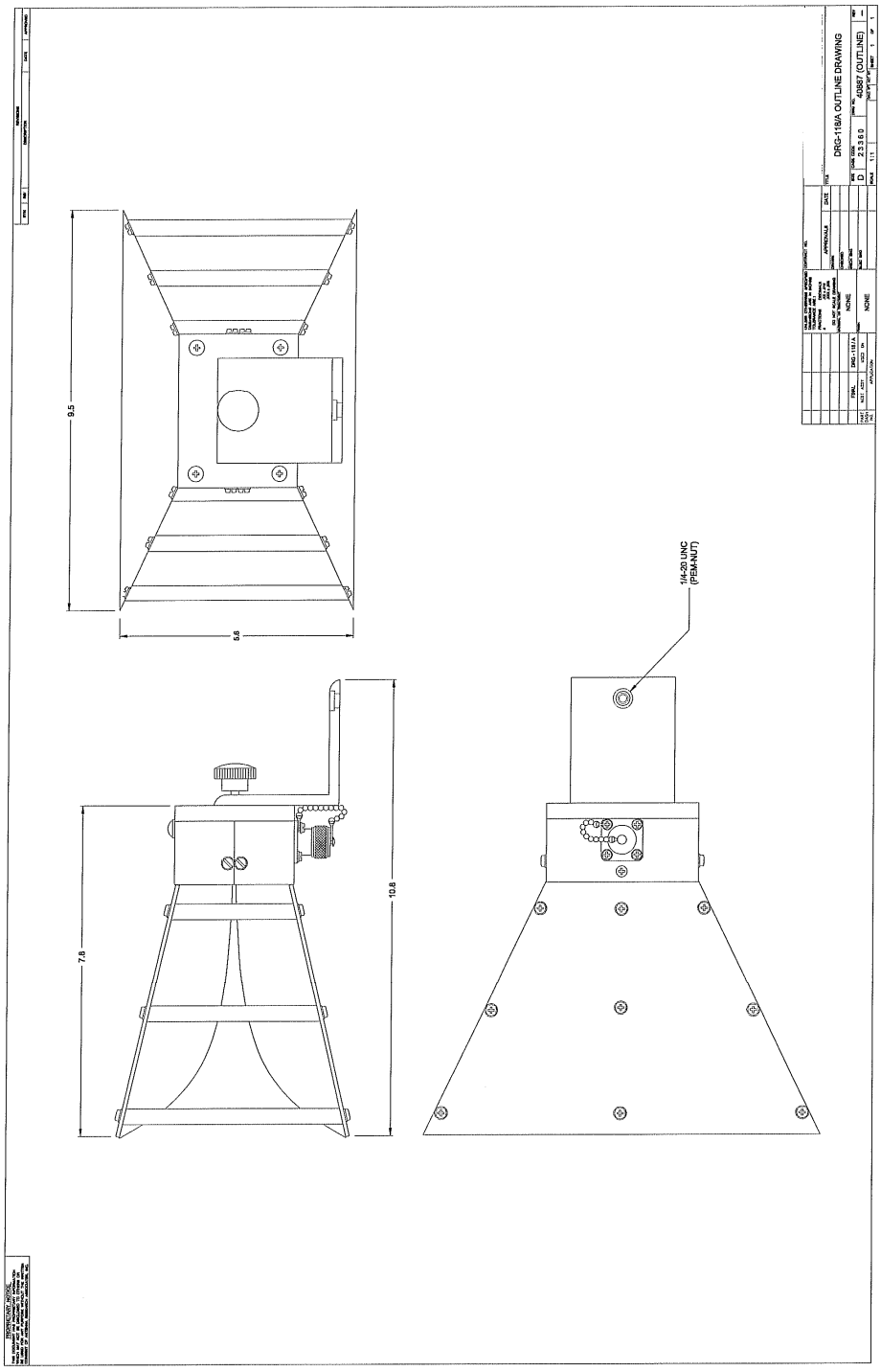

Figure 1-4 DRG-118G Outline

SECTION 2. TECHNICAL SPECIFICATIONS

2.1. Electrical Specifications

Frequency Range:	1.0 GHz to 18.0 GHz.
Polarization:	Linear.
Pattern:	Unidirectional Beam in E-Plane and H-Plane (see Figures 2-4 to 2-21).
3 dB Beamwidth:	35° to 20° Nominal (see Figures 2-4 to 2-21).
Impedance:	50 Ohms.
VSWR:	2.0 : 1 Typical (see Figure 2-1).
Gain:	6.0 dBi to 14.0 dBi Typical (see Figure 2-2).
Antenna Factor:	36.6 dB / m Typical (see Figure 2-3).
Power Handling:	400 Watts CW.
Connector:	Type N Female.

2.2. Mechanical Specifications

Antenna Dimensions (Maximum):	
Length:	7.85” (19.9 centimeter).
Width:	9.50” (24.1 centimeter).
Height:	5.63” (14.3 centimeter).
Antenna Weight:	3.8 lbs (1.7 kg).
Mounting:	¼-20 threaded hole for tripod mount.
Material:	Aluminum, Brass, Stainless Steel, & Black Phenolic.
Finish:	White Enamel, Gold Iridite.

2.3. Environmental Specifications

Humidity:	Up to 100%.

2.4. Typical Data

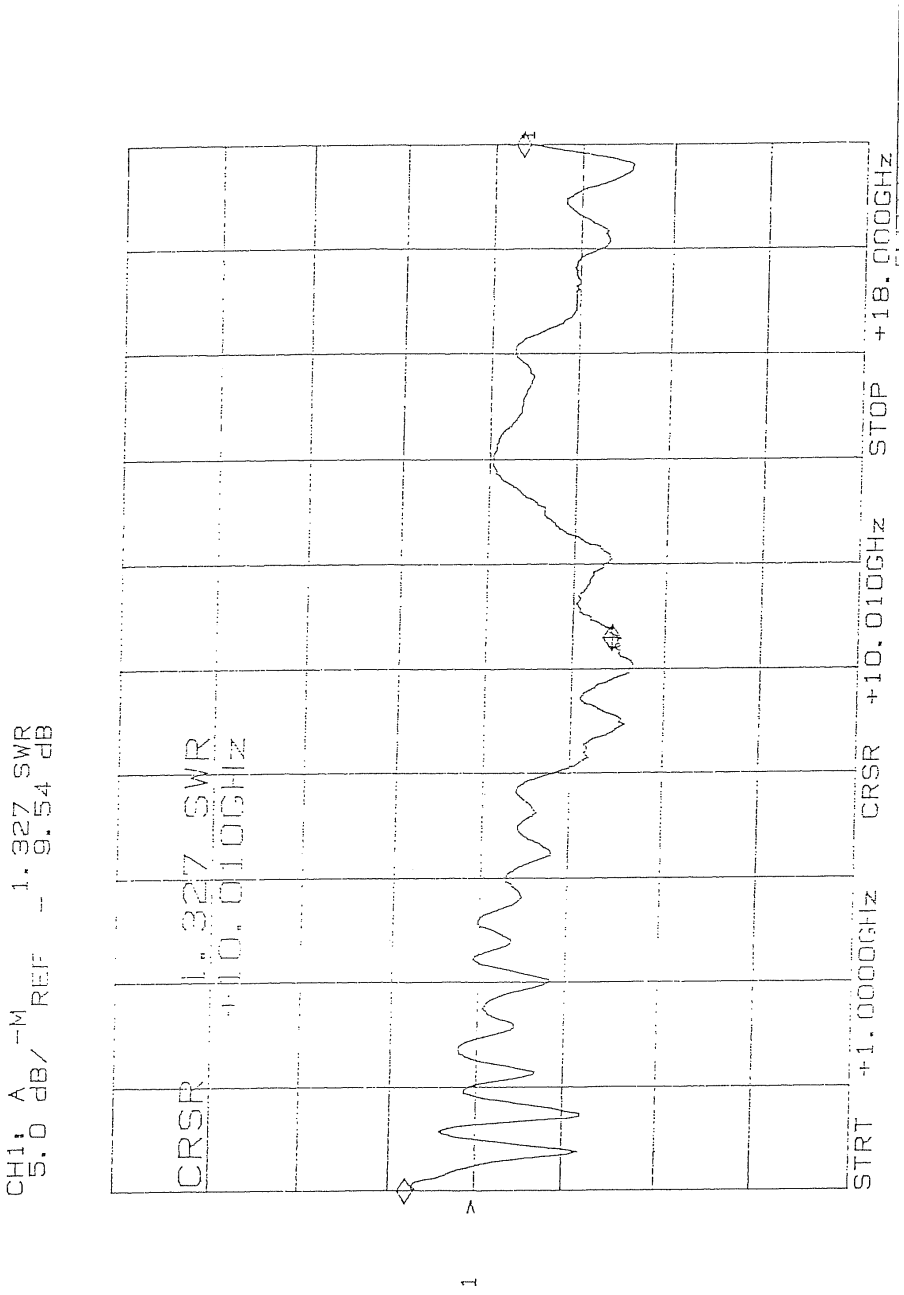

Figure 1 - DRG - 118/A VSWR

Figure 2-1 DRG-118G Typical VSWR Plot

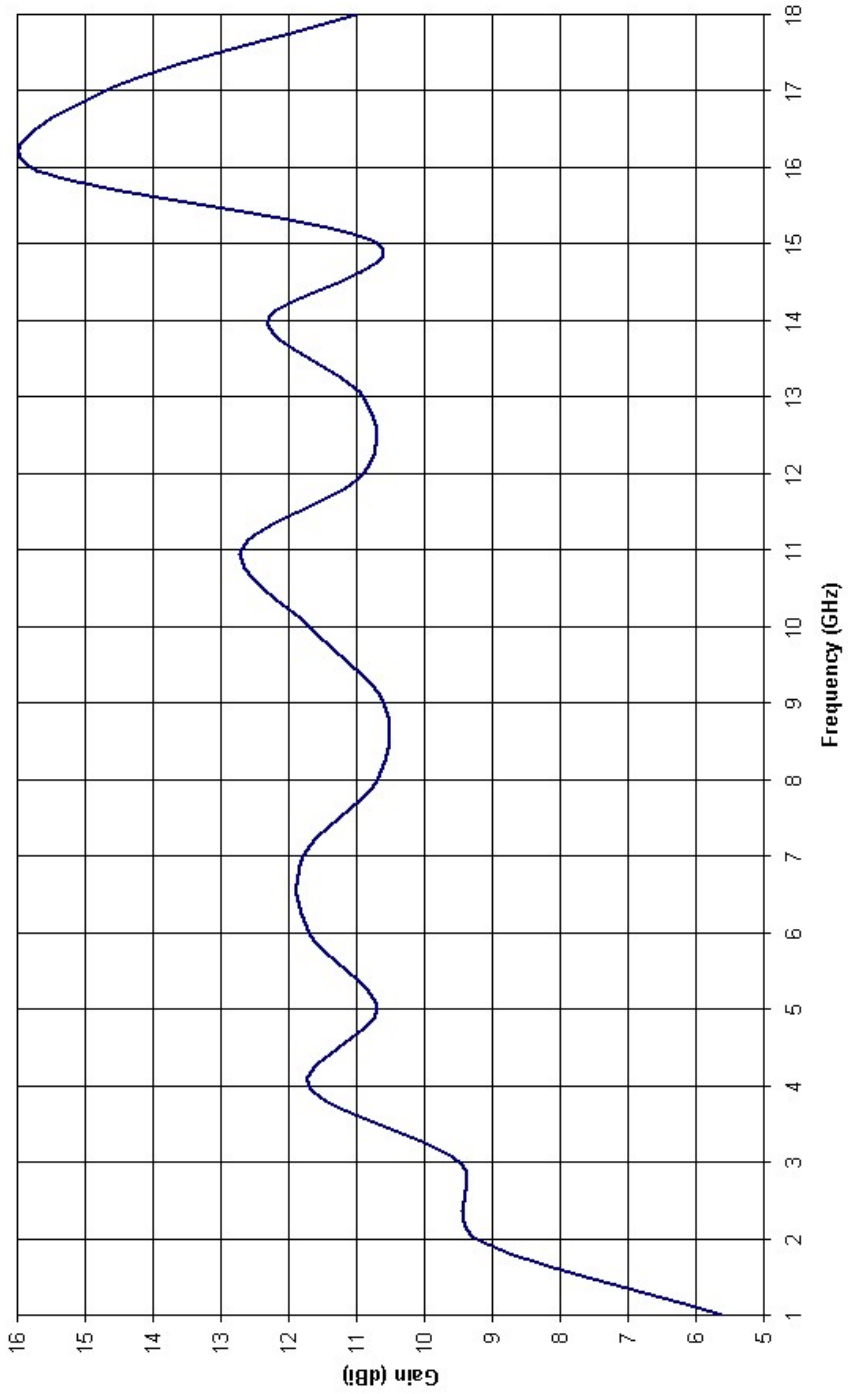

Figure 2-2 DRG-118G Typical Gain Plot

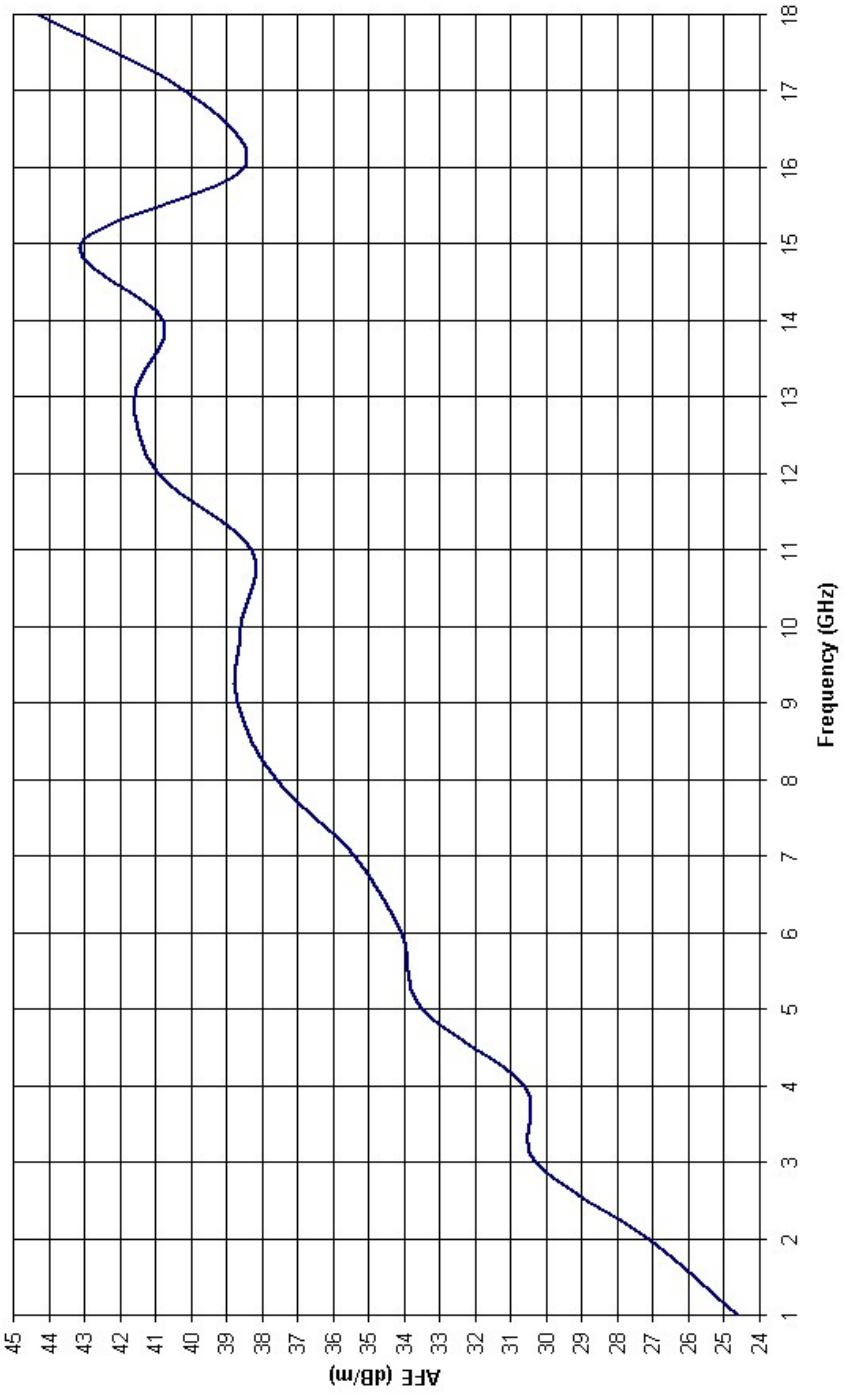

Figure 2-3 DRG-118G Typical AFE Plot

FREQ: 1.000 GHZ
POLARIZATION: Linear

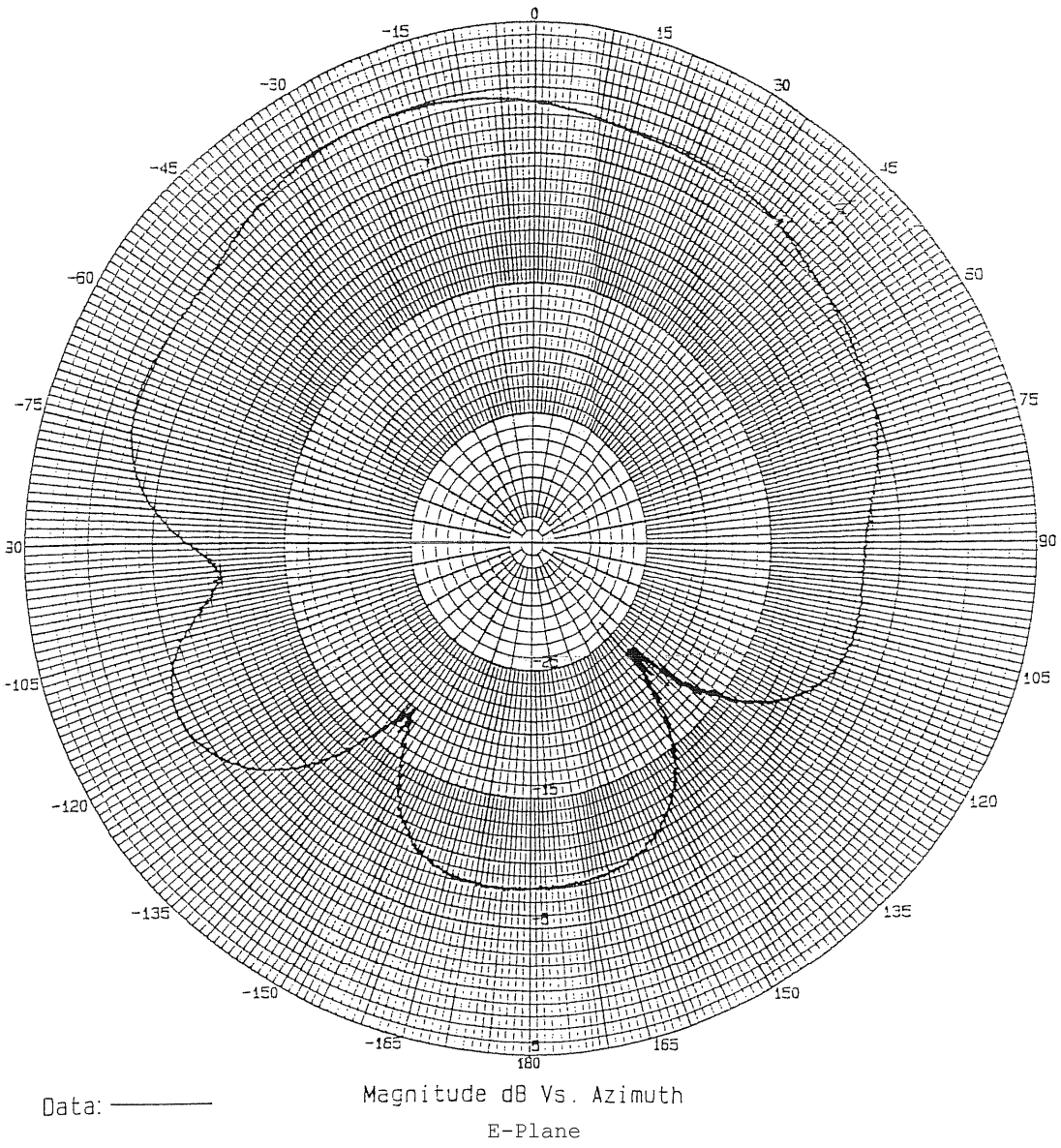

Figure 2-4 DRG-118G Typical E-Plane Pattern at 1 GHz

FREQ: 2.000 GHZ
POLARIZATION: Linear

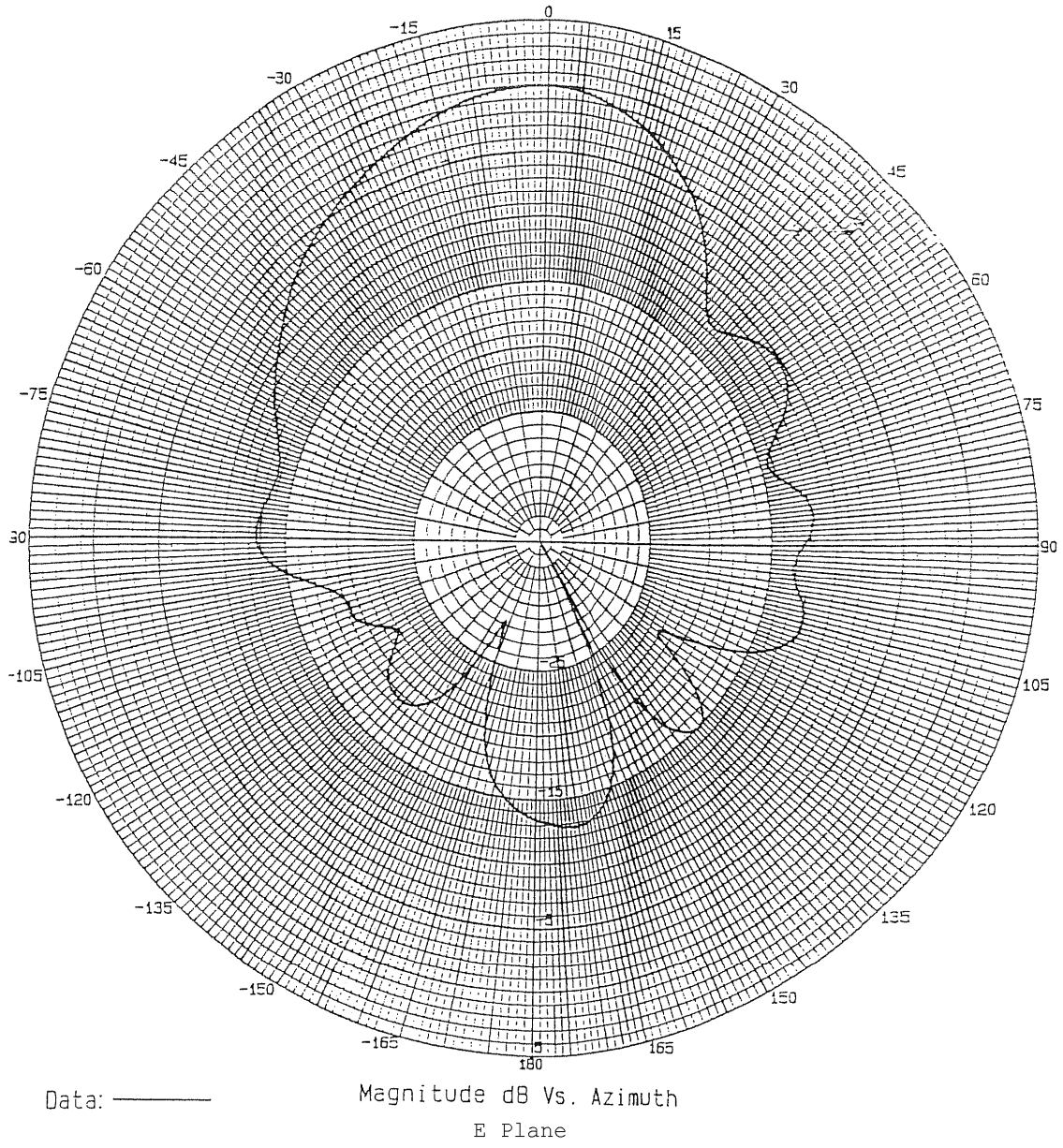

Figure 2-5 DRG-118G Typical E-Plane Pattern at 2 GHz

FREQ: 3.000 GHZ
POLARIZATION: Linear

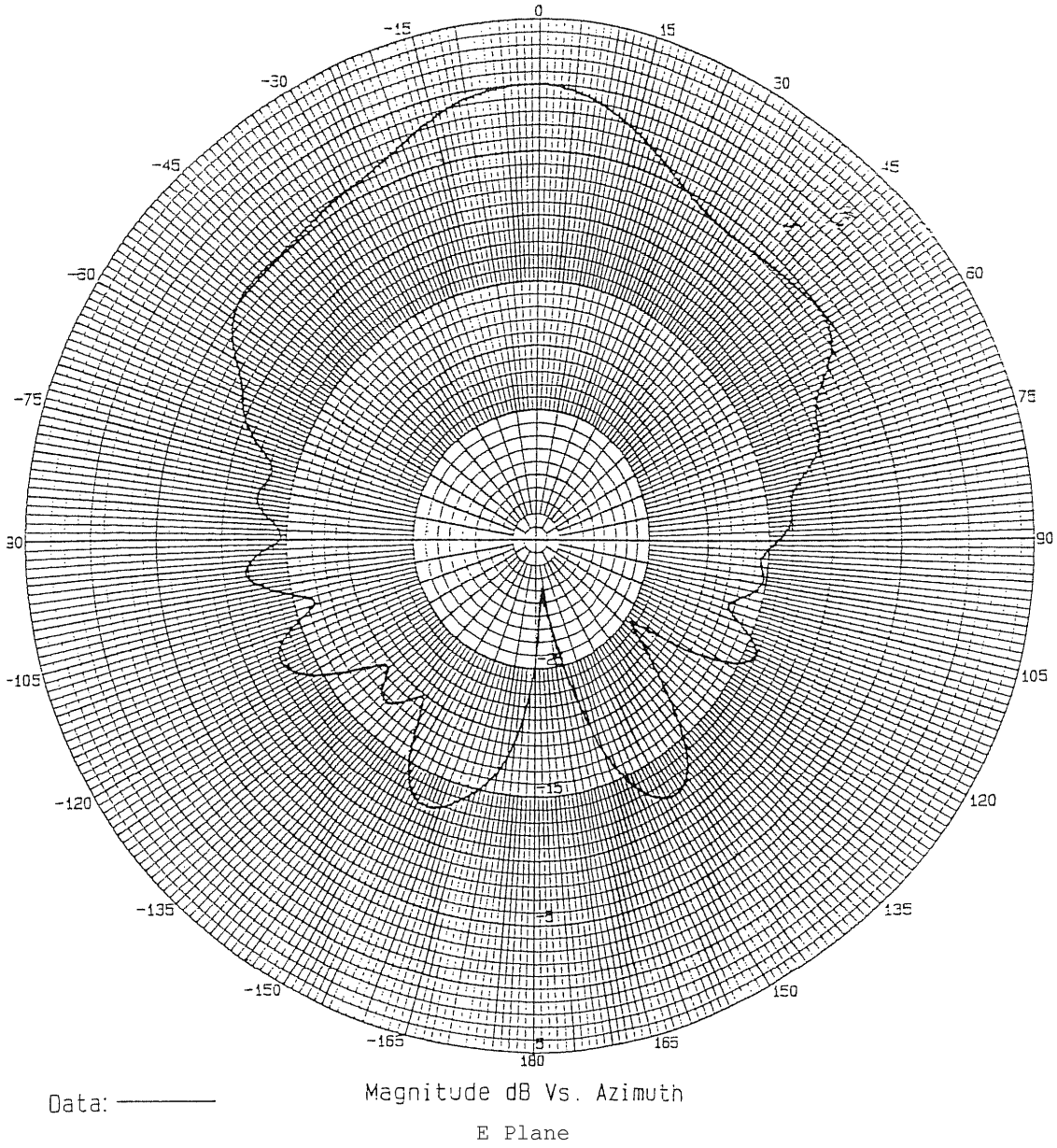

Figure 2-6 DRG-118G Typical E-Plane Pattern at 3 GHz

FREQ: 4.000 GHZ
POLARIZATION: Linear

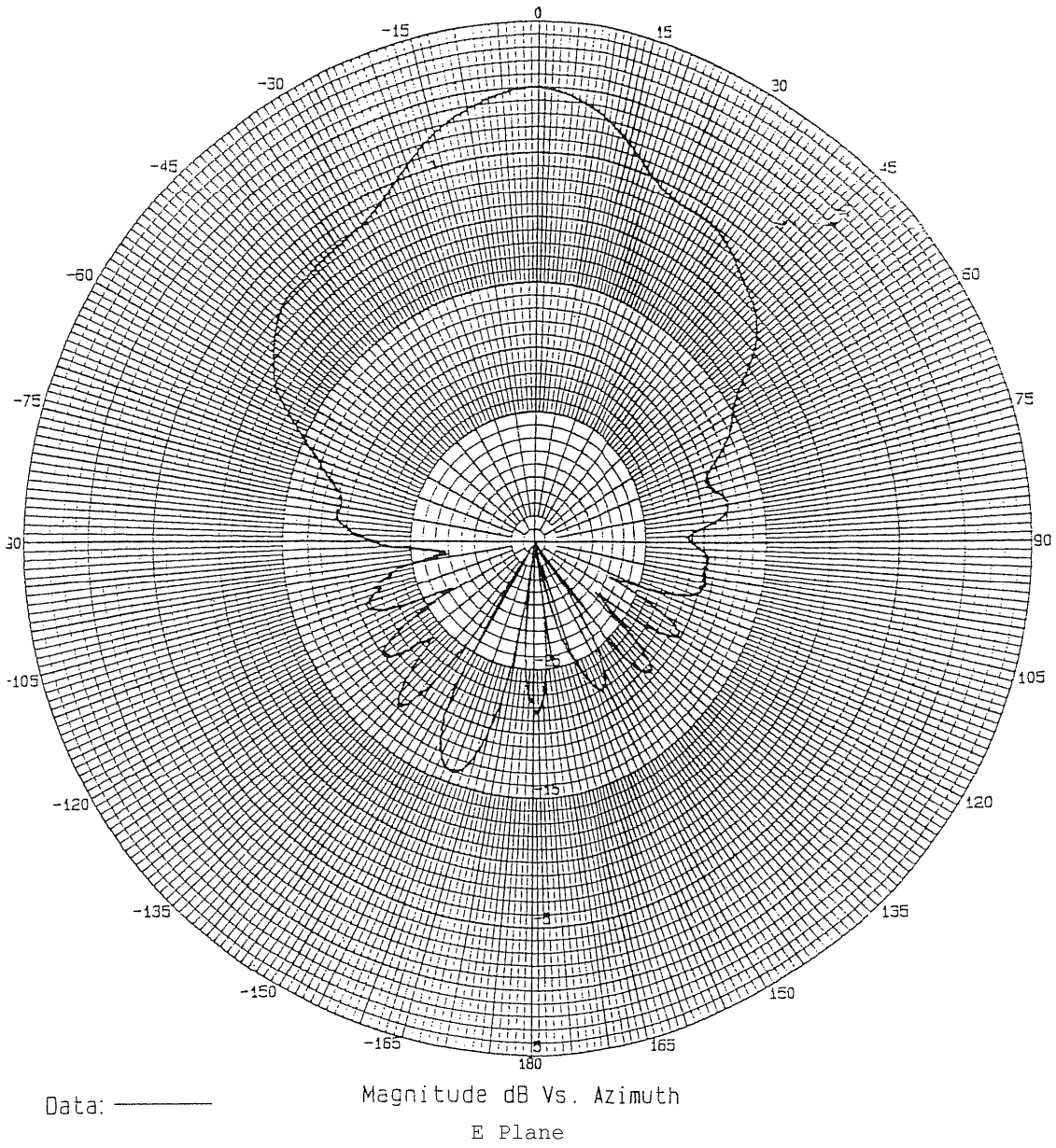

Figure 2-7 DRG-118G Typical E-Plane Pattern at 4 GHz

FREQ: 5.000 GHZ
POLARIZATION: Linear

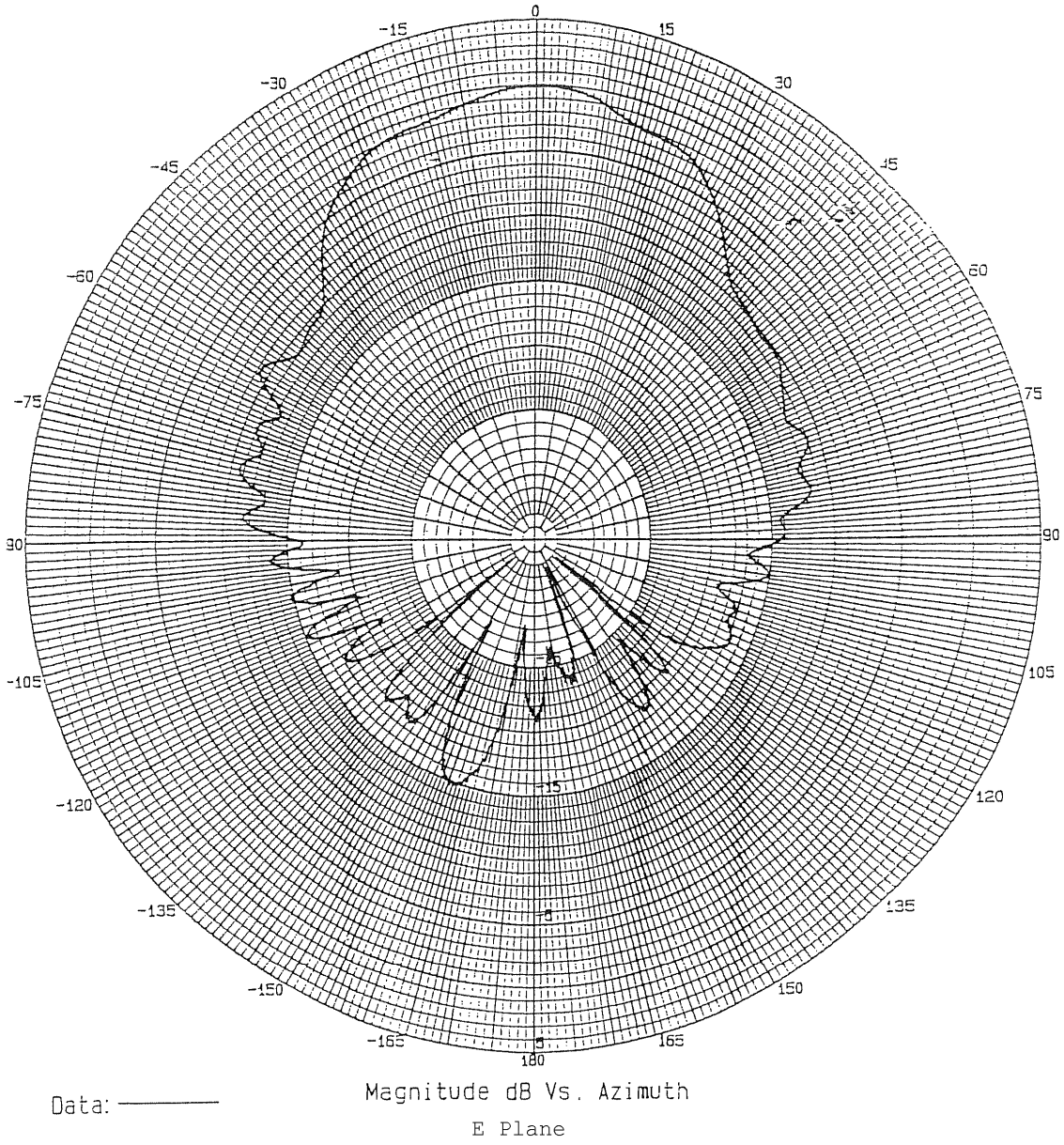

Figure 2-8 DRG-118G Typical E-Plane Pattern at 5 GHz

FREQ: 6.000 GHZ
POLARIZATION: Linear

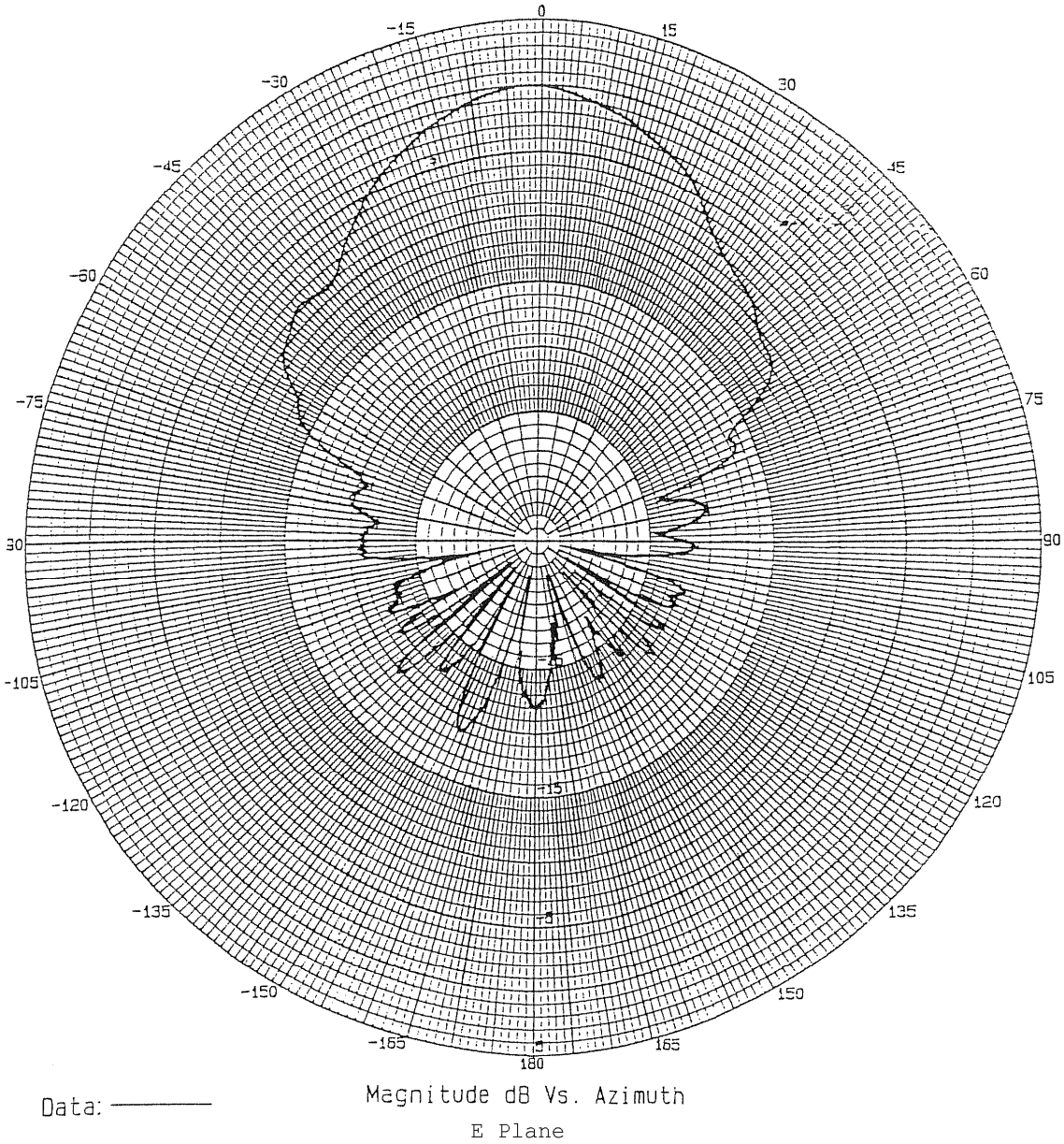

Figure 2-9 DRG-118G Typical E-Plane Pattern at 6 GHz

FREQ: 7.000 GHZ
POLARIZATION: Linear

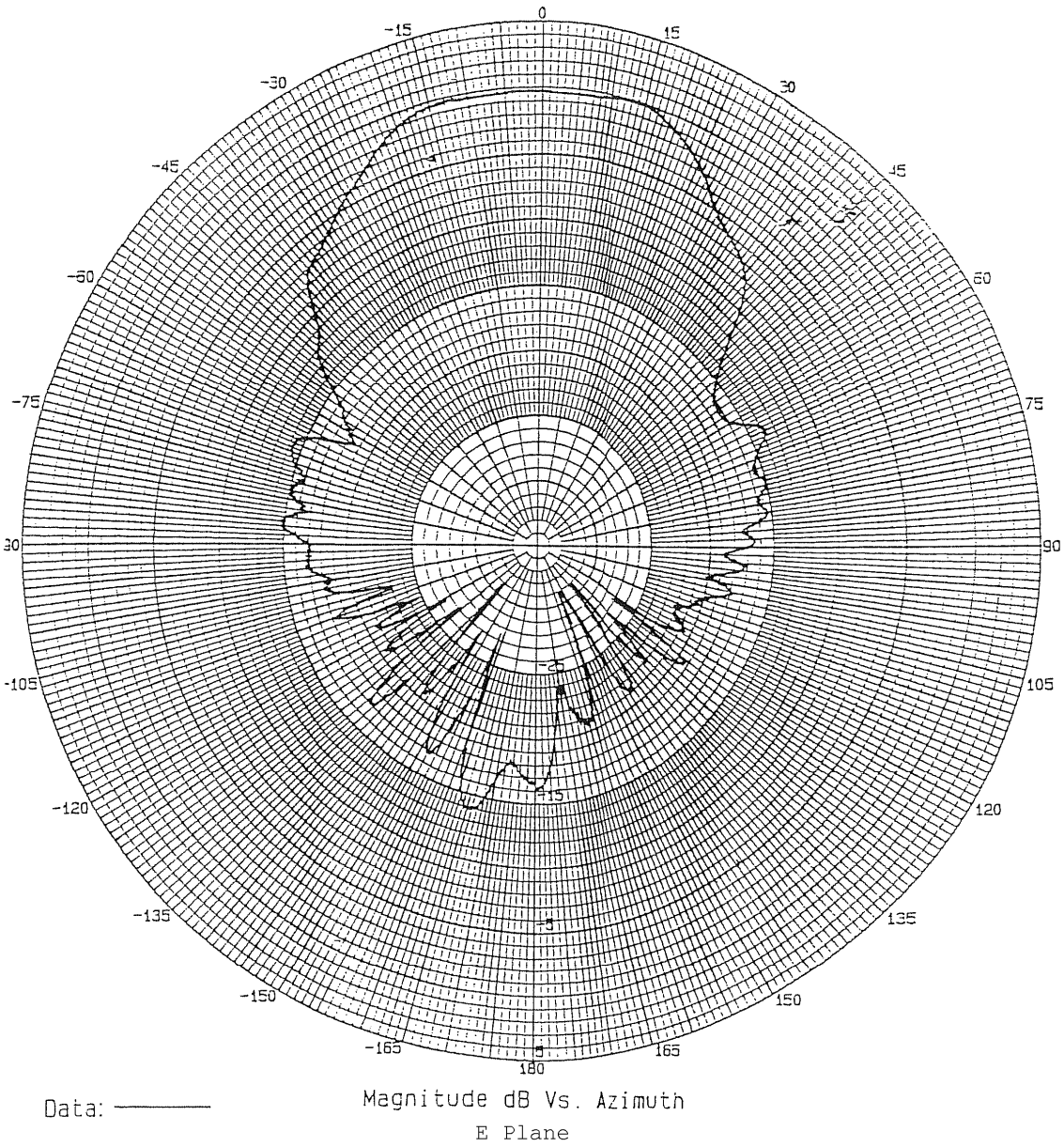

Figure 2-10 DRG-118G Typical E-Plane Pattern at 7 GHz

FREQ: 8.000 GHZ
POLARIZATION: Linear

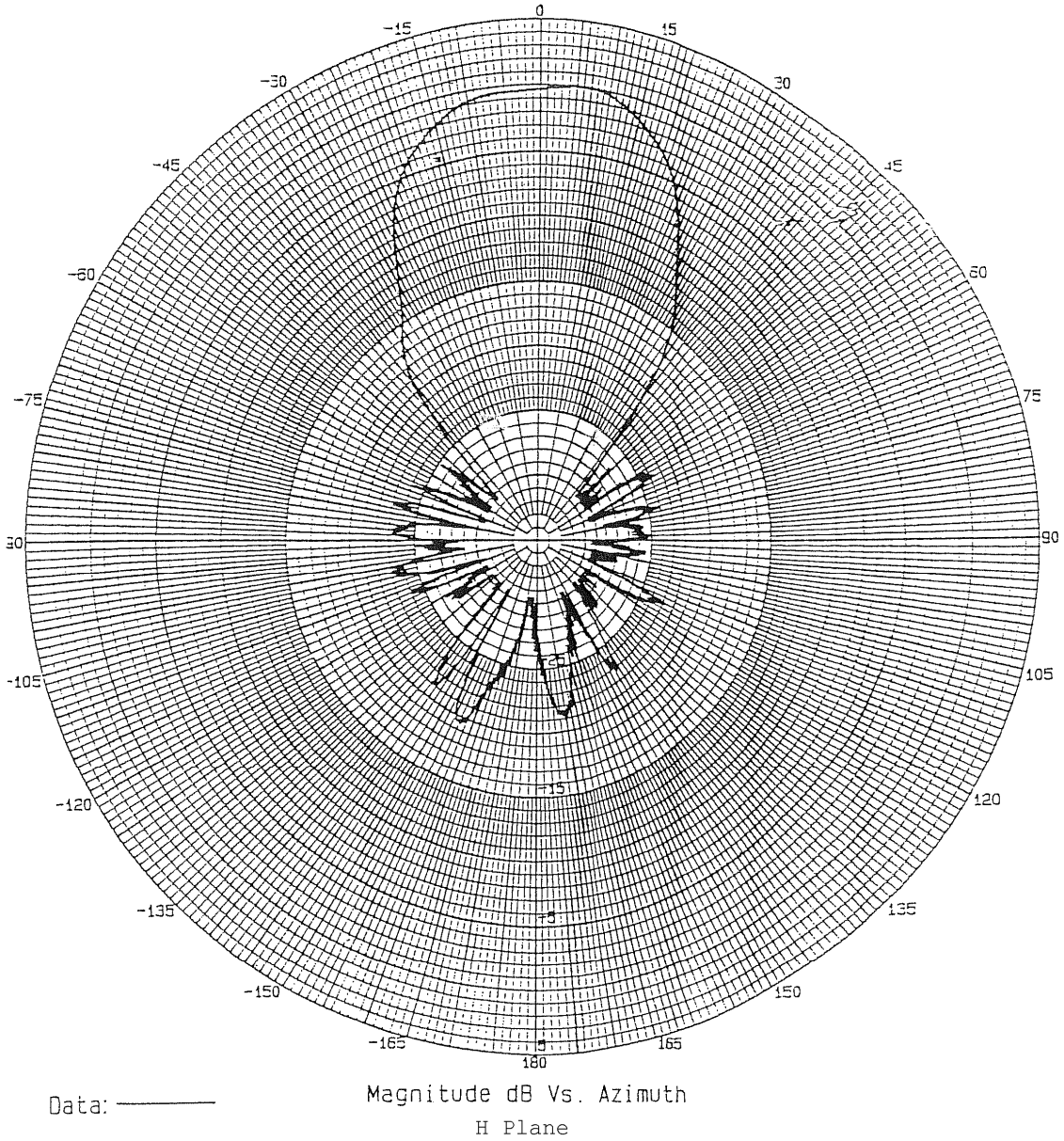

Figure 2-11 DRG-118G Typical H-Plane Pattern at 8 GHz

FREQ: 9.000 GHZ
POLARIZATION: Linear

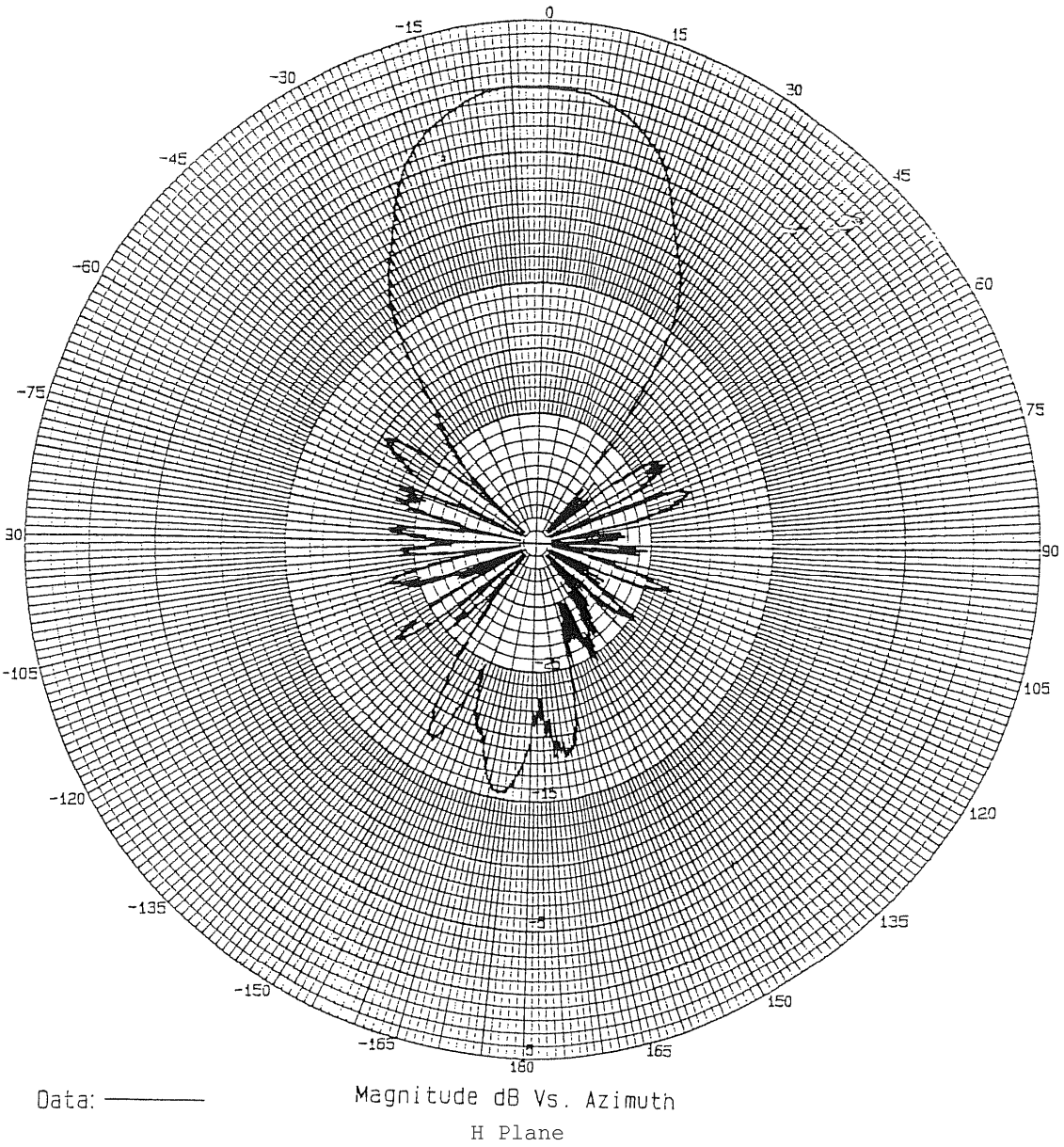

Figure 2-12 DRG-118G H-Plane pattern at 9 GHz

FREQ: 10.000 GHZ
POLARIZATION: Linear

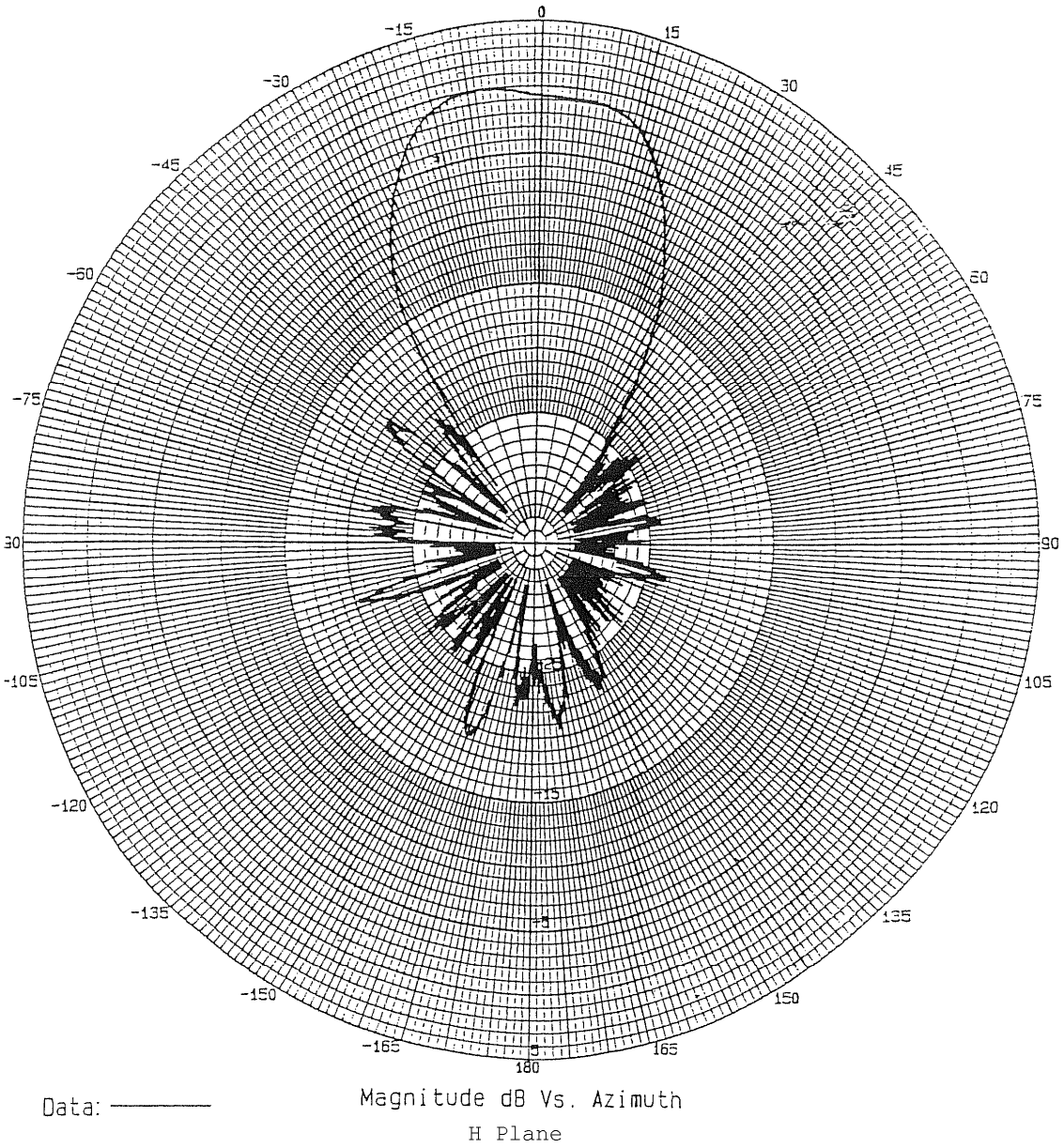

Figure 2-13 DRG-118G Typical H-Plane Pattern at 10 GHz

FREQ: 12.000 GHZ
POLARIZATION: Linear

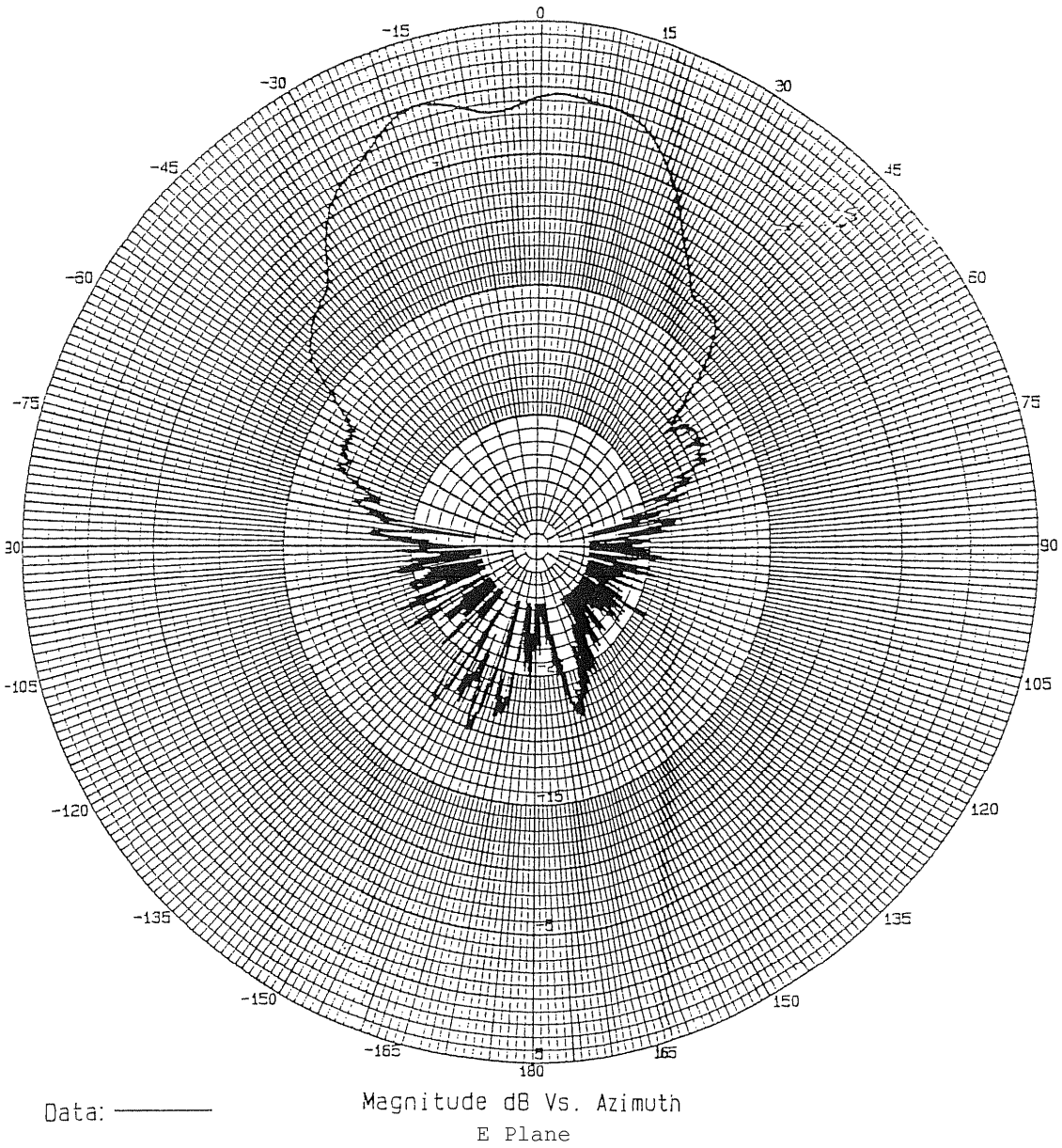

Figure 2-14 DRG-118G Typical E-Plane Pattern at 12 GHz

FREQ: 12.000 GHZ
POLARIZATION: Linear

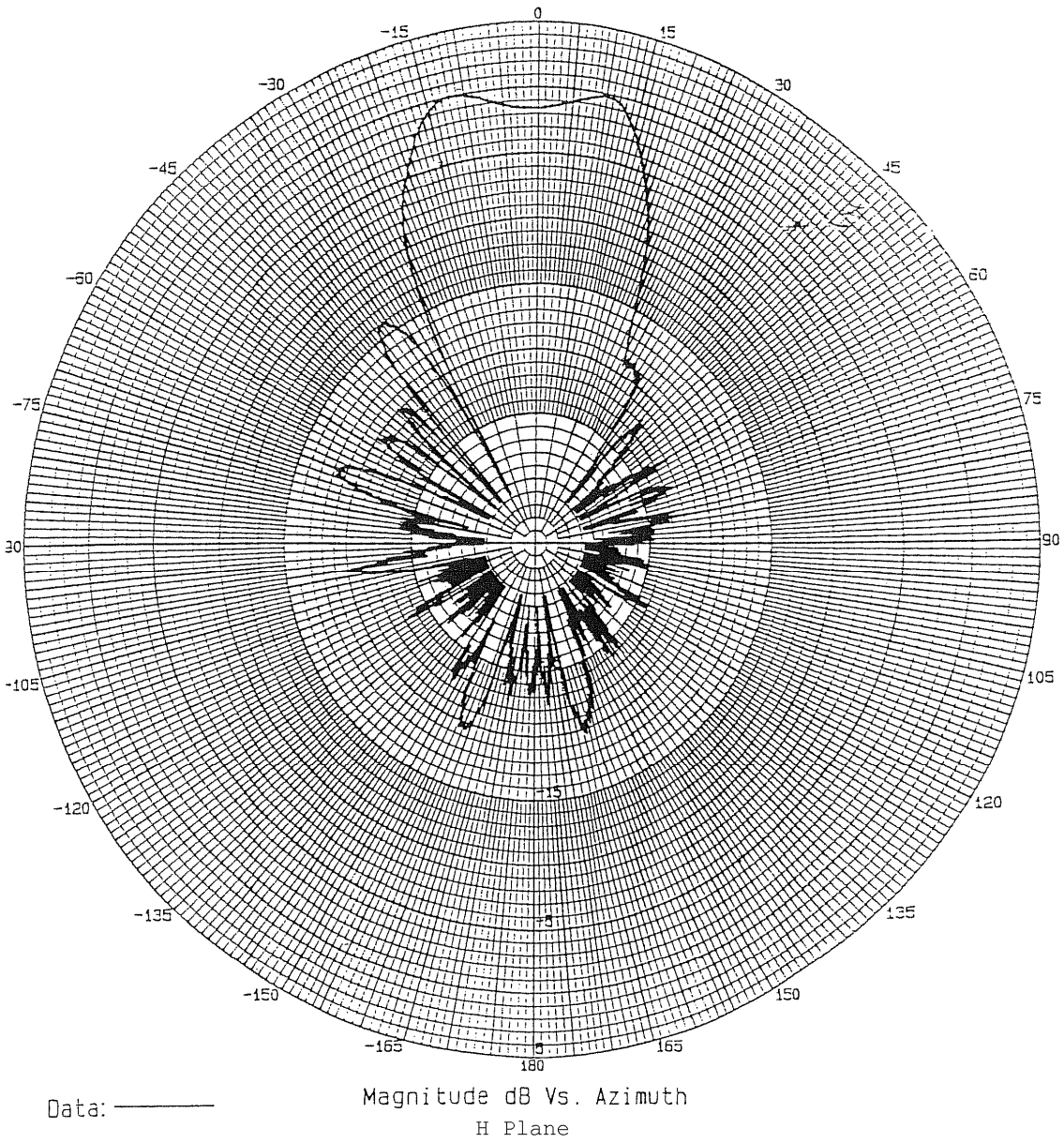

Figure 2-15 DRG-118G Typical H-Plane Pattern at 12 GHz

FREQ: 14.000 GHZ
POLARIZATION: Linear

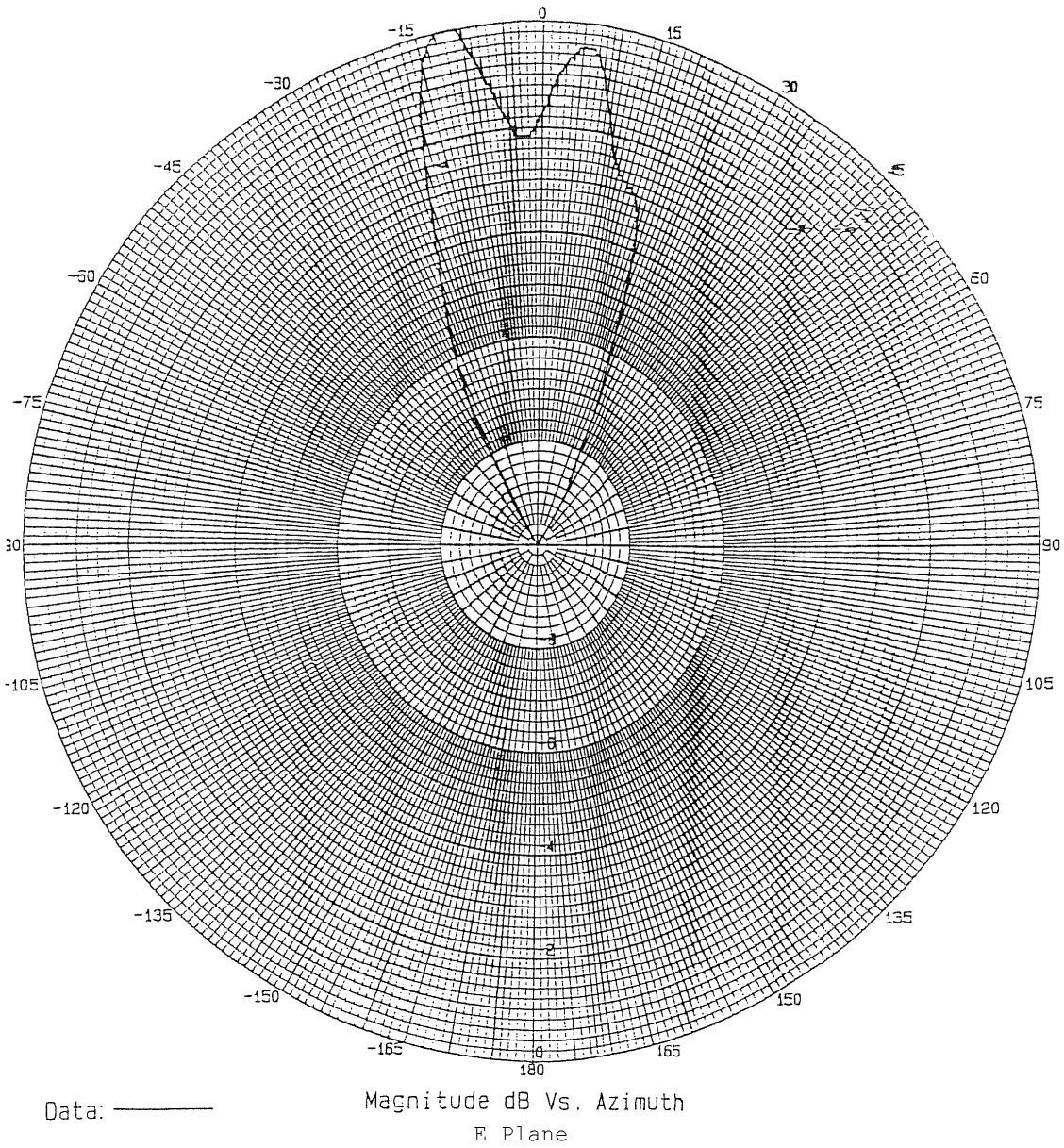

Figure 2-16 DRG-118G Typical E-Plane Pattern at 14 GHz

FREQ: 14.000 GHZ
POLARIZATION: Linear

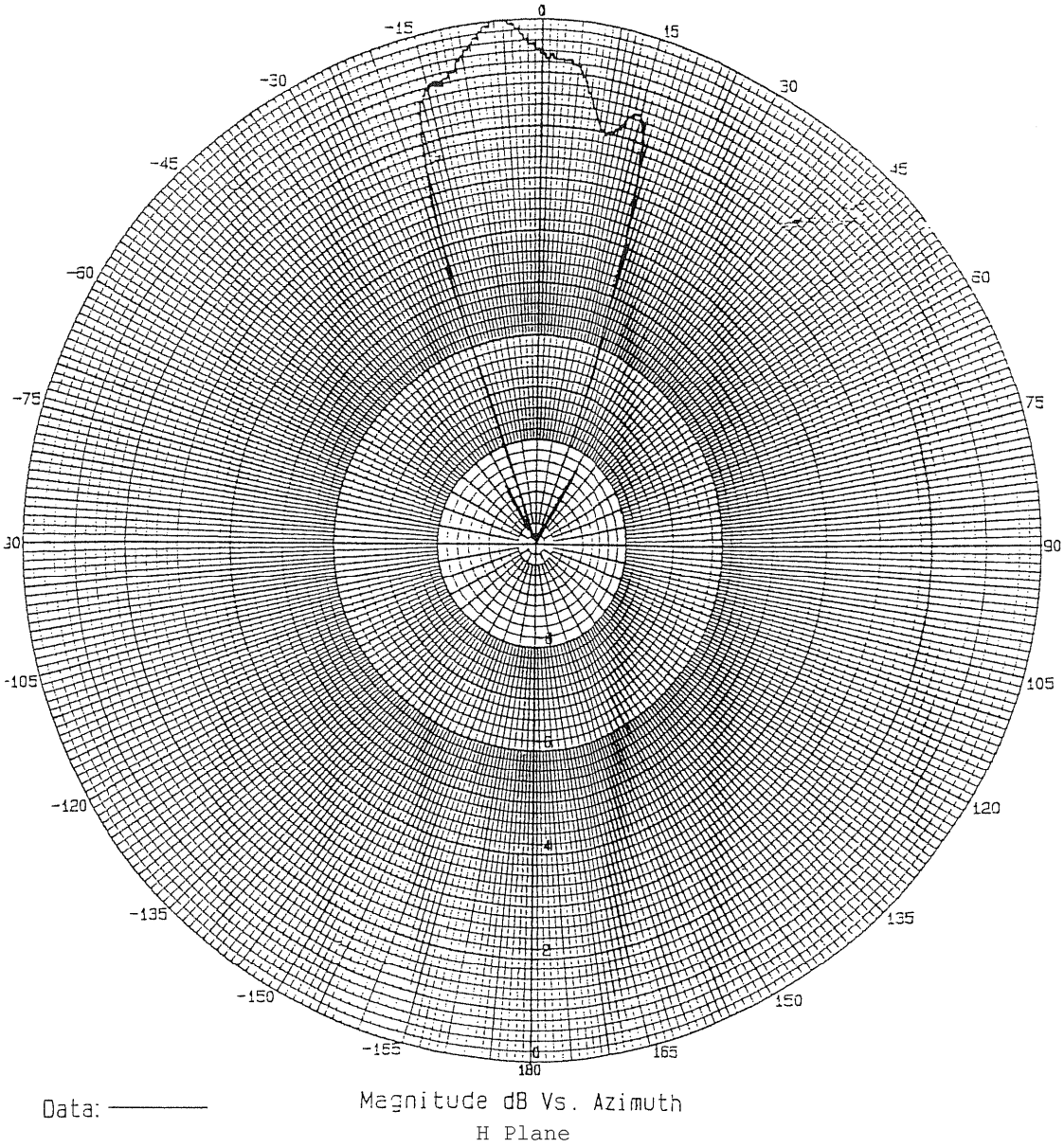

Figure 2-17 DRG-118G Typical H-Plane Pattern at 14 GHz

FREQ: 16.000 GHZ
POLARIZATION: Linear

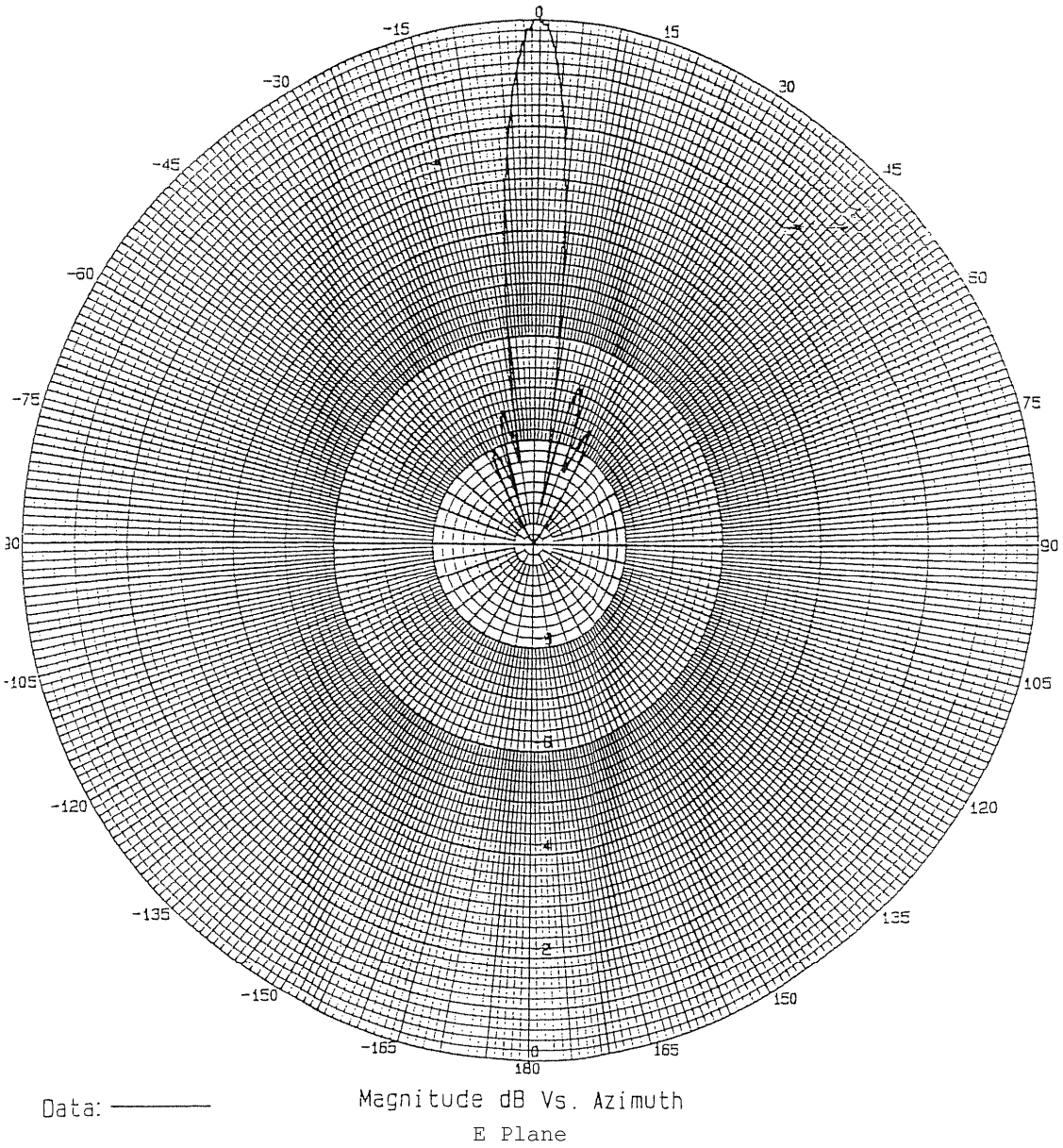

Figure 2-18 DRG-118G Typical E-Plane Pattern at 16 GHz

FREQ: 16.000 GHZ
POLARIZATION: Linear

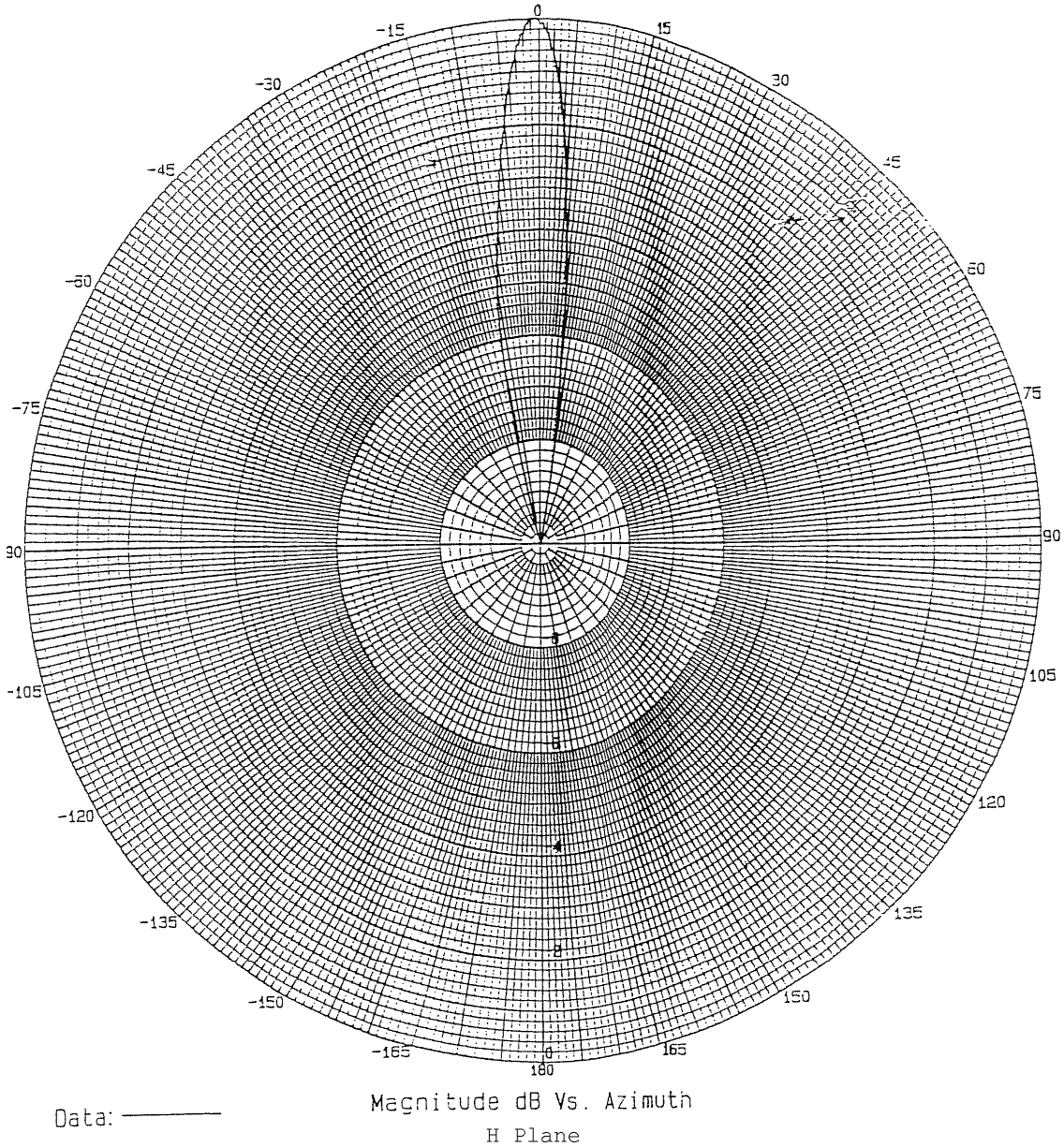

Figure 2-19 DRG-118G Typical H-Plane Pattern at 16 GHz

FREQ: 18.000 GHZ
POLARIZATION: Linear

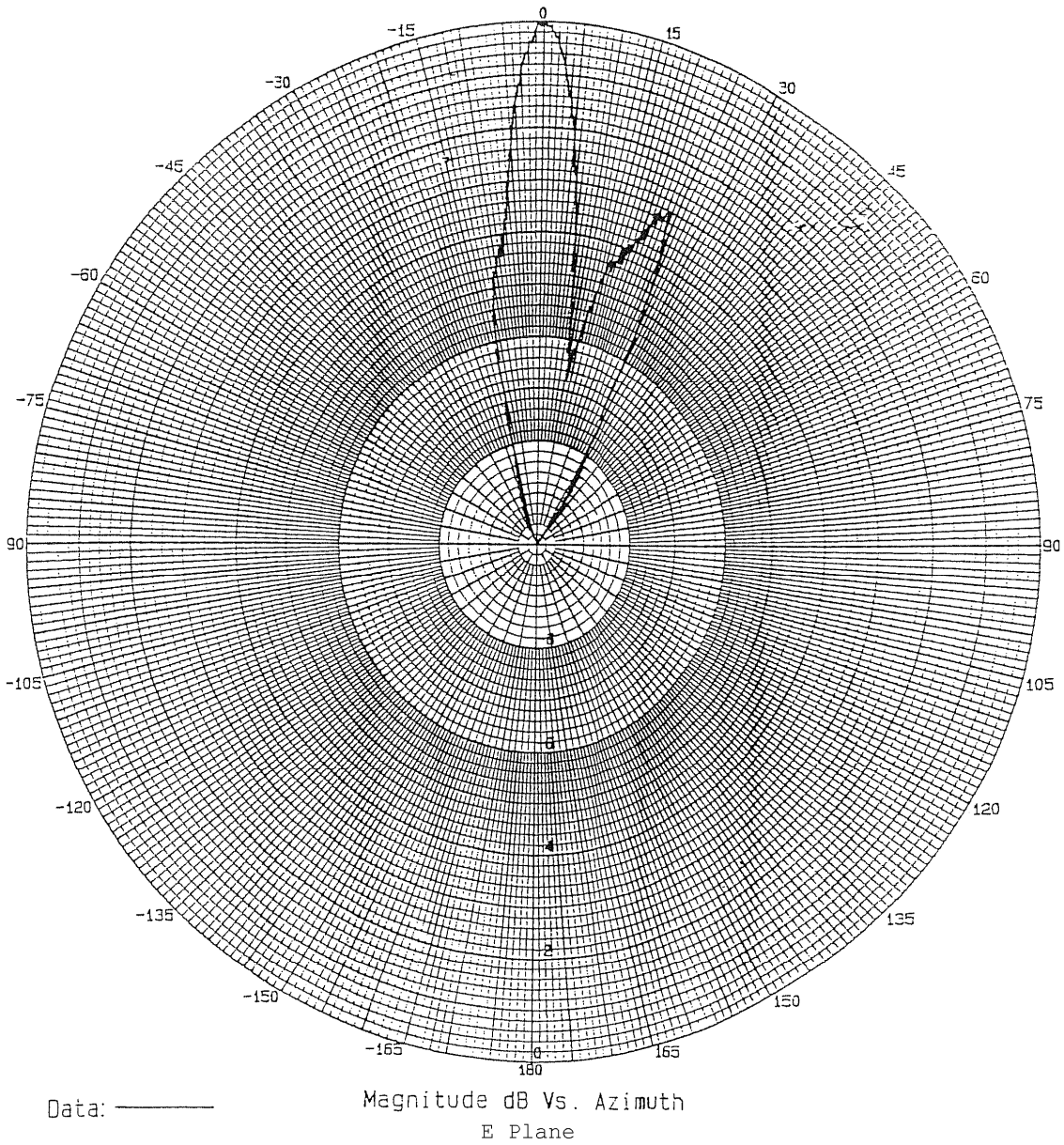

Figure 2-20 DRG-118G Typical E-Plane Pattern at 18 GHz

FREQ: 18.000 GHZ
POLARIZATION: Linear

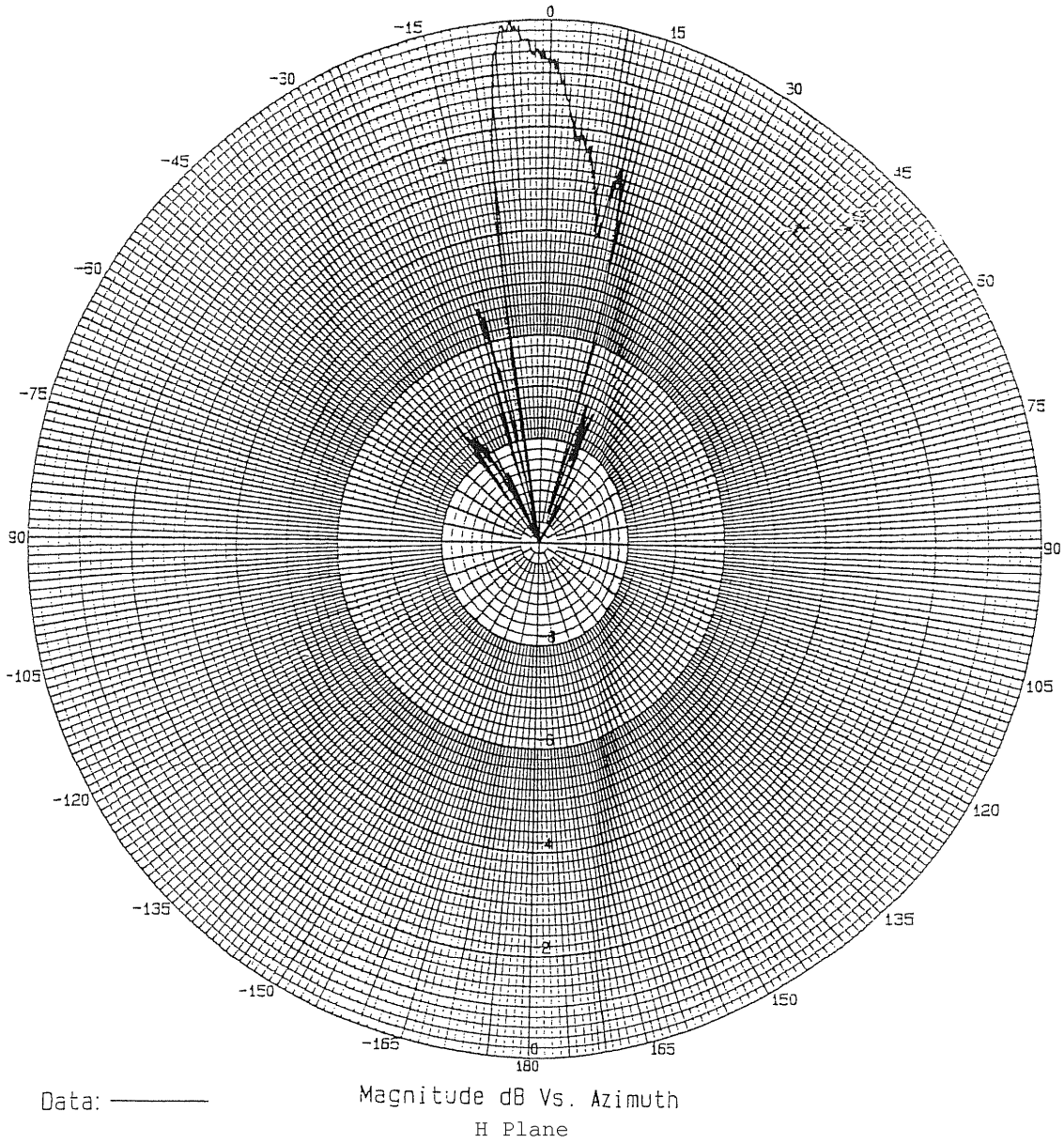

Figure 2-21 DRG-118G Typical H-Plane Pattern at 18 GHz

SECTION 3. THEORY

3.1. General

The DRG-118G is a linearly-polarized wide-band Dual-Ridged Horn Antenna. It is designed to transmit or receive in the frequency band from 1.0 GHz to 18.0 GHz with low VSWR, high gain, uniform E-plane and H-plane radiation patterns, and high transmit power capability. The antenna is ideally suited for EMC testing, surveillance, gain measurements, and pattern measurements.

3.2. Field Measurement

The Power gain G, relative to an isotropic antenna, and the E-Field antenna factor AFE are related by

$$AFE\ (dB/m) = 20*\log_{10}f - G\ (dBi) - 29.78 \quad \text{(Equation 3-1)}$$

where f is frequency in MHz. The E-field antenna factor is the ratio of the incident E-field in volts/meter to output voltage V_O of the antenna across a termination resistor of stated value. The formula given above is valid only for a 50 Ohm termination.

Individually calibrated Antenna Factor curves can be provided as an option (see Figure 2-3 for typical Antenna Factor calibration data) and can be used to measure electric field strengths. To measure the electric field strength, first set up the antenna (see Section 4). The incident electric field strength seen by the antenna, denoted by E, is then determined from the voltage level V_O at the receiver (when the output connector of the antenna is matched to 50 Ohms). These two quantities are related through the frequency-dependent electric field antenna factor (AFE) by

$$E\ (V/M) = AFE\ (1/m) \times V_O\ (V). \quad \text{(Equation 3-2)}$$

Converting Equation 3-2 into decibel form gives

$$E\ (dB\ V/m) = AFE\ (dB/m) + V_O\ (dB\ V). \quad \text{(Equation 3-3)}$$

An example showing the application of Equation 3-2 is given below. Assume the observed antenna output voltage at 10 GHz is V_O = 7.0 microvolts (-103.1 dB V) across the 50 Ohm load at the receiver and that the antenna factor is typically as follows

$$AFE = 38.03\ dB/m,$$

hence

$$E\ (dB\ V/m) = 38.03 - 103.1 =$$

$$-65.07\ dB\ V/m,$$

which is equivalent to

$$E = 10^{E\ (dB)/20}\ V/m \quad \text{(Equation 3-3)}$$

$$= 10^{-65.07/20} = 557.83 \times 10^{-6}\ V/m$$

SECTION 4. SETUP & OPERATION

4.1. Setup

The DRG-118G, by itself, requires no assembly. Mount the DRG-118G to a tripod or mounting bracket in the desired Polarization (Vertical or Linear) using the provided ¼-20 threaded holes on the antenna mount angle (see Figures 1-1 to 1-4). Then connect the RF connector of the DRG-118G (Type N Female) to the receiver, transmitter, or test equipment using an appropriate coaxial cable. The antenna is then ready for use. For field strength measurement instructions, see Section 3.2.

4.2. Factors Affecting Operation

Factors affecting the antenna operation include:

- the distance between the antenna and the source or receiving system,
- the orientation of the horn polarization with respect to the desired polarization,
- the position of the antenna with respect to any large conducting objects, and
- the background noise of the environment.

The source or receiving system should not be located closer than 1 meter to the DRG-118G in order for the calibrated antenna factor to be accurate.

SECTION 5. MAINTENANCE

Little or no maintenance will be required if care is exercised in handling the system. The antenna itself is fabricated of aluminum, which can dent or scratch if handled in a rough manner, or if otherwise abused. However, it should be recognized that small dents and scratches usually do not alter the performance of the antenna.

If the antenna fails to provide satisfactory performance, it is recommended that it should be returned to Advanced Antennas for service. Address requests for replacement parts or service to:

ADVANCED ANTENNAS

10401 Roselle Street

San Diego, CA 92121

(800) 404-2832

SECTION 6. REPLACEABLE PARTS LIST

When placing orders, please include the following information: Model Number, Part Number, Serial Number, Color, and Description of the item.

Example:	Model Number:	DRG-118G
	Part Number:	AA-DRG-118G
	Serial Number:	000
	Color:	None
	Description:	DOUBLE-RIDGED HORN ANTENNA, 1 - 18 GHz

There are no field-replaceable parts for the DRG-118G. Any damage that may occur to the unit will require returning the unit to Advanced Antennas for servicing. All assembly hardware is American Standard for Unified Screw Threads.

Part Number	Description
AA-DRG-118G	DOUBLE RIDGED HORN ANTENNA, 1 - 18 GHz

Table 6-1 DRG-118G Replaceable Parts List

WARRANTY

All equipment manufactured by **Advanced Antennas** is warranted against defects in materials and workmanship for a period of one year from the date of shipment. **Advanced Antennas** will repair or replace any defective item or material if notified within the warranty period.

You will not be charged for warranty services performed at our factory. You must, however, prepay inbound shipping costs. This warranty does not apply to:

a) Products damaged during shipment EX-WORKS our plant

b) Products which have been improperly installed

c) Products which have been improperly used (operated outside the specification)

d) Products which have been improperly maintained

e) Consumable items such as batteries, lamps, fuses, customer replaceable solid-state components, etc.

f) Products which have been modified

g) Normal wear of materials

h) Calibration of products

Any warranties or guarantees, whether expressed or implied, that are not specifically set forth herein, will not be considered applicable to any equipment sold or otherwise furnished by **Advanced Antennas**. Under no circumstances does **Advanced Antennas** recognize or assume any liability for any loss, damage or expense arising either directly or indirectly from the use or handling of products manufactured by **Advanced Antennas**, or any inability to use them separately or in combination with other equipment or materials.

The warranty is void if items are shipped outside the U.S.A. without prior knowledge of **Advanced Antennas.**

A return authorization is required for repairs under warranty. Please contact **Advanced Antennas** for additional information.

TM-DRG118G-042020