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***Models 3112, 3106B, 3119,
3115, 3117, 3116C***

Double-Ridged Waveguide Horn Antennas

User Manual



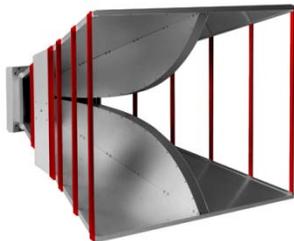
Model 3117



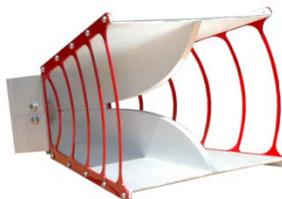
Model 3116C



Model 3112



Model 3106B



Model 3115



Model 3119

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An ESCO Technologies Company

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**Revision Record | Double Ridged Waveguide Horn Antenna, MANUAL
Part #399318, Rev. B**

Revision	Description	Date
A	Initial Release	October, 2010
B	Update 3116B to 3116C. Updates to all sections:	May , 2012

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Notes, Cautions, and Warnings

	<p>Note: Denotes helpful information intended to provide tips for better use of the product.</p>
	<p>Caution: Denotes a hazard. Failure to follow instructions could result in minor personal injury and/or property damage. Included text gives proper procedures.</p>
	<p>Warning: Denotes a hazard. Failure to follow instructions could result in SEVERE personal injury and/or property damage. Included text gives proper procedures.</p>



See the ETS-Lindgren *Product Information Bulletin* for safety, regulatory, and other product marking information.

1.0 Introduction

The ETS-Lindgren family of Double-Ridged Waveguide Horn Antennas consists of linearly polarized broadband antennas ranging in frequency from 100 MHz to 40 GHz. These antennas were designed and built specifically from EMI measurements and specifications compliance testing. However, they can also be used for antenna gain, pattern measurement, surveillance, automotive and military EMC immunity applications.

MODEL 3112

The Model 3112 Double-Ridged Waveguide Horn Antenna is a linearly polarized antenna covering the frequency range of 100 MHz to 1 GHz.

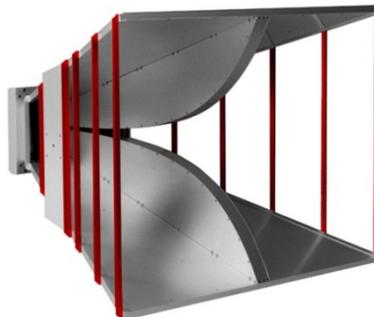
The Model 3112 is especially effective for generating high electromagnetic fields with relatively low power input. The antenna is also useful for receiving low-level signals where high gain characteristics are needed.



MODEL 3106B

The Model 3106B Double-Ridged Waveguide Horn Antenna is a linearly polarized broadband antenna covering a frequency range of 200 MHz to 2.5 GHz. It is precision machined from aluminum, making it lightweight and durable. Two brackets are attached to the sides of the antenna so it can be polarized either horizontal or vertically.

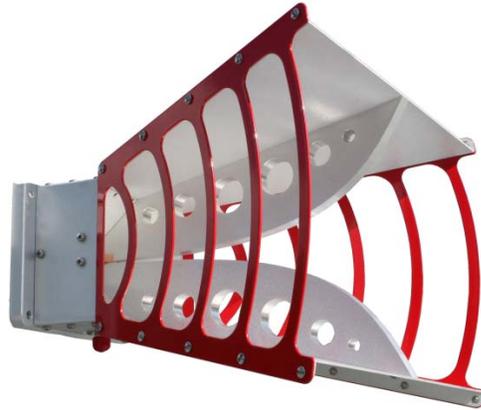
The Model 3106B has high gain and excellent VSWR characteristics over the entire frequency range (see Appendix B). It is especially effective for generating high electromagnetic field with relatively low power input. The antenna is also useful for receiving low level signals where high gain characteristics are needed.



MODEL 3119

The Model 3119 Double-Ridged Waveguide Horn Antenna is a linearly polarized broadband antenna covering the frequency range of 400 MHz to 6 GHz.

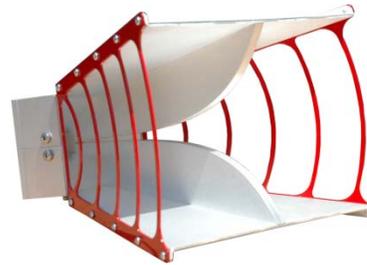
The Model 3119 is ideally suited for immunity over 1 GHz and as a reference antenna for wireless testing. In addition, the 3119 is useful for antenna pattern measurement as a source antenna.



MODEL 3115

The Model 3115 Double-Ridged Waveguide Horn Antenna is a linearly polarized broadband antenna covering the frequency range of 750 MHz to 18 GHz

The Model 3115 is ideally suited for IEC 61000-4-3 and MIL-STD 461E immunity tests as well as ANSI C634 and EN 55033 emissions testing. In addition, the 3115 is useful for antenna pattern measurement as a source antenna



MODEL 3117

The Model 3117 Double-Ridged Waveguide Horn Antenna is a linearly polarized broadband antenna covering the 1 GHz to 18 GHz frequency range.

A single well defined main lobe radiation pattern over the entire frequency range provides excellent illumination of the Equipment Under Test (EUT). The Model 3117 is ideally suited for IEC 6100-4-3 and MIL-STD 661/462 immunity tests as well as ANSI C634 and EN 55033 emissions tests.



MODEL 3116C

The Model 3116C Double-Ridged Waveguide Horn Antenna is a linearly polarized broadband antenna covering the frequency range 10 GHz to 40 GHz. It is designed and built specifically for emissions and susceptibility testing.

The Model 3116C is precision machined from aluminum. A 50 Ω Type K (2.92 mm) female connector is mounted on the base block of the antenna for increased performance at high frequencies. For flexible mounting options, the 3116C includes a bracket that accepts a ¼” 20 thread screw and also a rear stinger style mount.



Optional Items

ETS-Lindgren offers the following non-metallic, non-reflective tripods for use at both indoor and outdoor EMC test sites.

MODEL 4-TR TRIPOD

The 4-TR Tripod is constructed of linen phenolic and delrin, designed with an adjustable center post for precise height adjustments. Maximum height is 2.0m (80.0 in), and minimum height is 94 cm (37.0 in). This tripod can support up to an 11.8 kg (26.0 lbs) load



Maximum Height	2 m 80 in
Minimum Height	94 cm 37 in
Maximum Load	11.8 kg 26 lbs

MODEL 7-TR TRIPOD

The 7-TR Tripod is constructed of PVC and fiberglass components, providing increased stability for physically large antennas. The unique design allows for quick assembly, disassembly and convenient storage. The 7-TR allows several different configurations, including options for manual or pneumatic polarization. Quick height adjustment and locking wheels provide ease of use during testing. Maximum height is 2.17 m (85.8 in), with a minimum height of 0.8 m (31.8 in). This tripod can support a 13.5 kg (30 lbs) load.



Maximum Height	2.17m 85.8 in
Minimum Height	0.8m 31.8 in
Maximum Load	13.5 kg 30 lbs
Straight Boom (standard)	For general antenna mounting on a 7-TR
Offset Boom (optional)	For general antenna mounting on a 7-TR with pneumatic or manual polarization
Centerline Rotation Boom (optional)	When changing polarization, maintains centerline rotation, for rear-mount stinger-type antennas only
7-TR Boom (optional)	For Model 3106B antenna only

MODEL 3112 POSITIONING SYSTEM

The Model 3112 features an option for a fixed height pneumatic assisted polarization positioning system. The position system is ideal when using the Model 31112 for immunity testing.



Power Supply	160 mA 120 VAC Optional 220 VAC available
Pneumatic Interface	50-80 PSI
Weight	181.43 - 226.76 kg 400 -500 lbs
Maximum Height	355.6 cm 140 in
Maximum Load	194.13 cm 76.43 in

ETS-Lindgren Product Information Bulletin

See the ETS-Lindgren *Product Information Bulletin* included with your shipment for the following:

- Warranty information
- Safety, regulatory, and other product marking information
- Steps to receive your shipment
- Steps to return a component for service
- ETS Lindgren calibration service
- ETS Lindgren contact information

2.0 Maintenance

CAUTION

Before performing any maintenance, follow the safety information in the ETS-Lindgren *Product Information Bulletin* included with your shipment.



Maintenance of a Double-Ridged Waveguide Antenna is limited to external components such as cables or connectors.

If you have any questions concerning maintenance, contact ETS Lindgren Customer Service.

Annual Calibration

See the *Product Information Bulletin* included with your shipment for information on ETS-Lindgren calibration services.

Replacement and Optional Parts



ETS-Lindgren may substitute a similar part or new part number with the same functionality for another part/part number. Contact ETS-Lindgren for questions about part numbers and ordering parts.

Following are the part numbers for ordering replacement or optional parts for the Double-Ridged Waveguide Antennas.

Part Description	Part Number
User Manual	399318
Model 3112 Pneumatic Assisted Pedestal	109621
4-TR Tripod	4-TR
4-TR Mounting Bracket	101501
7-TR Tripod	7-TR
7-TR Straight Boom	109042
7-TR Offset Boom	108983
7-TR Centerline Rotation Boom	108197
7-TR Tripod, 3106B Mount, Pneumatic	7-TR/POL-3106
7-TR Boom, Model 3106B Only	108507

Service Procedures

For the steps to return a system or system component to ETS-Lindgren for service, see the *Product Information Bulletin* included with your shipment.

3.0 Specifications

Electrical Specifications

MODEL 3112

Frequency Range	100 MHz—1 GHz
VSWR Ratio (Average)	< 1.6:1
Maximum Continuous Power	800 W
Peak Power	1.5 kW (Type N, female connector) 2.5 kW CW (EIA 1 5/8 in. flange connector)
Impedance (Nominal)	50 Ω
Connector	Type N, female EIA 1 5/8 in. flange
Front-to-Back Ratio	20 dB
Cross Polarization	20 dB minimum

MODEL 3106B

Frequency Range	200 MHz—2.5 GHz
VSWR Ratio (Average)	<1.6:1
Maximum Continuous Power	800 W
Peak Power	1600 W
Impedance (Nominal)	50 Ω
Connector	Type N, female
Front-to-Back Ratio	20 dB
Cross Polarization	20 dB minimum

MODEL 3119

Frequency Range	400 MHz—6 GHz
VSWR Ratio (Average)	3.5:1
Maximum Continuous Power	800 W
Peak Power	2500 W
Impedance (Nominal)	50 Ω
Connector	Type N, female
Front-to-Back Ratio	20 dB
Cross Polarization	20 dB minimum

MODEL 3115

Frequency Range	750 MHz—18 GHz
VSWR Ratio (Average)	5:1
Maximum Continuous Power	750 W
Peak Power	500 W
Impedance (Nominal)	50 Ω
Connector	Type N, female
Front-to-Back Ratio	20 dB
Cross Polarization	20 dB minimum

MODEL 3117

Frequency Range	1 GHz—18 GHz
VSWR Ratio (Average)	3.5:1 max <2:1 above 1.5 GHz
Maximum Continuous Power	300 W
Peak Power	400 W
Impedance (Nominal)	50 Ω
Connector	Type N, female
Front-to-Back Ratio	>6.42 dB at 1 GHz >12.08 dB at 2 GHz >20 dB at 3 GHz—18 GHz
Cross Polarization	20 dB at 3 GHz—18 GHz

MODEL 3116C

Frequency Range	10 GHz—40 GHz
VSWR Ratio (Average)	2.5:1 max
Maximum Continuous Power	20 W @ 40 GHz 40 W @ 10 GHz
Peak Power	200 W
Impedance (Nominal)	50 Ω
Connector	Type K, female 2.92 mm
Front-to-Back Ratio	20 dB
Cross Polarization	20 dB minimum

Physical Specifications

MODEL 3112

Width	203.2 cm (80 in)
Depth	182 cm (71.65 in)
Height	139.7 cm (56 in)
Approximate Weight	86.1 kg (189.81 lbs)

MODEL 3106B

Width	93.3 cm (36.7 in)
Depth	97.8 cm (38.5 in)
Height	72.9 cm (28.7 in)
Approximate Weight	11.8 kg (26.01 lbs)

MODEL 3119

Width	48.84 cm (19.23 in)
Depth	40 cm (15.74 in)
Height	31.37 cm (12.35 in)
Approximate Weight	7.4 kg (16.3 lbs)

MODEL 3115

Width	24.4 cm (9.6 in)
Depth	27.9 cm (11 in)
Height	15.9 cm (6.2 in)
Approximate Weight	1.8 kg (4 lbs)

MODEL 3117

Width	17.5 cm (6.9 in)
Depth	17.5 cm + 15.5 cm mount (6.9 in + 6.1 in mount)
Height	15.5 cm (6.1 in)
Approximate Weight	1.13 kg (2.5 lb)

MODEL 3116C

Width	10.8 cm (4.25 in)
Depth	with stinger: 25.73 cm (10.13 in) with bracket 13.03 cm (5.13 in)
Height	With stinger: 6.35 cm (2.5 in) with bracket: 8.9 cm (3.5 in)
Approximate Weight	With stinger 0.334 kg (0.74 lbs) with bracket: 0.201 kg (0.44 lbs)

4.0 Mounting Instructions

CAUTION

Before connecting any components, follow the safety information in the ETS-Lindgren *Product Information Bulletin* included with your shipment.

CAUTION

The ETS-Lindgren Double-Ridged Waveguide Horn Antennas are precision instruments. Handle with care.



Make sure that no part of the antenna is in contact with the tripod or tower.

Model 3112 Optional Positioning System

CAUTION

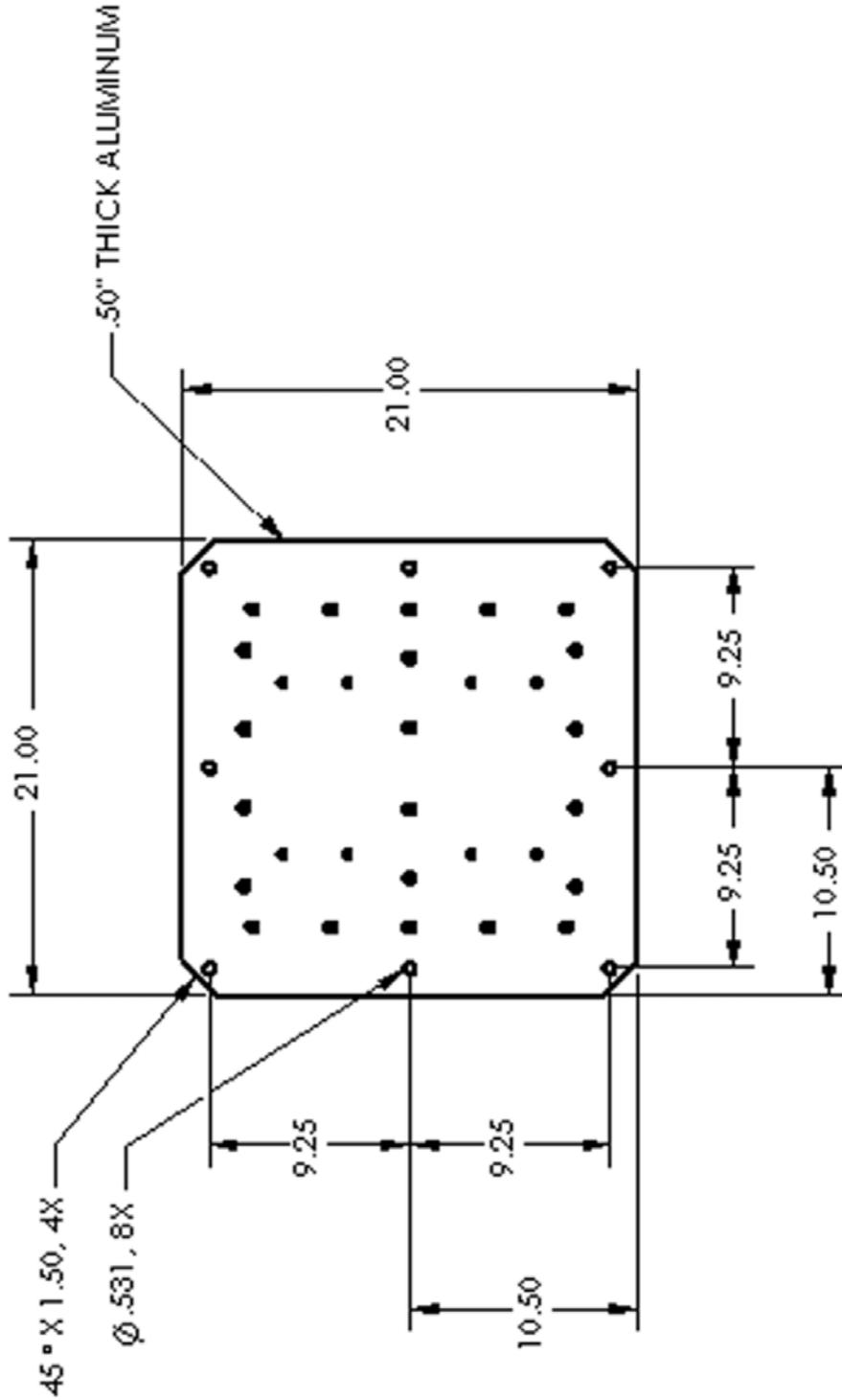
Failure to provide continuous support of the antenna when attaching or removing the antenna from the positioning system may result in damage and/or personal injury.



The customer is responsible for providing an adequate and safe support system for the Model 3112 Double Ridged Waveguide Horn Antenna when moving and attaching to the optional positioning system.

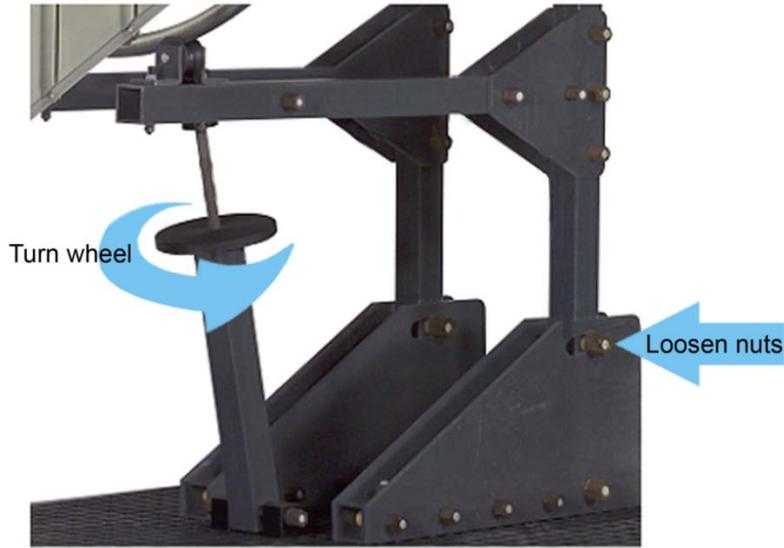


The Model 3112 Double Ridged Waveguide Horn antenna includes a series of outer holes in the rear plate that is compatible with the optional positioning system. Additionally, the mounting holes can be used to meet customer specific mounting requirements.



Model 3112 Mounting Pattern
Rear plate with outer hole pattern for end mounting

CONNECTING THE OPTIONAL POSITIONING SYSTEM



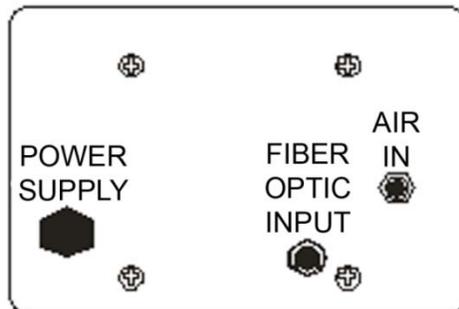
Model 3112 with optional positioner

Once the Model 3112 is securely mounted on the positioner, loosen the nuts and turn the wheel at the base of the horn support for better field uniformity. This bore sights the horn 10 degrees.

MODEL 3112 INPUT LOCATIONS

CAUTION

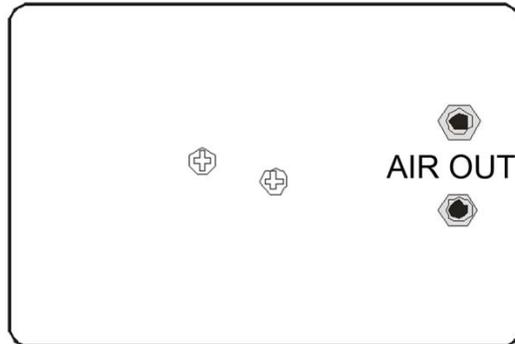
Do not connect power to the positioner until the antenna is securely mounted and all other connections have been made.



The input panel is located on the base of the Model 3112 positioner.

- Plug one end of the fiber optic cable into the **FIBER OPTIC INPUT** connector.
- Plug the opposite end of the fiber optic cable into the ETS-Lindgren Model 2090 Multi-Device Controller or compatible controller.
- Plug the cord included first into the **POWER SUPPLY** outlet. Make connection with the power source only once all other connections have been made and the antenna is securely attached to the positioner.

AIR POLARIZATION OPTION



- Plug the ends of the twin air hoses into the two **AIR OUT** connectors located on the interface box at the base of the custom positioning system.
- Plug the opposite ends of the twin hoses into the two 90 degree fittings on the air cylinder of the custom positioning system.
- Plug one end of the single air hose into the **AIR IN** connector located on the opposite side of the interface box at the base of the custom positioning system (shown in previous diagram).
- Plug the opposite end of the single air hose into the air supply.
- Once the antenna is completely secure and the connections are made, connect the power supply to the **POWER SUPPLY** port on the opposite side of the interface box at the base of the custom positioning system (show in previous diagram).

4-TR Mounting Instructions

CAUTION

Due to the size of the Model 3112, 3119 and 3106B Double-Ridged Waveguide Horn Antennas, do not mount them onto a 4-TR tripod.

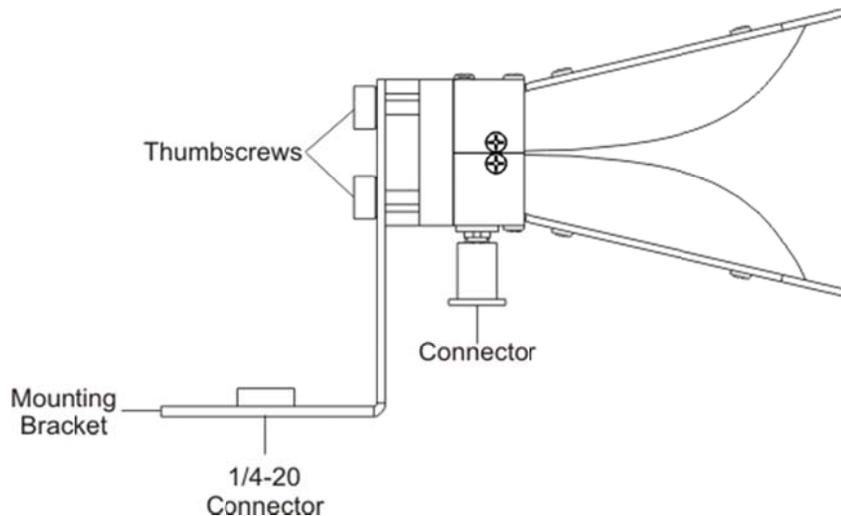
CAUTION

Failure to provide continuous support of the antenna when attaching or removing the mounting bracket or thumbscrews may result in damage.

MOUNTING BRACKET ATTACHMENT

ETS-Lindgren Double-Ridged Waveguide Horn antennas ship with the following mounting hardware:

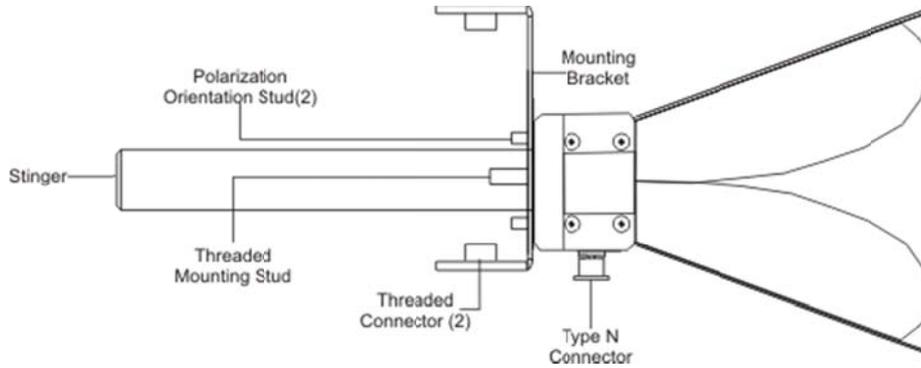
- Mounting bracket drilled to accept ETS-Lindgren or other tripod mount with 1/4–20 threads.
- Thumbscrews (2) for attaching the antenna to the mounting bracket.
- The illustration represents a typical assembly of the mounting bracket to an antenna. The Model 3116C is shown; however, the steps are similar for each of the ETS-Lindgren Double-Ridged Waveguide Horn Antennas.



1. Hold the antenna with the connector pointing to the floor and align the holes on the back of the antenna with the ones on the bracket provided.
2. Select set of holes for horizontal or vertical polarization as desired.
3. Insert both thumbscrews and tighten.

STINGER MOUNT ATTACHMENT

A stinger mount is included with the Model 3117 antenna for centerline rotation measurements. When using the Model 3117 with the 4-TR the mounting bracket must be attached.



1. Hold the antenna with the connector pointing to the floor and align the holes on the back of the antenna with the ones on the bracket provided.
2. Select set of holes for horizontal or vertical polarization as desired.
3. Insert both thumbscrews and tighten.
4. Align the stinger with the threaded mounting stud then tighten.

MOUNT ANTENNA TO THE MODEL 4-TR TRIPOD



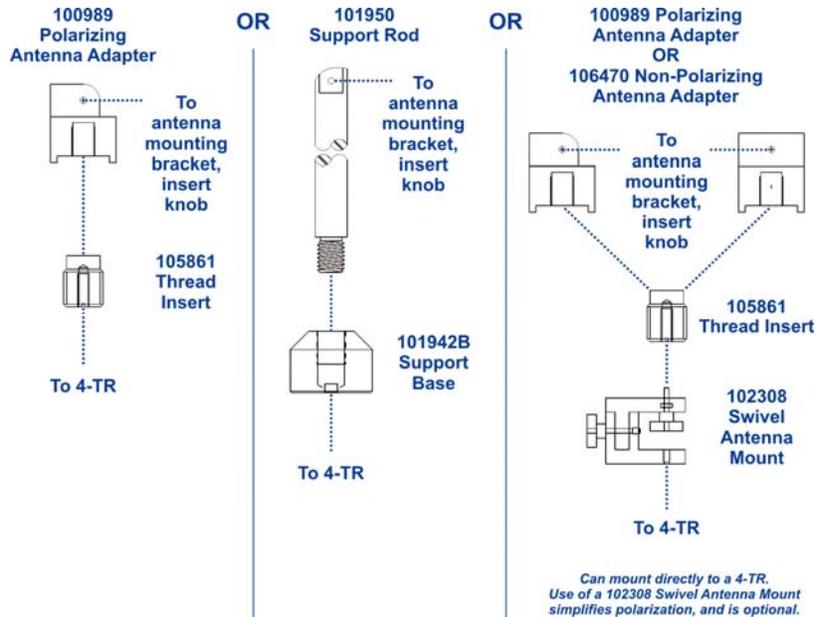
Model 3117 shown mounted onto 4-TR

1. Attach the mounting bracket to the 4-TR tripod by aligning the ¼-20 connector on the bracket with the ¼-20 bolt on the tripod. Support the antenna securely while turning the mounting bracket to tighten the connection

2. To change polarization, support the antenna securely and remove the thumbscrews. Turn the antenna to align the holes on the mounting bracket with the desired set of holes on the back of the antenna. Re-insert the thumbscrews and tighten.

4-TR TRIPOD OPTIONS

Following are additional options for mounting the Double-Ridged Waveguide antennas onto an ETS-Lindgren 4-TR Tripod. Contact the ETS-Lindgren Sales Department for information on ordering optional mounting hardware.



7-TR Mounting Instructions

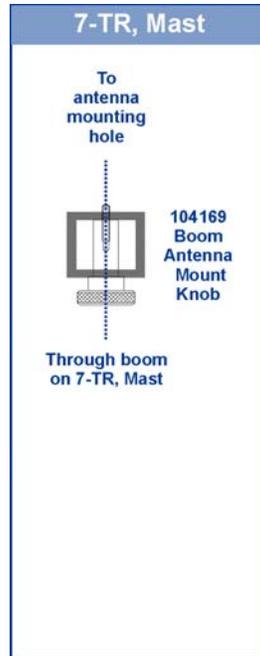
CAUTION

Due to the size of the Model 3112 Double-Ridged Waveguide Horn Antenna, do not mount it onto a 7-TR tripod.



Please refer to the Model 7-TR manual for mounting instructions and options.

Following are options for mounting a Double-Ridged Waveguide Antenna (except the Model 3112) onto an ETS-Lindgren 7-TR Tripod or mast. Contact the ETS-Lindgren Sales Department for information on ordering optional mounting hardware.



7-TR TRIPOD OPTIONS

109042 boom—Straight boom; for general antenna mounting on a 7-TR

108983 boom—offset boom; for general antenna mounting on a 7-TR with pneumatic or manual polarization; can also be used to mount stinger-type antennas

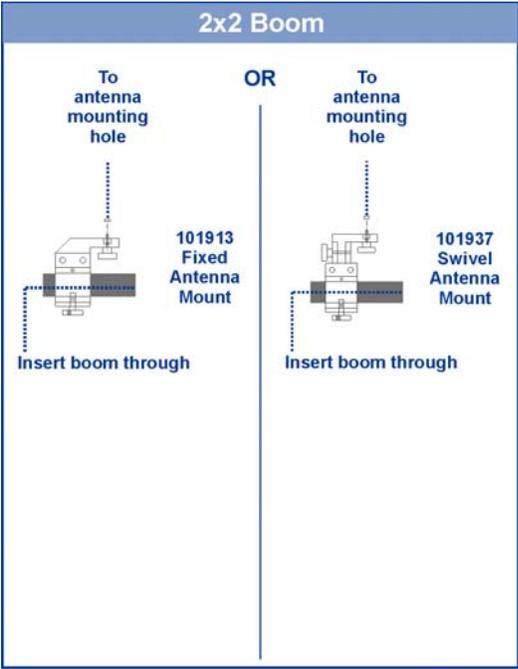
108507 boom—Centerline rotation boom for Model 3106 Series antennas only; when changing polarization, maintains centerline rotation

2x2 Boom Mounting Options



2x2 boom refers to a typical 2-inch by 2-inch boom.

Following are additional options for mounting the Double-Ridged Waveguide Antenna onto a 2x2 boom. Contact the ETS Lindgren Sales Department for information on ordering optional mounting hardware.



MOUNT ANTENNA TO 7-TR POSITIONER

Please review the mounting instructions included in the Model 7-TR manual.



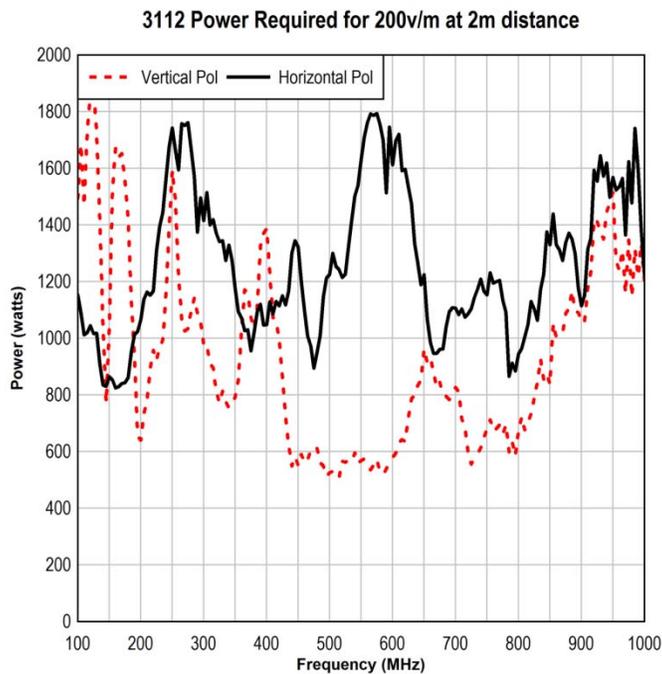
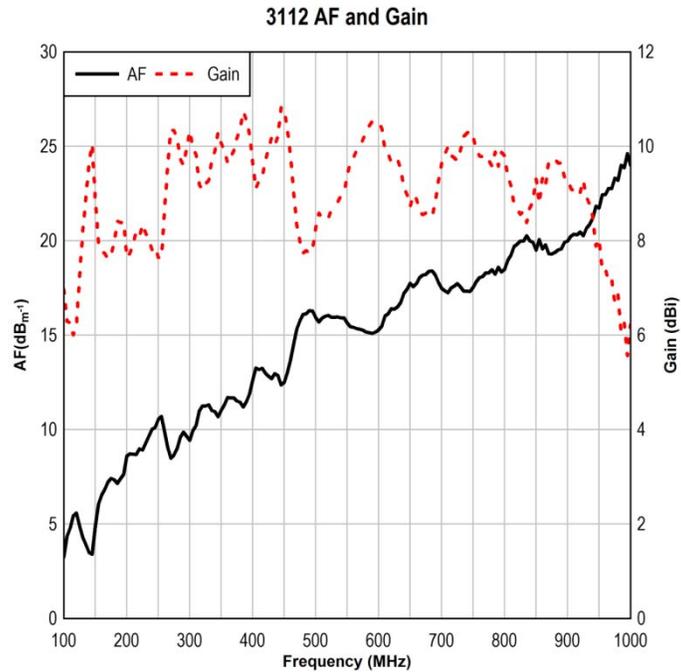
*7-TR shown with Model 3106B mounted onto 7-TR
with optional 108507 centerline rotation boom*

5.0 Typical Data

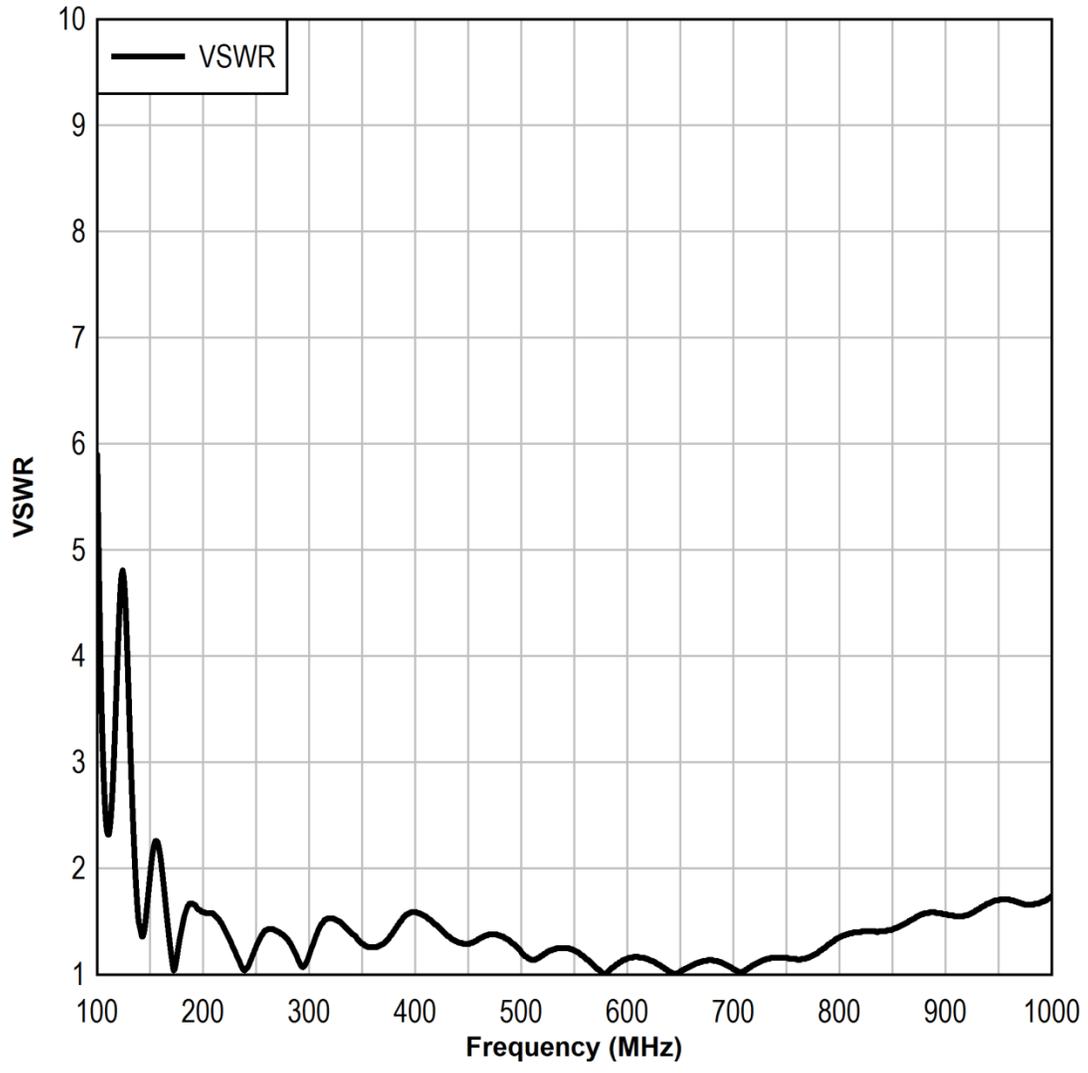
CAUTION

Before placing into operation, follow the safety information in the ETS-Lindgren *Product Information Bulletin* included with your shipment.

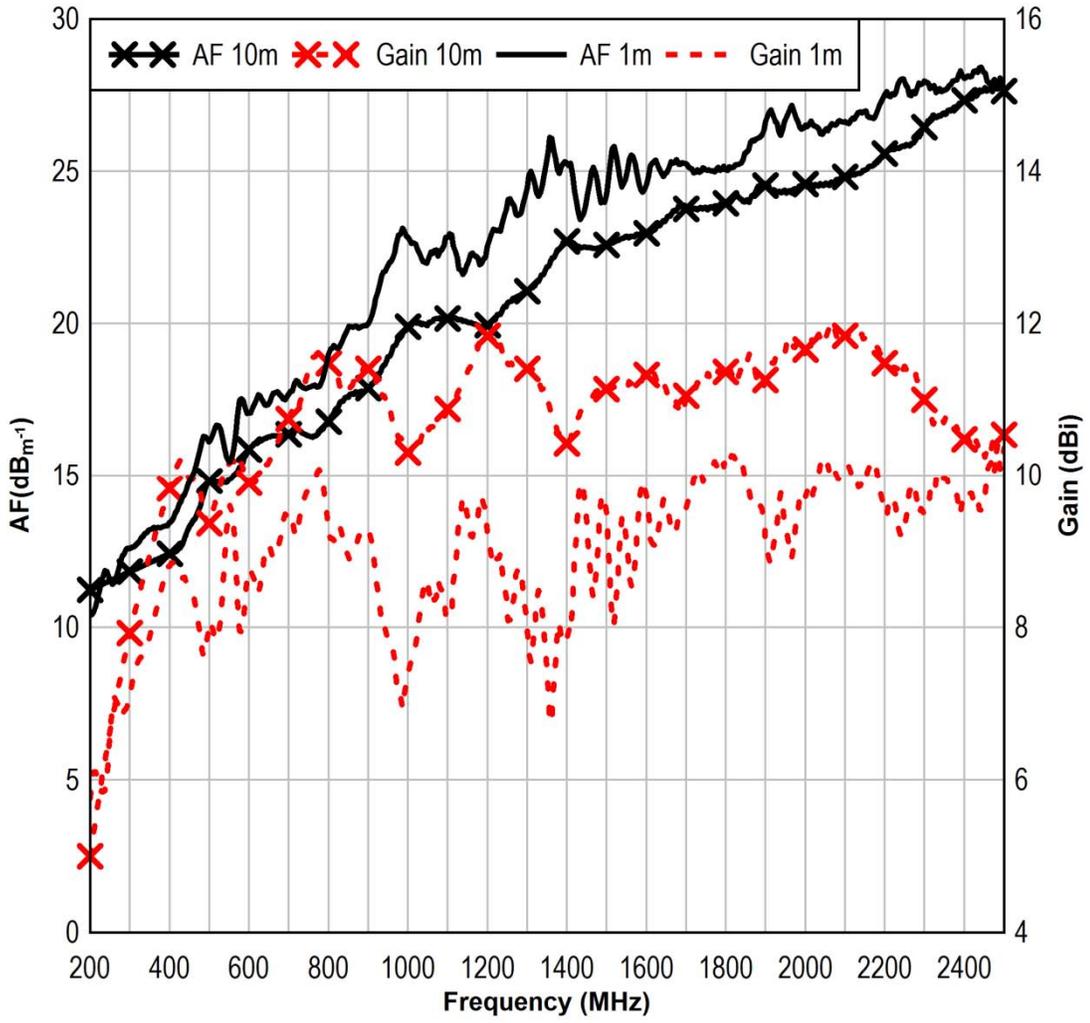
Model 3112



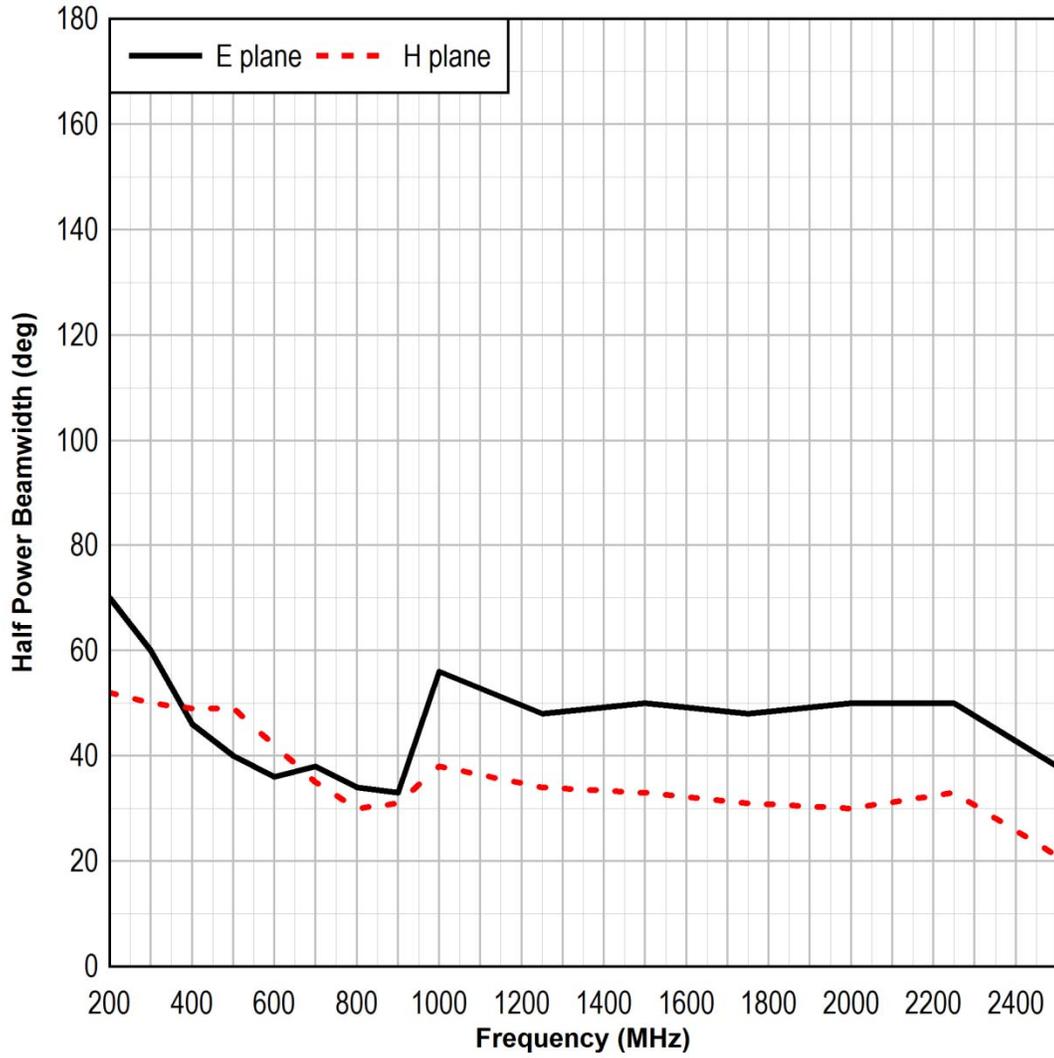
3112VSWR



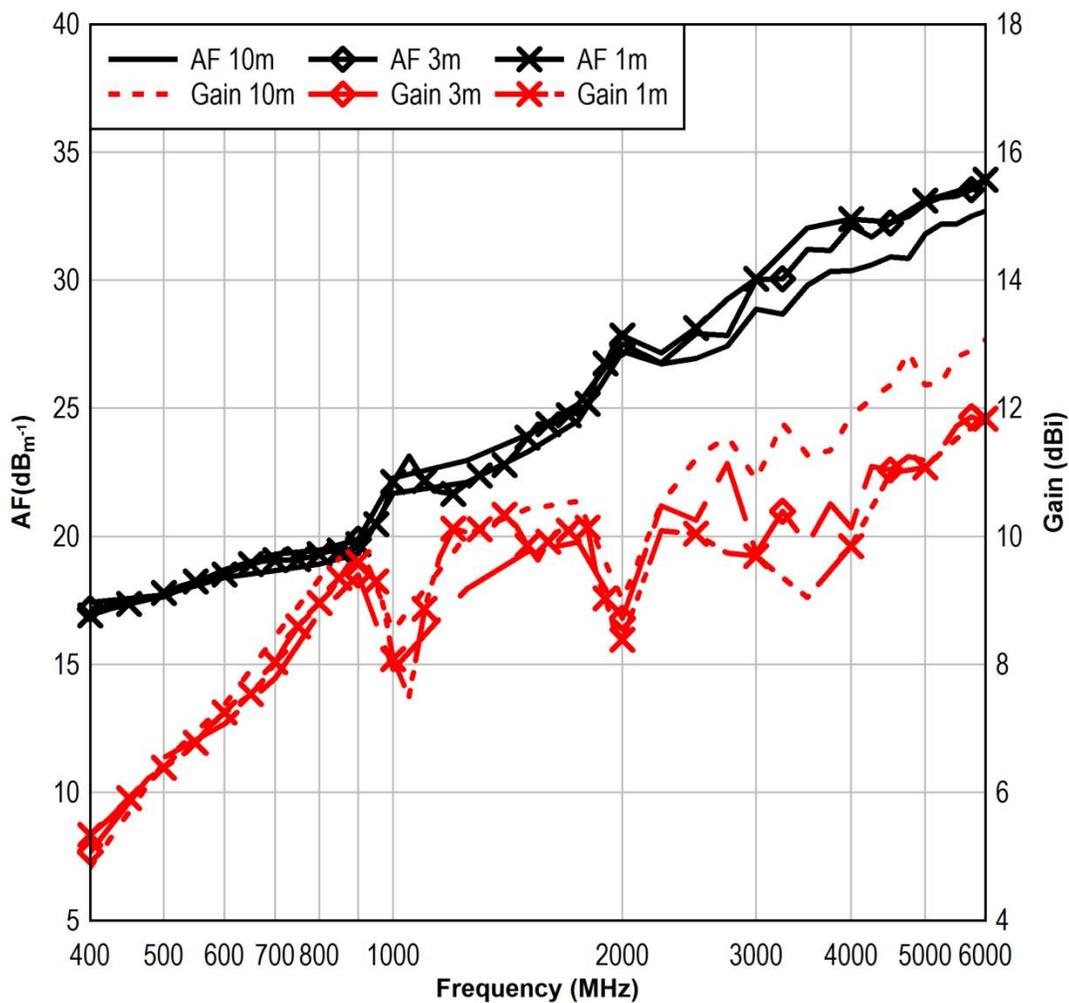
3106B AF and Gain



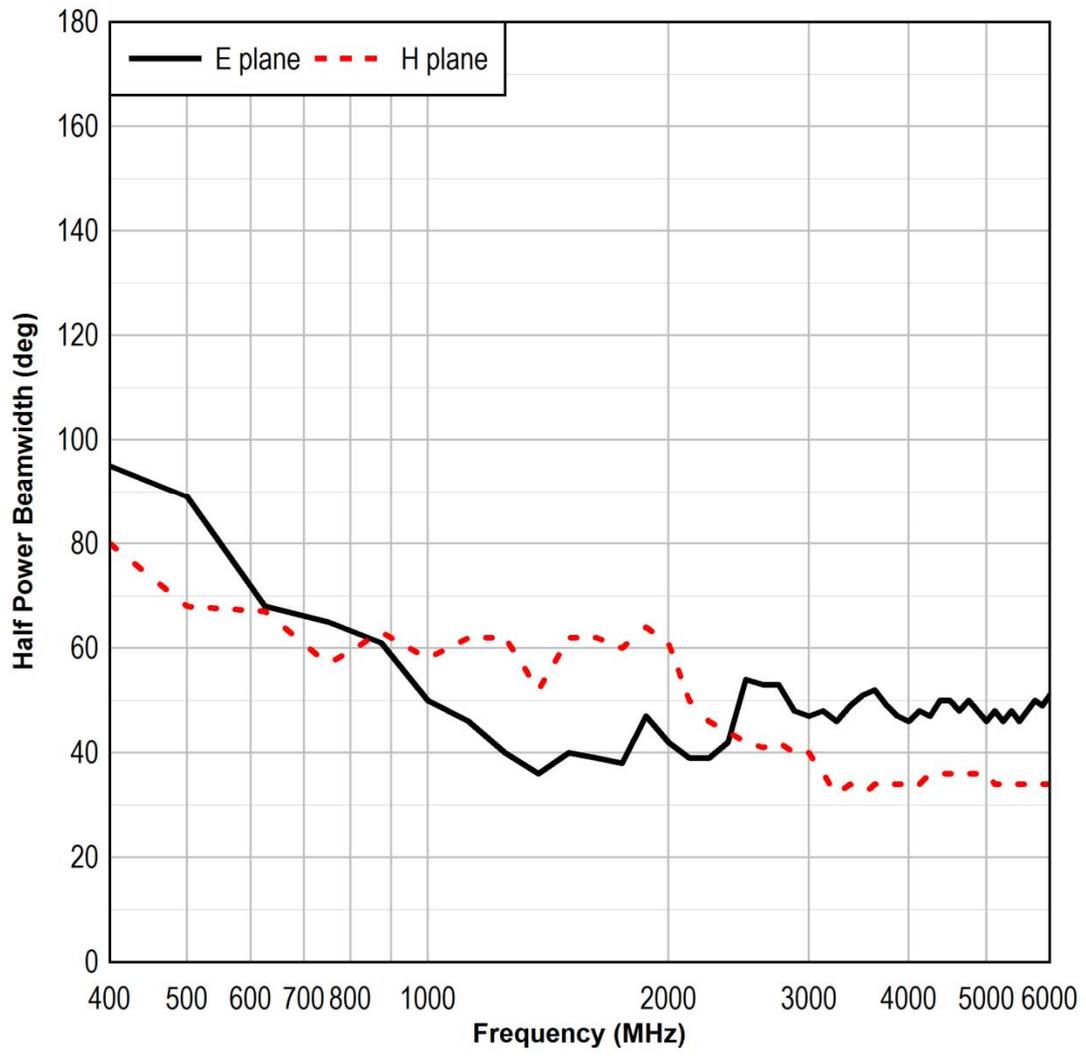
3106B Half Power Beamwidth



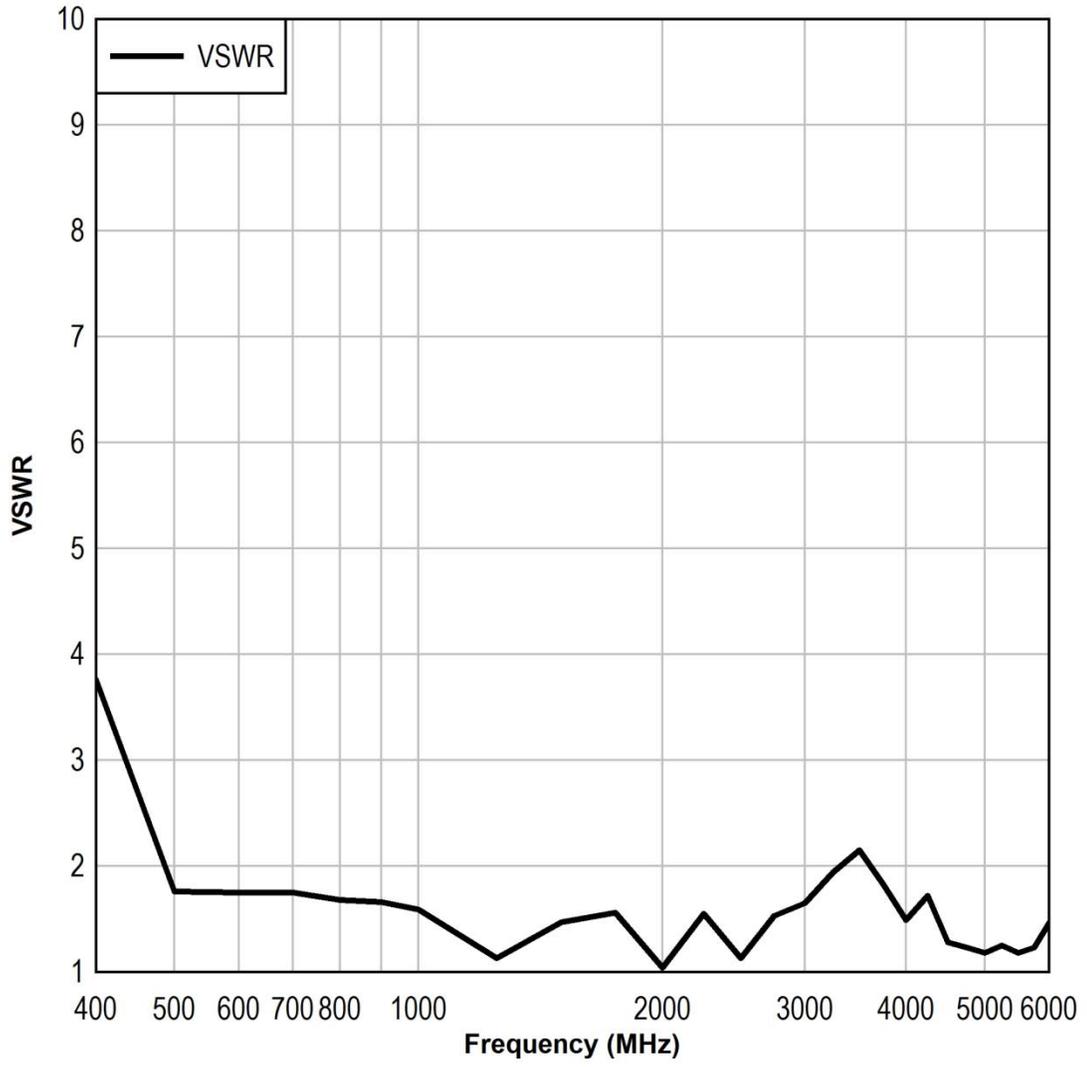
3119 AF and Gain



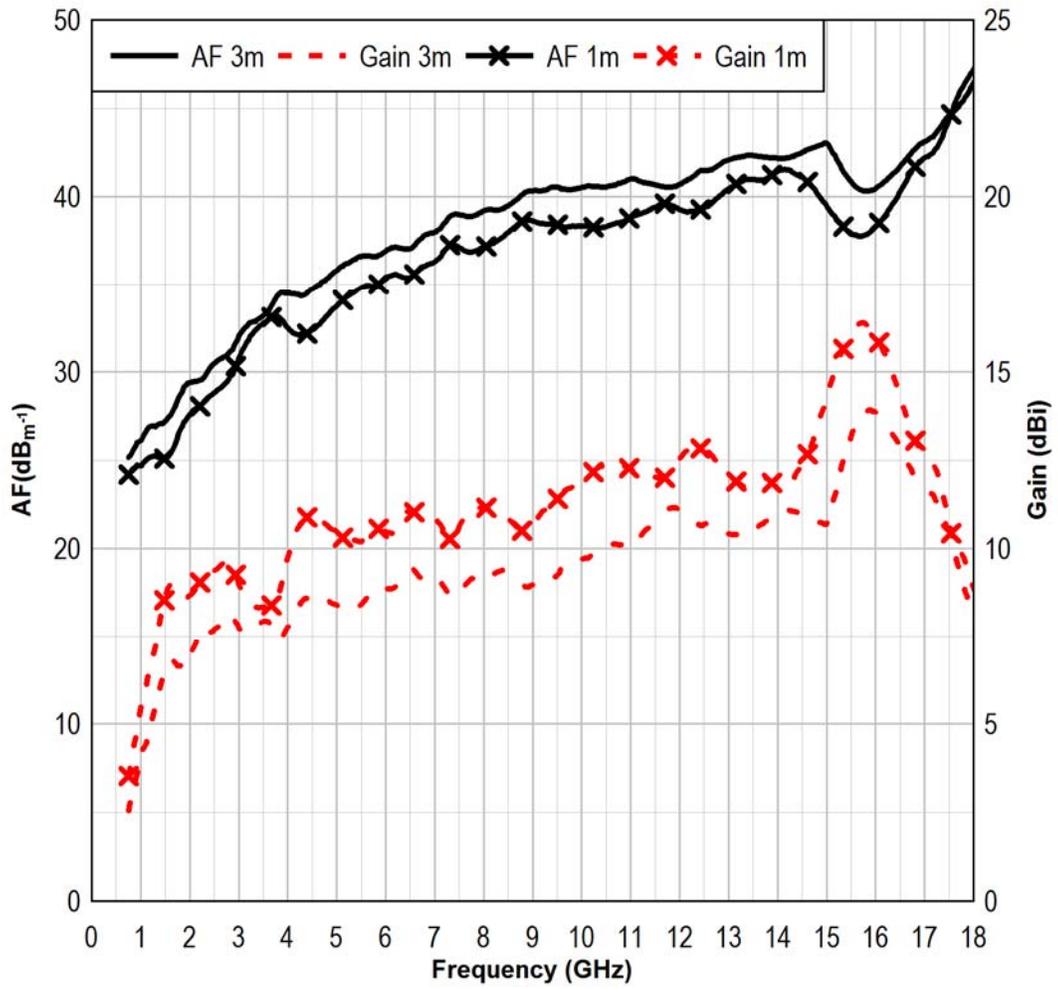
3119 Half Power Beamwidth



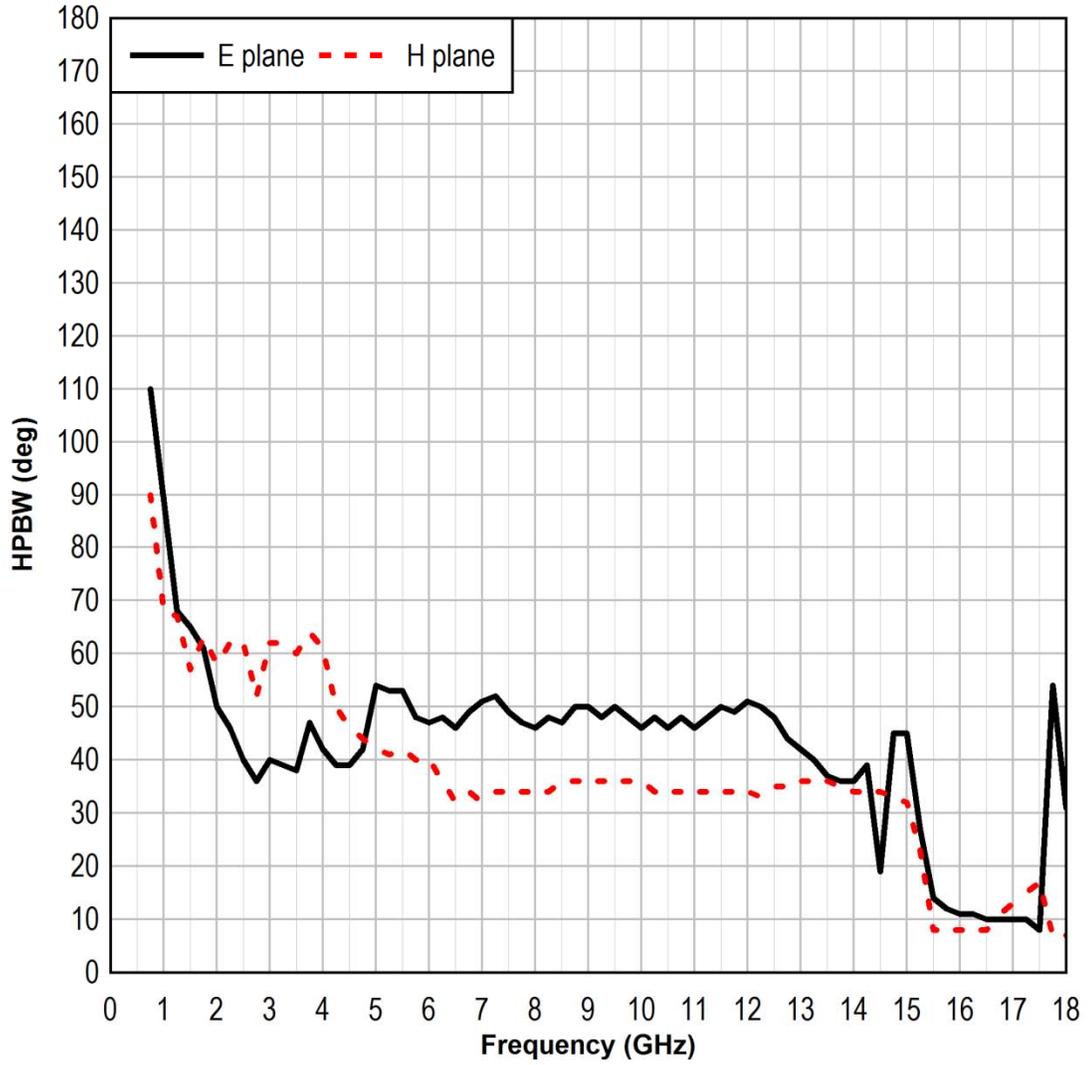
3119 VSWR



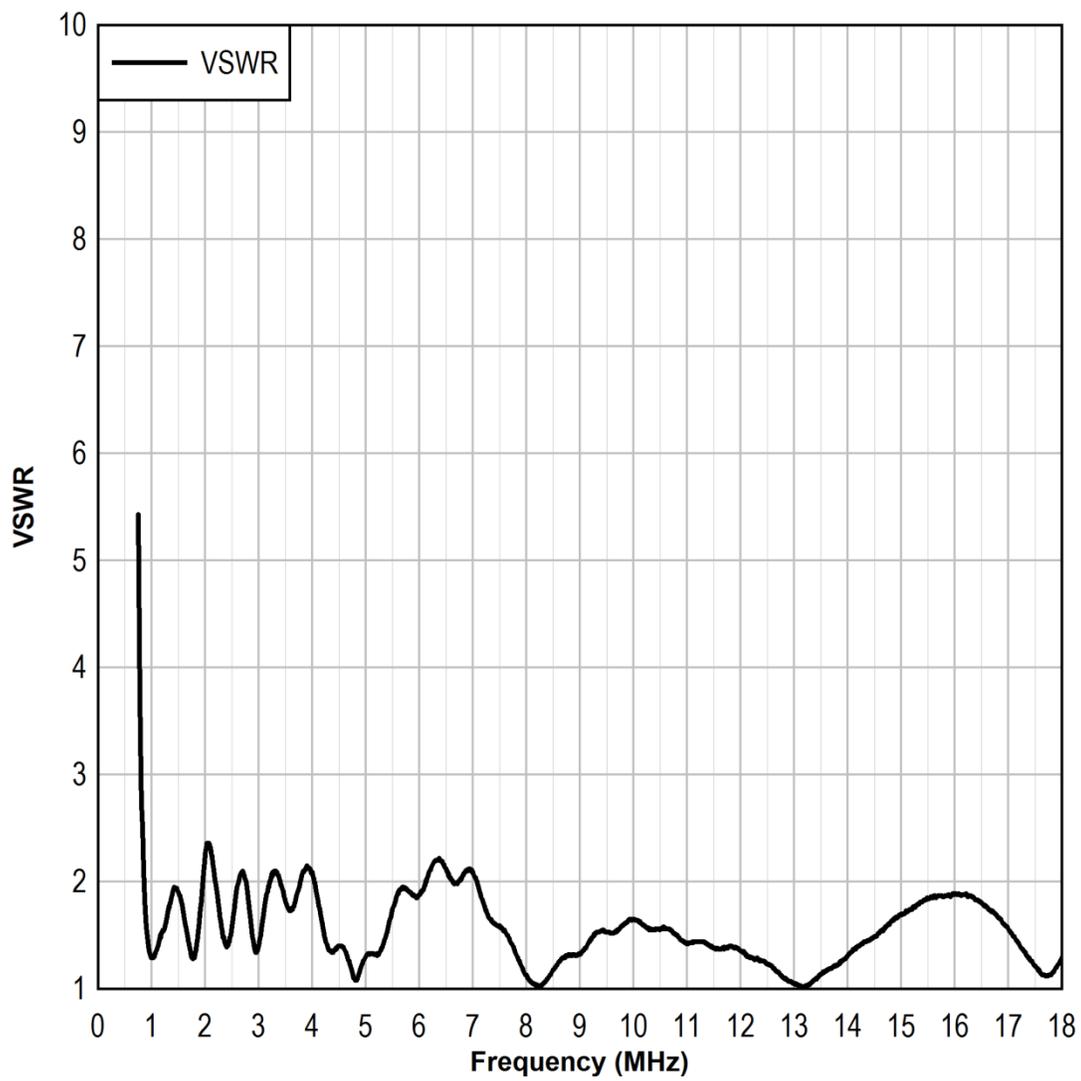
3115 AF and Gain



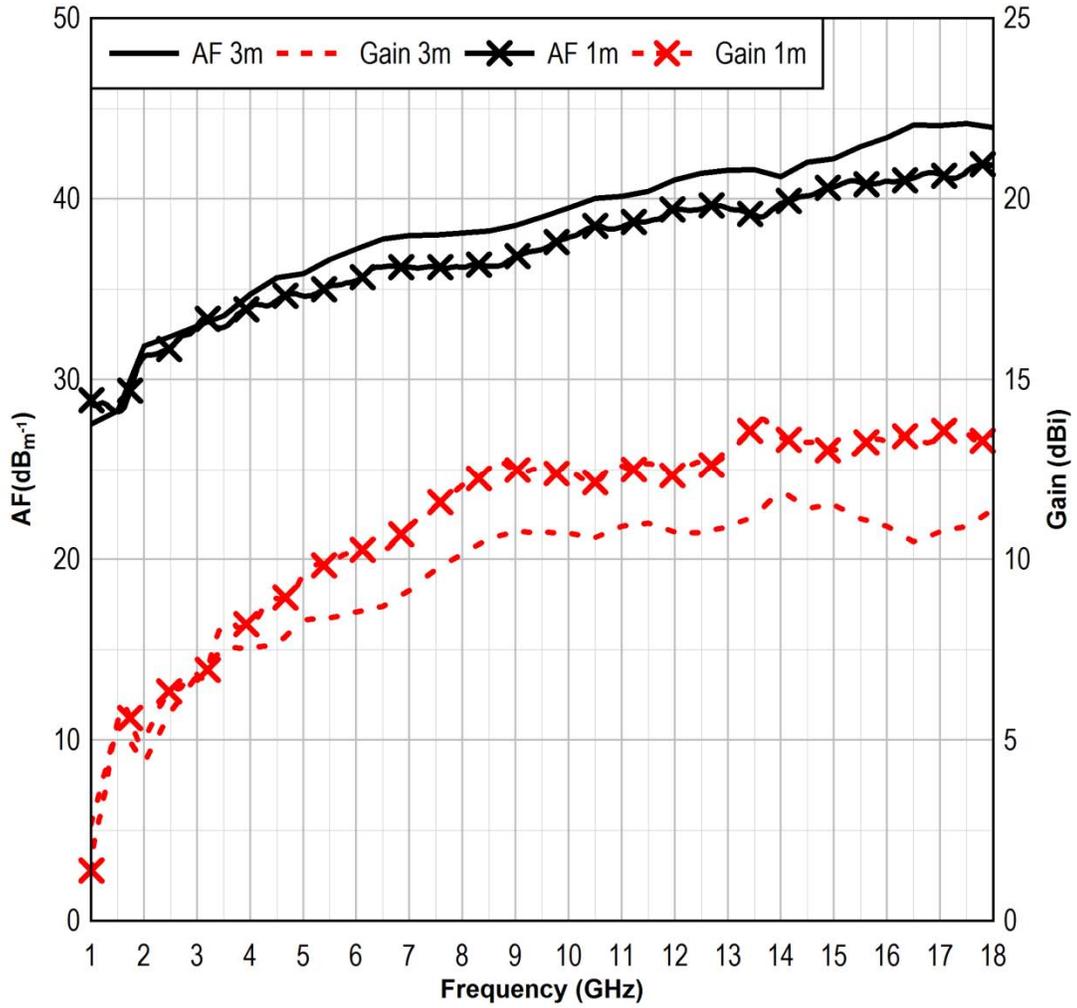
3115 Half Power Beamwidth



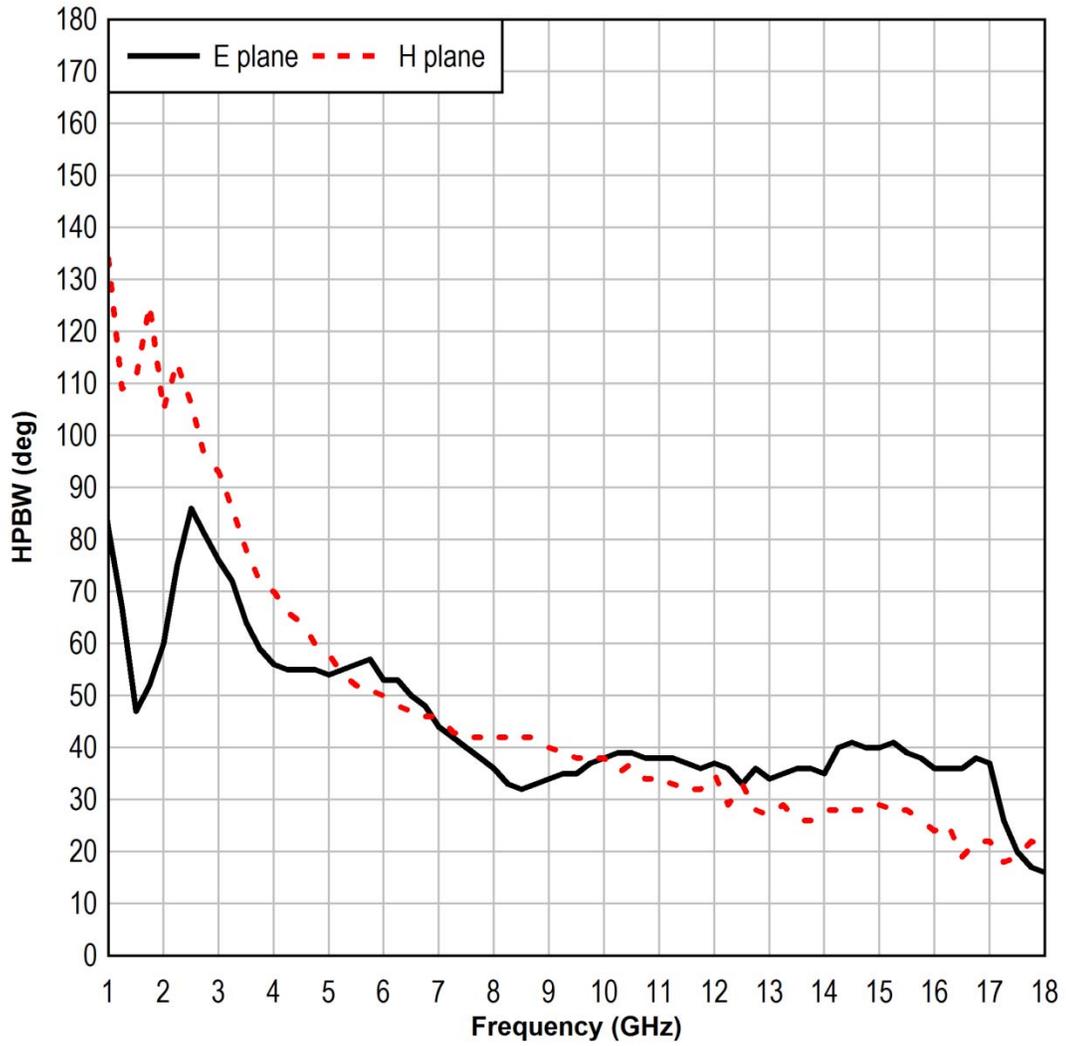
3115 VSWR



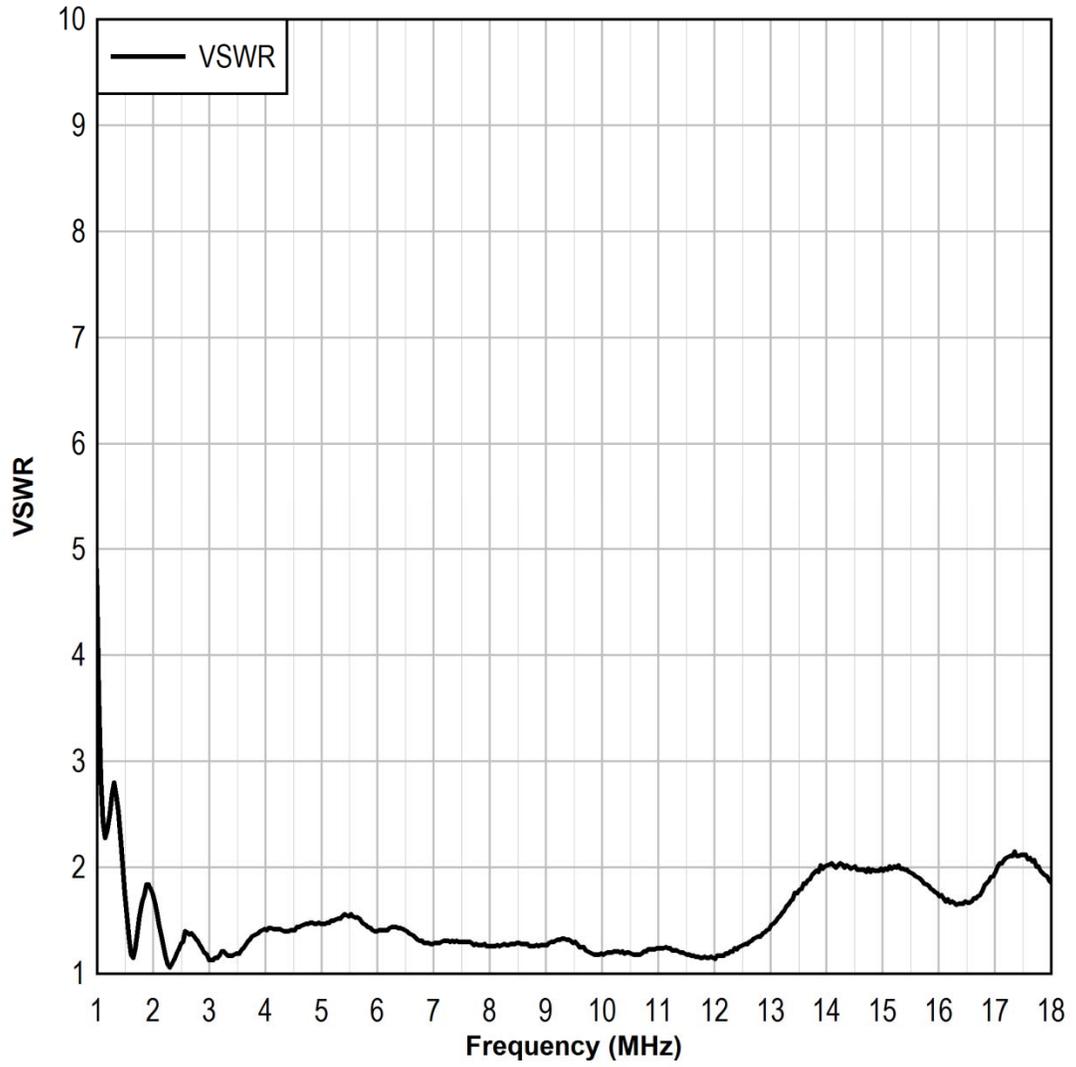
3117 AF and Gain



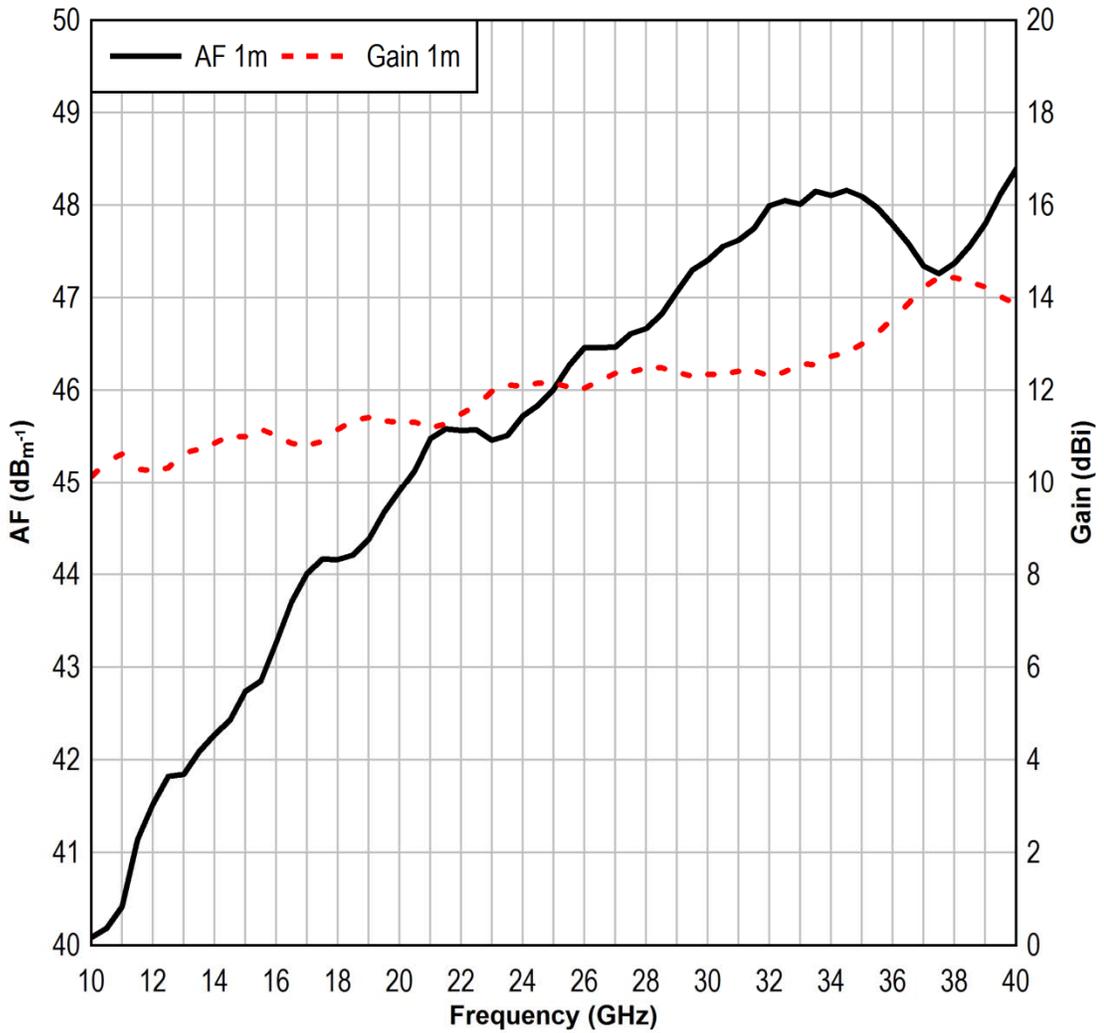
3117 Half Power Beamwidth



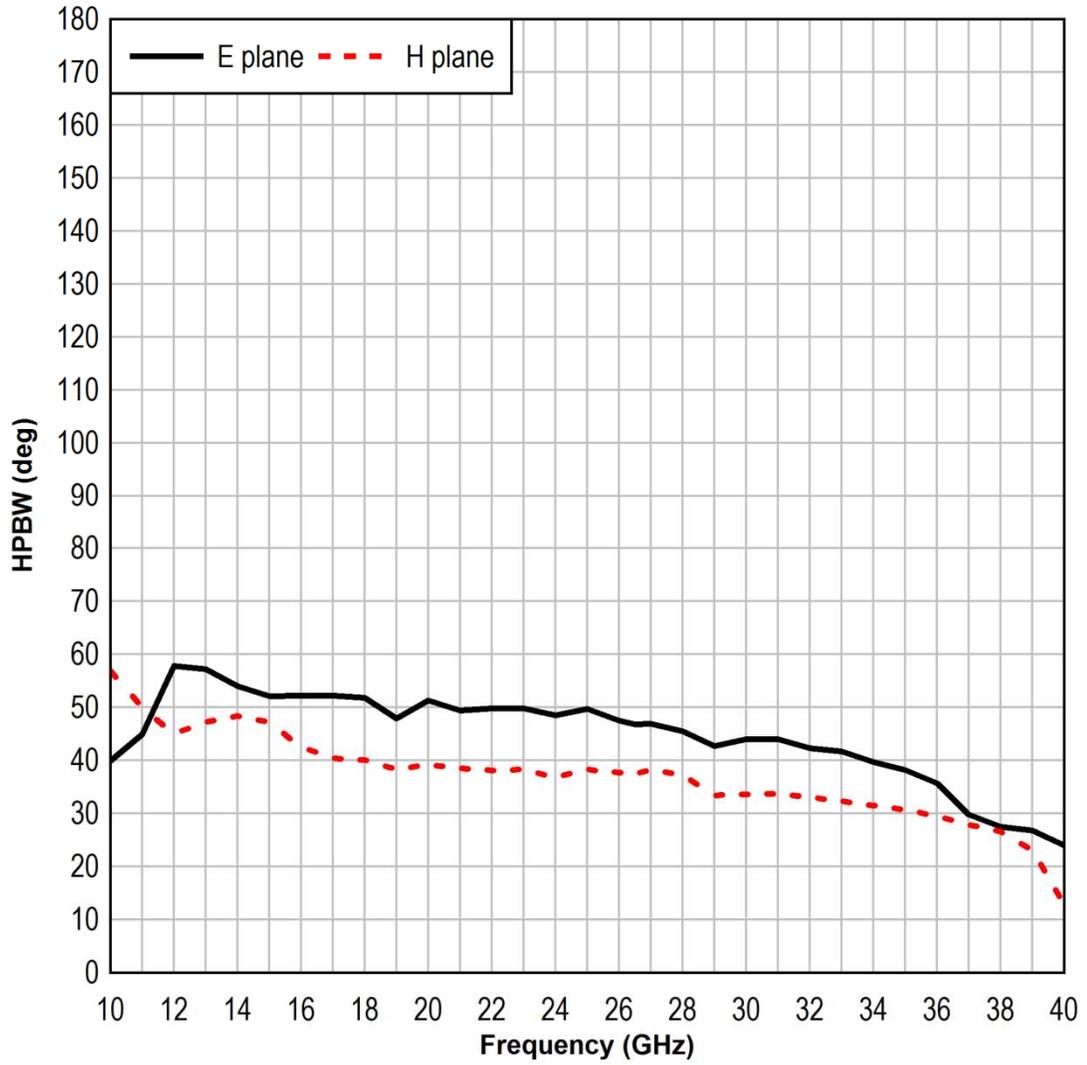
3117 VSWR



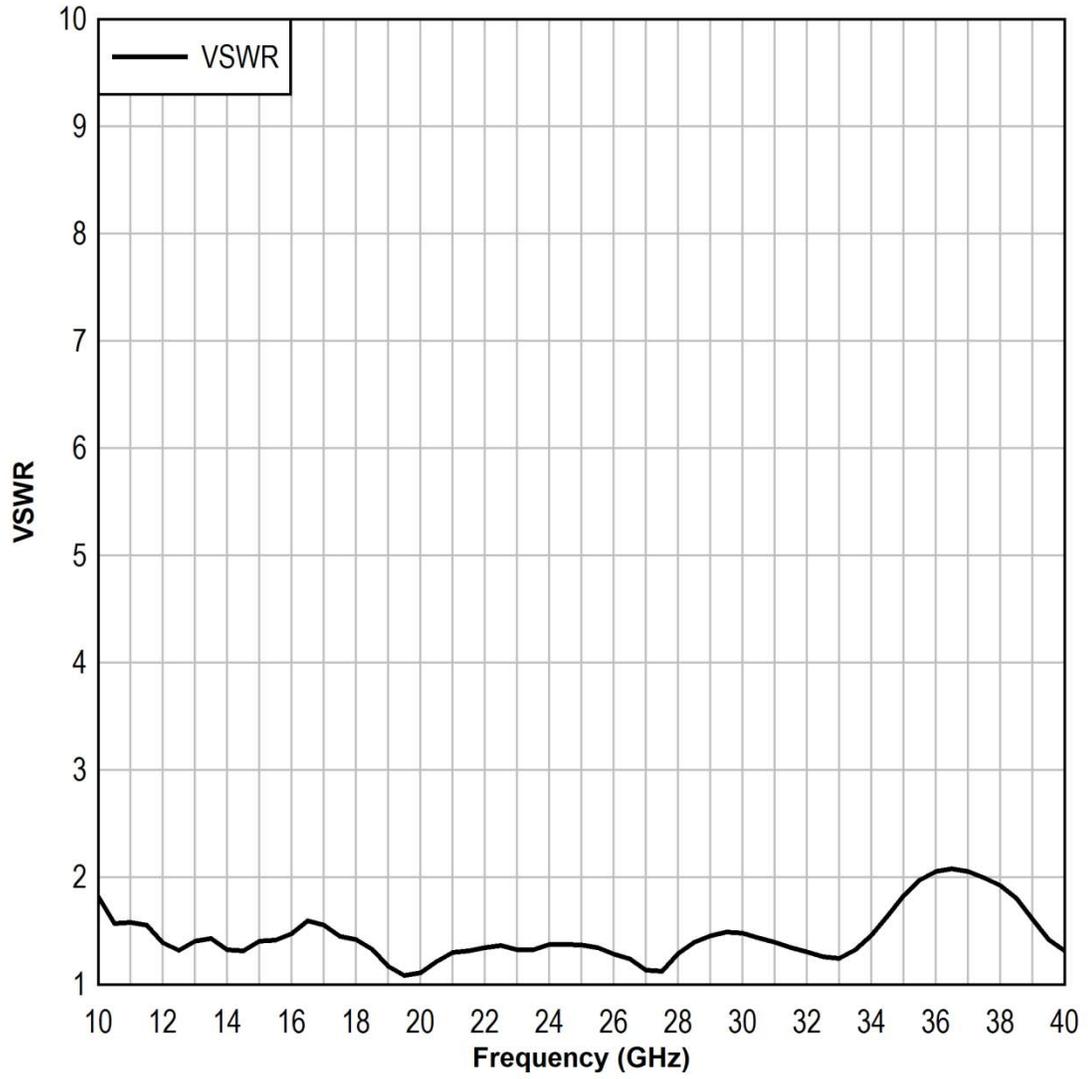
3116C AF and Gain



3116C Half Power Beamwidth (computed)



3116C VSWR



Appendix A: Warranty



See the *Product Information Bulletin* included with your shipment for the complete ETS-Lindgren warranty for your double ridged Waveguide horn antenna.

DURATION OF WARRANTIES FOR DOUBLE RIDGED WAVEGUIDE HORN ANTENNAS

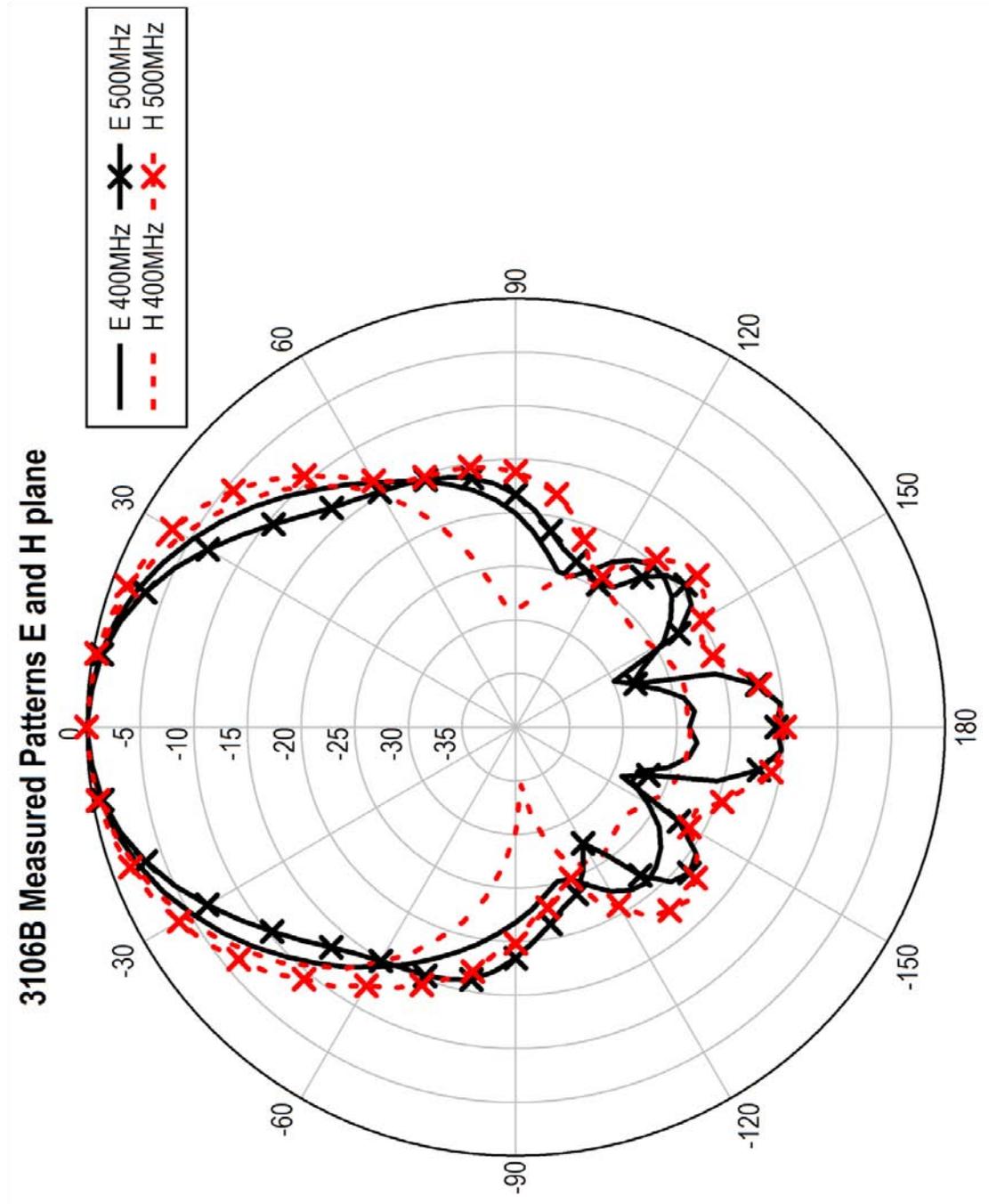
All product warranties, except the warranty of title, and all remedies for warranty failures are limited to two year.

Product Warranted	Duration of Warranty Period
Model 3112	2 Years
Model 3106B	2 Years
Model 3119	2 Years
Model 3115	2 Years
Model 3117	2 Years
Model 3116C	2 Years

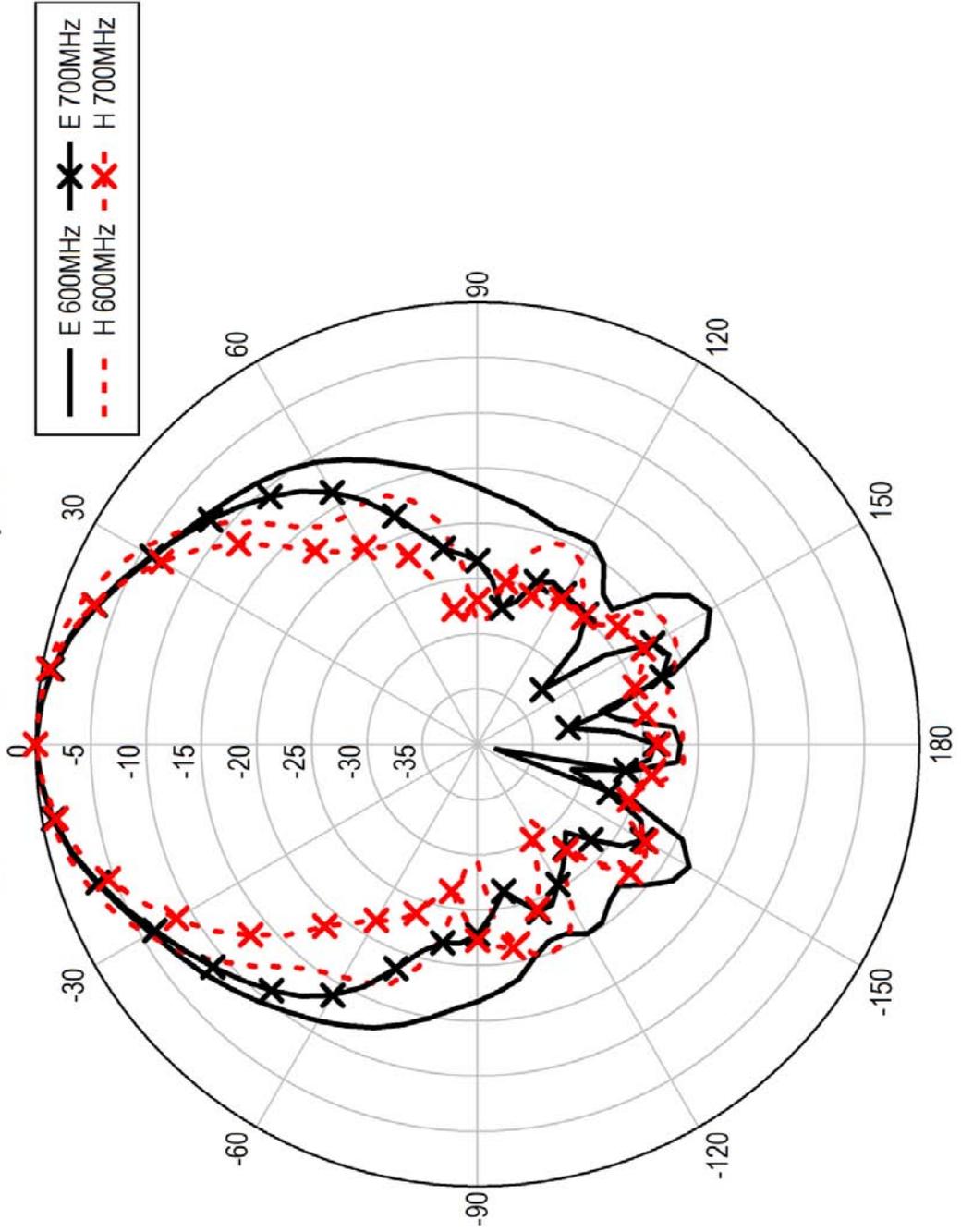
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Appendix B: Typical Measured Radiated Patterns

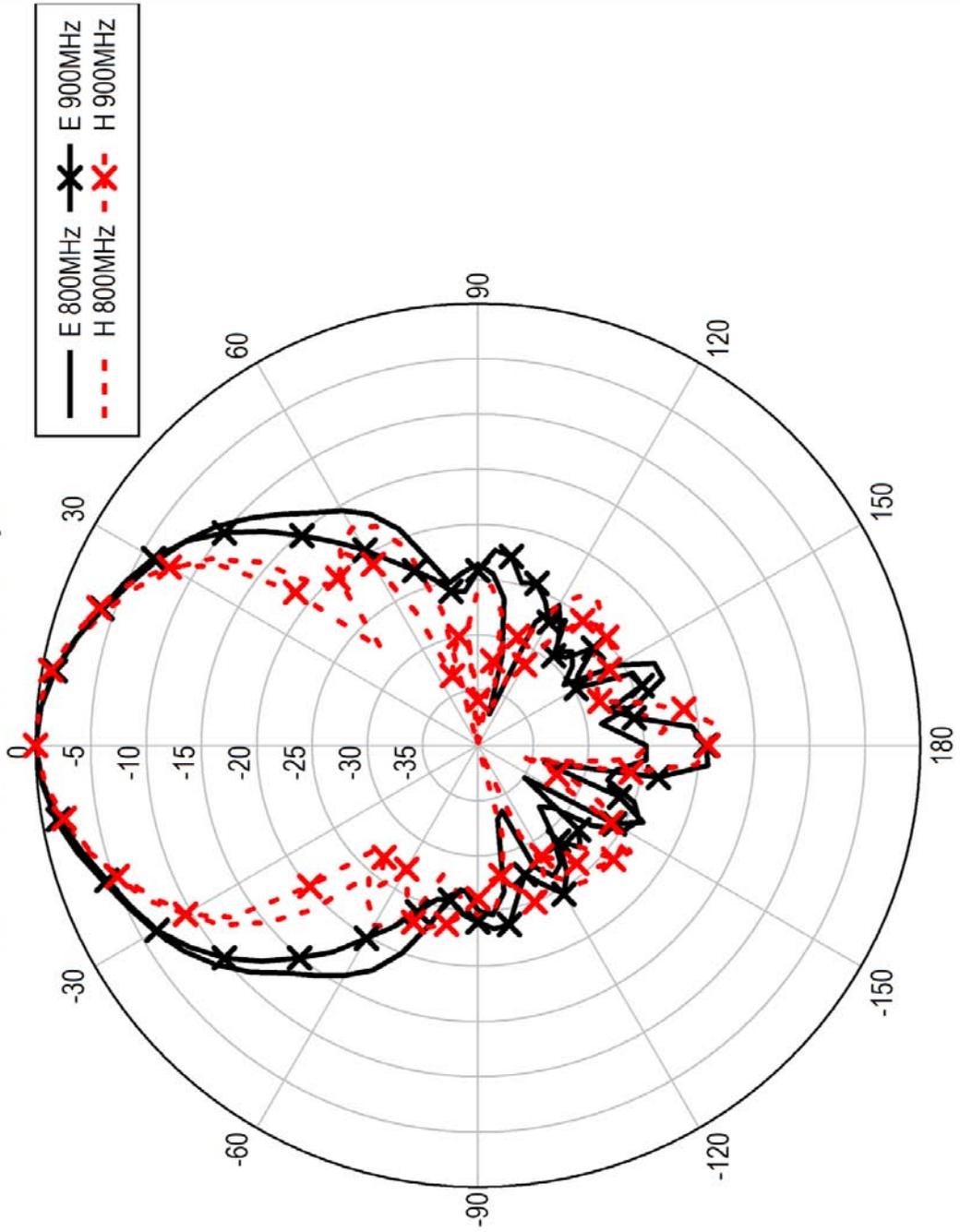
MODEL 3106B



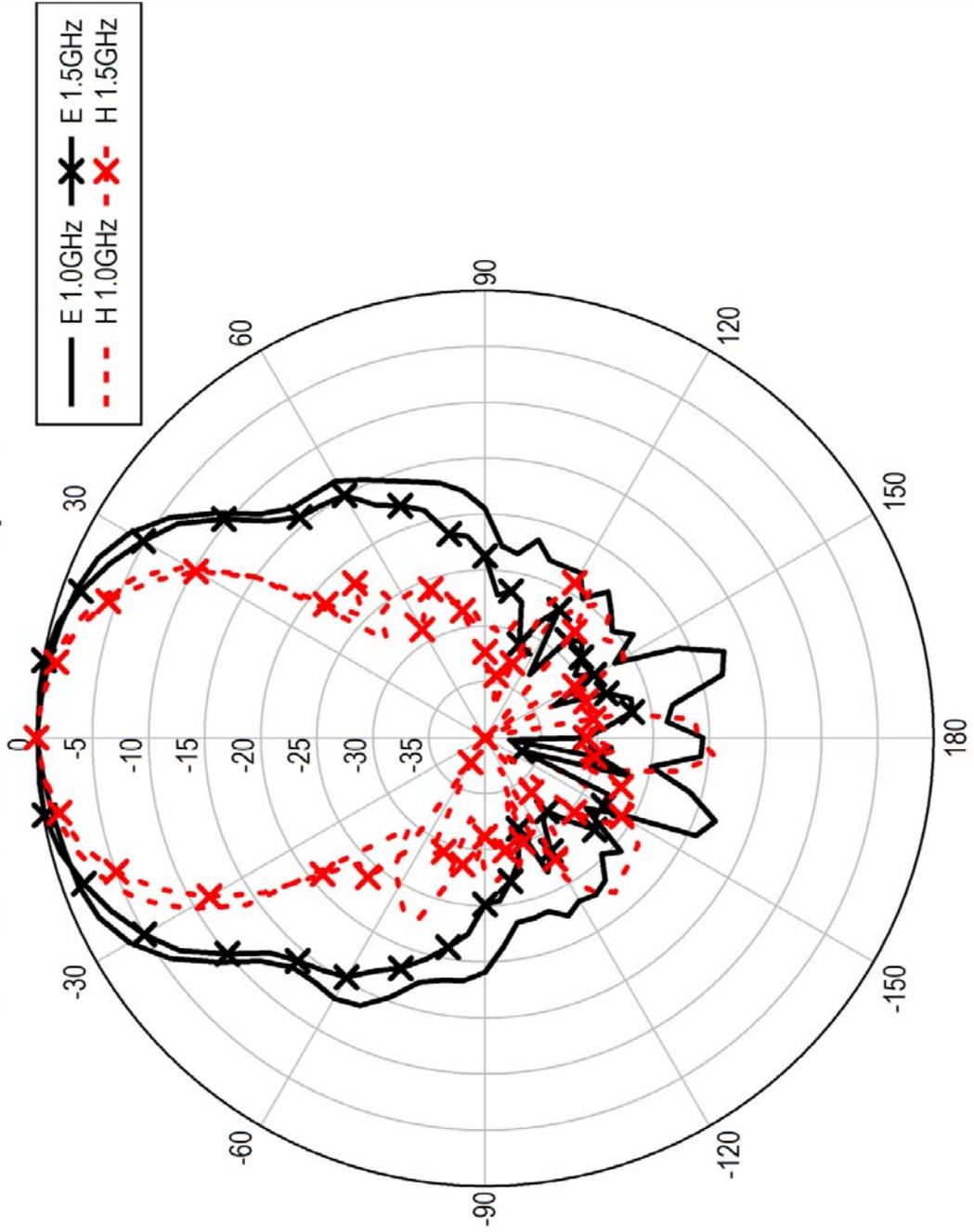
3106B Measured Patterns E and H plane



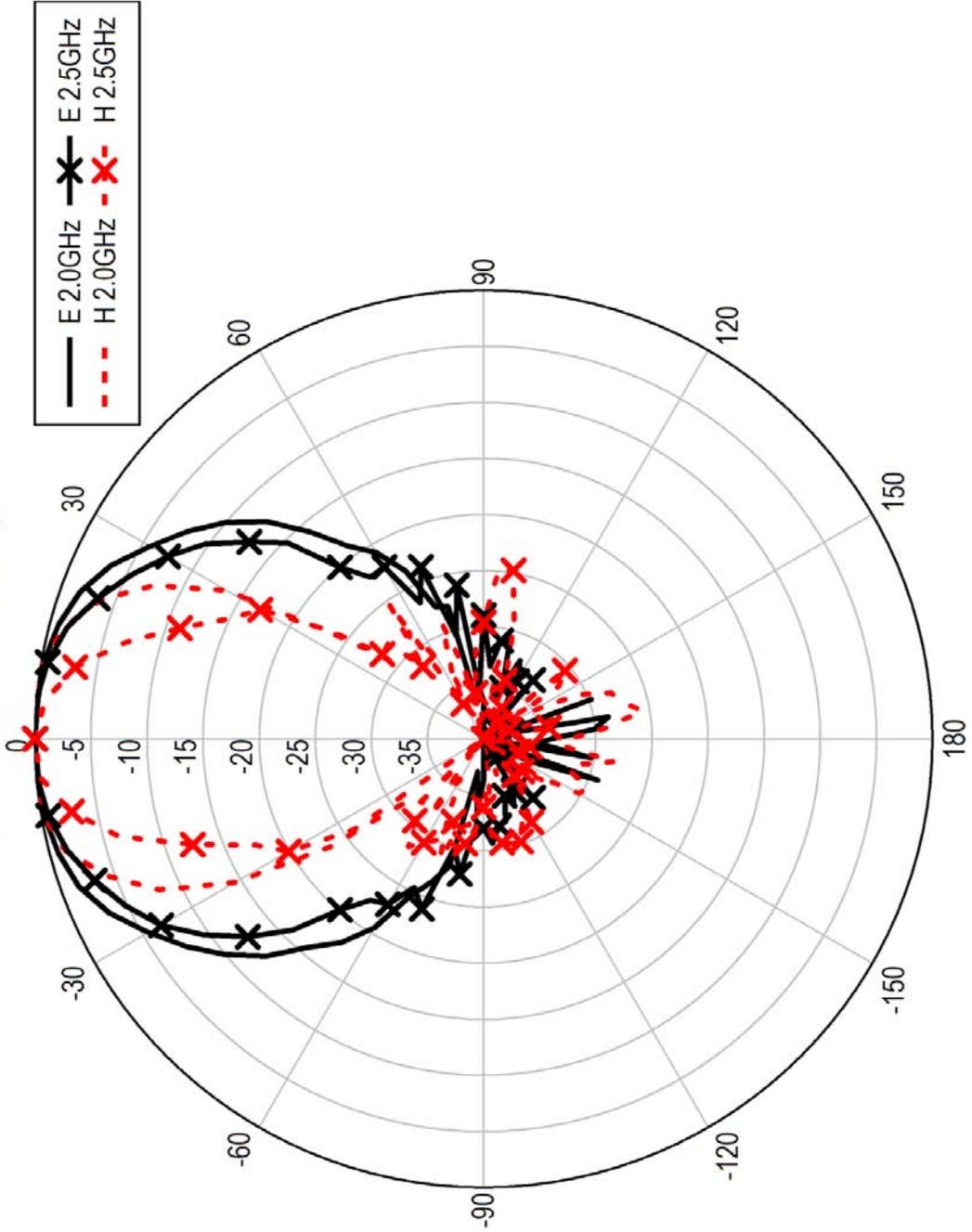
3106B Measured Patterns E and H plane

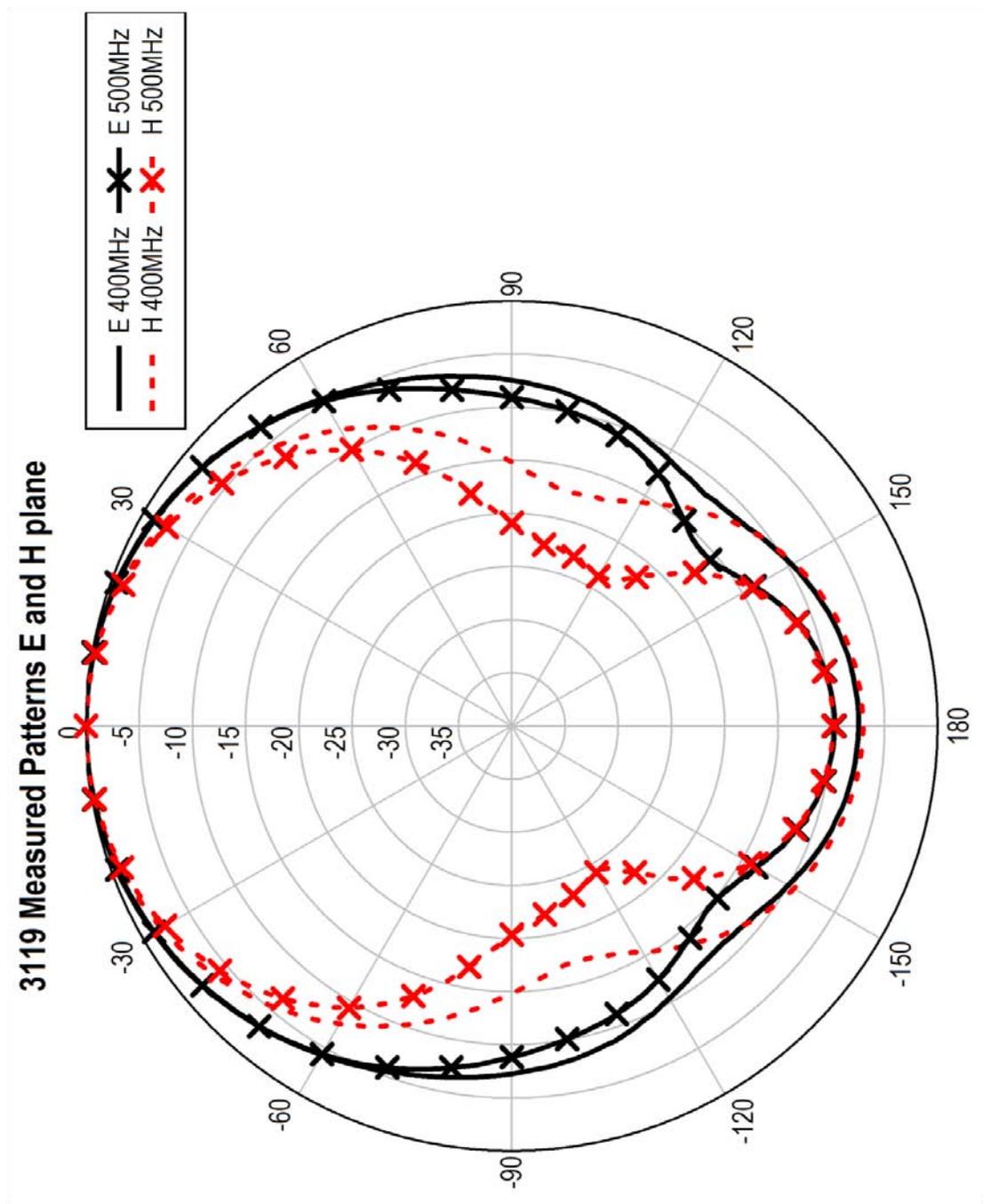


3106B Measured Patterns E and H plane

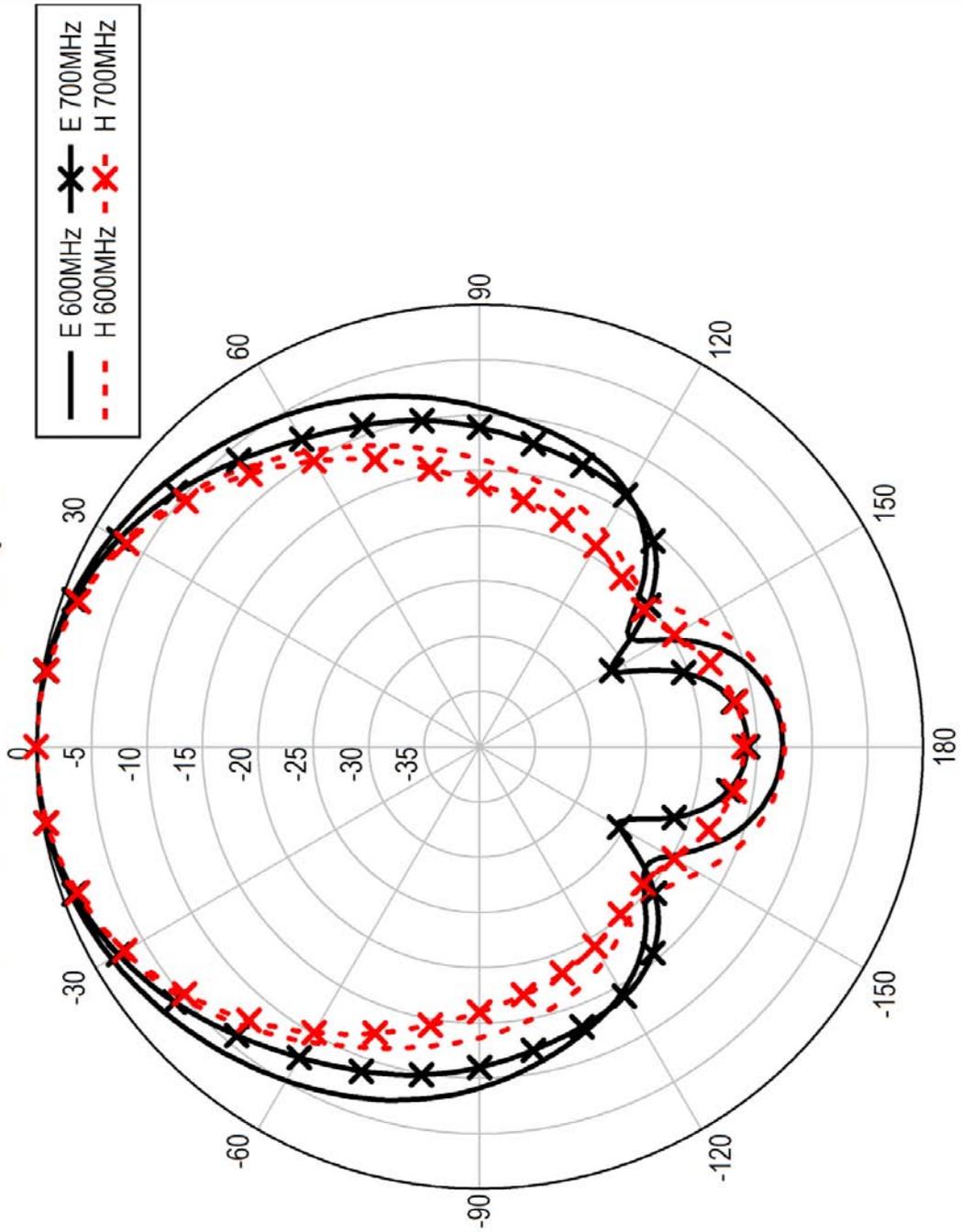


3106B Measured Patterns E and H plane

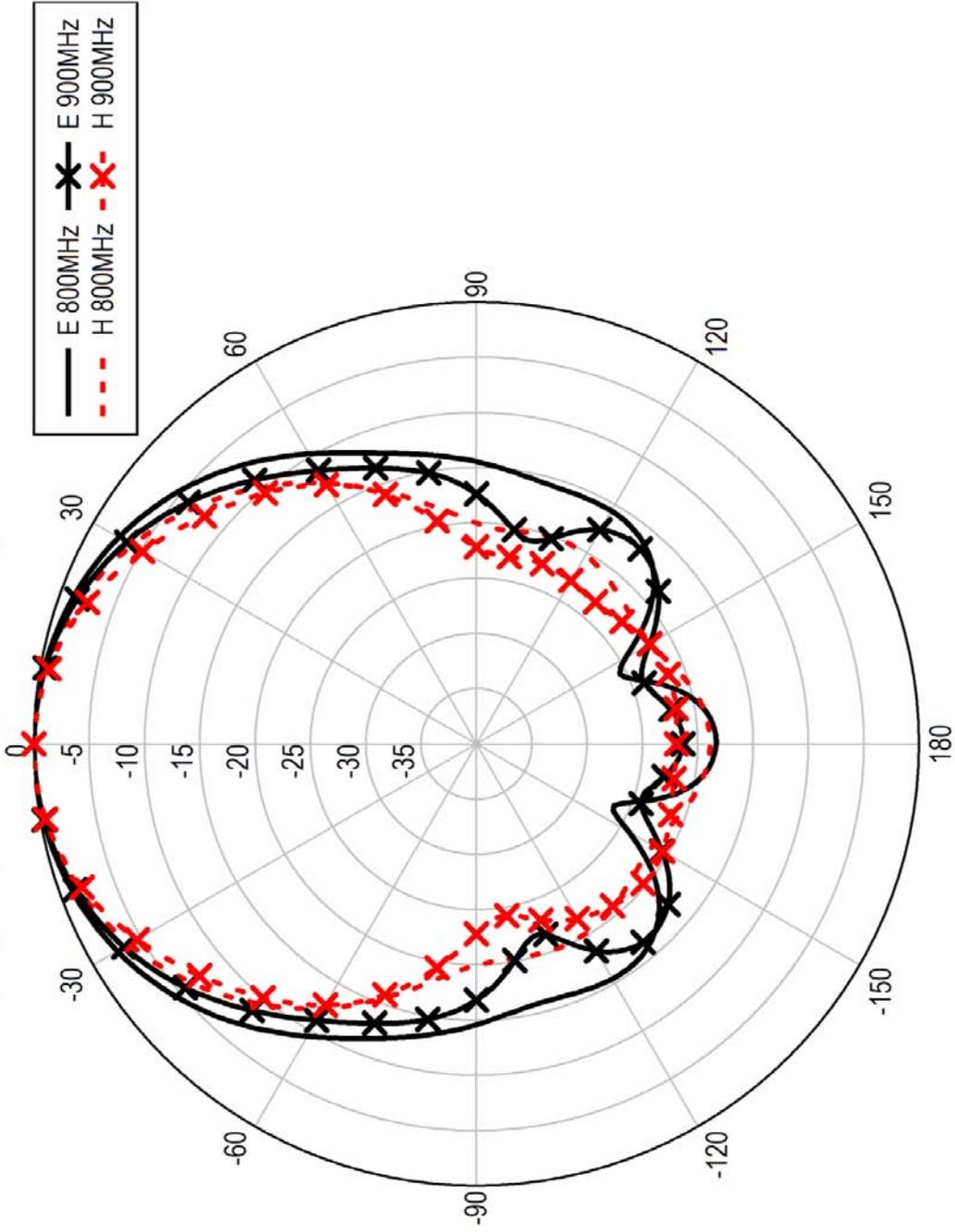




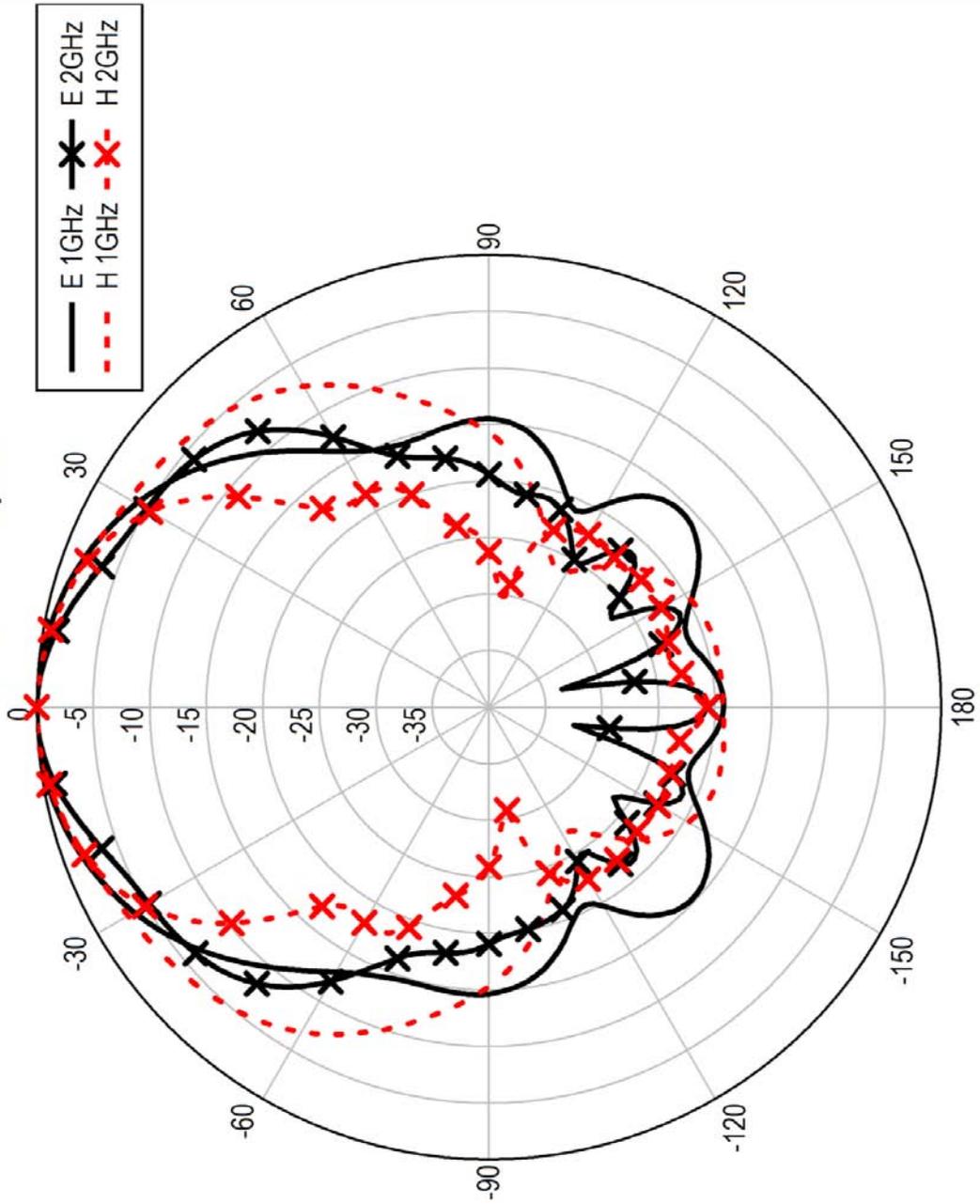
3119 Measured Patterns E and H plane

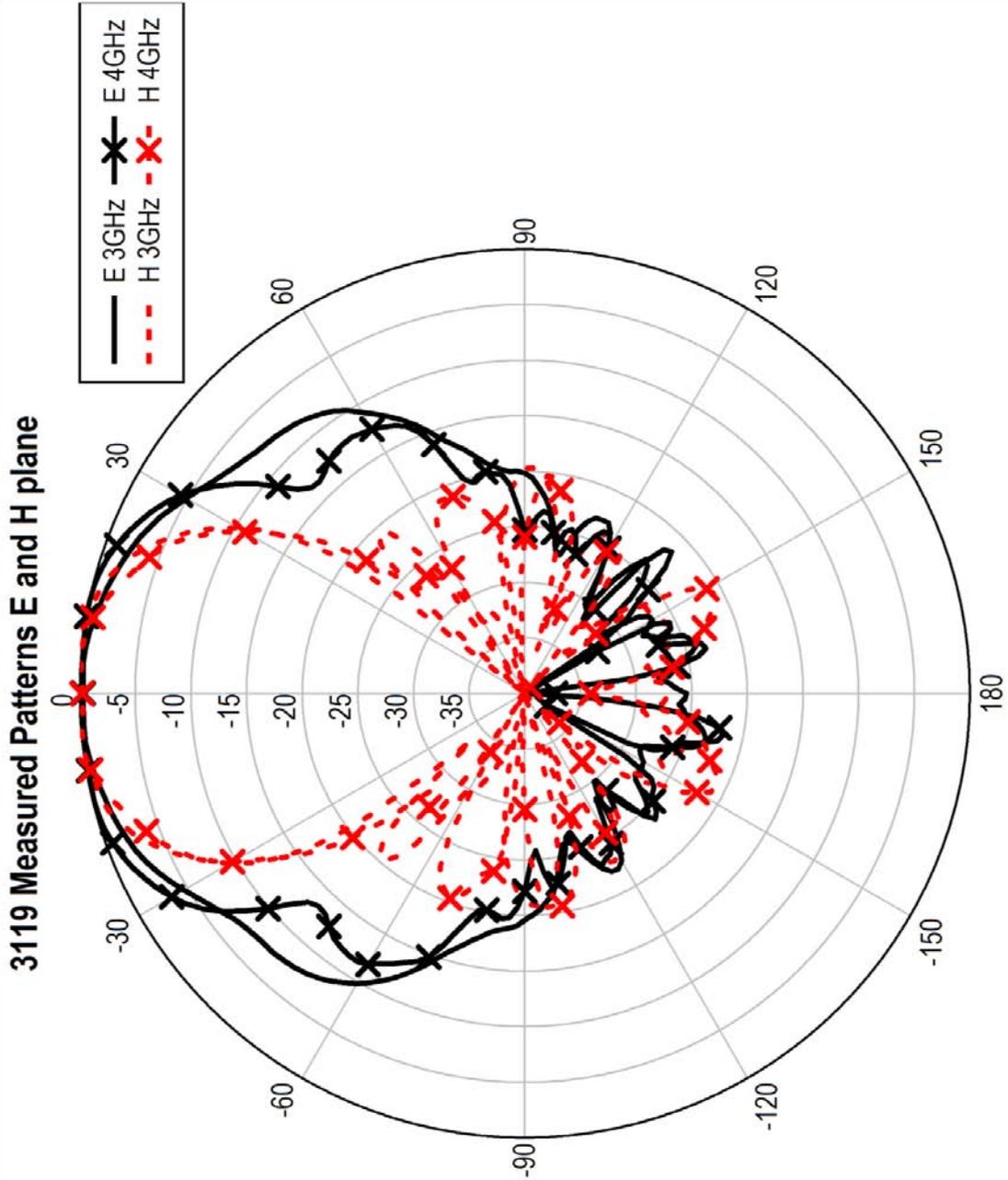


3119 Measured Patterns E and H plane

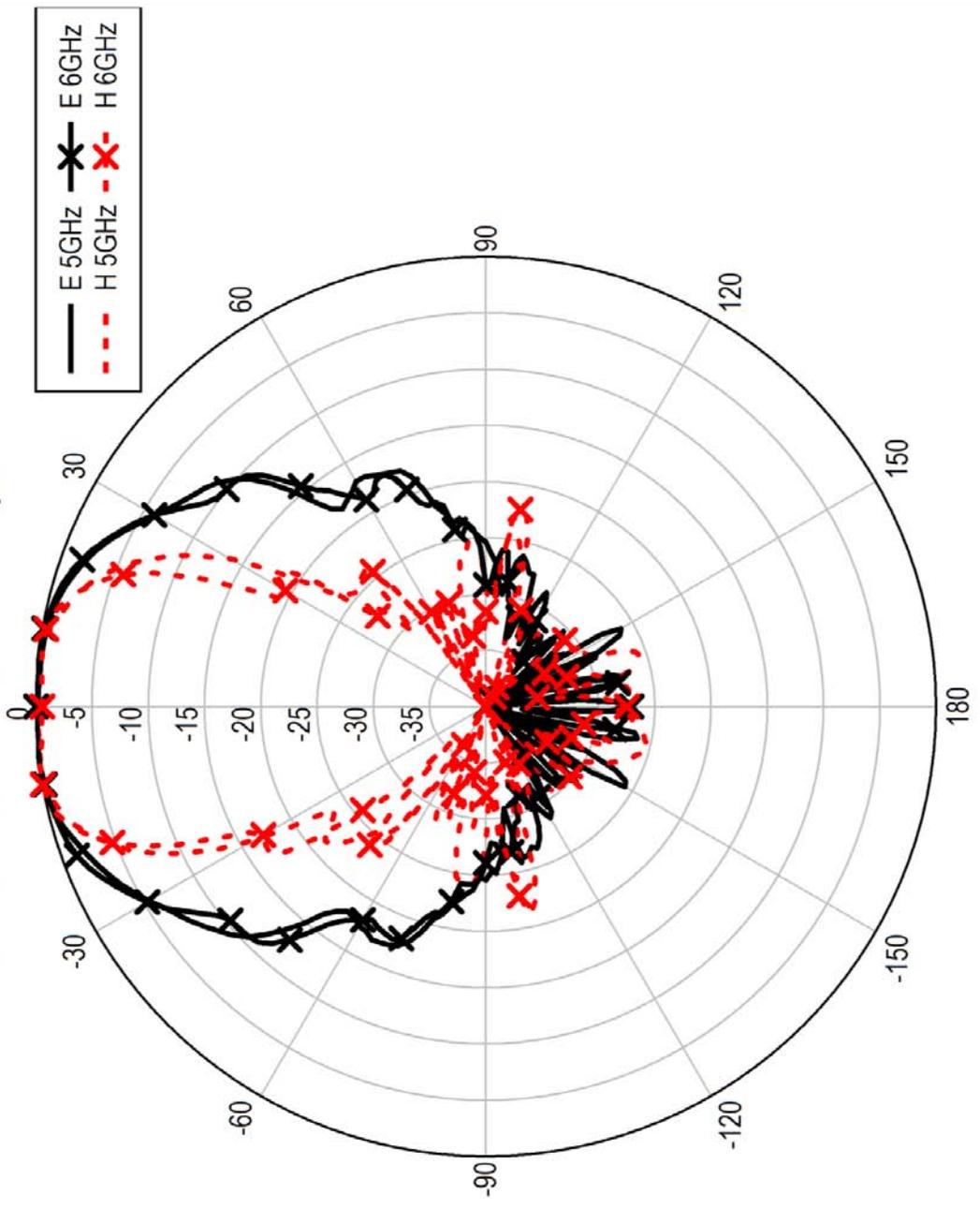


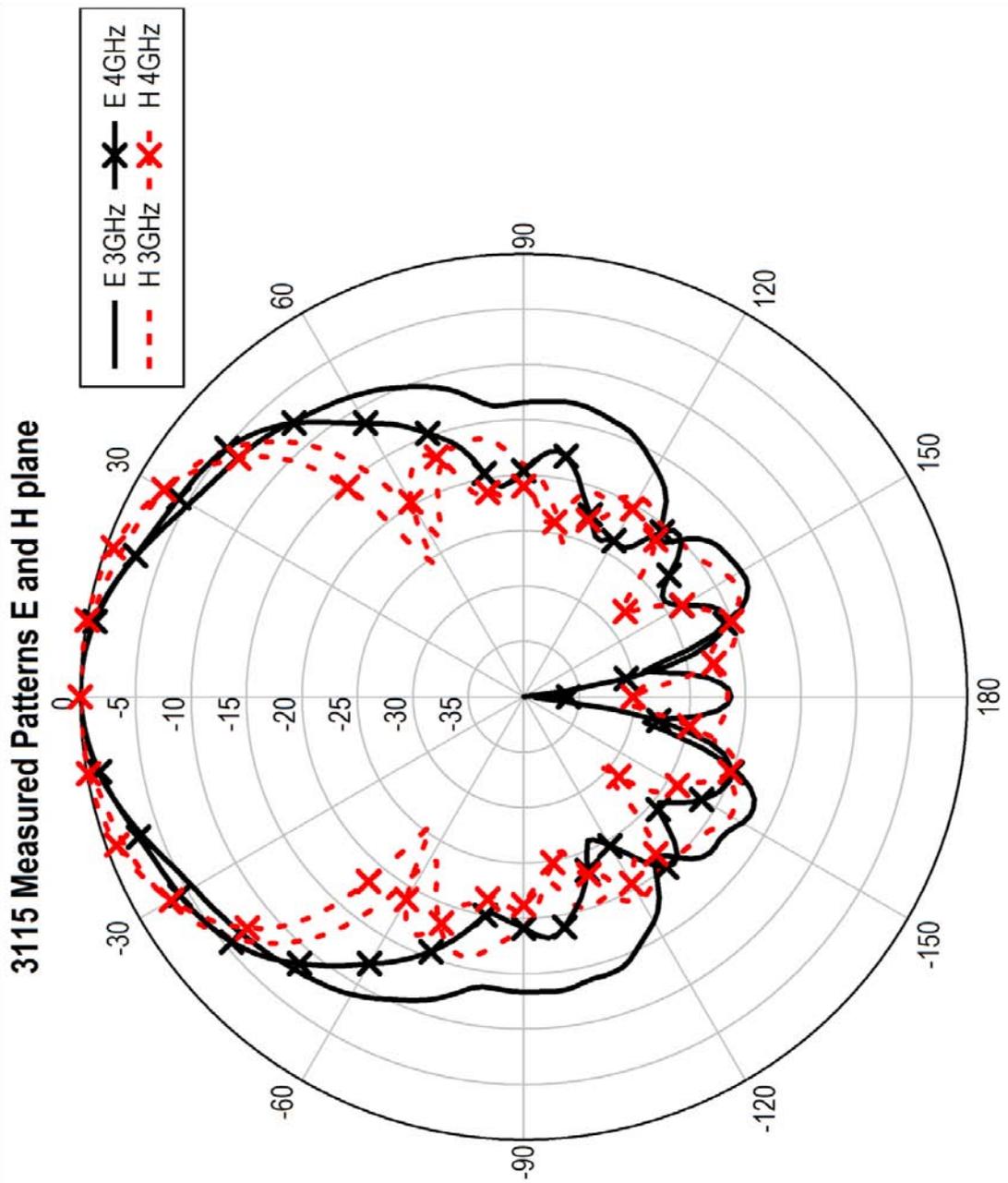
3119 Measured Patterns E and H plane



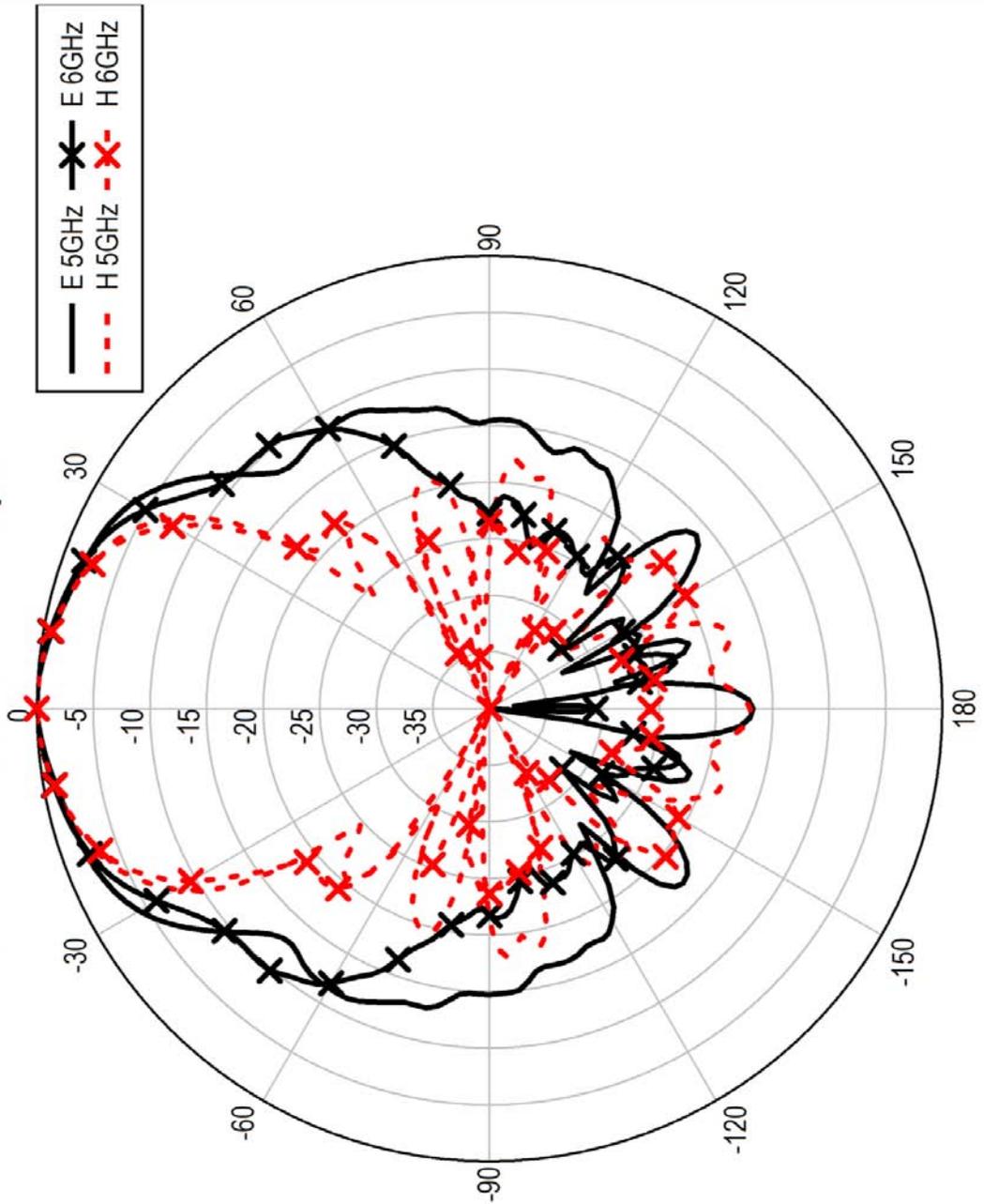


3119 Measured Patterns E and H plane

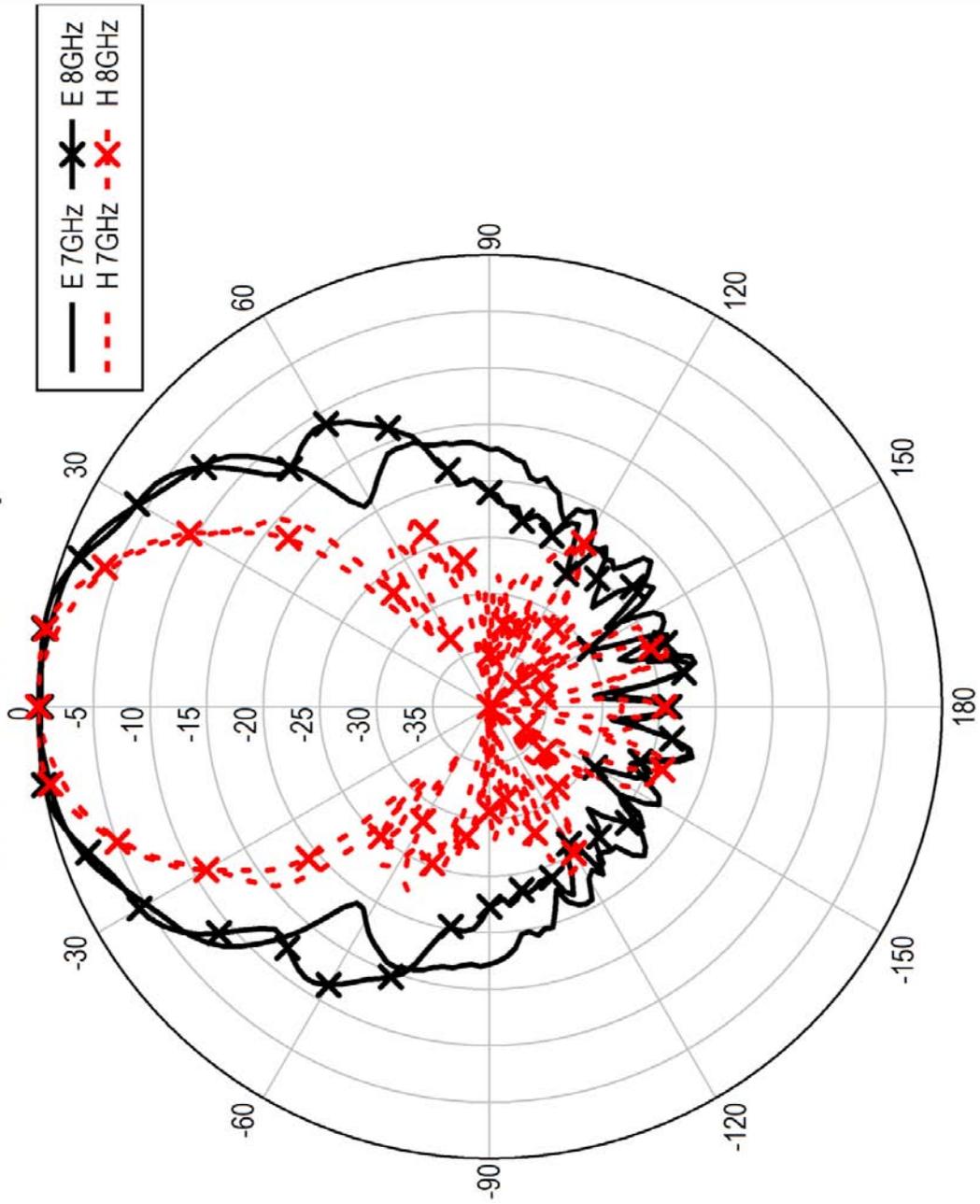




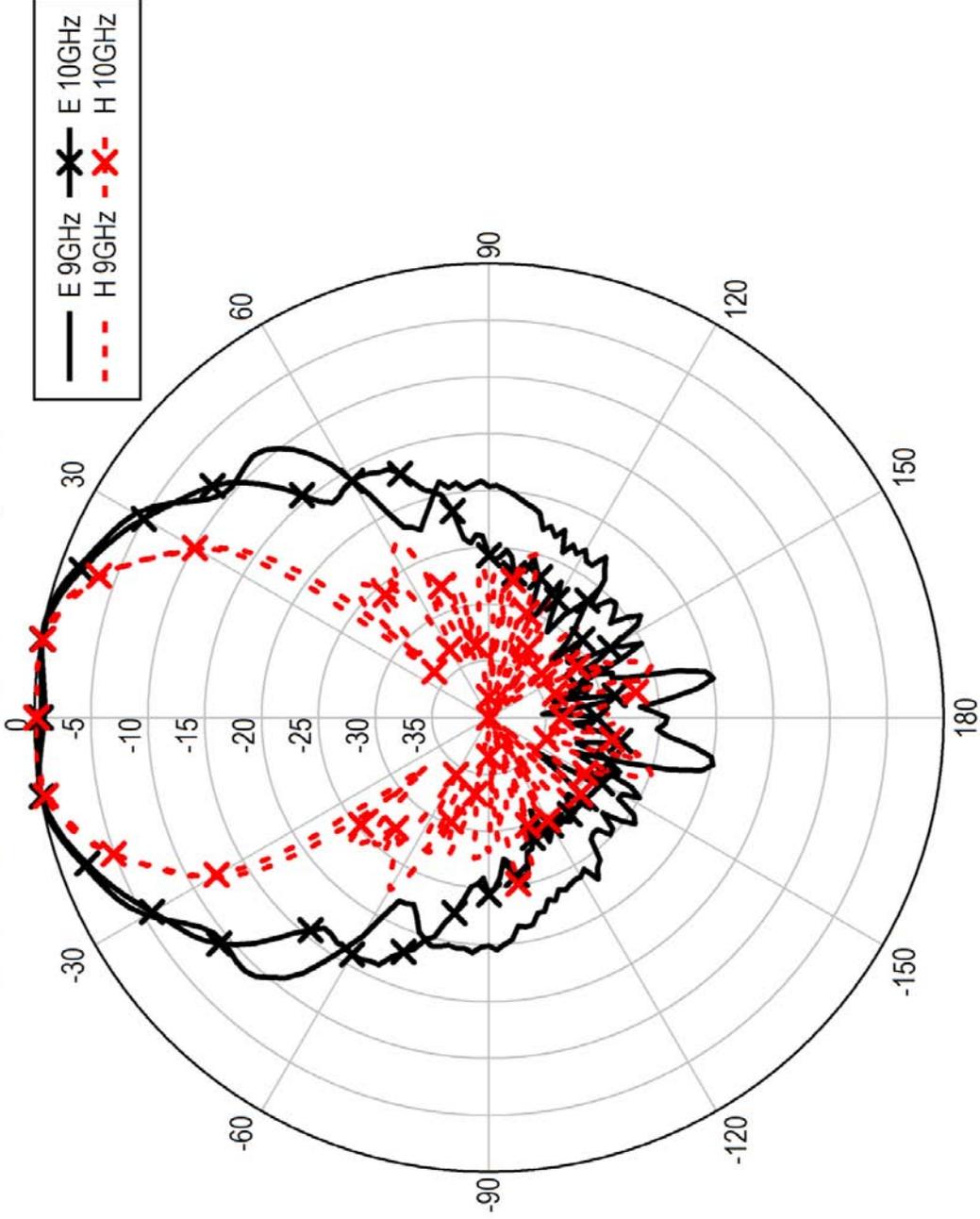
3115 Measured Patterns E and H plane



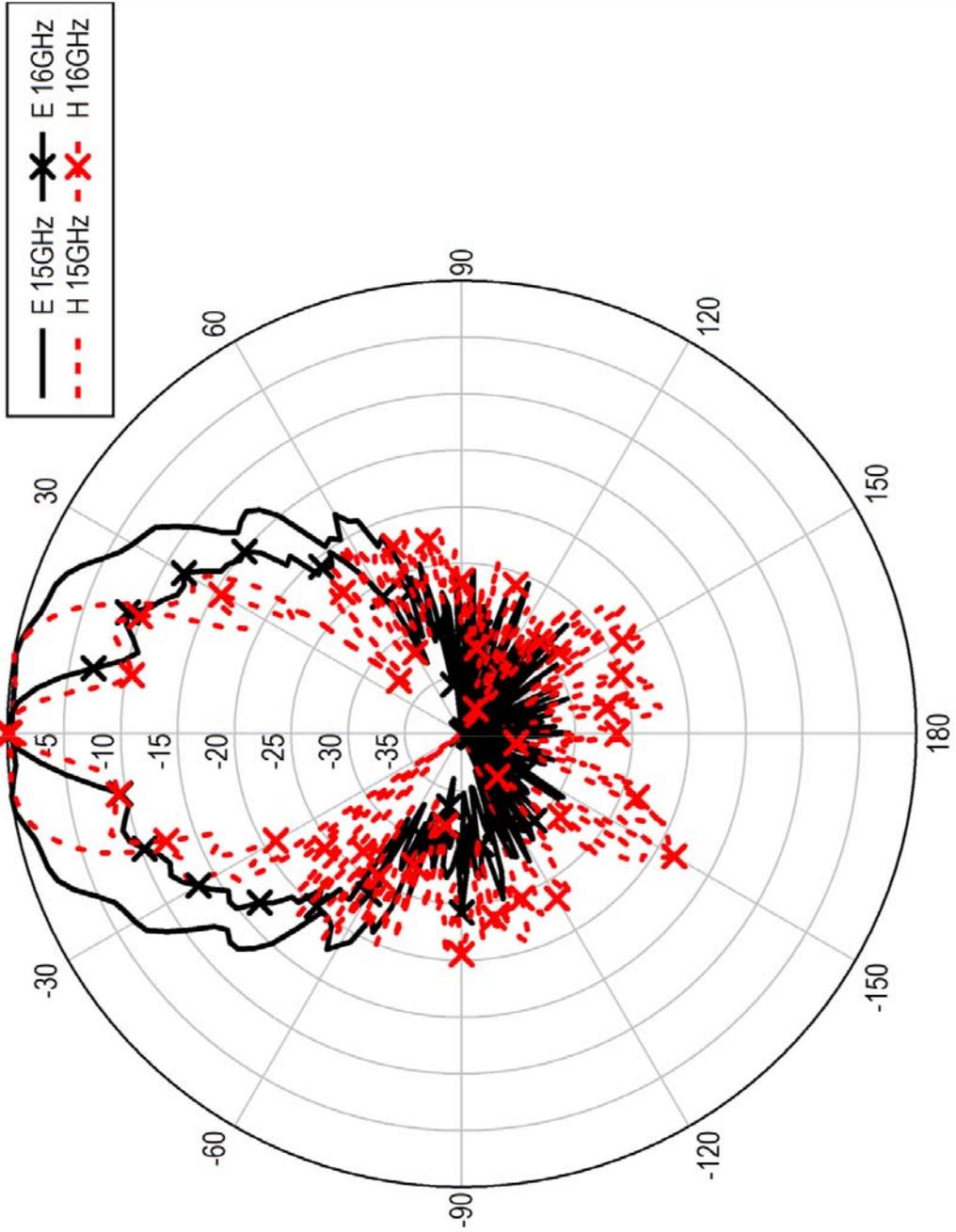
3115 Measured Patterns E and H plane



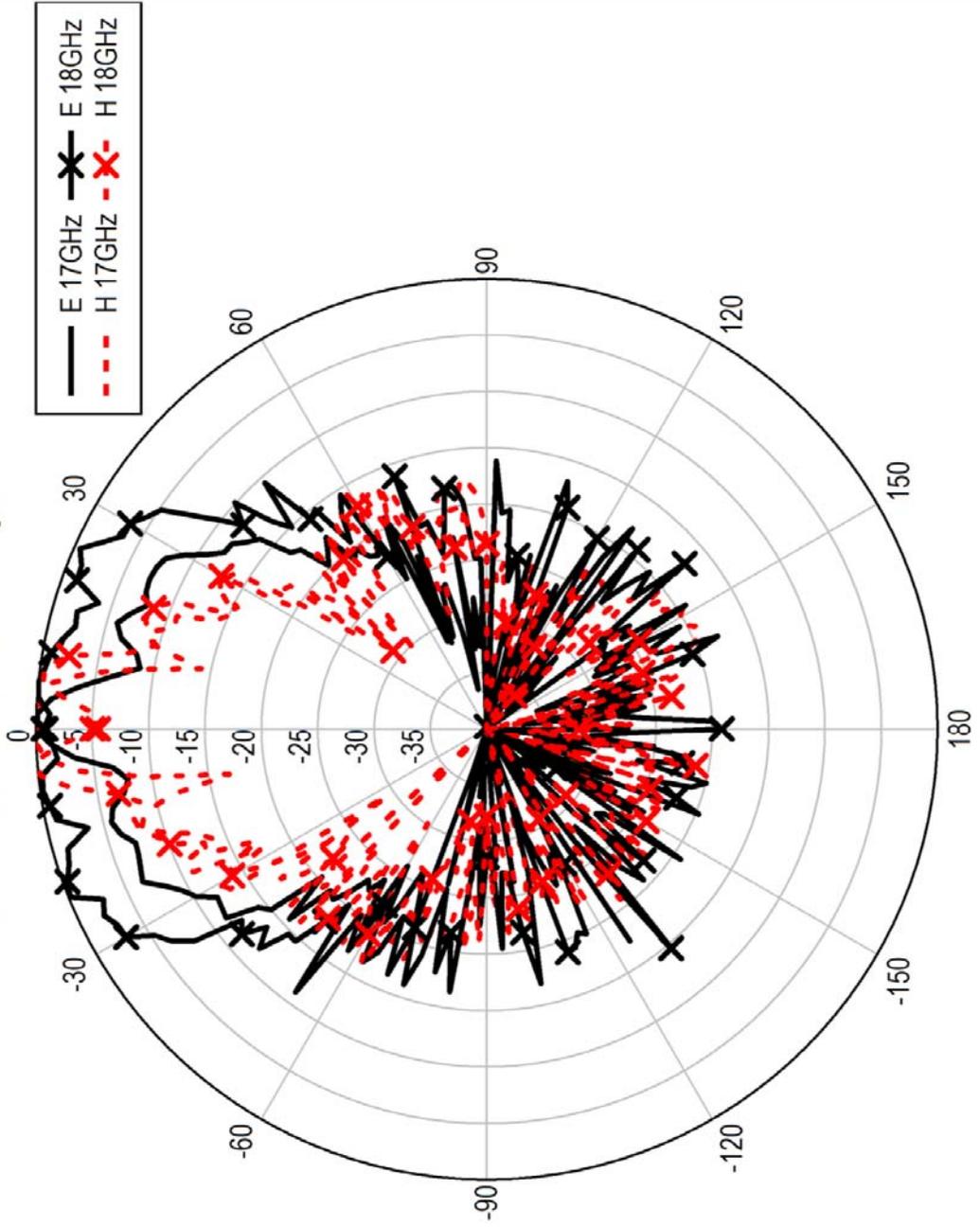
3115 Measured Patterns E and H plane

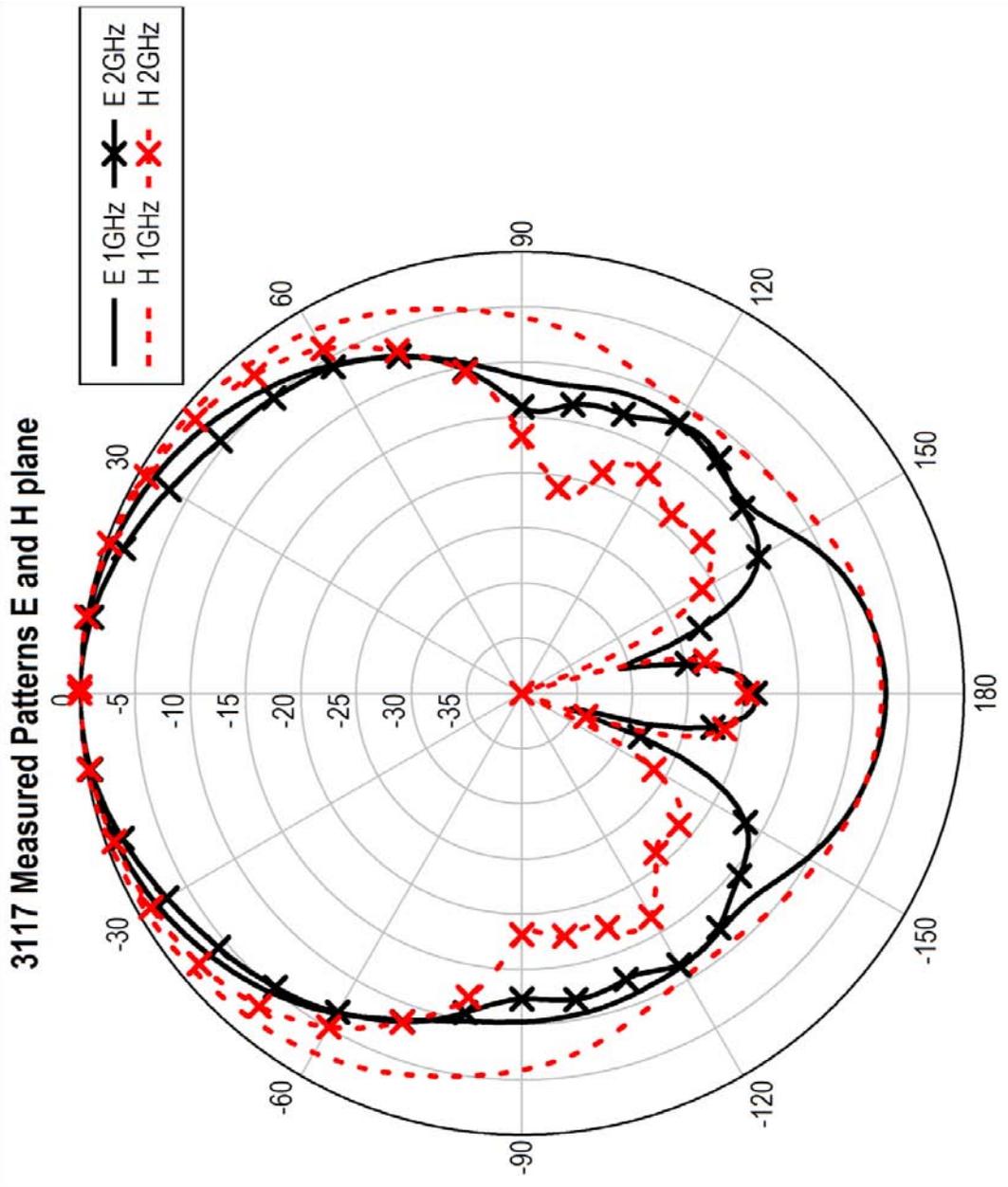


3115 Measured Patterns E and H plane

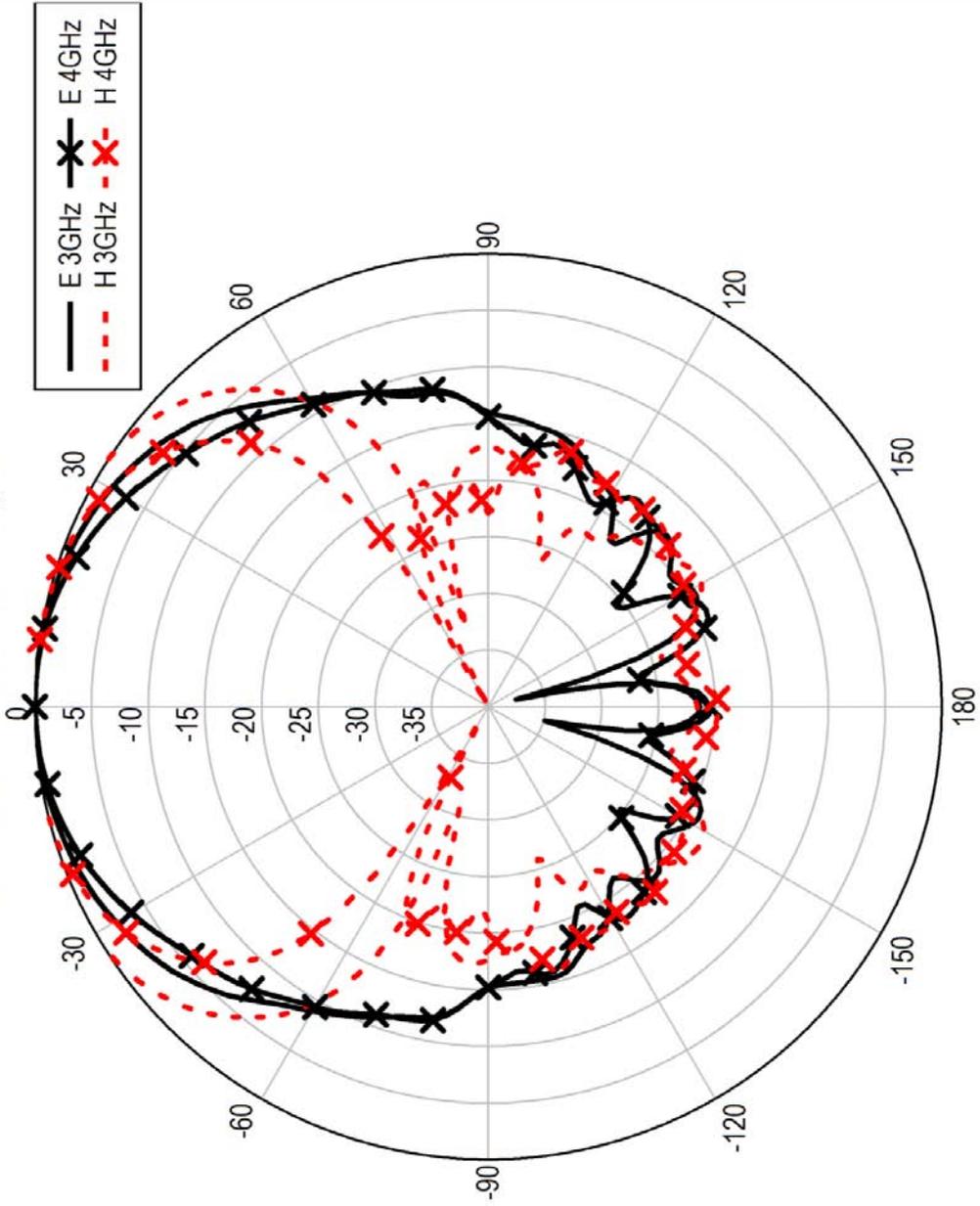


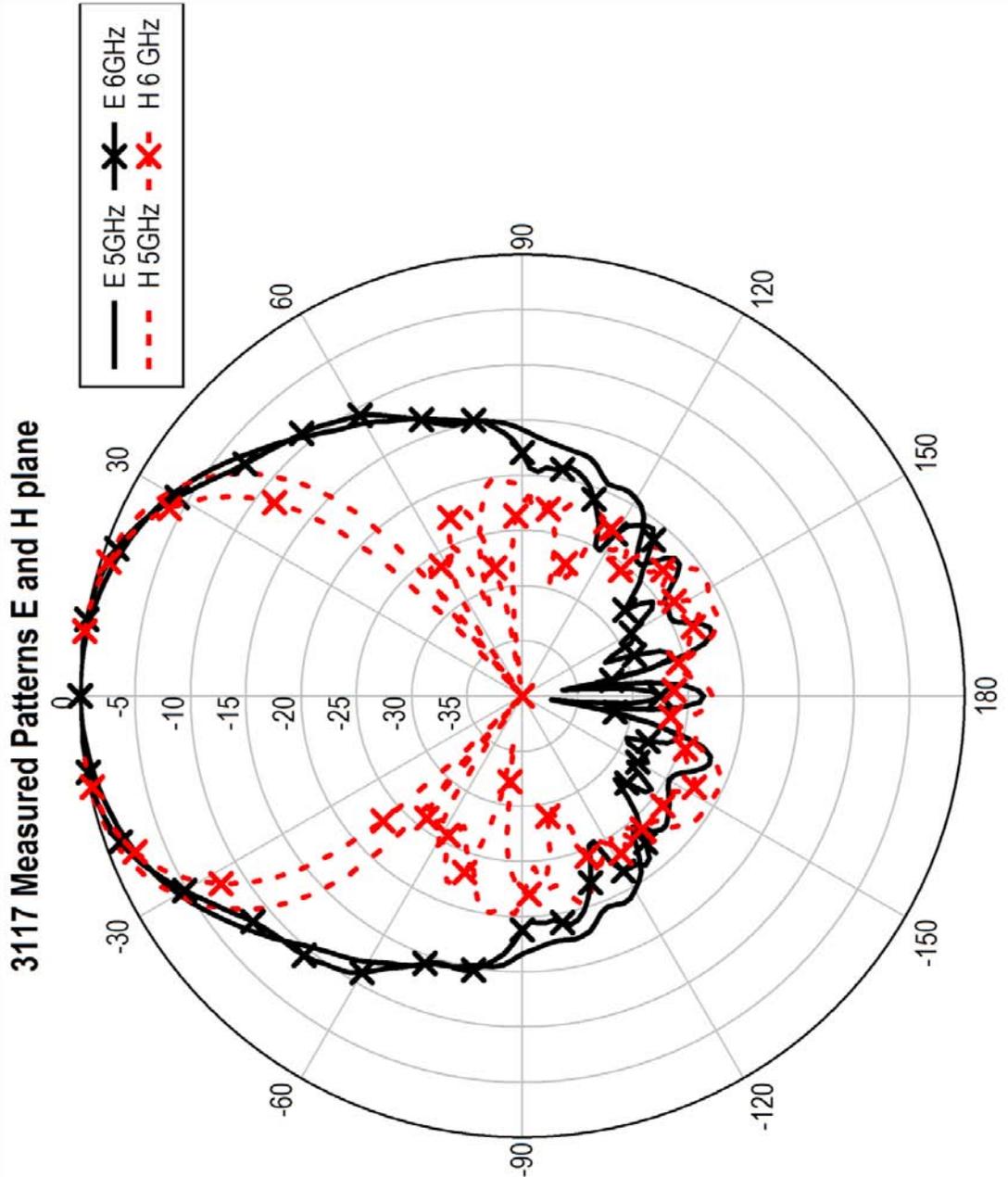
3115 Measured Patterns E and H plane



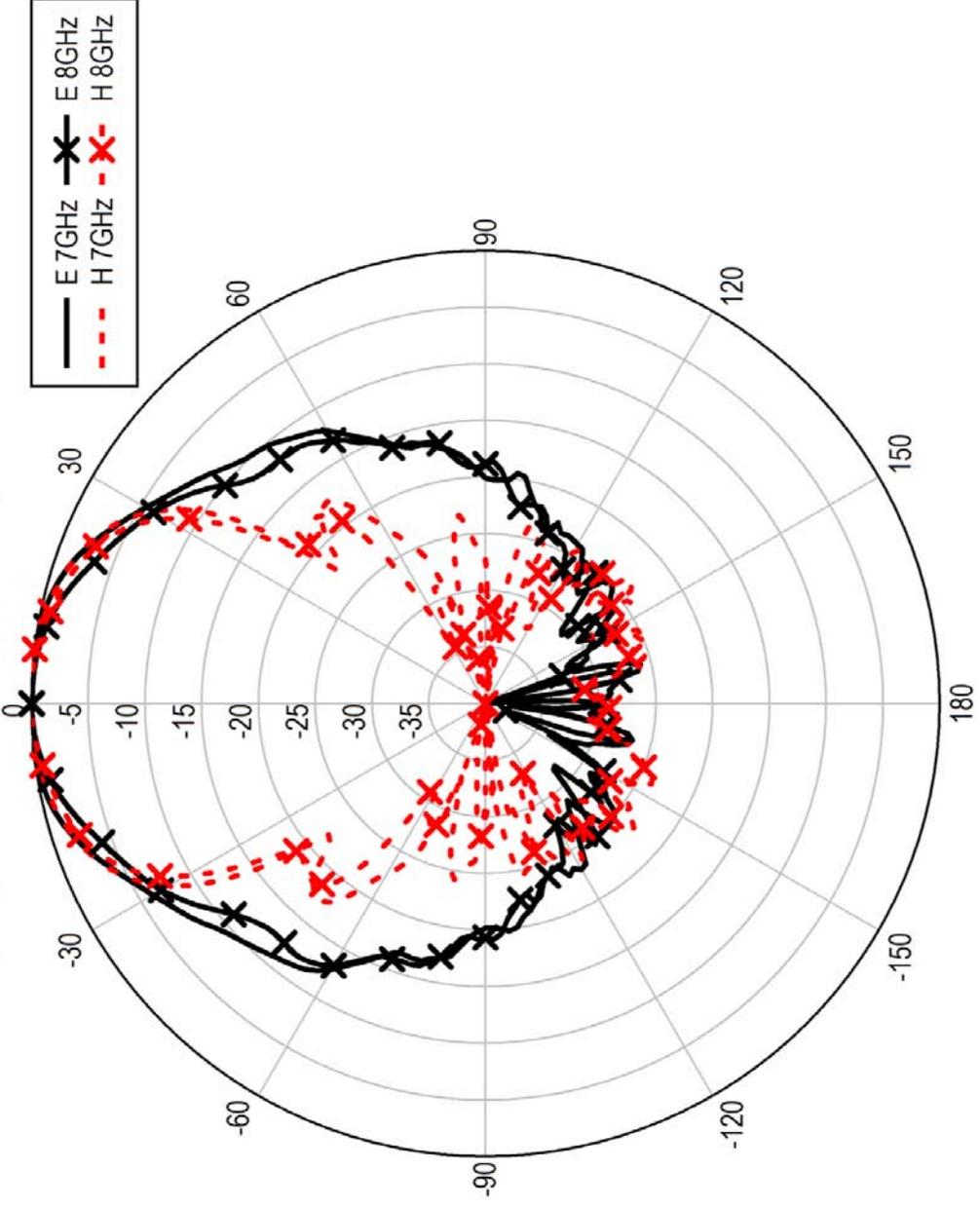


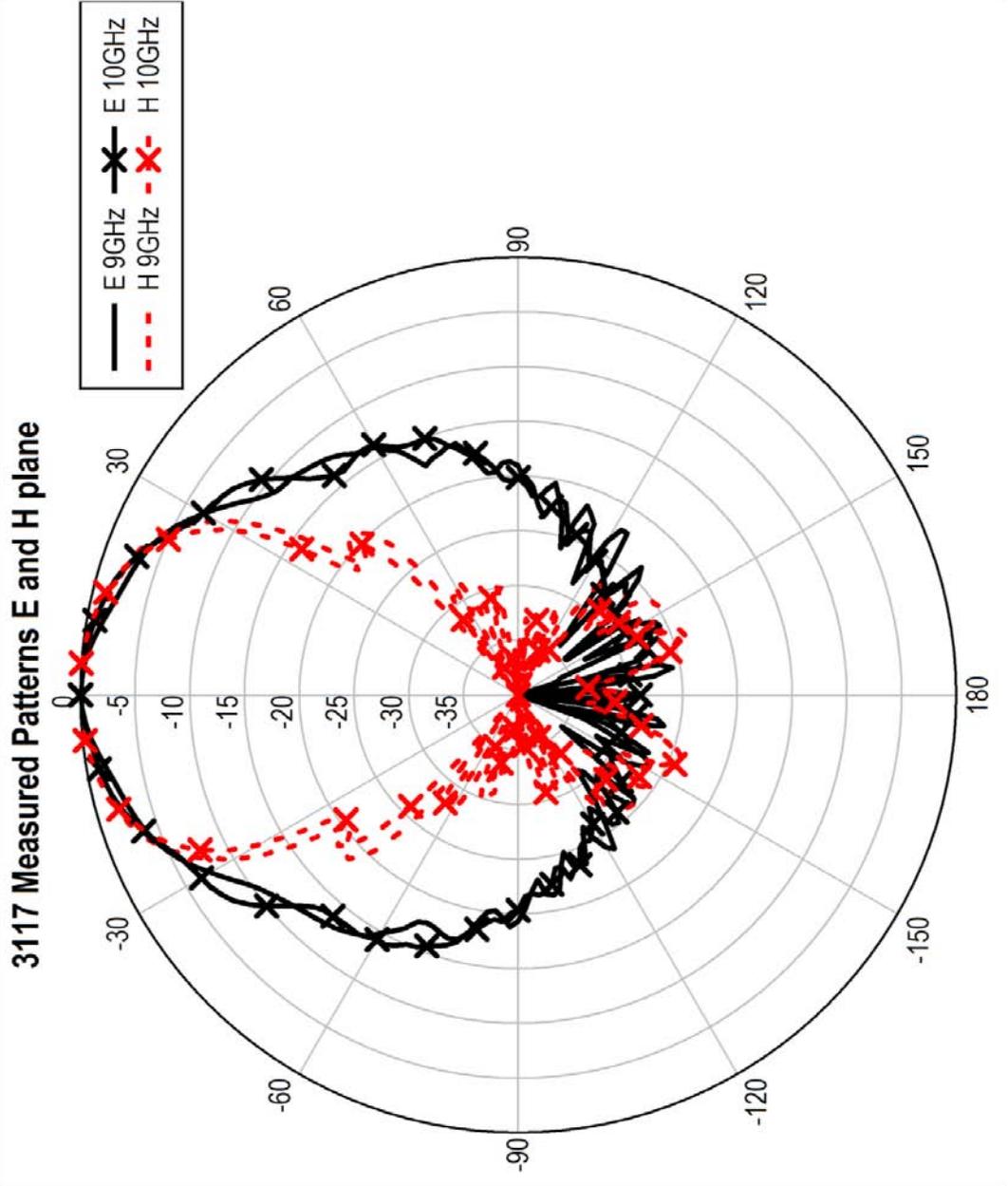
3117 Measured Patterns E and H plane



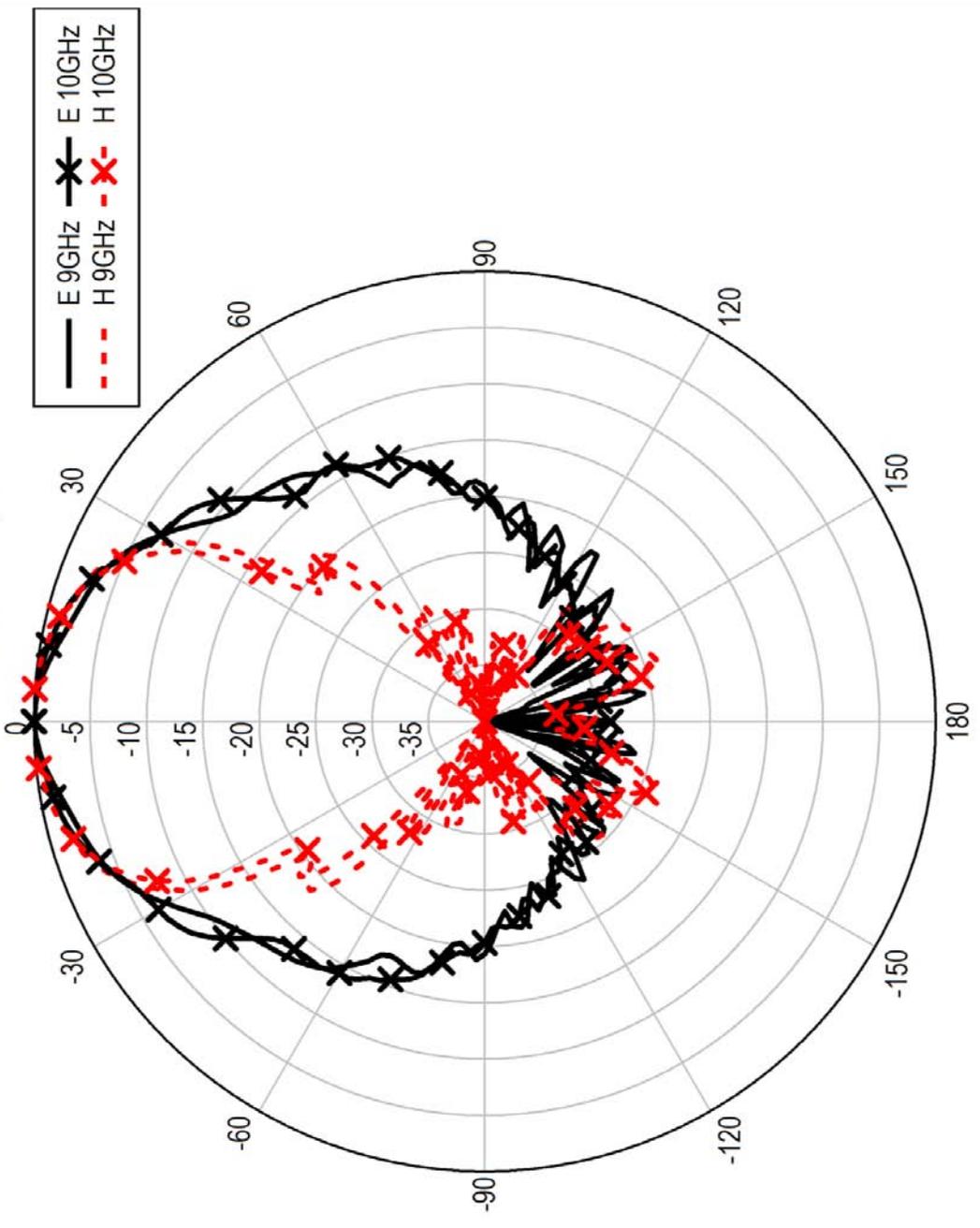


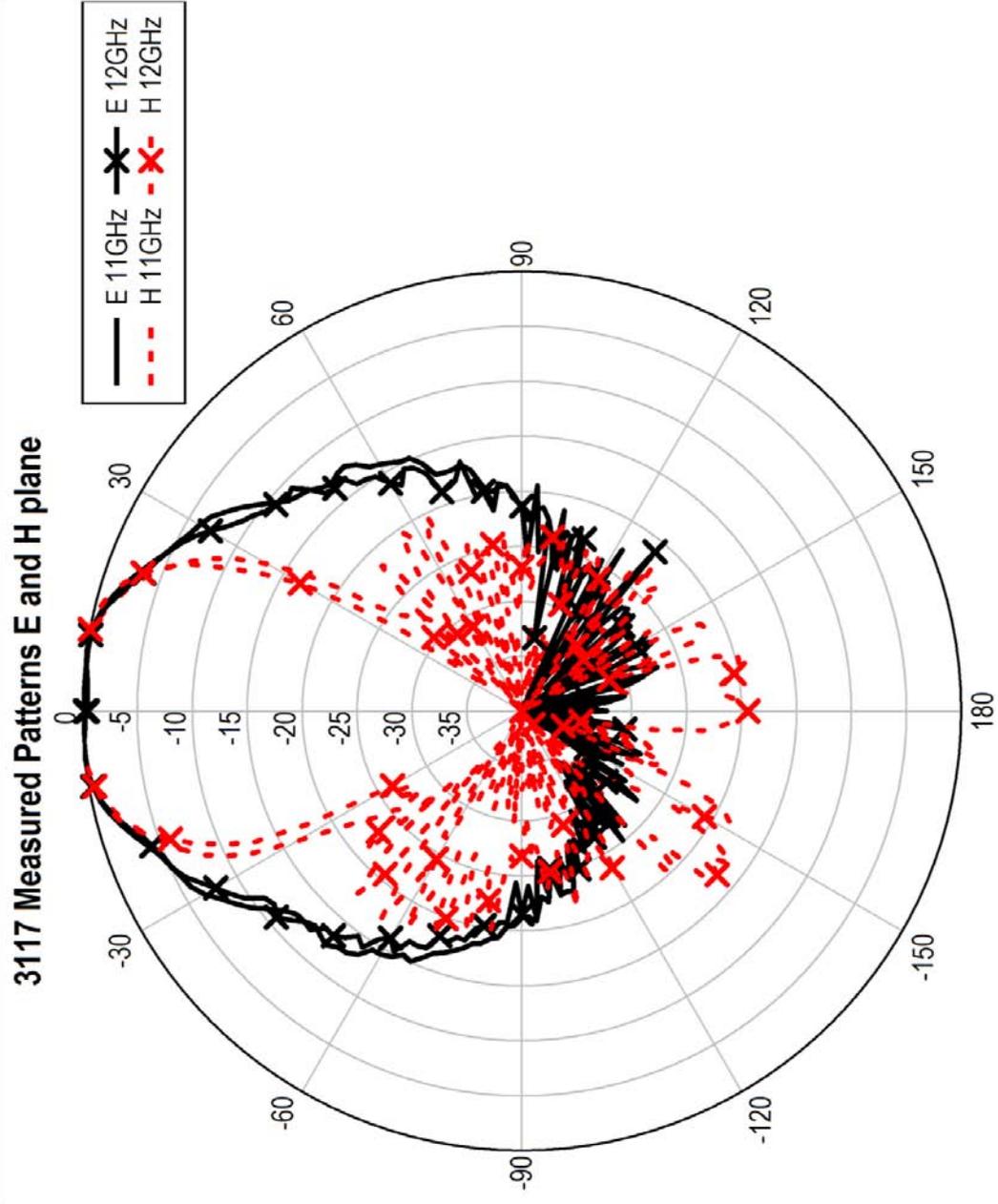
3117 Measured Patterns E and H plane



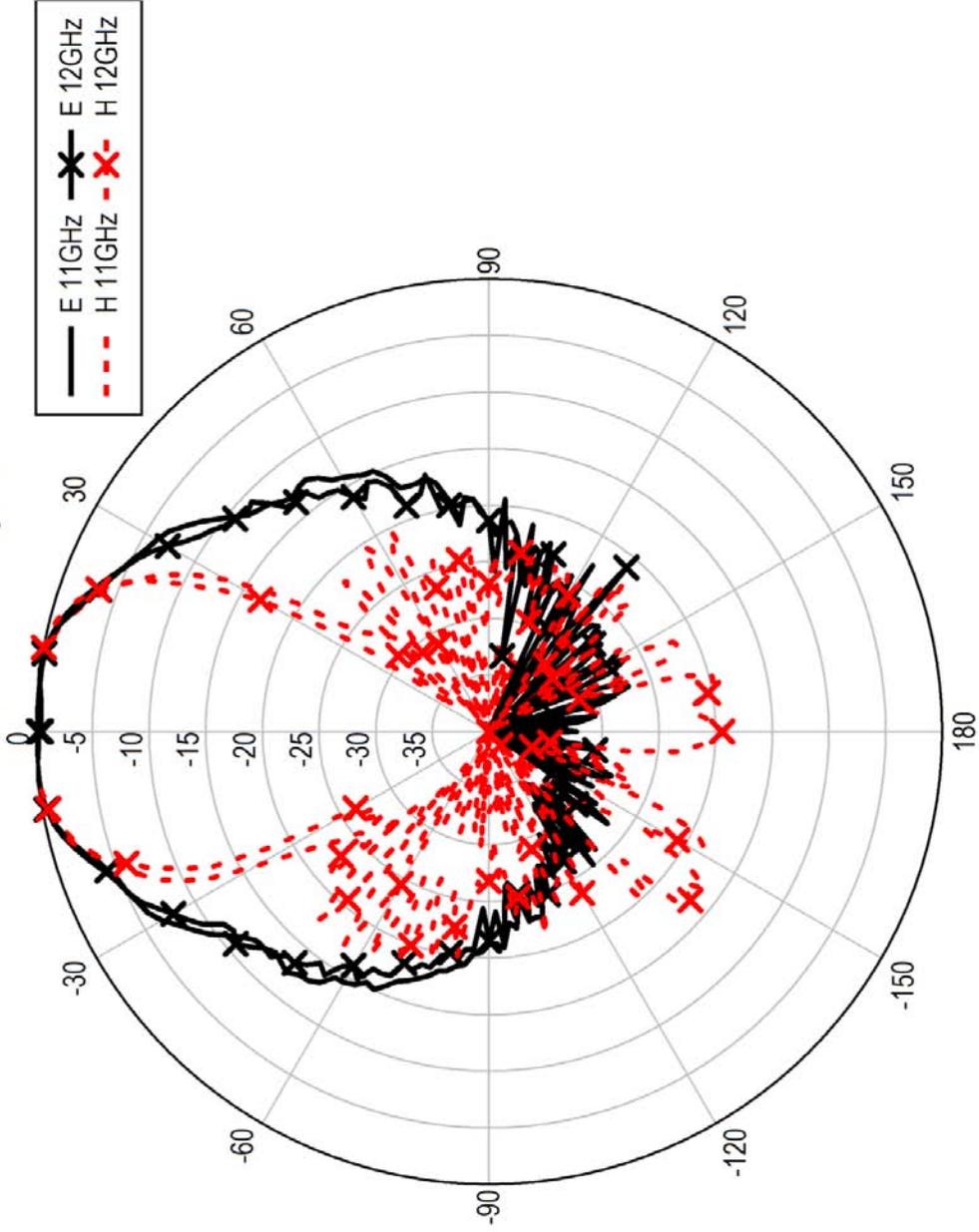


3117 Measured Patterns E and H plane

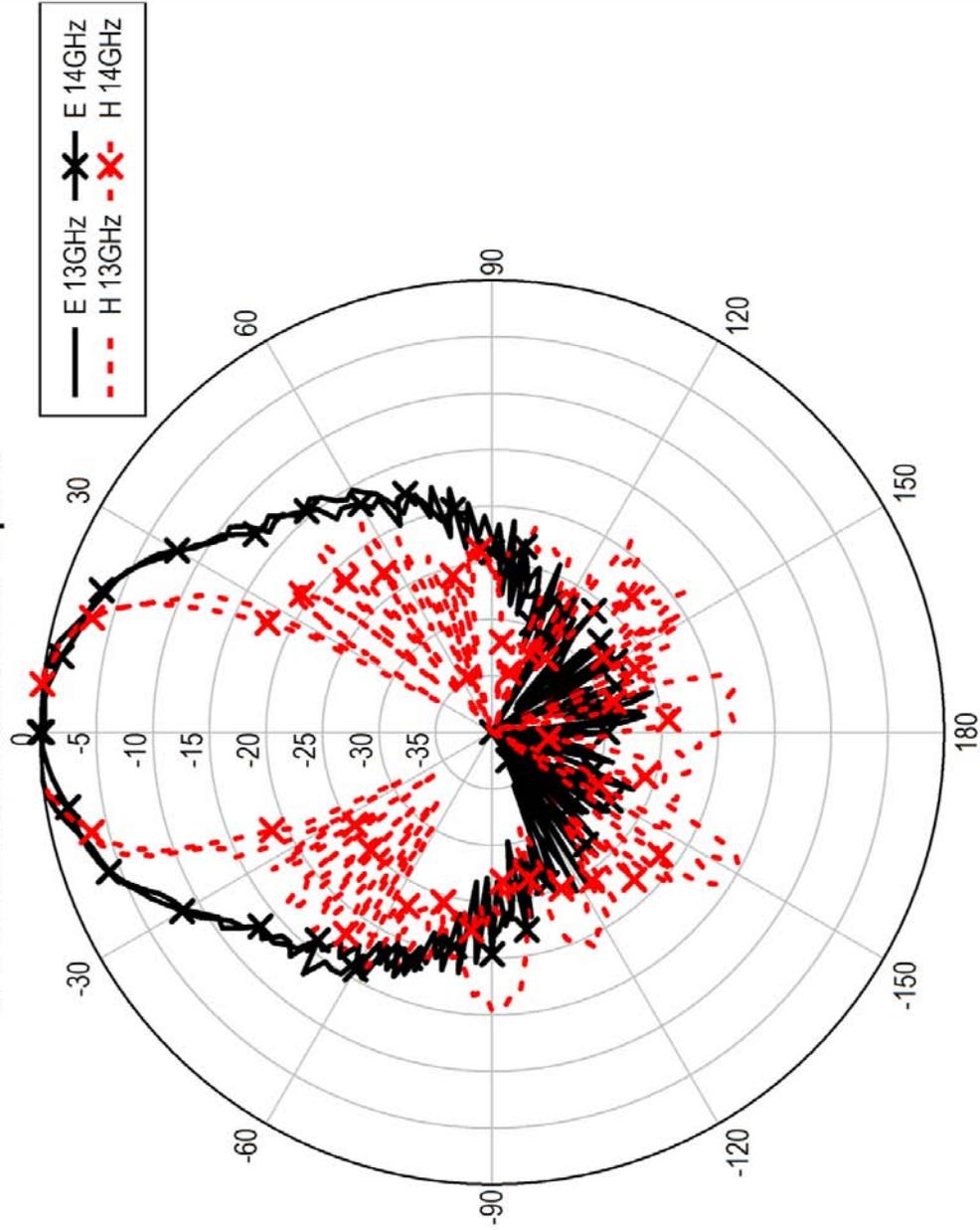




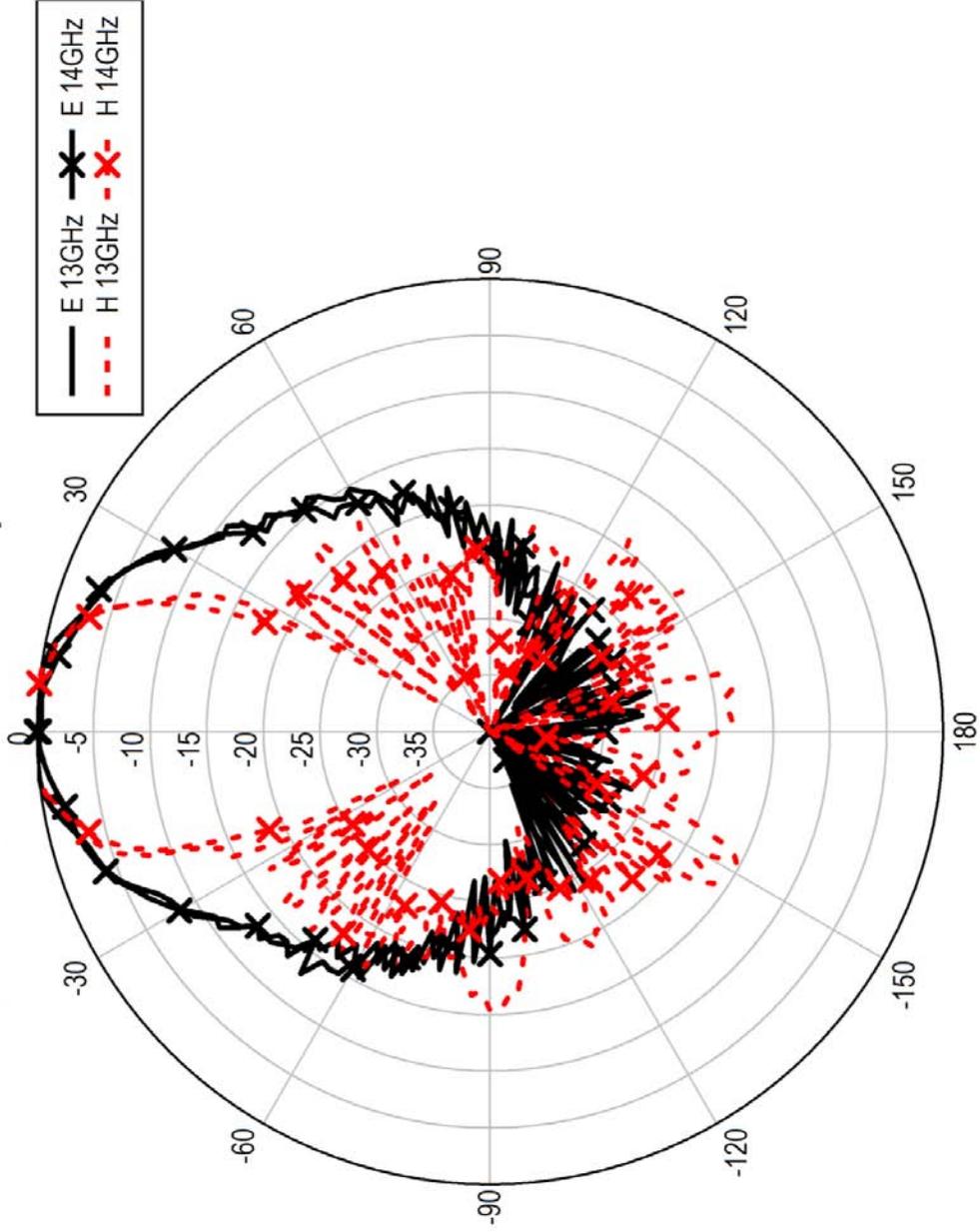
3117 Measured Patterns E and H plane



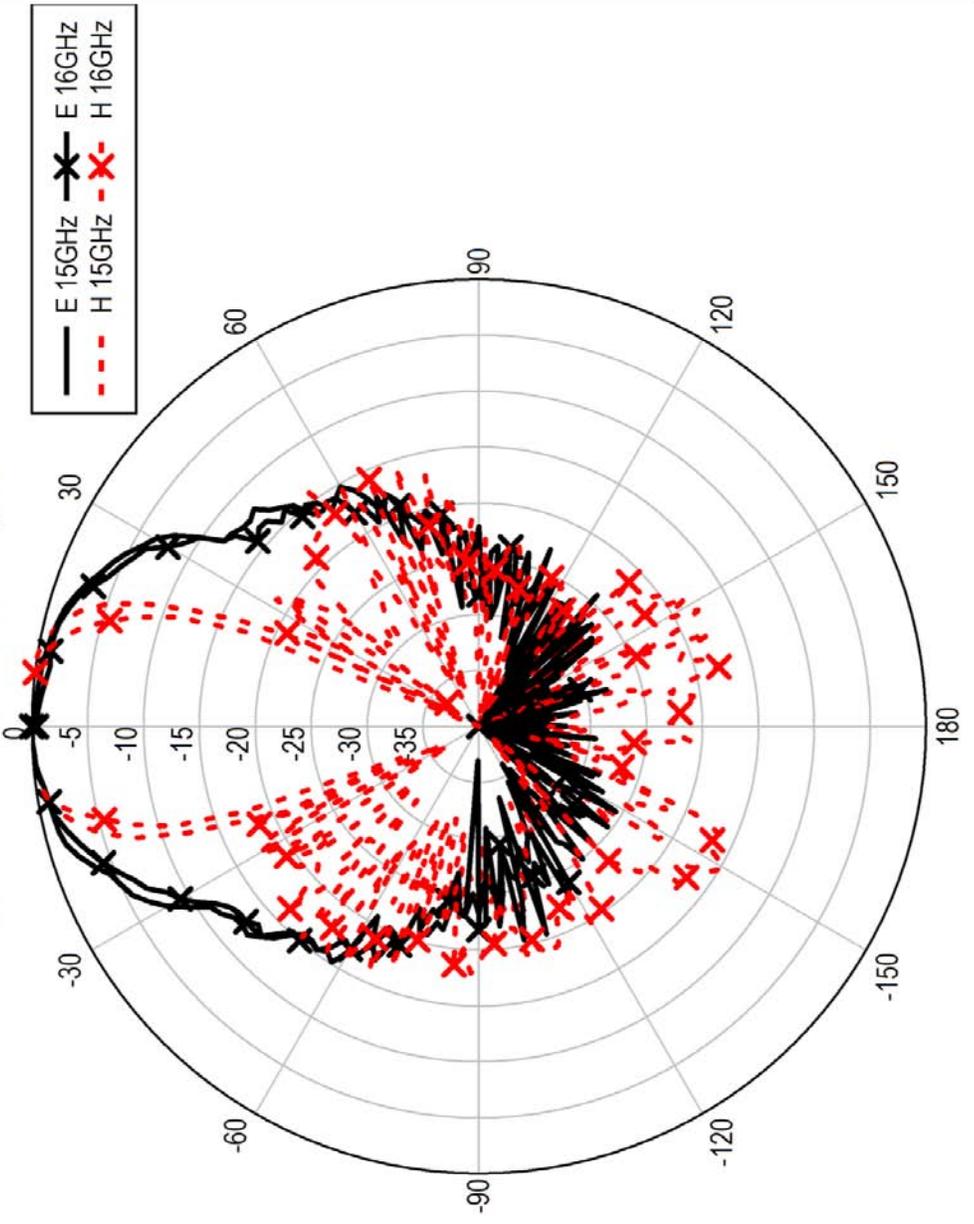
3117 Measured Patterns E and H plane



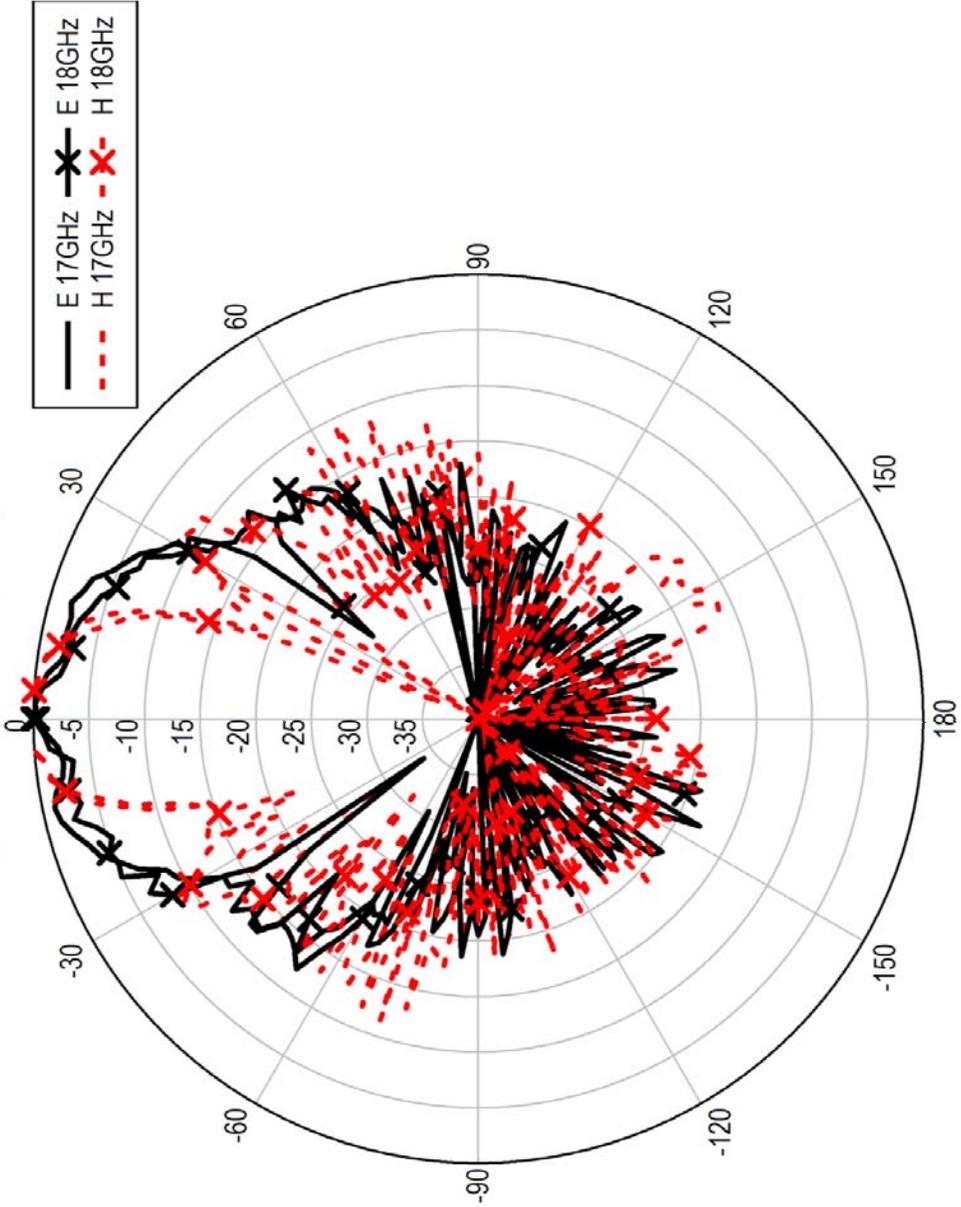
3117 Measured Patterns E and H plane



3117 Measured Patterns E and H plane



3117 Measured Patterns E and H plane



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