INSTRUCTION MANUAL

Horn Antenna

AH-640

26.5 to 40 GHz

Table of Contents

1.0 Introduction

This manual includes the antenna specifications, safety precautions, maintenance and warranty information. It also includes some basic guidance on properly on how to use it for EMC testing.

2.0 Product Description

Overview

The model AH-640 Horn antenna was specifically designed for EMI measurement from 26.5 to 18 GHz. The antenna is capable of receiving and transmitting signals for EMC testing. The Horn antenna is a transducer which converts electric field strength that can be displayed on a spectrum analyzer or EMI receiver during EMI testing.

Setting up using the antenna is described in section 6. Information on theory of operation is given in section7.

Standard Items included with the antenna:

- User's guide.
- Calibration data and Certificate traceable to NIST.

Optional item

- ISO-17025 calibration data and certificate.

3. 0 Product Specifications

Model:	AH-640
Frequency Range:	26.5 to 40 GHz
Typical VSWR:	< 2: 1
Power Handling:	5 Watts CW
Output Impedance:	50 Ω
Polarization:	Linear
Gain:	23 dBi min
Antenna Factors:	35 to 37 dB/m
Connector:	2.9 mm (f) - (k type)
Dimensions (L x W x H):	8.7 x 5.7 x 9 inches
	22 x 14.5 x 22.8 cm
Weight:	1.5 lb. / 0.68 kg

3.1 Other Horn Antennas available from Com-Power

- AH-220 - 200 MHz to 2 GHz
- AH-8065 - 800 MHz to 5 GHz
- AH-118 - 1 to 18 GHz
- AH-826 - 18 to 26.5 GHz
- AH-840 - 18 to 40 GHz

3.2 Other instrumentation accessories available

- PAM-2000 Preamplifier – 10 MHz to 2 GHz, 27 dB Gain
- PAM-6000 Preamplifier – 1 to 6 GHz, 30 dB Gain
- PAM-118A Preamplifier – 1-18 GHz, 40 dB Gain
- PAM-840 Preamplifier – 18 to 40 GHz, 25 dB Gain
- AT-120 Antenna Tripod
- Microwave cable assemblies

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4. 0 Important Safety Precautions

Generating Electro Magnetic Fields

The Model AH-640 antenna can used to generate electro- magnetic fields for immunity testing. Immunity testing should be conducted inside a shielded enclosure or anchoic chamber to avoid interference to other equipment and exposure of personnel to high electromagnetic fields.

Maintenance

There are no user serviceable parts in the antenna. User modifications to the antenna will void warranty and may also invalidate the calibration. Send the antenna to an authorized Com-Power service center if needs repair. Please visit our website at www.com-power.com to request a return merchandise authorization number (RMA) before you send the unit in for service.

Environmental conditions

This antenna is designed for indoor or outdoor use.

5.0 Warranty

Com-Power warrants to its Customers that the antennas it manufactures will be free from defects in materials and workmanship for a ***period of 3 years***. This warranty shall not apply to:

- Transport damages during shipment from your plant.
- Damages due to poor packaging.
- Products operated outside their specifications.
- Products Improperly maintained or modified.
- Consumable items such as fuses, power cords, cables, etc.
- Normal wear
- Calibration
- Products shipped outside the United States without the prior knowlege of Com-Power.

In addition, Com-Power shall not be obliged to provide service under this warranty to repair damage resulting from attempts to install, repair, service or modify the antenna by personnel other than Com-Power service representatives.

Under no circumstances does Com-Power recognize or assume liability for any loss, damage or expense arising, either directly or indirectly, from the use or handling of this product, or any inability to use this product seperately or in combination with any other equipment.

When requesting warranty services, it is recommended that the original packaging material be used for shipping. Damage due to improper packaging will void warranty.

In the case of repair or complaint, a label should be attached to the housing of the instrument which describes briefly the faults observed. Please include the name, telephone number and email address of the contact person. Please visit our website www.com-power.com and obtain an RMA number by selecting service and completing the online form.

5.1 Maintenance

This antenna has no user serviceable parts inside. If the unit does not operate or needs calibration, please contact Com-Power Corporation. Any modifications or repairs performed on the antenna by someone other than an authorized factory trained technician will void warranty.

The exterior surface may be cleaned with mild detergent and then be wiped with a dry, clean, lint-free cloth.

6.0 Setting up and using the antenna

6.1 Connecting

The model AH-640 horn antenna has a type 2.9 mm female connector of signal output or input. It can handle up to 5 Watts CW signal. These connectors are delicate and should be handled with care. Do not over tighten or use excessive force when making connections.

6.2 Antenna setup for receiving signals

The model AH-640 must be connected to the receiver / spectrum analyzer with high frequency, low loss cables. The loss must be measured and used in calculating the field strength.

6.3 Antenna setup for transmitting signals

When the AH-640 antenna is used for transmitting signals, the antenna is connected to a microwave signal generator and a power amplifier. The model AH-640 antenna can transmit up to 5 Watts of continuous power. The field generated by the antenna can be measured by using a field strength meter / probe or another horn antenna.

6.4 Test location

The Horn Antenna must be mounted and placed in area away from other conductive objects or materials when in use. Large conductive building, structures and electrical cables, can reflect and reradiate the emissions of EUT, causing errors in the test data. In addition, care should be taken to keep measuring instruments and test personnel away from the test area to avoid interference to the test, as well exposure of test personnel to high electro-magnetic fields.

7.0 Theory of Operation

7.1 Overview

Broadband antennas allow measurement of signals over a wide frequency range. Model AH-640 Horn Antennas are broadband antennas that operate in the frequency range of 18 to 26.5 GHz.

Model AH-640 can both receive and Transmit over the frequency range of operation and is used for susceptibility and emissions testing in EMC Laboratories.

Before the Horn antennas are used for measurement they have to be calibrated. During calibration of a known field strength (dBµV/m) is generated around the antenna at each frequency at predetermined intervals between 18 GHz – 26.5 GHz. The difference between field strength (dBµV/m) received by the antenna and known field strength generated (dBµV/m) is the antenna factor (dB/m) for that frequency. During EMC testing the antenna factor for the frequency of interest is added back to reading on the EMI meter or spectrum analyzer to calculate the field strength measured by the antenna.

Field strength (dBµV/m) = Output measured (dBµV) + Antenna Factor (dB/m)

*When using the AH-640 antenna for transmitting application, please refer to Table **8.1** to determine the power requirements to generate the desired electro-magnetic field.*

8.0 Typical Antenna Data

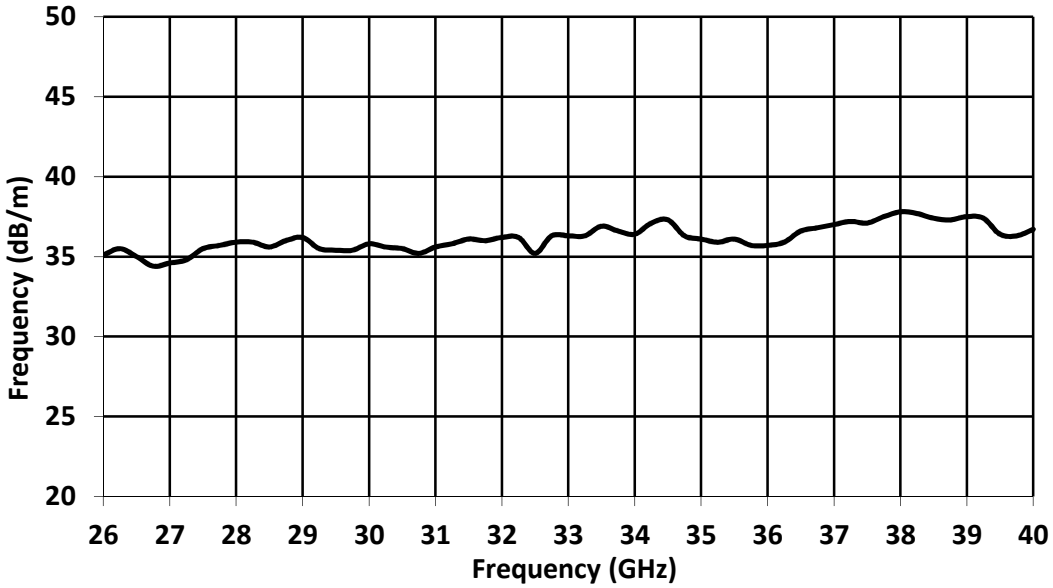


Figure 8.1 – Typical Antenna Factors

Frequency	Gain (dBi)	10 V/m	20 V/m	100 V/m
26.5	23.67	0.01	0.06	1.43
27	24.24	0.01	0.05	1.26
28	23.25	0.02	0.06	1.58
29	23.26	0.01	0.05	1.57
30	23.95	0.01	0.05	1.34
32	24.11	0.01	0.05	1.29
34	24.44	0.01	0.05	1.20
36	25.64	0.01	0.04	0.91
38	24.1	0.01	0.05	1.33
40	25.55	0.01	0.04	0.93

Table 8.1 – Typical Power Requirement in Watts at 1 meter antenna spacing

Typical Antenna Radiation Patterns

E-Plane **H-Plane**

Figures 8.2

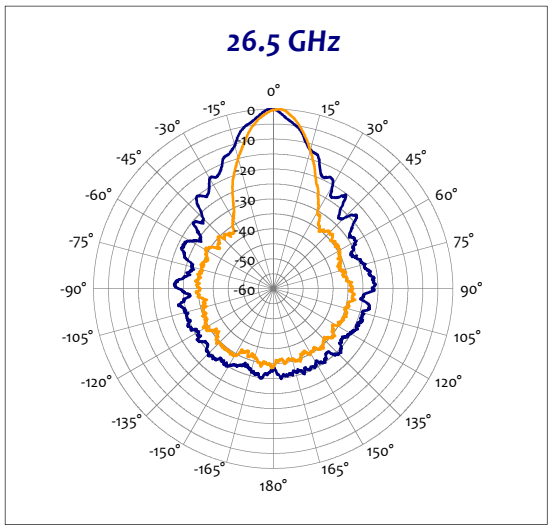
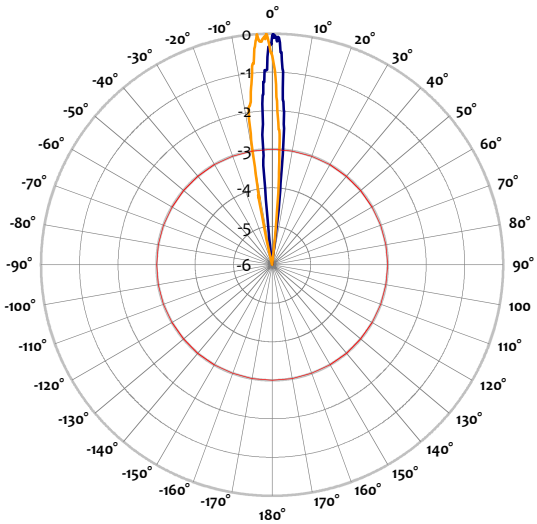


Figure 8.3 – Typical Antenna Patterns 27 GHz

E-Plane **H-Plane**

Radiation Pattern

3 dB Beamwidth

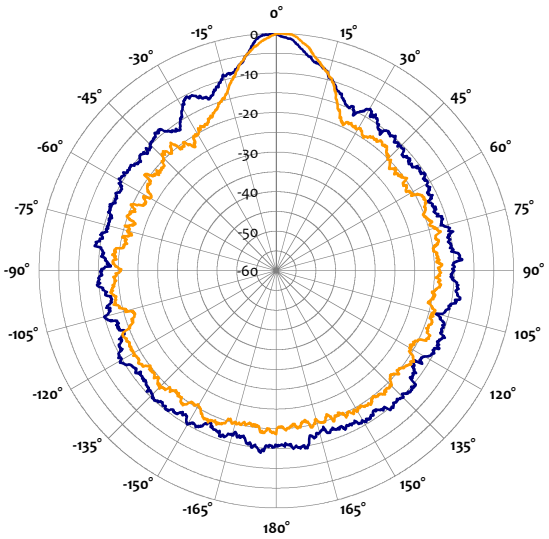


E-Plane: 9.5º	H-Plane: 13.3º

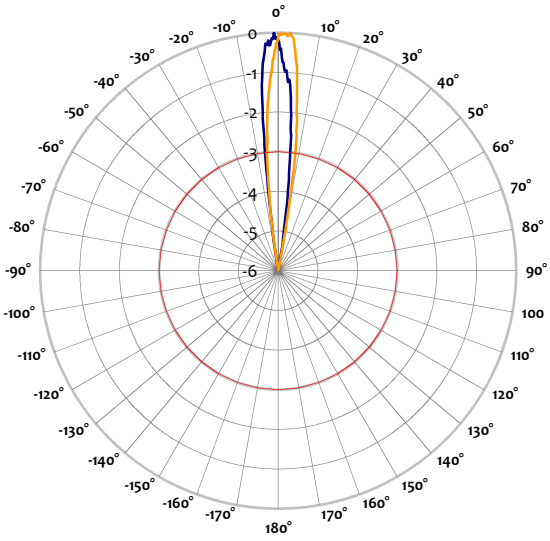
Figure 8.4 – Typical Antenna Patterns at 28 GHz

E-Plane **H-Plane**

Radiation Pattern



3 dB Beamwidth

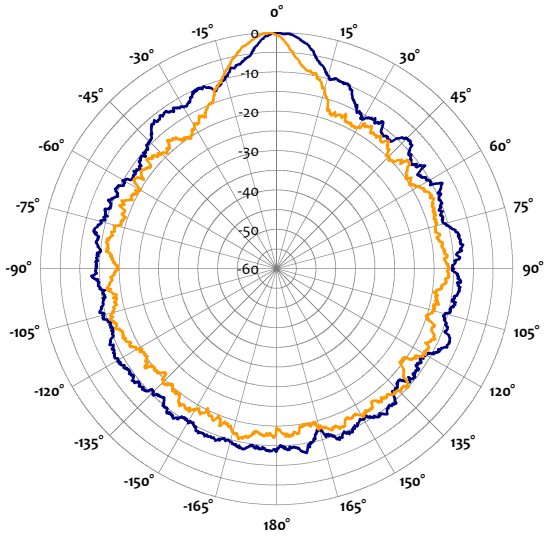


E-Plane: 12.5º	H-Plane: 13.5º

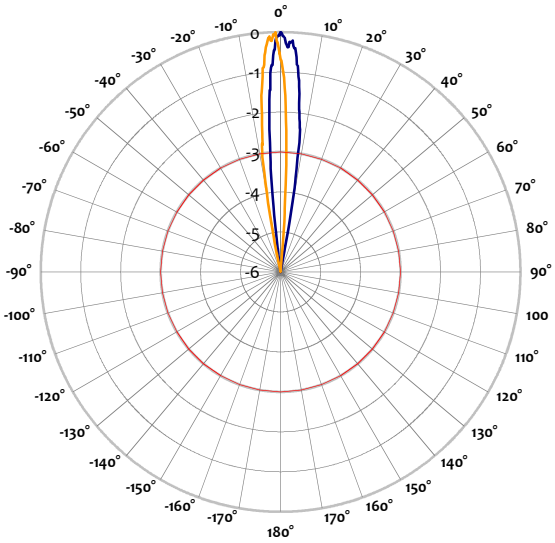
Figure 8.5 – Typical Antenna Patterns at 29 GHz

E-Plane **H-Plane**

Radiation Pattern



3 dB Beamwidth

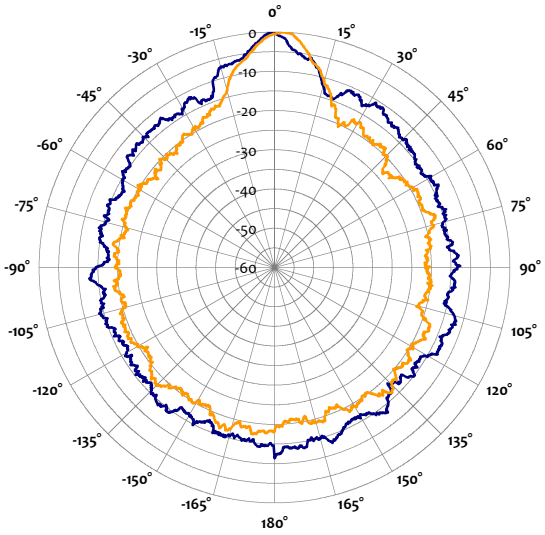


E-Plane: 13.0º	H-Plane: 11.3º

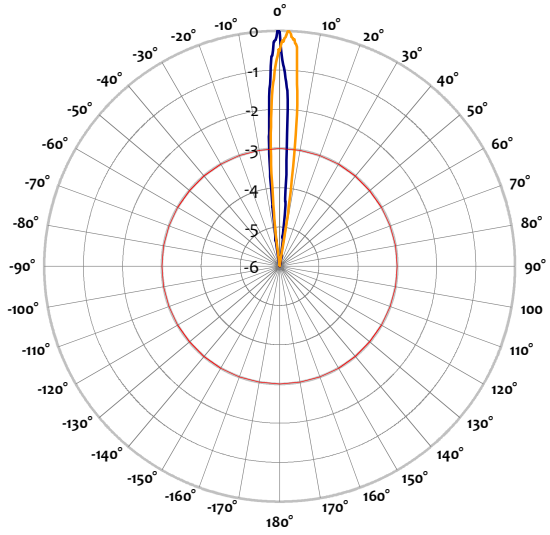
Figure 8.6 – Typical Antenna Patterns 30 GHz

E-Plane **H-Plane**

Radiation Pattern



3 dB Beamwidth

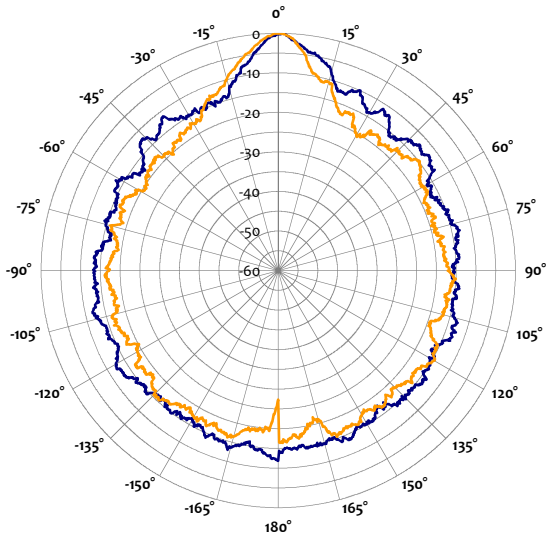


E-Plane: 8.0º	H-Plane: 11.5º

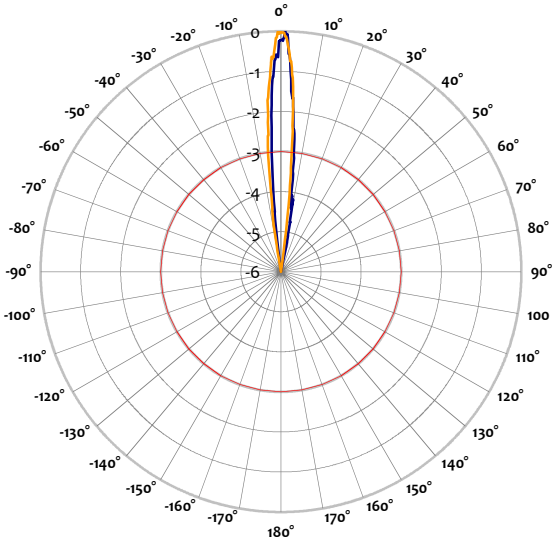
Figure 8.7 – Typical Antenna Patterns at 31 GHz

E-Plane **H-Plane**

Radiation Pattern



3 dB Beamwidth

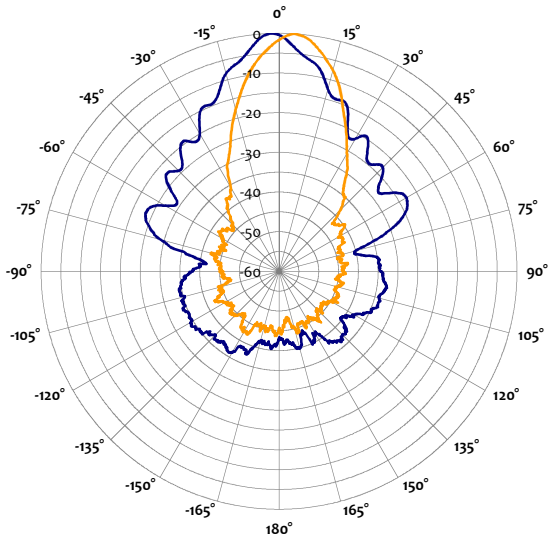


E-Plane: 10.3º	H-Plane: 11.0º

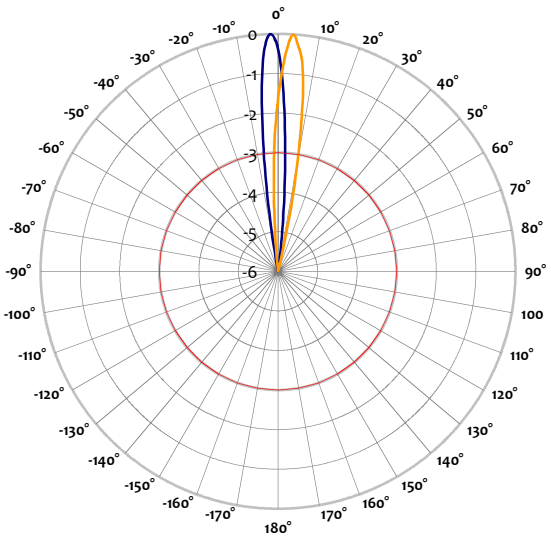
Figure 8.8 – Typical Antenna Patterns at 32 GHz

E-Plane **H-Plane**

Radiation Pattern



3 dB Beamwidth

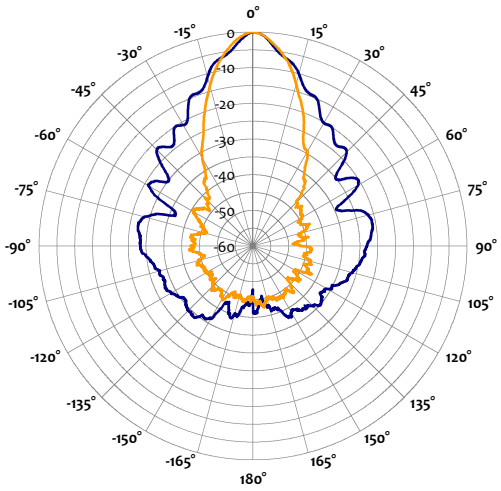


E-Plane: 10.0º	H-Plane: 11.5º

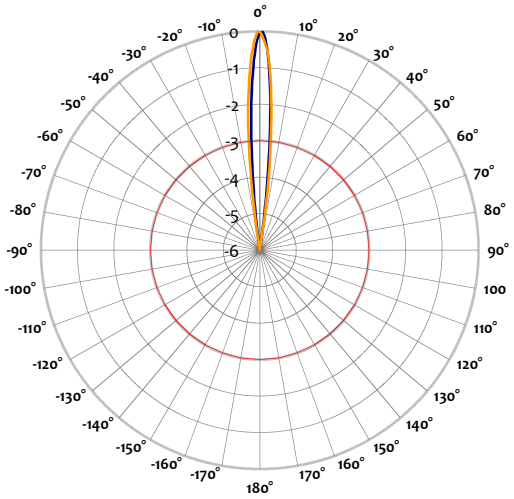
Figure 8.9 – Typical Antenna Patterns at 33 GHz

E-Plane **H-Plane**

Radiation Pattern



3 dB Beamwidth

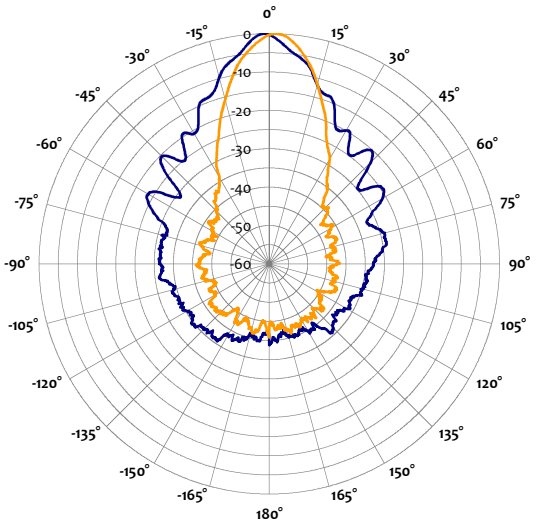


E-Plane: 9.3º	H-Plane: 11.5º

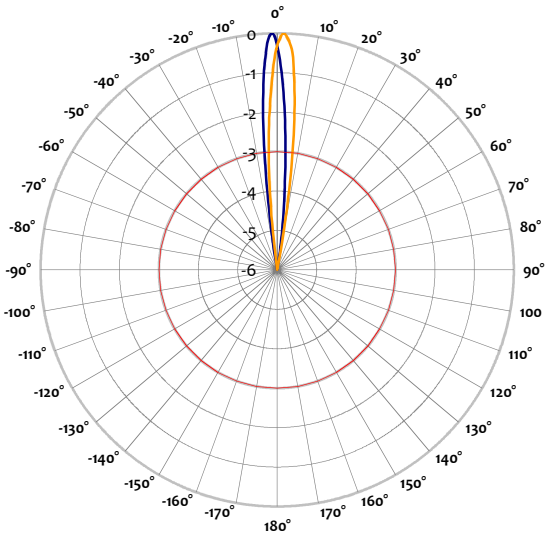
Figure 8.10 – Typical Antenna Patterns at 34 GHz

E-Plane **H-Plane**

Radiation Pattern



3 dB Beamwidth

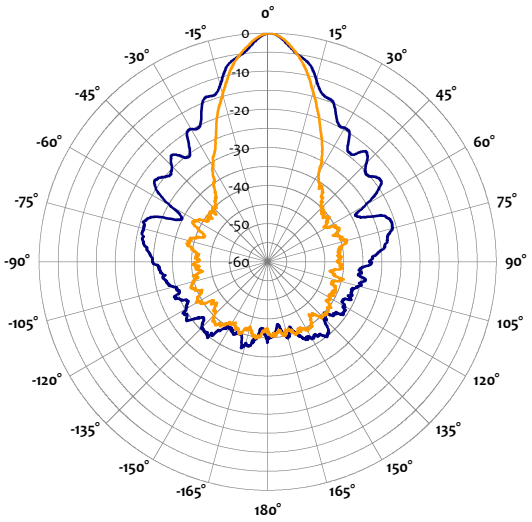


E-Plane: 10.0º	H-Plane: 11.3º

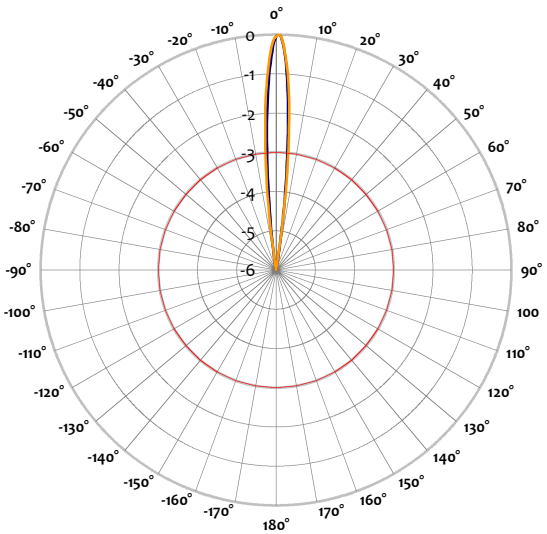
Figure 8.11 – Typical Antenna Patterns at 35 GHz

E-Plane **H-Plane**

Radiation Pattern



3 dB Beamwidth

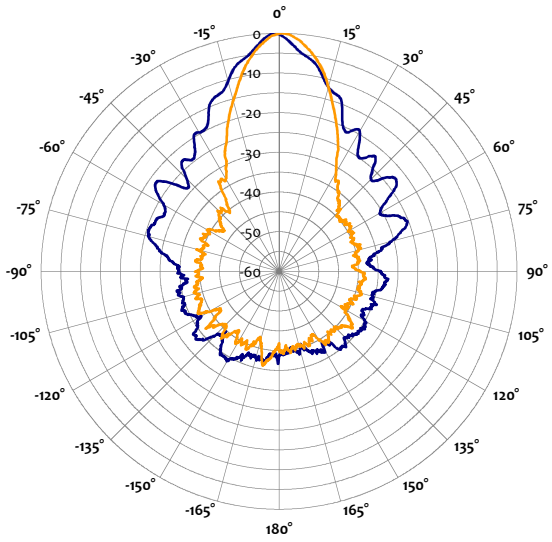


E-Plane: 9.8º	H-Plane: 10.8º

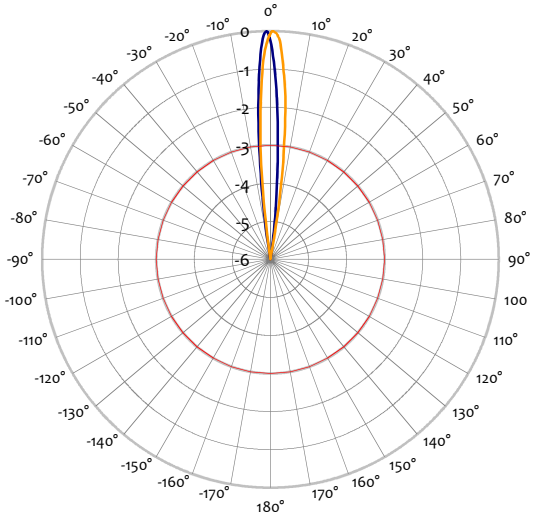
Figure 8.12 – Typical Antenna Patterns at 36 GHz

E-Plane **H-Plane**

Radiation Pattern



3 dB Beamwidth

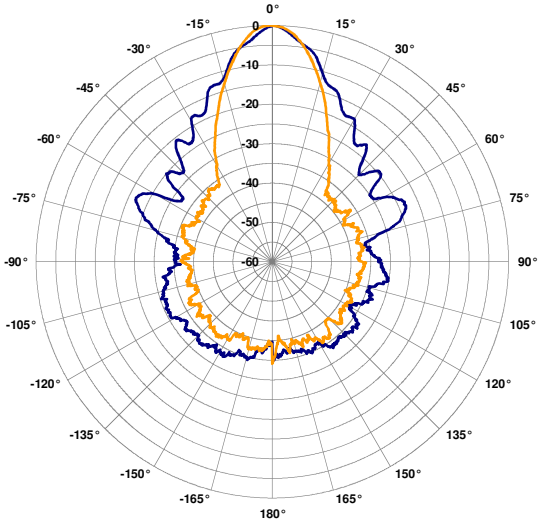


E-Plane: 9.0º	H-Plane: 11.5º

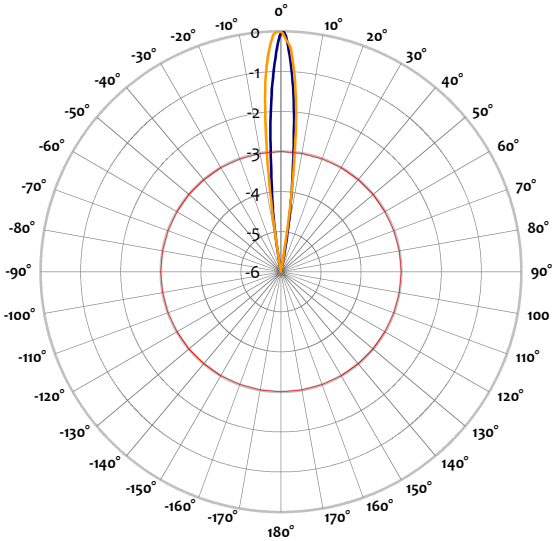
Figure 8.13 – Typical Antenna Patterns at 37 GHz

E-Plane **H-Plane**

Radiation Pattern



3 dB Beamwidth

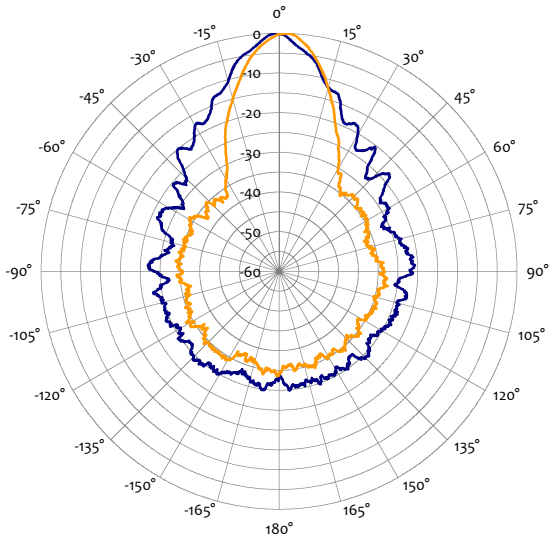


E-Plane: 10.8º	H-Plane: 13º

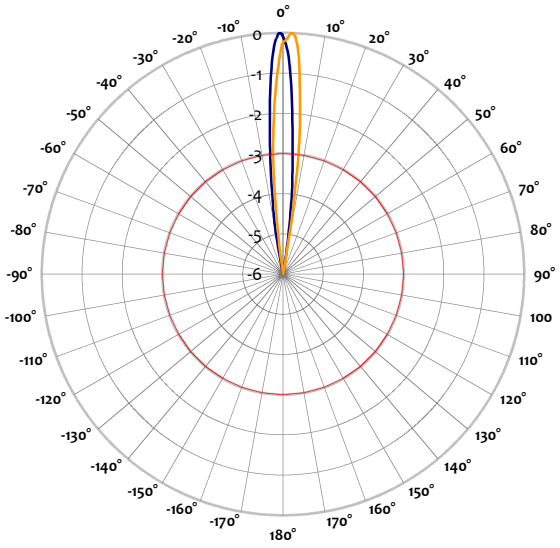
Figure 8.14 – Typical Antenna Patterns at 38 GHz

E-Plane **H-Plane**

Radiation Pattern



3 dB Beamwidth



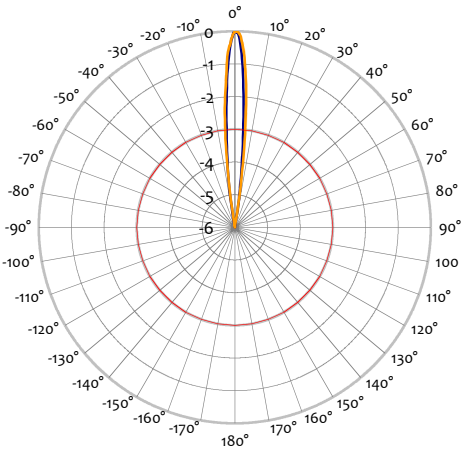
E-Plane: 10.5º	H-Plane: 11.8º

Figure 8.15 – Typical Antenna Patterns at 39 GHz

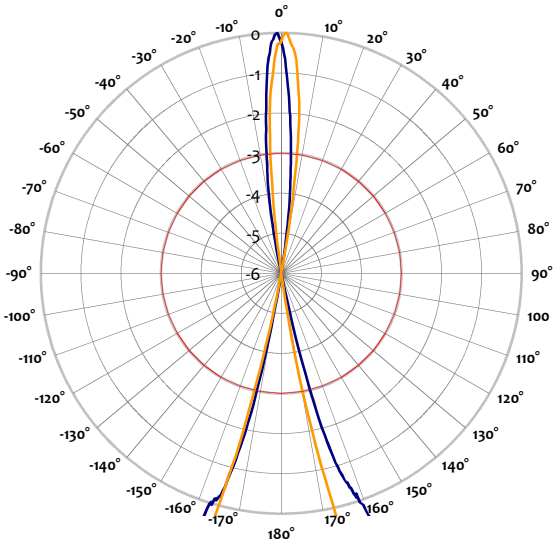
E-Plane **H-Plane**

Radiation Pattern

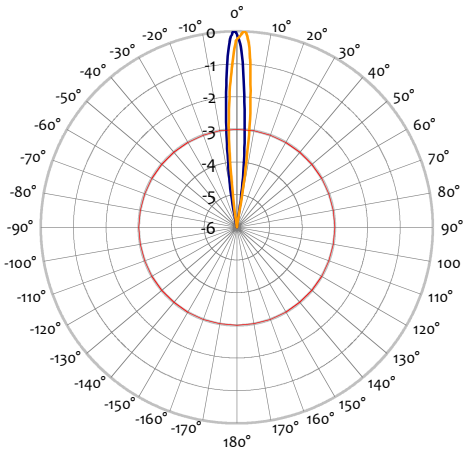
-3 dB BEAMWIDTH



3 dB Beamwidth



-3 dB BEAMWIDTH



E-Plane: 9.0º	H-Plane: 5.2º