NOTES



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*"Alpha Antenna uses antenna designs that are known to work!"*

# Alpha Antenna

## Model - Alpha 6-160

## The 6-160 Meter HF J-Pole

**USER GUIDE**

**V2.2**

**March 7, 2012**




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## Have Other Questions?

If you have questions about your antenna, please feel free to contact us.

## Support

Email: support@alphaantenna.com

Phone: 1-888-482-3249

WEB: www.alphaantenna.com

## Troubleshooting

If your antenna isn't tuning up properly, simply try moving it. Chances are, you have it in a position that is causing an odd SWR and the tuner doesn't like it.

If your antenna is giving unwanted TVI or RFI to other equipment in the house, you may also need to reposition the antenna. This is mostly the case for installations where the antenna is running parallel to ground. This creates a large reflection to ground, which tends to create interference in the shack and the house. To eliminate this issue, try installing as much of the antenna in a vertical configuration as you possibly can, still following the other rules for standards antenna installation presented here in this manual and in the ARRL Handbook.

If you are running an inverted "L" and you aren't getting too much DX, try repositioning to a sloper or vertical (sloped or straight up). The inverted "L" positioning tends to give the antenna NVIS (Near Vertical Incidence Skywave) characteristics, which is a radio-wave propagation method that provides usable signals in the range between groundwave and skywave distances of 30 to 400 miles.

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## Introduction

Thank you for purchasing the Alpha 6-160 from Alpha Antenna. At 75 feet in length the unique design characteristics of your 6-160 Meter HF J-Pole antenna enables it to achieve resonance on the major HF bands (6/10/15/20/40 Meters) and presents a SWR on all of the HF bands, including 80 & 160 Meters, that is low enough for 10:1 tuners to achieve a perfect match.

Alpha Antenna uses antenna designs that are known to work! Designed by Amateur Radio Operators at Alpha Antenna, in conjunction with a Certified Commercial Broadcast Engineer, the Alpha Antenna 6-160 merges the best antenna designs into one antenna system.

## Technical Specifications

- Weight: 2.5 pounds
- Configuration: Vertical, Inverted L, Horizontal
- Frequency Coverage: 1.8 to 54 MHz
- Power Rating: 200 watts
- Length: 75 Feet

## Functional Description

A combination of antenna designs, namely the J-Pole and Zepp along with matching network technologies, are utilized to achieve a resonant antenna design on 6, 10, 15, 20, & 40 Meters and a fairly resonant pattern on the rest of the HF bands, including 80 & 160 Meters. From the J-Pole formulas we derive the lengths of each wire pair, spacing of the wiring between their respective sheaths, and size & number of the strands of the wire used. From the Zepp is the matching feeder element formula, and although significant, is by no means the only factor in matching the antenna. A 4:1 UNUN compliments the Matching Network of the antenna. The 4:1 UNUN allows for the antenna to be fed with 50 ohm coax at the antenna. This makes for an important design characteristic when feeding a tuner, as it keeps the RF voltages low at the feed point. Then, depending upon what band you are using, a tuner can be used to perform the final matching for resonance.

## Installation Safety

*WARNING: INSTALLATION OF THIS PRODUCT NEAR POWER LINES IS DANGEROUS! FOR YOUR SAFETY, FOLLOW THE ENCLOSED INSTALLATION DIRECTIONS. THOUGH THIS ANTENNA IS CONSTRUCTED OF INSULATED WIRE, PROPER CARE MUST BE TAKEN DURING INSTALLATION. INSTALLER ASSUMES ALL LIABILITY FOR PROPERTY AND LIFE SAFETY.*

**YOU, YOUR ANTENNA, AND SAFETY**



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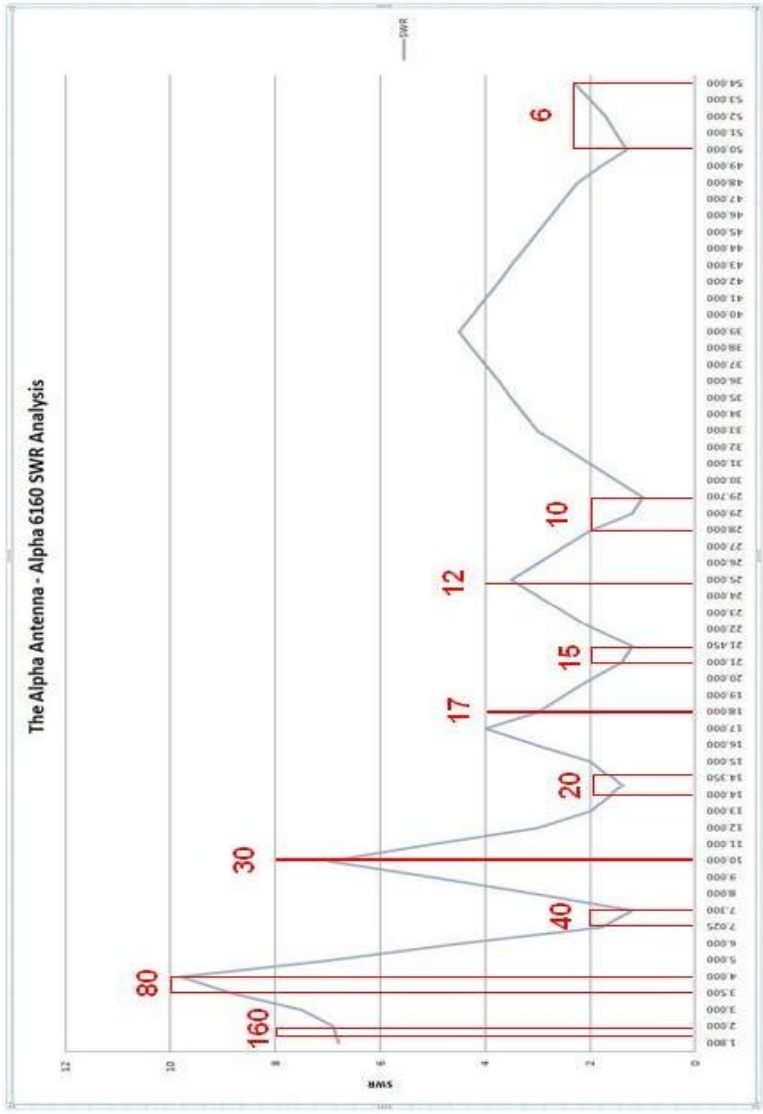

## Optimum SWR Performance

The SWR for the Alpha 6-160 HF-J-Pole has been tested at heights from just 6 feet through 30 feet and comes pre-tuned. During tests, optimum results achieved are represented in the following SWR Analysis. These results will vary for your particular installation based upon objects in your surrounding environment. If you do not have a tuner or if necessary, you can incrementally tune the Alpha 6-160 using the tuning stub.* This involves selecting the center frequency that you will operate on and trimming a short amount (1-3 inches at a time) of the shorter wire. This should be done using an antenna analyzer for optimum results. Although the SWR will not change much as 1-3 inches of wire are trimmed, eventually you will see the SWR start to increase, at which time you need to stop trimming. It is necessary to take precise readings on each band and monitor for when the first band starts to increase, which is an indication that it's about time to stop trimming.

*** Tuning through trimming the tuning stub invalidates any implied or stated warrantees. Note the Troubleshooting section before you attempt to trim the tuning stub.**



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Each year, hundreds of people are killed, mutilated, or receive severe and permanent injuries when attempting to install an antenna. In many of these cases, the victim was aware of the danger of electrocution, but did not take adequate steps to avoid the hazard. For your safety, and to help you achieve a good installation, please **READ** and **FOLLOW** the safety precautions below. **THEY MAY SAVE YOUR LIFE!**

1. If you are installing an antenna for the first time, please, for your own safety as well as others, seek PROFESSIONAL ASSISTANCE.

2. Select your installation site with safety, as well as performance, in mind. (Detailed information in Site Selection appears in a separate section of this booklet.) **REMEMBER:** ELECTRIC POWER LINES AND PHONE LINES LOOK ALIKE. FOR YOUR SAFETY, ASSUME THAT ANY OVERHEAD LINES CAN KILL YOU.

3. Call your electric power company. Tell them your plans and ask them to come take a look at your proposed installation. This is a small inconvenience, considering **YOUR LIFE IS AT STAKE.**

4. Plan your installation procedure carefully and completely *before* you begin. Successful raising of a mast or tower is largely a matter of coordination. Each person should be assigned a specific task, and should know what to do and when to do it. One person should be designated as the leader/coordinator of the operation to call out instructions and watch for signs of trouble.

5. When installing your antenna, **REMEMBER: DO NOT USE A METAL LADDER. DO NOT WORK ON A WET OR WINDY DAY. DO DRESS PROPERLY:** shoes with rubber soles and heels, rubber gloves, long sleeved shirt or jacket.

6. If the assembly starts to drop, get away from it and let it fall. Remember, the antenna, mast, cable and metal guy wires are all excellent conductors of electrical current. Even the slightest touch of any of these parts to a power line completes an electrical path through the antenna and the installer – **THAT'S YOU!**

7. If ANY PART of the antenna system should come in contact with a power line, **DON'T TOUCH IT OR TRY TO REMOVE IT YOURSELF. CALL YOUR LOCAL POWER COMPANY.** They will remove it safely. If an accident should occur with the power lines, call for qualified emergency help **IMMEDIATELY.**

## Antenna Installation

There are several basic methods to installing the antenna. The most common methods are Horizontal and Inverted L, where the feed point or center of the antenna is tied to a pole or high object in order to get the radiator as high in the air as possible. The best rule of thumb is to get it as high off the ground as possible for your situation. Other than that, even if you install it in a different shape to fit your apartment, condo or other installation, the antenna is pretty forgiving.



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Since the antenna can be used in either permanent or temporary installations, finding a good place for the antenna is just a matter of examining your location. Try to keep the entire antenna away from metal objects, including metal siding of houses or metal poles, water pipes, rain gutters, etc.

70% of the power radiated from the antenna is in the first 1/3 of the antenna where the coax attaches. It is important to affix the start point of then antenna to objects like trees, roofs, chimneys or string it up with a nonconductive cable (nylon rope) to get the start point as high off the ground as possible. The antenna will perform best when both ends are high off the ground.

## Connection to HF Radio

The Alpha 6-160 antenna is designed to directly connect to your tuner or radio's tuner with standard 50 ohm coax. To connect the antenna to your tuner, simply screw the PL-259 end of your coax into the Alpha 6-160 antenna and the other end into to your tuner or radio. This antenna is designed to be fed with unbalanced or balanced feed line.

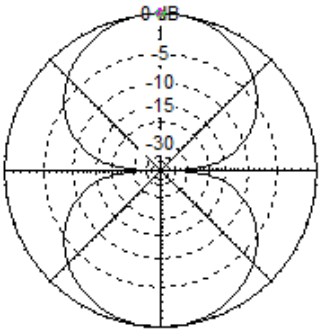
# 6-160 HF J-Pole Antenna


# 6 thru 160 Meter Far Field Analysis

# 160M

Total Field

Free Space




EZNEC

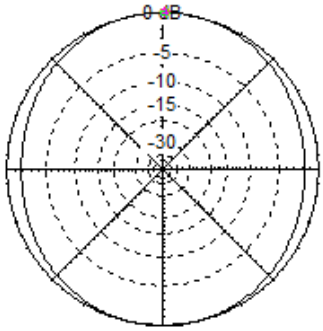
1.8 MHz

| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 90.0 deg. |
| Elevation Angle | 0.0 deg. | Gain | 6.29 dBi |
| Outer Ring | 6.29 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 6.29 dBi @ Az Angle = 90.0 deg. |
| Front/Side | 44.88 dB |
| Beamwidth | 89.0 deg.; -3dB @ 45.5, 134.5 deg. |
| Sidelobe Gain | 6.29 dBi @ Az Angle = 270.0 deg. |
| Front/Sidelobe | 0.0 dB |

Total Field

30 FEET




EZNEC

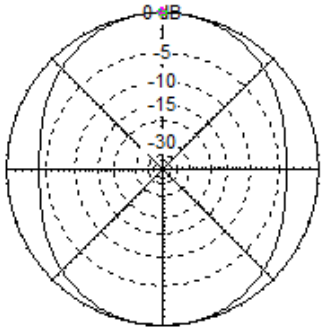
1.8 MHz

| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 89.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 11.69 dBi |
| Outer Ring | 11.69 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 11.69 dBi @ Az Angle = 89.0 deg. |
| Front/Side | 1.69 dB |
| Beamwidth | ? |
| Sidelobe Gain | 11.69 dBi @ Az Angle = 270.0 deg. |
| Front/Sidelobe | 0.0 dB |

Total Field

½ Wavelength




EZNEC

1.8 MHz

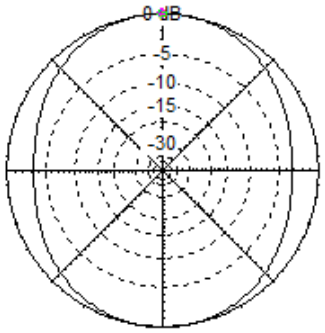
| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 90.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 9.43 dBi |
| Outer Ring | 9.43 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 9.43 dBi @ Az Angle = 90.0 deg. |
| Front/Side | 4.08 dB |
| Beamwidth | 129.0 deg.; -3dB @ 25.4, 154.4 deg. |
| Sidelobe Gain | 9.43 dBi @ Az Angle = 270.0 deg. |
| Front/Sidelobe | 0.0 dB |

# 80M

Total Field

Free Space




EZNEC

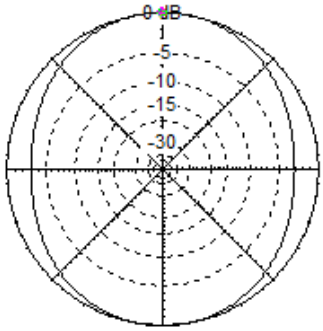
3.65 MHz

| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 90.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 3.97 dBi |
| Outer Ring | 3.97 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 3.97 dBi @ Az Angle = 90.0 deg. |
| Front/Side | 3.27 dB |
| Beamwidth | 149.5 deg.; -3dB @ 14.2, 163.7 deg. |
| Sidelobe Gain | 3.97 dBi @ Az Angle = 270.0 deg. |
| Front/Sidelobe | 0.0 dB |

Total Field

30 FEET




EZNEC

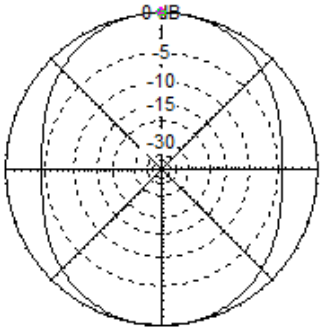
3.65 MHz

| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 90.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 8.23 dBi |
| Outer Ring | 8.23 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 8.23 dBi @ Az Angle = 90.0 deg. |
| Front/Side | 2.94 dB |
| Beamwidth | ? |
| Sidelobe Gain | 8.23 dBi @ Az Angle = 270.0 deg. |
| Front/Sidelobe | 0.0 dB |

Total Field

½ Wavelength




EZNEC

3.65 MHz

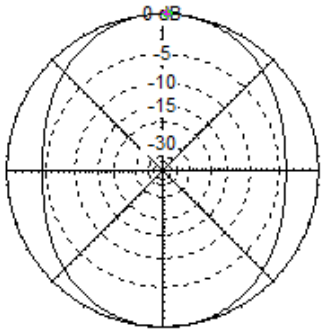
| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 90.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 6.78 dBi |
| Outer Ring | 6.78 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 6.78 dBi @ Az Angle = 90.0 deg. |
| Front/Side | 4.55 dB |
| Beamwidth | 120.4 deg.; -3dB @ 29.6, 150.0 deg. |
| Sidelobe Gain | 6.78 dBi @ Az Angle = 270.0 deg. |
| Front/Sidelobe | 0.0 dB |

# 40M

Total Field

Free Space




EZNEC

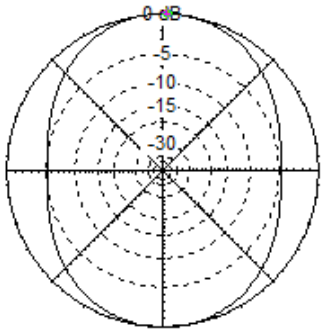
7.2 MHz

| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 88.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 4.37 dBi |
| Outer Ring | 4.37 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 4.37 dBi @ Az Angle = 88.0 deg. |
| Front/Side | 4.11 dB |
| Beamwidth | 119.6 deg.; -3dB @ 27.8, 147.4 deg. |
| Sidelobe Gain | 4.37 dBi @ Az Angle = 271.0 deg. |
| Front/Sidelobe | 0.0 dB |

Total Field

30 FEET




EZNEC

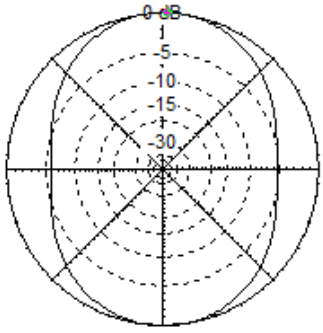
7.2 MHz

| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 88.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 7.78 dBi |
| Outer Ring | 7.78 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 7.78 dBi @ Az Angle = 88.0 deg. |
| Front/Back | 0.02 dB |
| Beamwidth | 110.3 deg.; -3dB @ 32.9, 143.2 deg. |
| Sidelobe Gain | 7.78 dBi @ Az Angle = 271.0 deg. |
| Front/Sidelobe | 0.0 dB |

Total Field

½ Wavelength




EZNEC

7.2 MHz

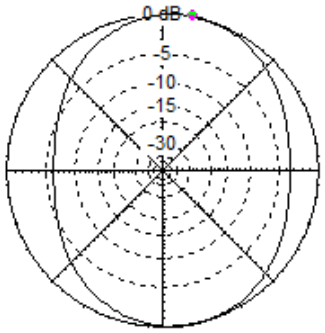
| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 88.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 7.03 dBi |
| Outer Ring | 7.03 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 7.03 dBi @ Az Angle = 88.0 deg. |
| Front/Side | 5.39 dB |
| Beamwidth | 105.1 deg.; -3dB @ 35.9, 141.0 deg. |
| Sidelobe Gain | 7.03 dBi @ Az Angle = 271.0 deg. |
| Front/Sidelobe | 0.0 dB |

# 30M

Total Field

Free Space




EZNEC

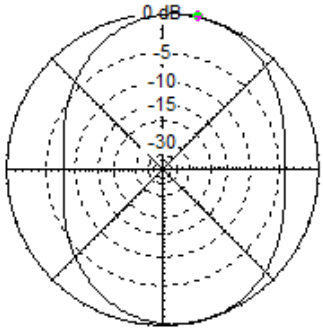
10.12 MHz

| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 79.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 4.83 dBi |
| Outer Ring | 4.83 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 4.83 dBi @ Az Angle = 79.0 deg. |
| Front/Back | 0.56 dB |
| Beamwidth | 113.2 deg.; -3dB @ 18.8, 132.0 deg. |
| Sidelobe Gain | 4.83 dBi @ Az Angle = 280.0 deg. |
| Front/Sidelobe | 0.0 dB |

Total Field

30 FEET




EZNEC

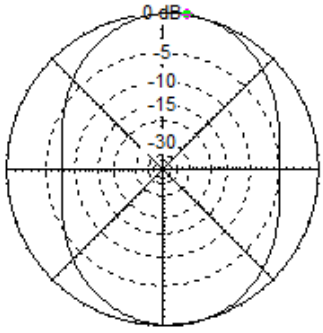
10.12 MHz

| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 77.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 8.16 dBi |
| Outer Ring | 8.16 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 8.16 dBi @ Az Angle = 77.0 deg. |
| Front/Back | 0.9 dB |
| Beamwidth | 100.9 deg.; -3dB @ 24.9, 125.8 deg. |
| Sidelobe Gain | 8.16 dBi @ Az Angle = 282.0 deg. |
| Front/Sidelobe | 0.0 dB |

Total Field

½ Wavelength




EZNEC

10.12 MHz

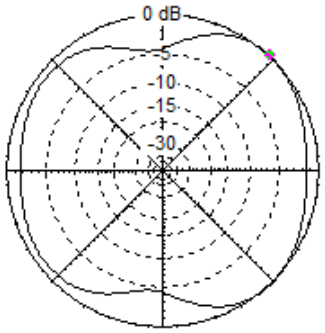
| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 81.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 7.52 dBi |
| Outer Ring | 7.52 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 7.52 dBi @ Az Angle = 81.0 deg. |
| Front/Back | 0.43 dB |
| Beamwidth | 97.9 deg.; -3dB @ 31.5, 129.4 deg. |
| Sidelobe Gain | 7.52 dBi @ Az Angle = 278.0 deg. |
| Front/Sidelobe | 0.0 dB |

# 20M

Total Field

Free Space




EZNEC

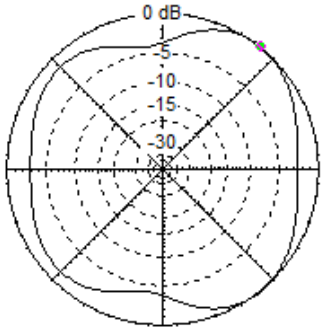
14.2 MHz

| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 47.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 2.02 dBi |
| Outer Ring | 2.02 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 2.02 dBi @ Az Angle = 47.0 deg. |
| Front/Back | 1.0 dB |
| Beamwidth | 161.0 deg.; -3dB @ 279.5, 80.5 deg. |
| Sidelobe Gain | 2.02 dBi @ Az Angle = 313.0 deg. |
| Front/Sidelobe | 0.0 dB |

Total Field

30 FEET




EZNEC

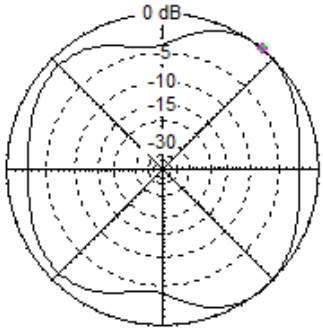
14.2 MHz

| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 51.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 4.86 dBi |
| Outer Ring | 4.86 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 4.86 dBi @ Az Angle = 51.0 deg. |
| Front/Back | 1.54 dB |
| Beamwidth | 169.2 deg.; -3dB @ 275.4, 84.6 deg. |
| Sidelobe Gain | 4.86 dBi @ Az Angle = 308.0 deg. |
| Front/Sidelobe | 0.0 dB |

Total Field

1 Wavelength




EZNEC

14.2 MHz

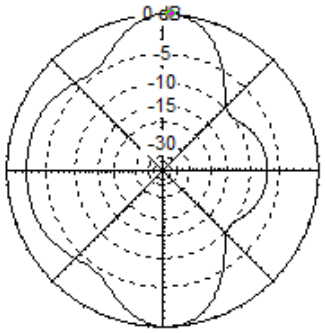
| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 50.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 6.0 dBi |
| Outer Ring | 6.0 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 6.0 dBi @ Az Angle = 50.0 deg. |
| Front/Back | 1.27 dB |
| Beamwidth | 166.2 deg.; -3dB @ 276.9, 83.1 deg. |
| Sidelobe Gain | 6.0 dBi @ Az Angle = 309.0 deg. |
| Front/Sidelobe | 0.0 dB |

18M

Total Field

Free Space




EZNEC

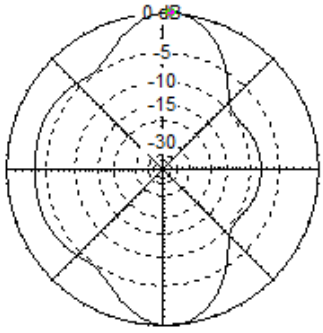
18.1 MHz

| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 87.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 5.74 dBi |
| Outer Ring | 5.74 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 5.74 dBi @ Az Angle = 87.0 deg. |
| Front/Back | 0.16 dB |
| Beamwidth | 46.9 deg.; -3dB @ 65.5, 112.4 deg. |
| Sidelobe Gain | 5.74 dBi @ Az Angle = 272.0 deg. |
| Front/Sidelobe | 0.0 dB |

Total Field

30 FEET




EZNEC

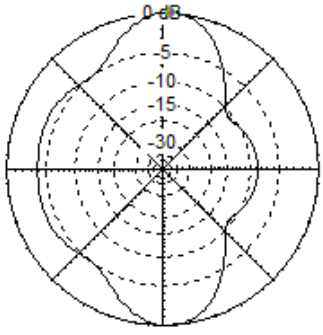
18.1 MHz

| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 87.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 6.78 dBi |
| Outer Ring | 6.78 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 6.78 dBi @ Az Angle = 87.0 deg. |
| Front/Back | 0.21 dB |
| Beamwidth | 47.3 deg.; -3dB @ 64.2, 111.5 deg. |
| Sidelobe Gain | 6.78 dBi @ Az Angle = 273.0 deg. |
| Front/Sidelobe | 0.0 dB |

Total Field

1 Wavelength




EZNEC

18.1 MHz

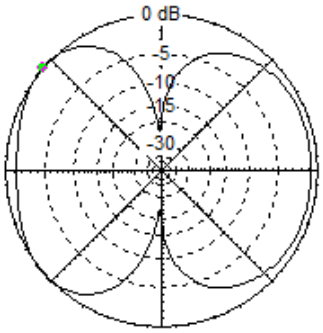
| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 87.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 10.4 dBi |
| Outer Ring | 10.4 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 10.4 dBi @ Az Angle = 87.0 deg. |
| Front/Back | 0.19 dB |
| Beamwidth | 46.0 deg.; -3dB @ 65.4, 111.4 deg. |
| Sidelobe Gain | 10.4 dBi @ Az Angle = 272.0 deg. |
| Front/Sidelobe | 0.0 dB |

15M

Total Field

Free Space




EZNEC

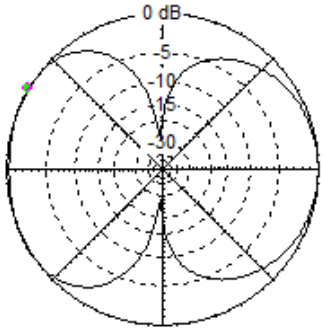
21.25 MHz

| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 139.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 5.89 dBi |
| Outer Ring | 5.89 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 5.89 dBi @ Az Angle = 139.0 deg. |
| Front/Back | 1.16 dB |
| Beamwidth | 131.0 deg.; -3dB @ 114.5, 245.5 deg. |
| Sidelobe Gain | 5.89 dBi @ Az Angle = 221.0 deg. |
| Front/Sidelobe | 0.0 dB |

Total Field

30 FEET




EZNEC

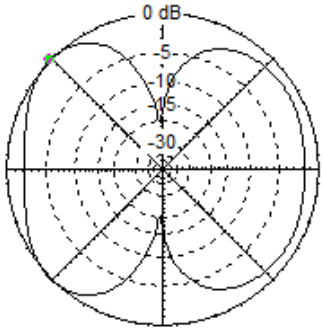
21.25 MHz

| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 149.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 1.47 dBi |
| Outer Ring | 1.47 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 1.47 dBi @ Az Angle = 149.0 deg. |
| Front/Back | 0.86 dB |
| Beamwidth | 123.8 deg.; -3dB @ 118.1, 241.9 deg. |
| Sidelobe Gain | 1.47 dBi @ Az Angle = 211.0 deg. |
| Front/Sidelobe | 0.0 dB |

Total Field

1 Wavelength




EZNEC

21.25 MHz

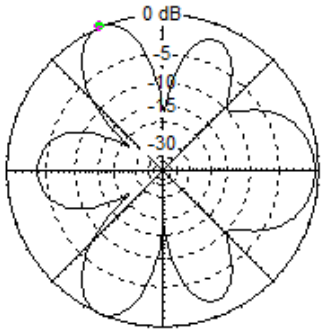
| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 136.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 9.53 dBi |
| Outer Ring | 9.53 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 9.53 dBi @ Az Angle = 136.0 deg. |
| Front/Back | 1.3 dB |
| Beamwidth | 133.5 deg.; -3dB @ 113.2, 246.7 deg. |
| Sidelobe Gain | 9.53 dBi @ Az Angle = 224.0 deg. |
| Front/Sidelobe | 0.0 dB |

12M

Total Field

Free Space




EZNEC

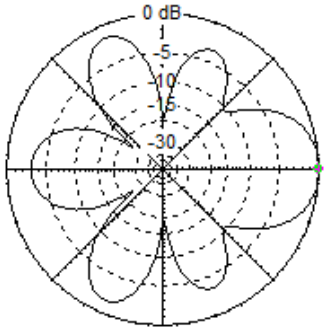
24.94 MHz

| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 114.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 4.03 dBi |
| Outer Ring | 4.03 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 4.03 dBi @ Az Angle = 114.0 deg. |
| Front/Back | 1.91 dB |
| Beamwidth | 26.5 deg.; -3dB @ 101.1, 127.6 deg. |
| Sidelobe Gain | 4.03 dBi @ Az Angle = 246.0 deg. |
| Front/Sidelobe | 0.0 dB |

Total Field

30 FEET




EZNEC

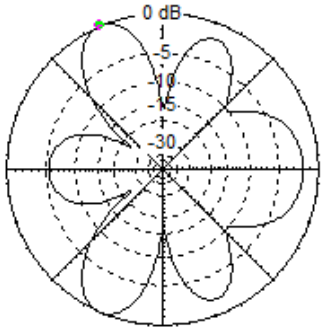
24.94 MHz

| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 0.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 0.11 dBi |
| Outer Ring | 0.11 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 0.11 dBi @ Az Angle = 0.0 deg. |
| Front/Back | 3.03 dB |
| Beamwidth | 49.8 deg.; -3dB @ 335.1, 24.9 deg. |
| Sidelobe Gain | -1.44 dBi @ Az Angle = 114.0 deg. |
| Front/Sidelobe | 1.55 dB |

Total Field

1 Wavelength




EZNEC

24.94 MHz

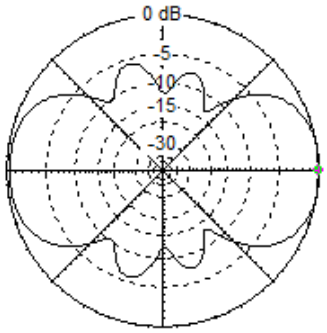
| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 114.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 8.56 dBi |
| Outer Ring | 8.56 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 8.56 dBi @ Az Angle = 114.0 deg. |
| Front/Back | 1.9 dB |
| Beamwidth | 26.7 deg.; -3dB @ 101.0, 127.7 deg. |
| Sidelobe Gain | 8.56 dBi @ Az Angle = 246.0 deg. |
| Front/Sidelobe | 0.0 dB |

10M

Total Field

Free Space




EZNEC

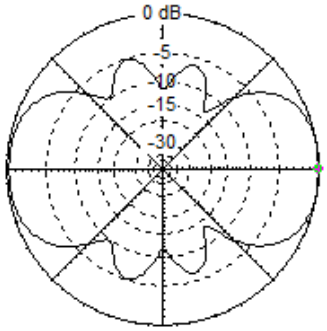
28.3 MHz

| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 0.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 5.69 dBi |
| Outer Ring | 5.69 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 5.69 dBi @ Az Angle = 0.0 deg. |
| Front/Back | 0.39 dB |
| Beamwidth | 69.2 deg.; -3dB @ 325.4, 34.6 deg. |
| Sidelobe Gain | 5.3 dBi @ Az Angle = 180.0 deg. |
| Front/Sidelobe | 0.39 dB |

Total Field

30 FEET




EZNEC

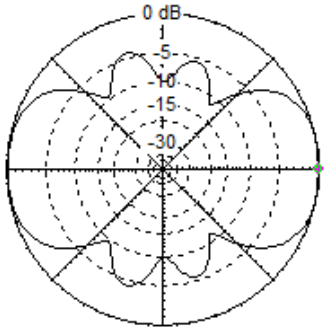
28.3 MHz

| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 0.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 6.37 dBi |
| Outer Ring | 6.37 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 6.37 dBi @ Az Angle = 0.0 deg. |
| Front/Back | 0.33 dB |
| Beamwidth | 70.2 deg.; -3dB @ 324.9, 35.1 deg. |
| Sidelobe Gain | 6.04 dBi @ Az Angle = 180.0 deg. |
| Front/Sidelobe | 0.33 dB |

Total Field

1 Wavelength




EZNEC

28.3 MHz

| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 0.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 8.65 dBi |
| Outer Ring | 8.65 dBi | | 0.0 dBmax |

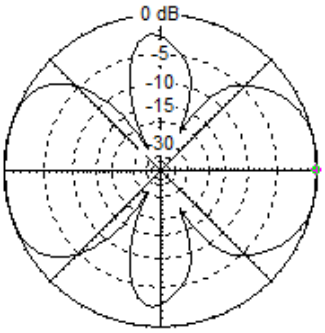
| | |
|---|---|
| Slice Max Gain | 8.65 dBi @ Az Angle = 0.0 deg. |
| Front/Back | 0.22 dB |
| Beamwidth | 72.8 deg.; -3dB @ 323.6, 36.4 deg. |
| Sidelobe Gain | 8.43 dBi @ Az Angle = 180.0 deg. |
| Front/Sidelobe | 0.22 dB |

# 6M

Total Field

EZNEC

Free Space




50.2 MHz

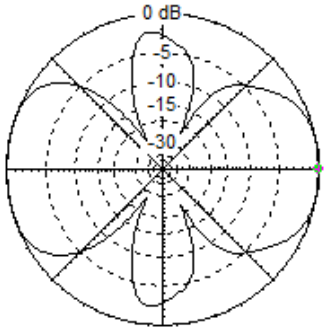
| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 0.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 4.49 dBi |
| Outer Ring | 4.49 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 4.49 dBi @ Az Angle = 0.0 deg. |
| Front/Back | 0.02 dB |
| Beamwidth | 76.4 deg.; -3dB @ 321.8, 38.2 deg. |
| Sidelobe Gain | 4.47 dBi @ Az Angle = 180.0 deg. |
| Front/Sidelobe | 0.02 dB |

Total Field

EZNEC

30 FEET




50.2 MHz

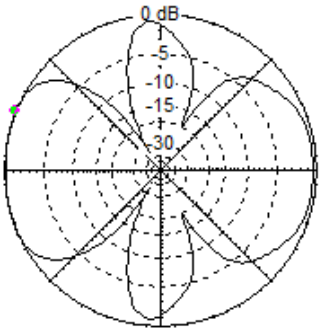
| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 0.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 3.7 dBi |
| Outer Ring | 3.7 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 3.7 dBi @ Az Angle = 0.0 deg. |
| Front/Back | 0.08 dB |
| Beamwidth | 72.8 deg.; -3dB @ 323.6, 36.4 deg. |
| Sidelobe Gain | 3.64 dBi @ Az Angle = 166.0 deg. |
| Front/Sidelobe | 0.06 dB |

Total Field

EZNEC

1 Wavelength




50.2 MHz

| | | | |
|---|---|---|---|
| Azimuth Plot | | Cursor Az | 158.0 deg. |
| Elevation Angle | 45.0 deg. | Gain | 7.57 dBi |
| Outer Ring | 7.57 dBi | | 0.0 dBmax |

| | |
|---|---|
| Slice Max Gain | 7.57 dBi @ Az Angle = 158.0 deg. |
| Front/Back | 0.77 dB |
| Beamwidth | 85.2 deg.; -3dB @ 137.4, 222.6 deg. |
| Sidelobe Gain | 7.57 dBi @ Az Angle = 201.0 deg. |
| Front/Sidelobe | 0.0 dB |