

Features

- 30 MHz to 100 MHz frequency range
- Wide beamwidth illuminates a large uniform area
- High power balun handles up to 15 kW RF input power
- Tilt-angle, height and polarization are easily adjustable
- Mounted on wheeled base for easy mobility



EMCO's Model 3159 is a broadband, linearly-polarized biconical antenna with a 30 MHz to 100 MHz frequency range. This antenna exhibits a wide beamwidth and is specially designed to handle up to 15 kW input power for generating high electric field strength over a large uniform area.

An optional wheeled pedestal is available which permits horizontal and vertical antenna polarization, height, and tilt-angle adjustments. A pneumatic cylinder is used to change polarization, and can be remotely controlled using an optional ETS-EMCO Model 2090 Controller or an ETS-EMCO 2190 Virtual Controller. The Model 2090 is IEEE-488 compatible, and uses fiber optic I/O for communication with the pedestal. The Model 2190 is PC resident software, and also uses fiber optic I/O for communication. (See separate product data sheets for additional details.)

Unlike a top-hat capacitively-loaded log periodic dipole antenna normally used in this frequency range, the phase center/

source distance is the same for low and high frequencies. This ensures high field strength at frequencies as low as 30 MHz. The design of the Model 3159 takes advantage of the wide beamwidth feature of a biconical antenna, and its optimized design provides low VSWR and high radiation efficiency.

Electrical Field Distribution*

The Model 3159 antenna is used for both horizontal and vertical polarization. The antenna exhibits a dipole-like radiation pattern, i.e., a toroidal shape with an omni-directional pattern in the H-plane. In the low frequency range, such as at 30 MHz (wavelength $\lambda=10$ m), the equipment under test (EUT) is in the near-field of the antenna. Therefore, the field distribution cannot be easily estimated from the beamwidth and far-field pattern. Our full numerical model makes no assumption about the performance and radiation pattern of the biconical antenna.

In both horizontal and vertical polarization the Model 3159 needs to be placed

5 m from the VUT to cover a uniform area such as 5m x 2.4 m² with 100 V/m from 0 dB to -3 dB. Antenna height is 1.8m, and the antenna is tilted to boresight to a 1 m height point in the uniform field plane.

The field distribution in an area (0.6 m above the floor, 5x2.4 m) for the setups in Figure 1 and 2 are simulated. Typical frequencies are shown here. Field distribution data at additional frequencies and setups are available upon request.

Technical Description

The ETS-EMCO Model 3159 high-power biconical antenna has a 4:1 Guanella balun for matching the impedance to the amplifier. The balun maintains a low operating temperature due to the unit's efficient radiation and high power design.

Standard Configuration

- 2 biconical elements
- High power balun (10 kW)

* Field distribution data are based on free-space condition. Performance may vary with different ground treatments.

Options

- ETS-EMCO custom pedestal with angle tilt control (0-21°) and polarization control (horizontal and vertical)
- ETS-EMCO 2X90 Controller

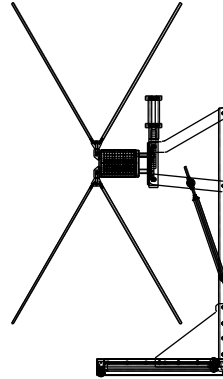
Electrical Specifications

Frequency:	30 MHz - 100 MHz
Input impedance:	50 W
VSWR:	2:1 typical, 4:1 maximum
Maximum RF input power:	15 kW
RF connector:	1-5/8" EIA

Physical Specifications

Dimensions:	
Length	3 m total length
Diameter	1.04 m

Custom Pedestal Dimensions:	
Length	1.2 m
Width	1.2 m
Height (adjustable)	1.6 m - 2.0 m



ETS-EMCO's custom pedestal allows antenna height and tilt-angle to be easily adjusted.

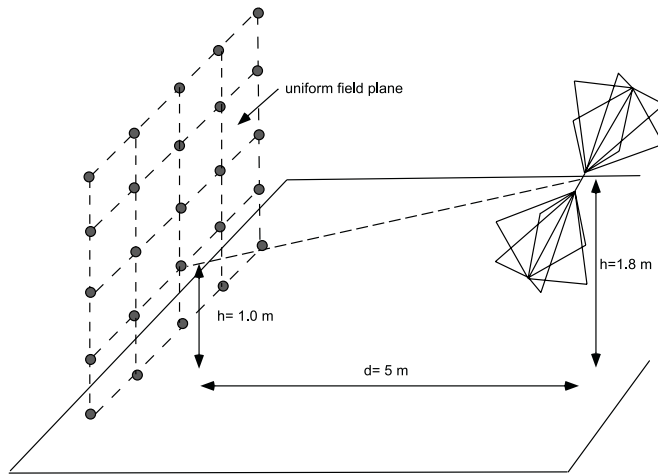


Figure 1. ETS-EMCO 3159 horizontal polarization setup schematic. Antenna is at 1.8 m height, tilted to boresight to a 1 m point.

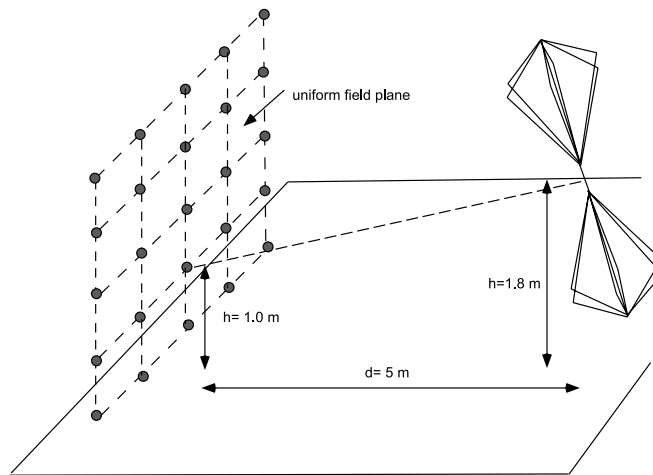


Figure 2. ETS-EMCO 3159 vertical polarization setup schematic. Antenna is at 1.8 m height, tilted to boresight to a 1 m point.

Horizontal Polarization:

3159 horiz. @ 30 MHz, d=5m

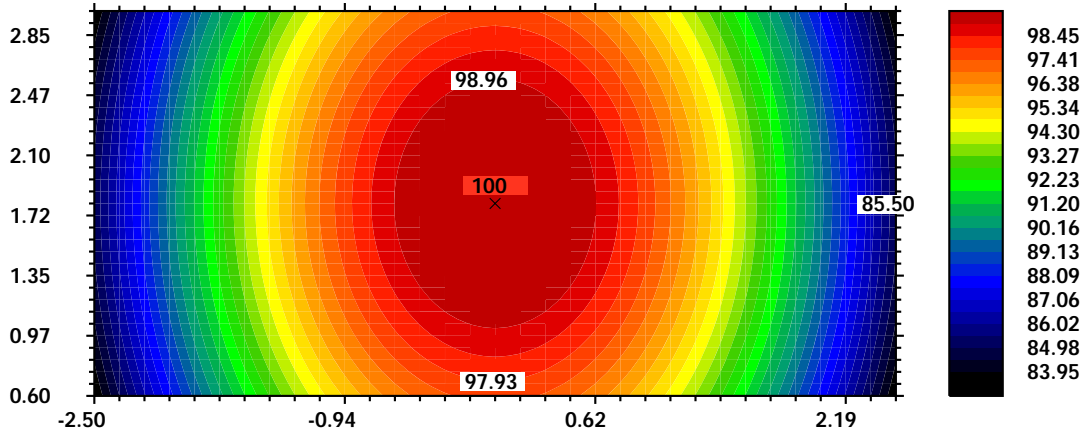


Figure 3. E-field (V/m) in the uniform field area for ETS-EMCO 3159 horizontally polarized d=5 m (setup shown in figure 1), f=30 MHz with input power of 10 kW. filename: xd5f30h.ps

3159 horiz. @ 60 MHz, d=5m

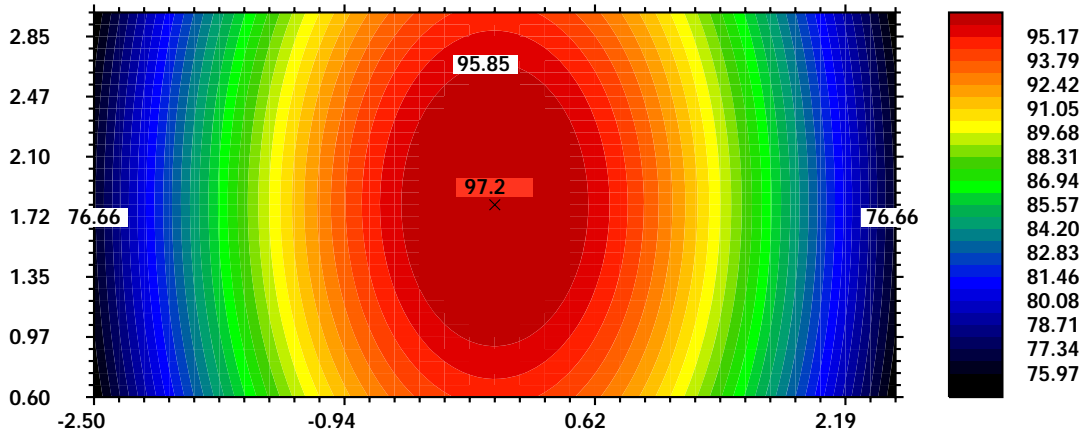


Figure 4. E-field (V/m) in the uniform field area for ETS-EMCO 3159 horizontally polarized d=5 m (setup shown in figure 1), f=60 MHz with input power of 10 kW. filename: xd5f60h.ps

3159 horiz. @ 80 MHz, d=5m

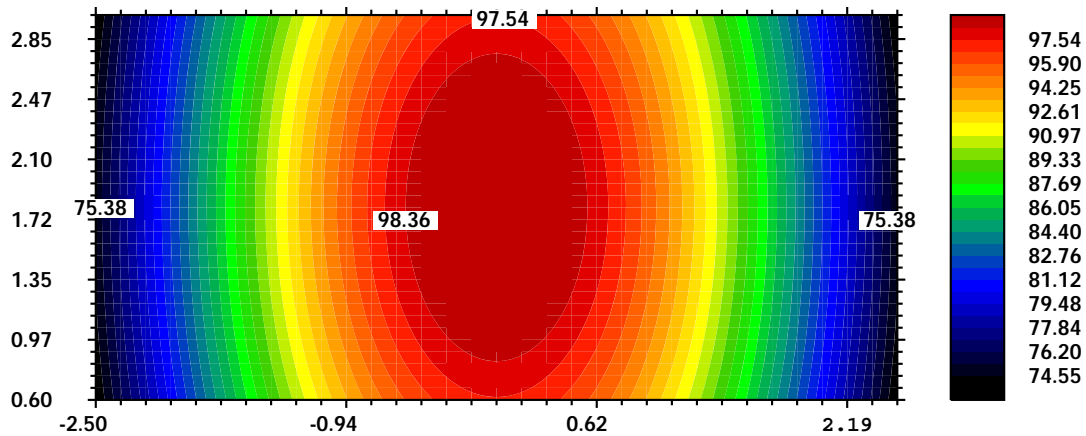


Figure 5. E-field (V/m) in the uniform field area for ETS-EMCO 3159 horizontally polarized d=5 m (setup shown in figure 1), f=80 MHz with input power of 10 kW.
 filename: xd5f80h.ps

3159 horiz. @ 100 MHz, d=5m

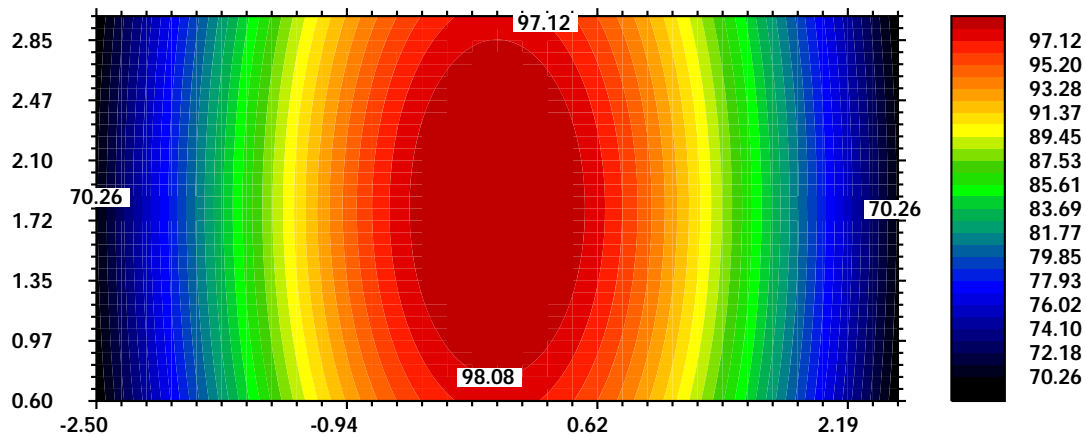
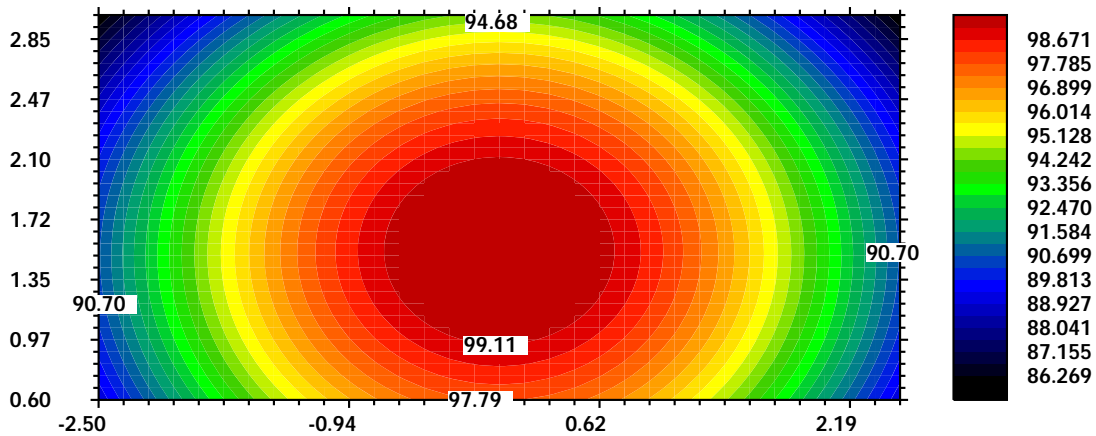


Figure 6. E-field (V/m) in the uniform field area for ETS-EMCO 3159 horizontally polarized d=5 m (setup shown in figure 1), f=100 MHz with input power of 10 kW.
 filename: xd5f100h.ps

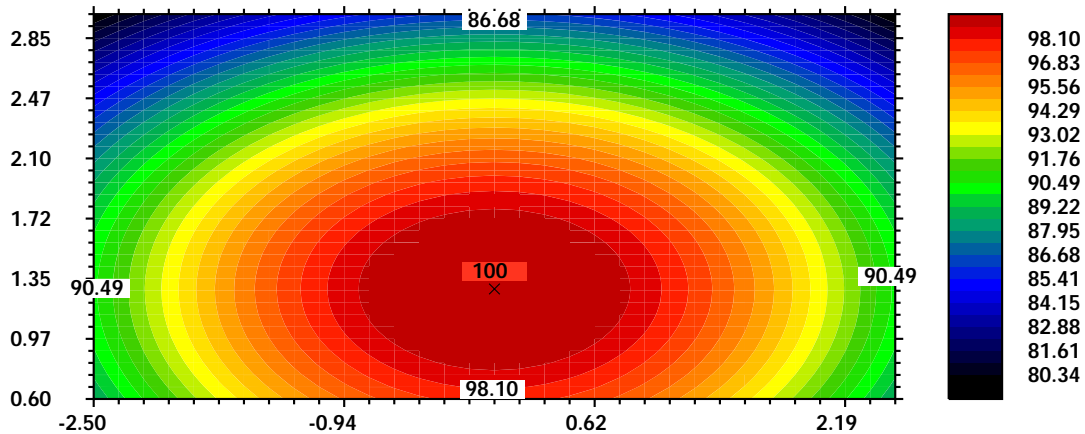
Vertical Polarization:

3159 vertical @ 30 MHz, d=5m



*Figure 7. E-field (V/m) in the uniform field area for ETS-EMCO 3159 vertically polarized d=5 m (setup shown in figure 2), f=30 MHz with input power of 10 kW.
 filename: xad5f30v.ps*

3159 vertical @ 60 MHz, d=5m



*Figure 8. E-field (V/m) in the uniform field area for ETS-EMCO 3159 vertically polarized d=5 m (setup shown in figure 2), f=60 MHz with input power of 10 kW.
 filename: xad5f60v.ps*

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3159 vertical @ 80 MHz, d=5m

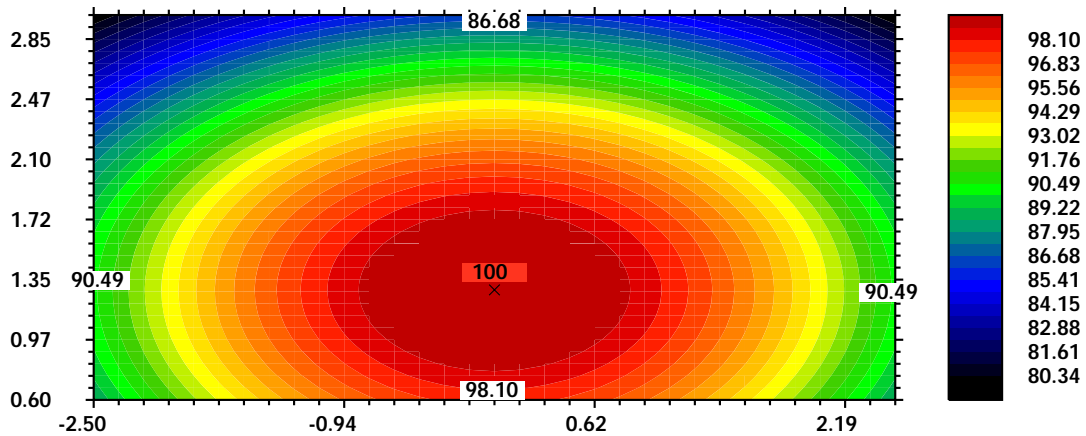


Figure 9. E-field (V/m) in the uniform field area for ETS-EMCO 3159 vertically polarized d=5 m (setup shown in figure 2), f=80 MHz with input power of 10 kW.

filename: xad5f80v.ps

3159 vertical @ 100 MHz, d=5m

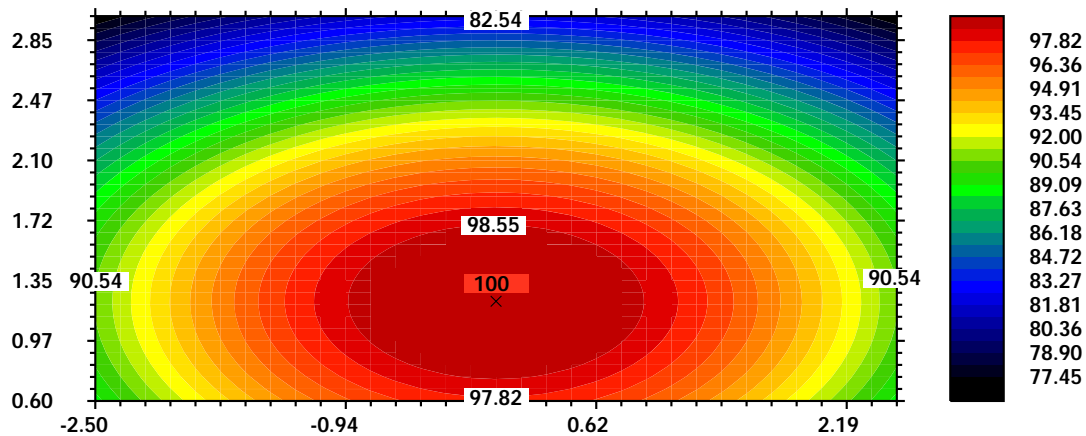


Figure 10. E-field (V/m) in the uniform field area for ETS-EMCO 3159 vertically polarized d=5 m (setup shown in figure 2), f=100 MHz with input power of 10 kW.

filename: xad5f100v.ps

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