

Cup Horns from Olver, et al., *Microwave Horns and Feeds*, IEE Electromagnetics Series, 1994, Kumar (Wade W1GHZ, Ch. 6-3) 1985, EuCAP 2006, and Volakis p 14-38, 2007

Page 219 Single Cup Choke Horn, Olver, et. al., 0.47λ deep, 0.603λ wide cup Opt. $f/D = 0.375$

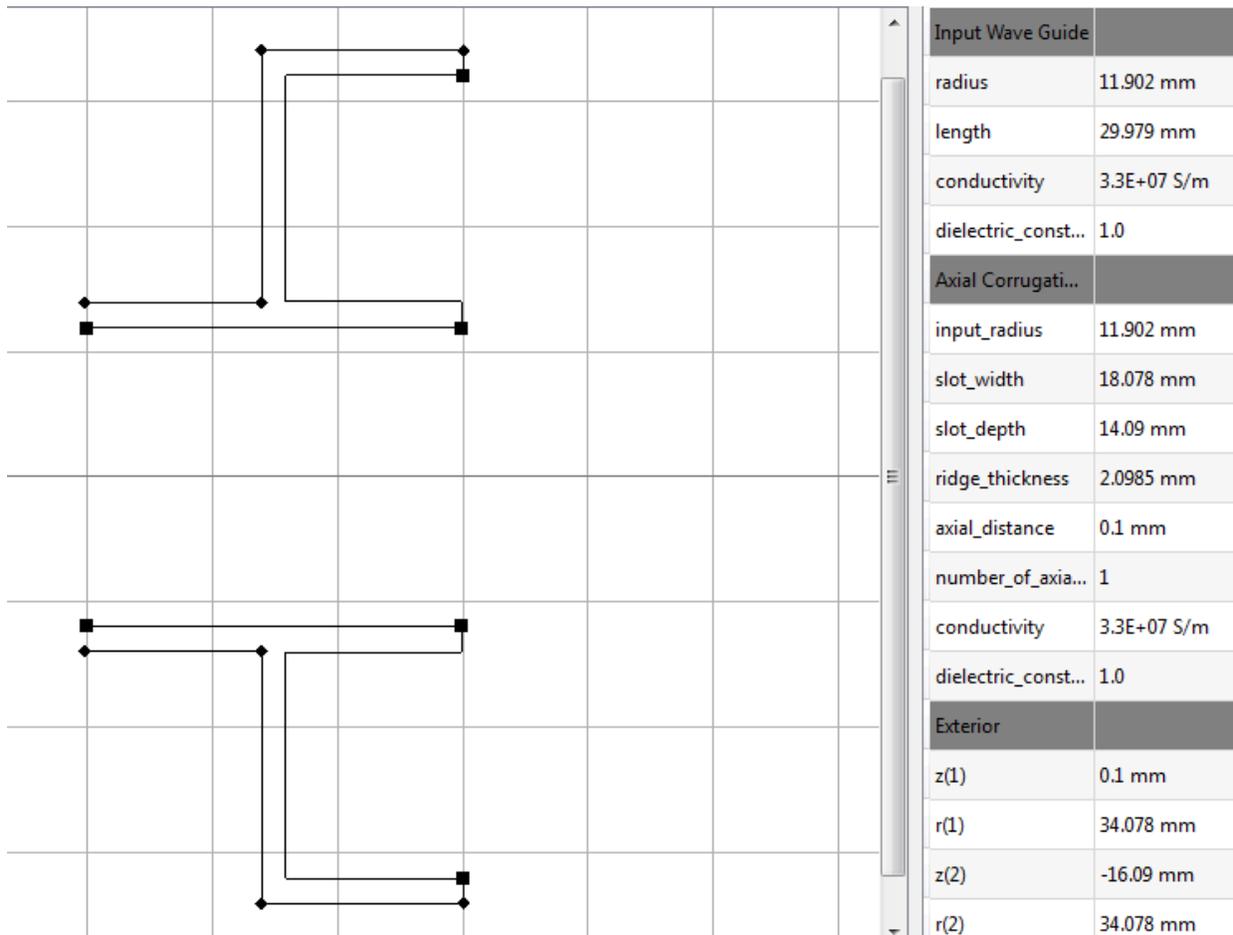


Figure 1 CHAMP geometry of Olver, et al., Cup Horn, p. 219

Phase Center = -3 mm at center frequency (10 GHz)

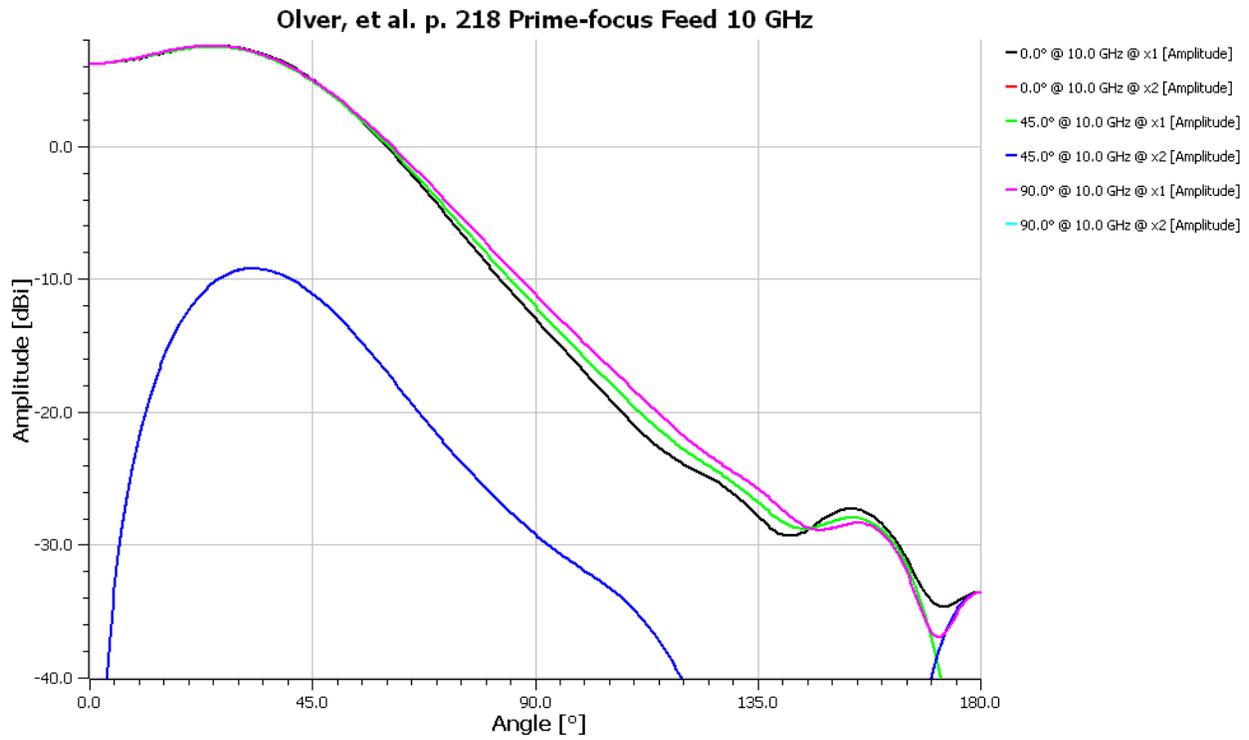


Figure 2 Pattern at 10 GHz (10 GHz Center Frequency)

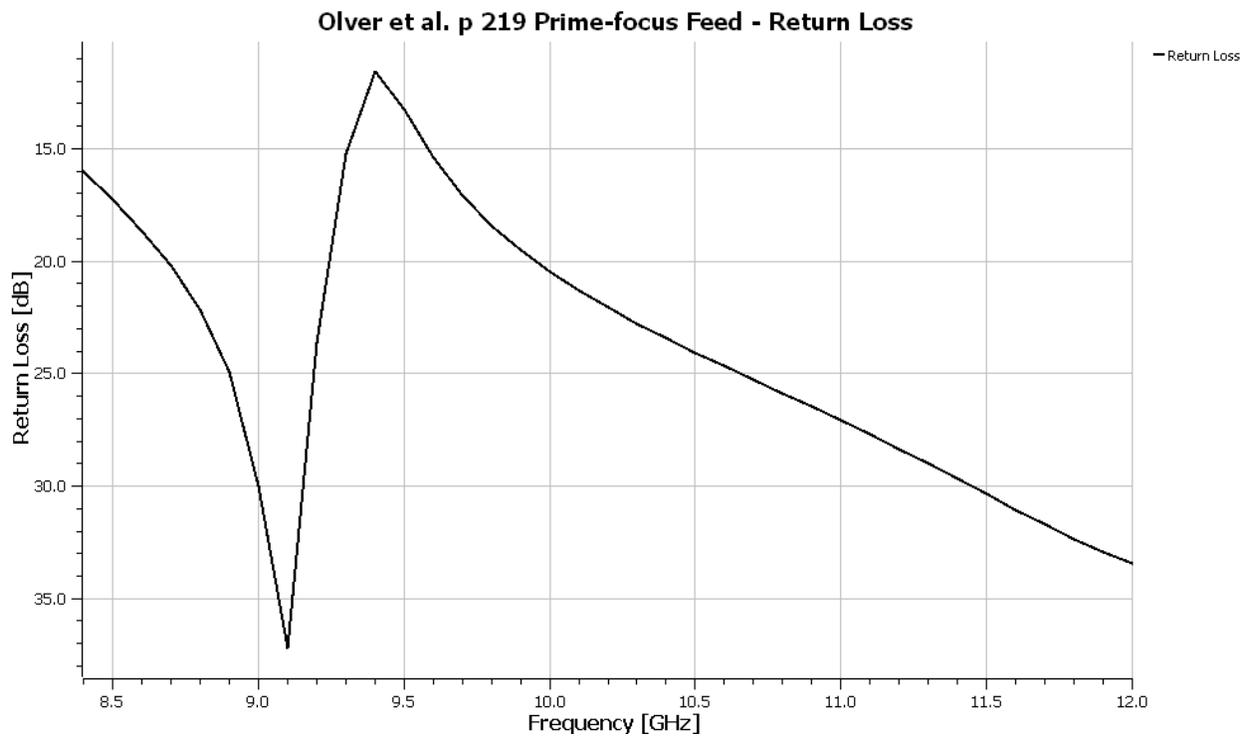


Figure 3 Return Loss of Single Cup Choke Horn, p. 219, Olver, et al.

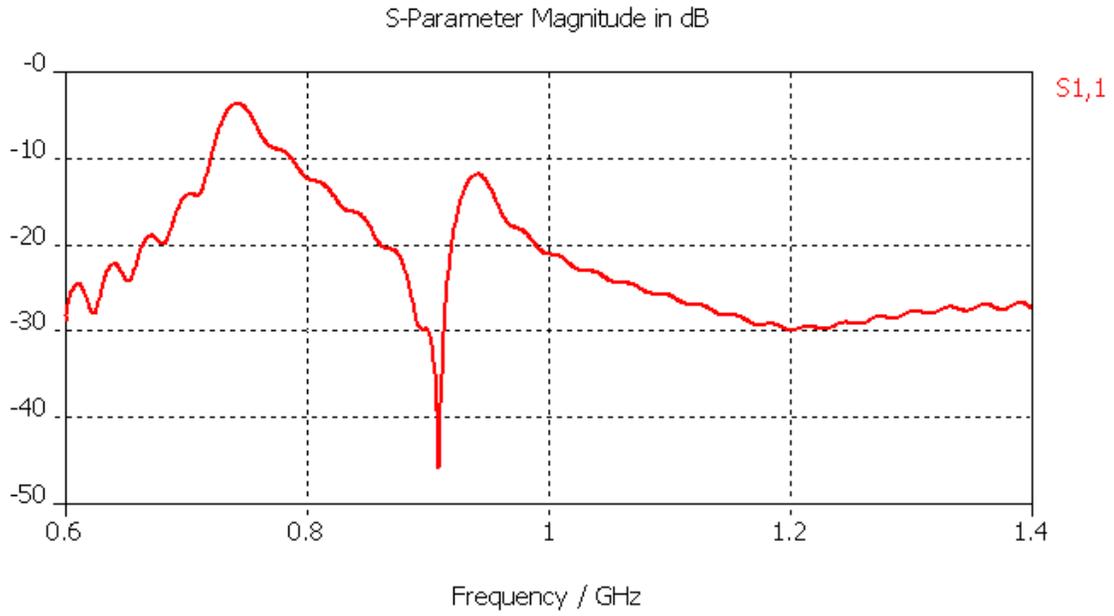


Figure 4 Cup Horn p. 219 Olver, *Microwave Horns and Feeds*, CST Time-domain analysis

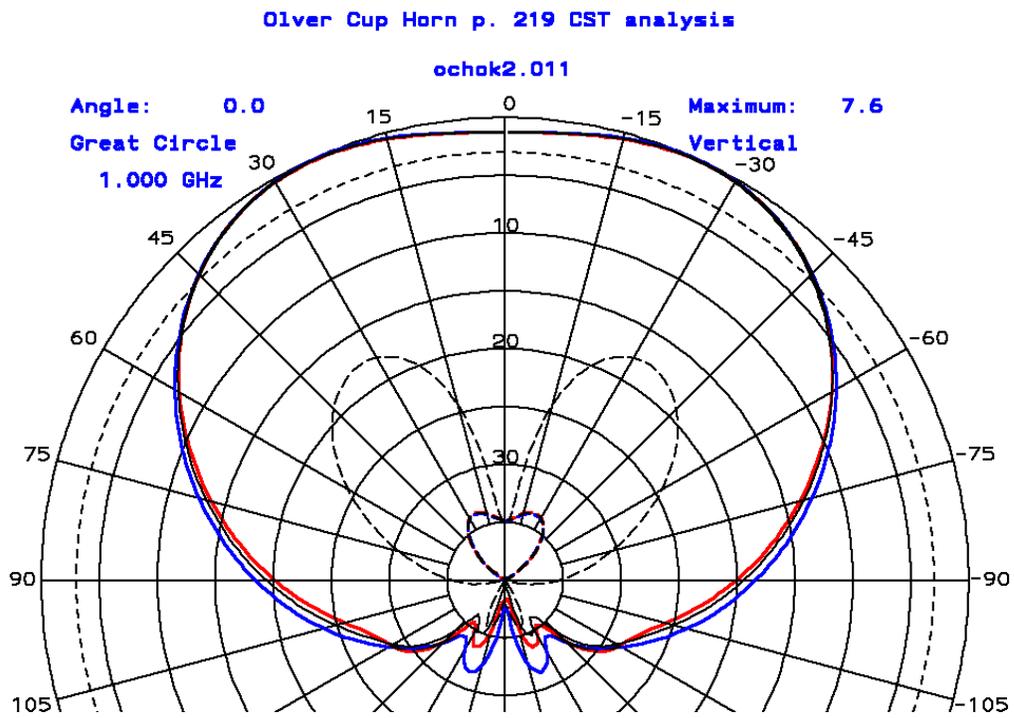


Figure 5 CST Analysis Blue *E*-plane, Red *H*-plane, Black diagonal plane

Page 220 Single Cup Choke Horn, Olver, et. al., 0.57λ deep, 0.603λ wide cup, 0.1λ Extension Opt. $f/D = 0.34$

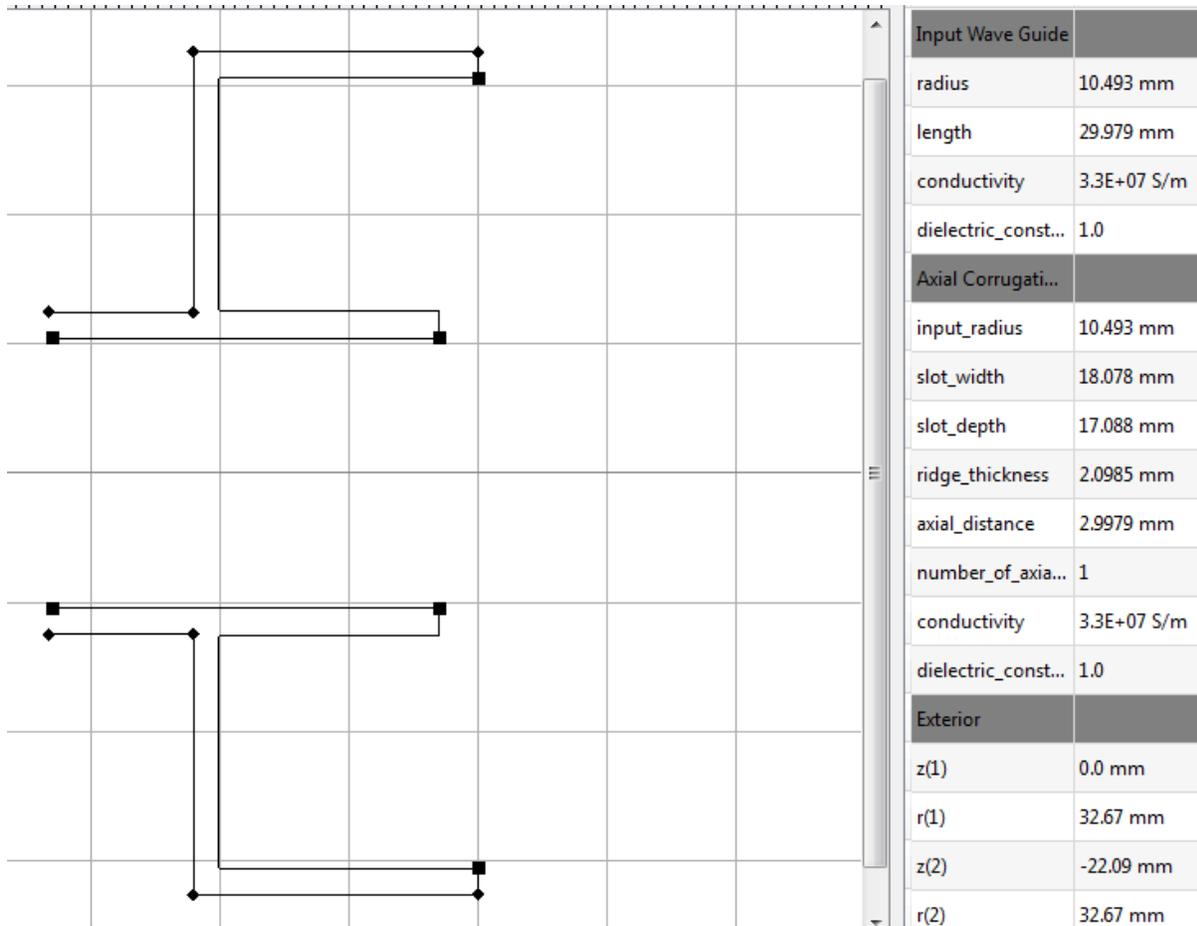


Figure 6 Olver, et al., Single Choke Horn, p. 220

Phase Center = -1 mm at center frequency (10 GHz)

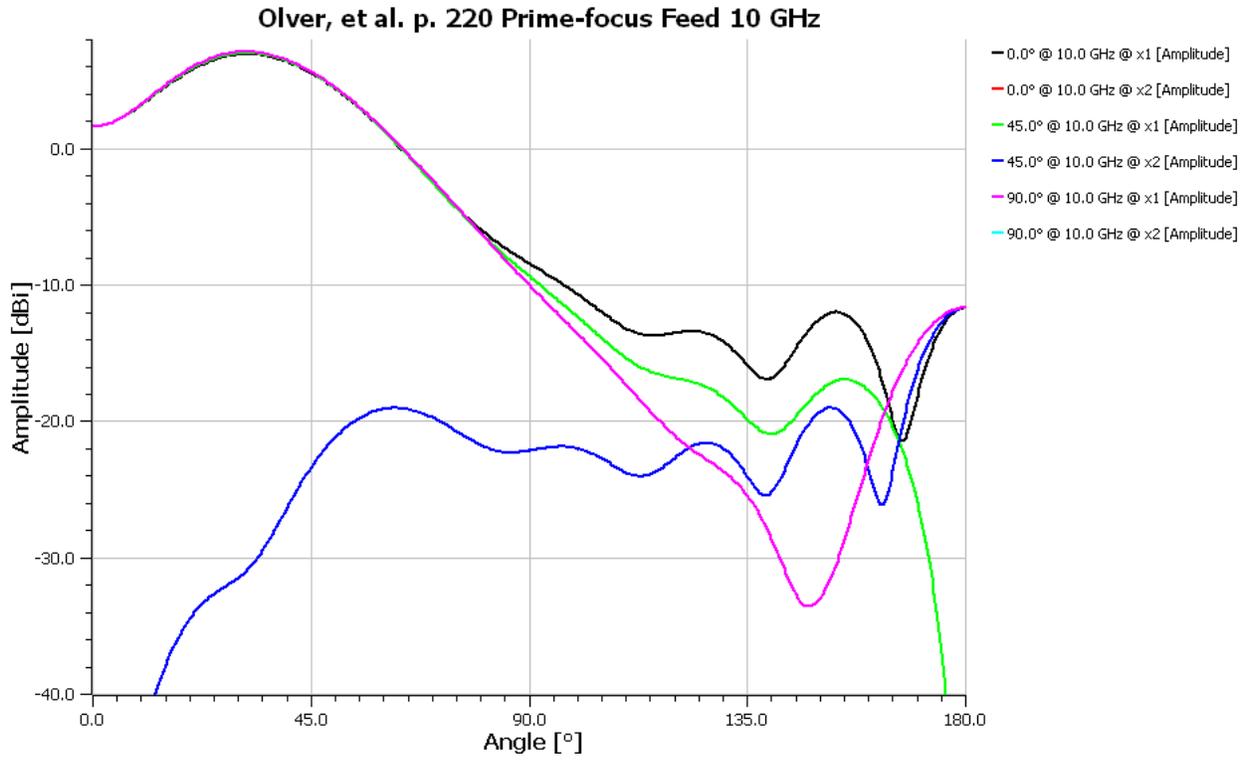


Figure 7 Pattern at 10 GHz (10 GHz Center Frequency)

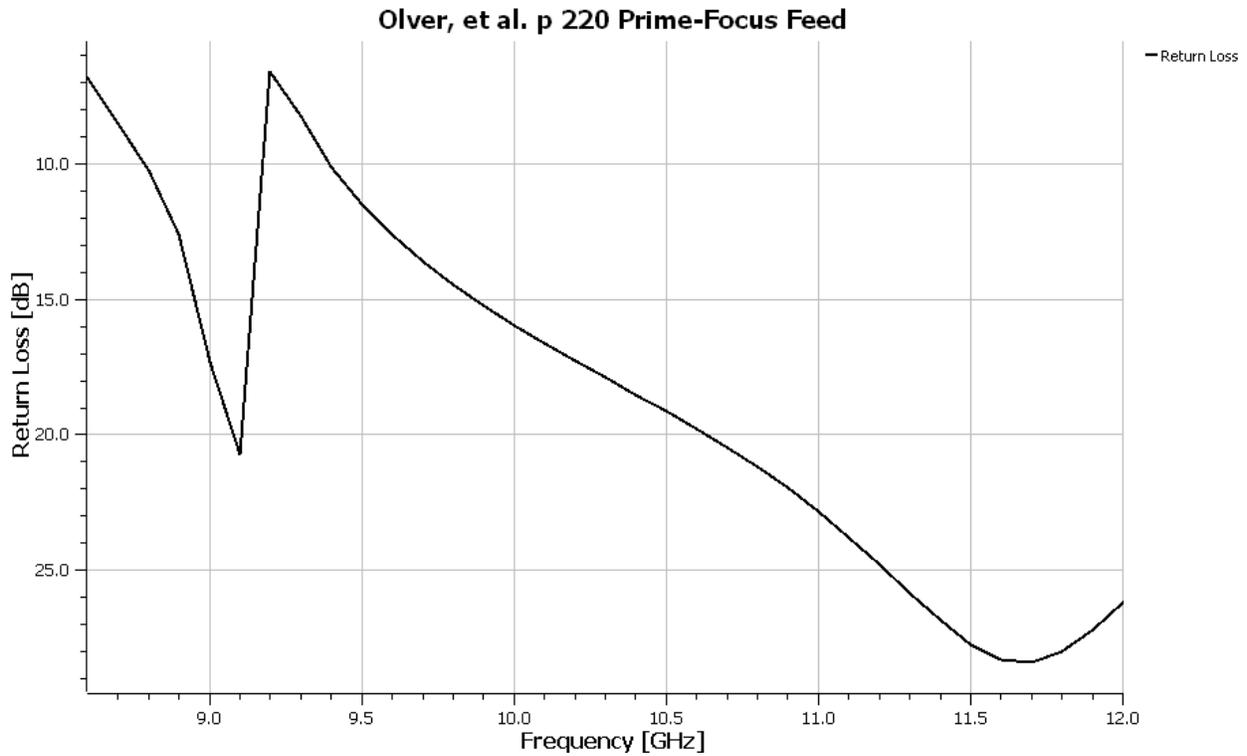


Figure 8 Return Loss of Single Cup Choke Horn, p. 220, Olver, et al.

CST Time-Domain Analysis of Cup Horn

Olver, et al. *Microwave Horns and Feeds*

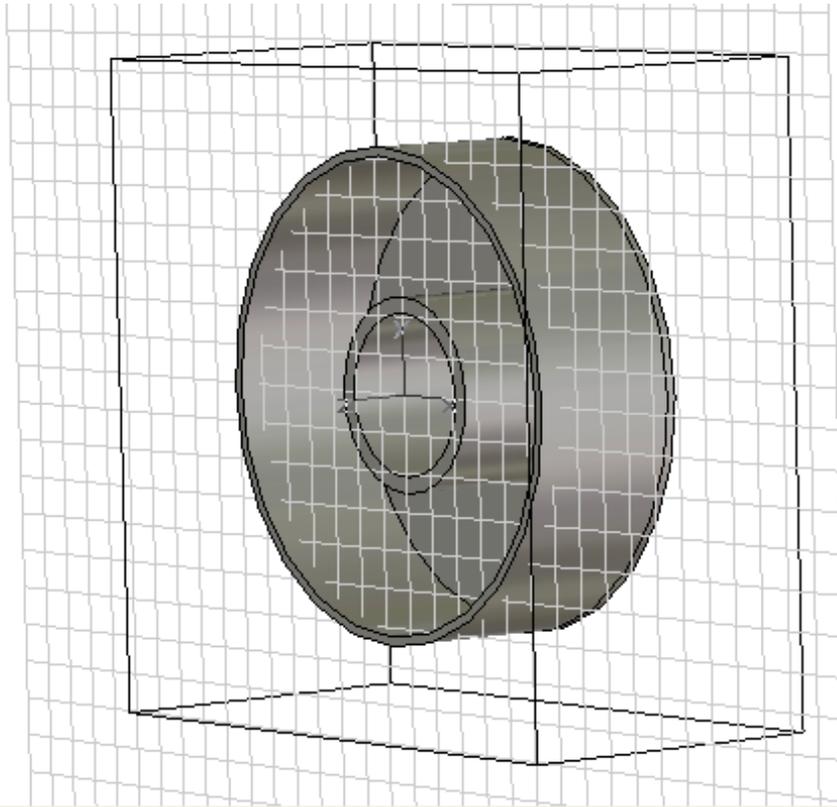


Figure 9 Olver p. 220 Cup Horn

Waveguide diameter: 0.7λ

Coaxial Cavity radii: $0.42, 1.023 \lambda$

Cavity depth 0.57λ

External wall extension: 0.1λ

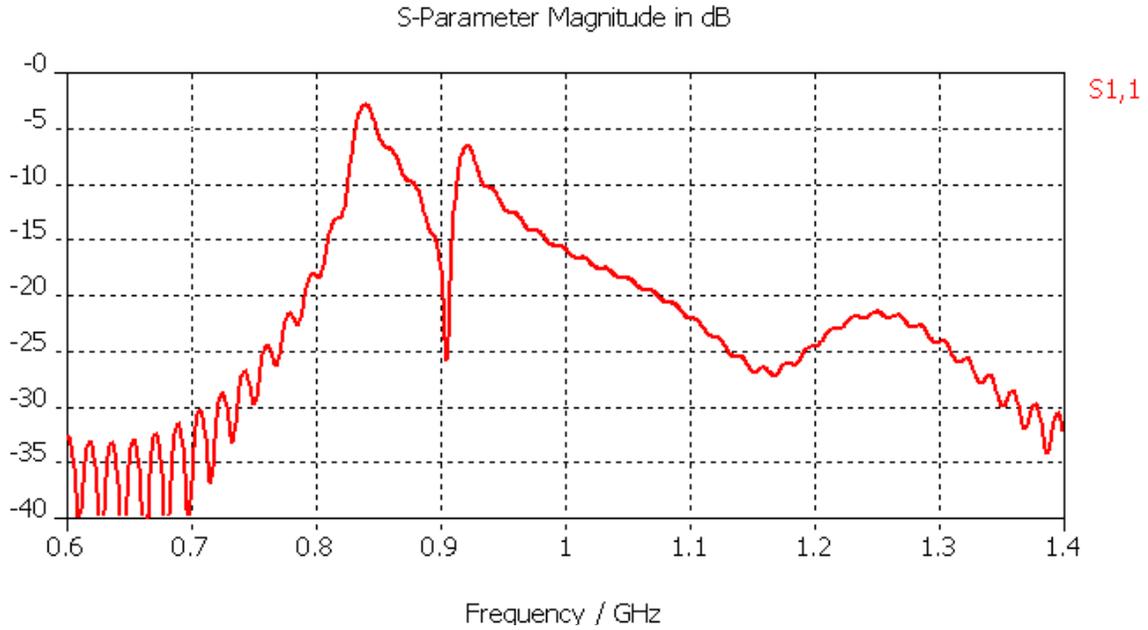


Figure 10 Cup Horn p. 220 Olver, *Microwave Horns and Feeds*, CST analysis

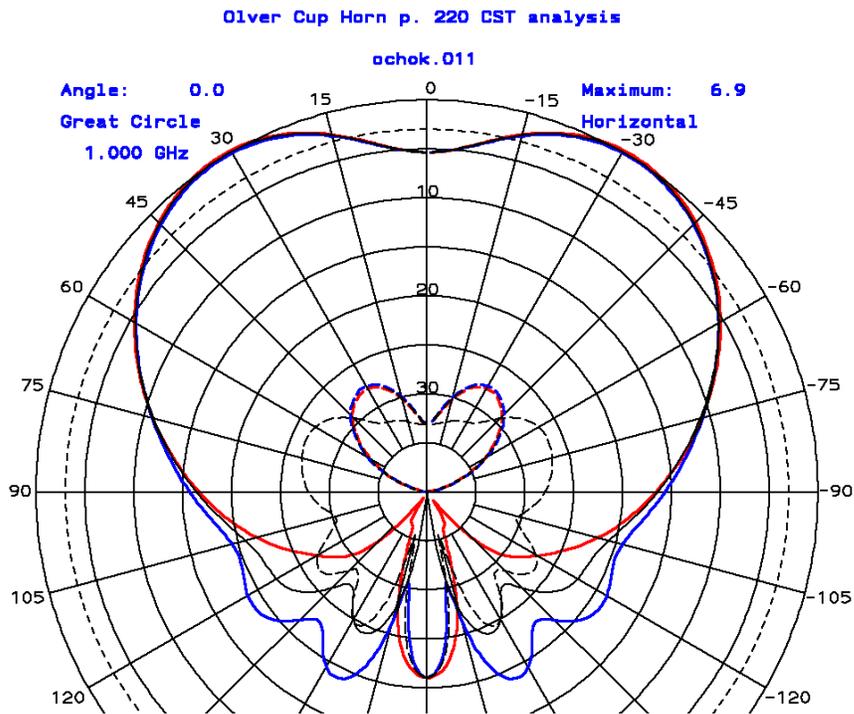


Figure 11 CST Analysis Blue *E*-plane, Red *H*-plane, Black diagonal plane

Page 222 Single Cup Choke Horn, Olver, et. al., 0.57λ deep,
 0.603λ wide cup, 0.1λ Extension, $\lambda/4$ External Choke $f/D = 0.36$

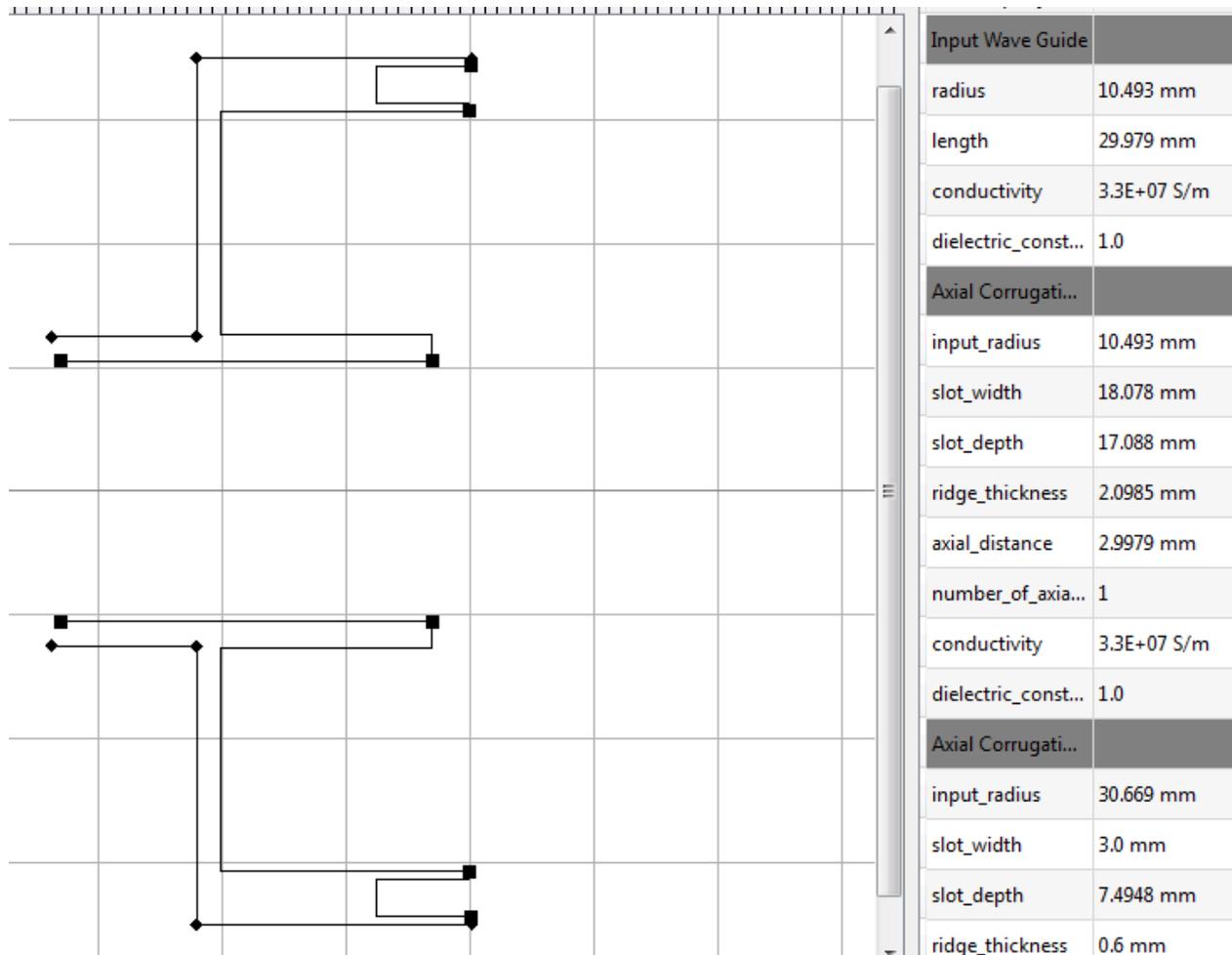


Figure 12 CHAMP geometry of Single Cup Choke Horn

Phase Center = -1 mm at center frequency (10 GHz)

The external $\lambda/4$ chokes reduce the backlobe by about 6 dB.

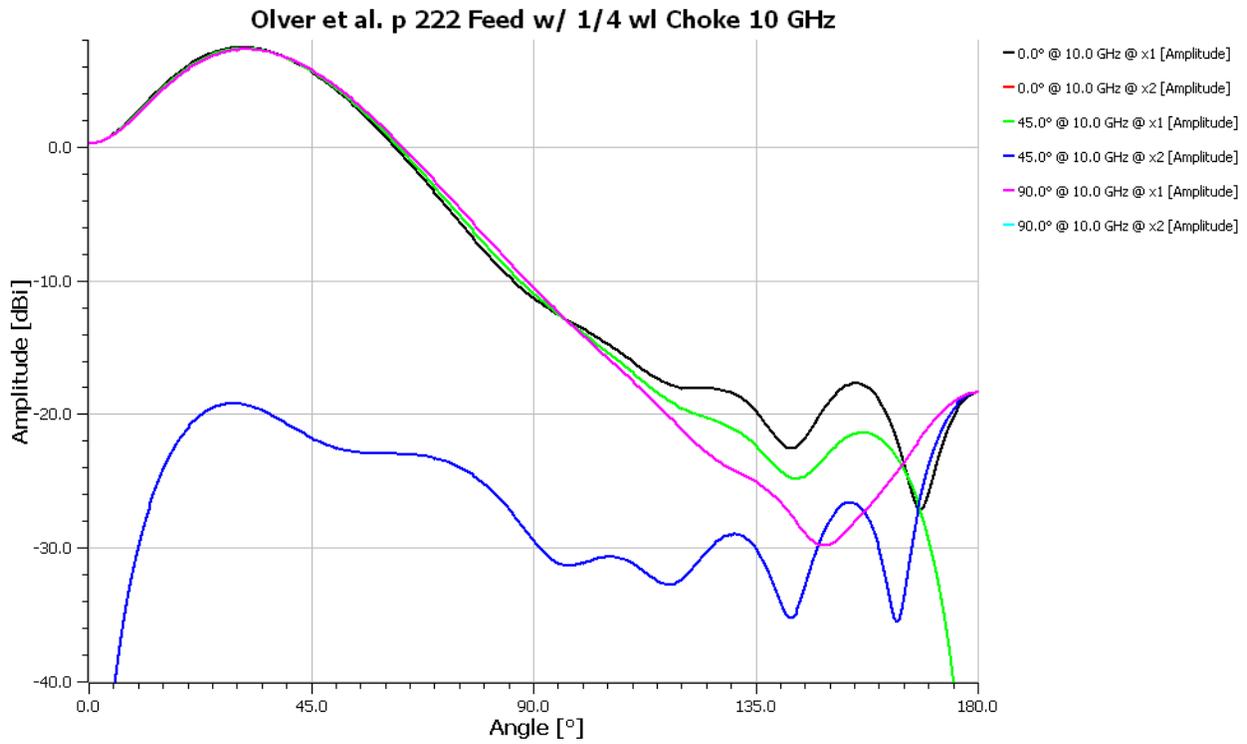


Figure 13 Pattern at 10 GHz (10 GHz Center Frequency)

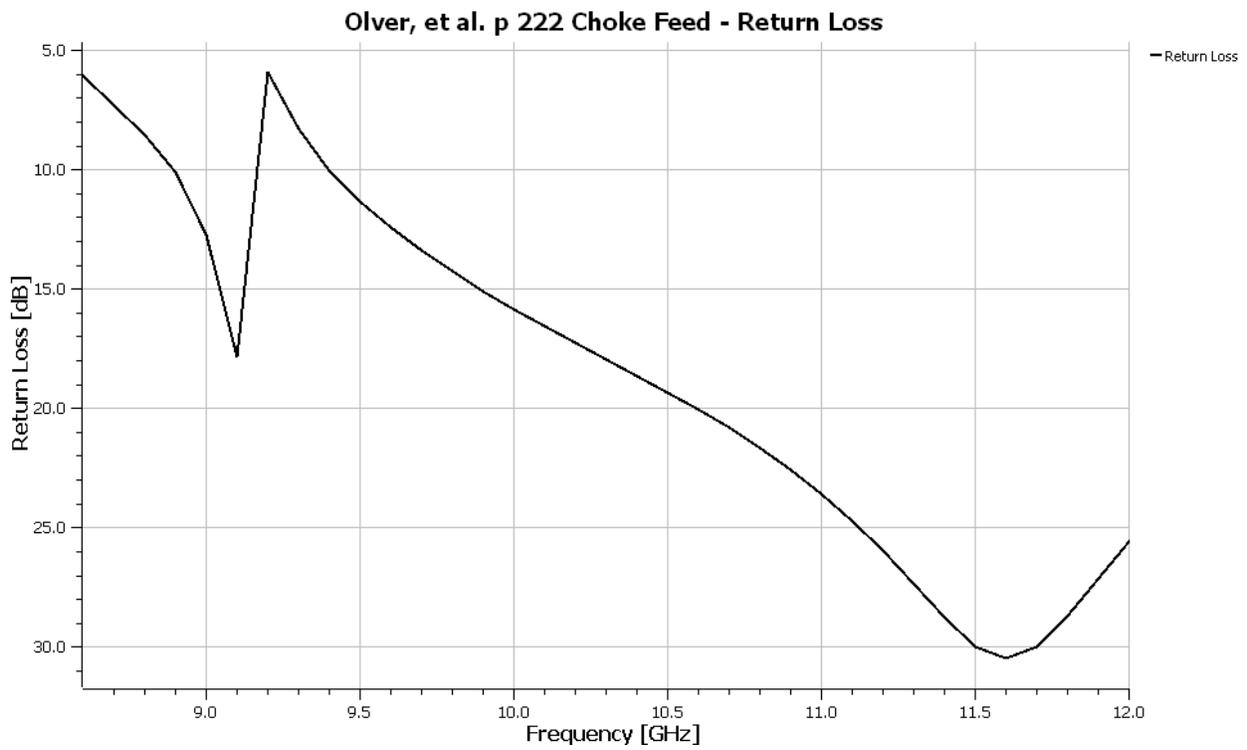


Figure 14 Return Loss of Single Cup Choke Horn, p. 222, Olver, et al.

Page 220 Single Cup Choke Horn, Olver, et. al., 0.57λ deep,
 0.78λ wide cup, 0.1λ Extension Opt. $f/D = 0.38$

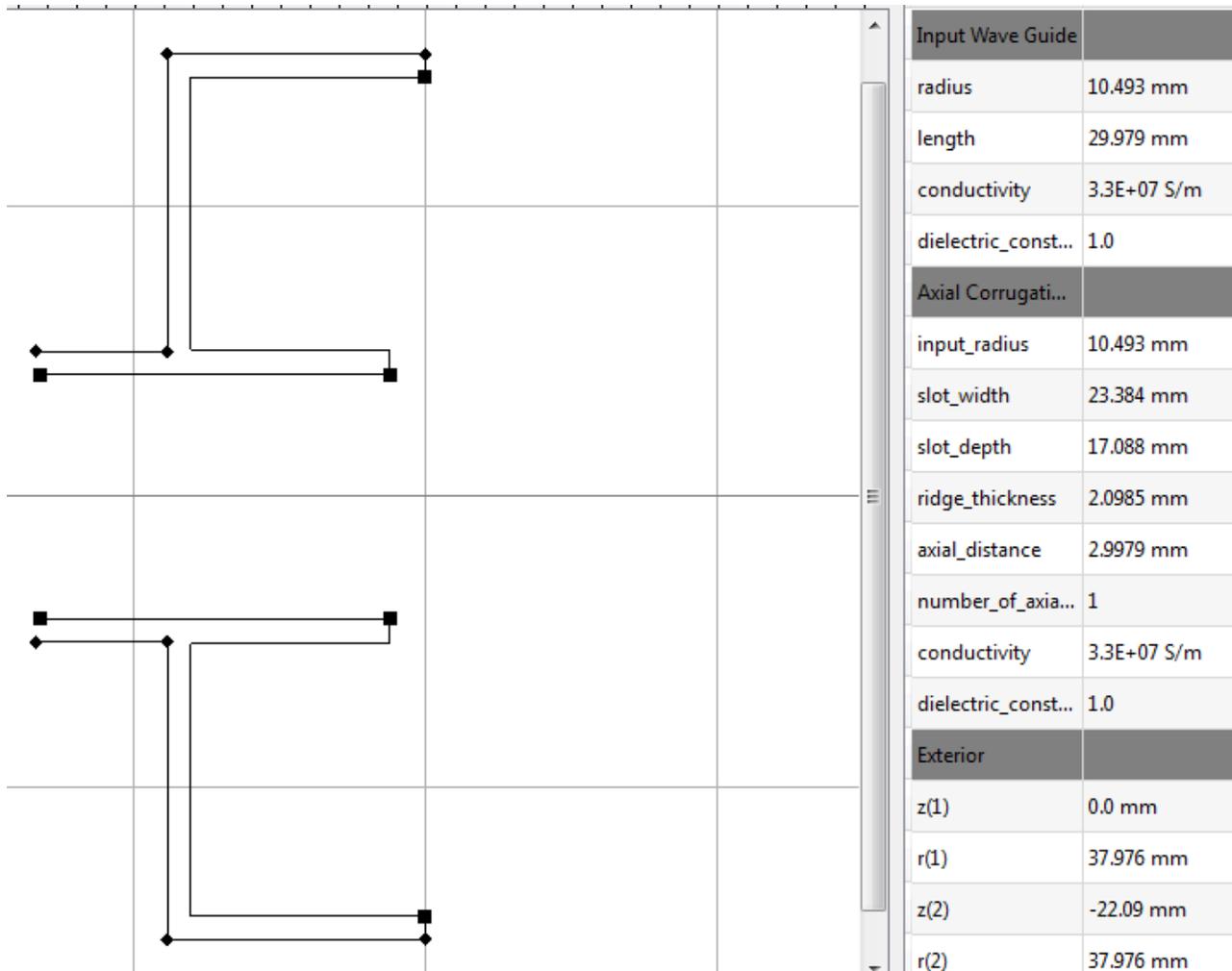


Figure 15 CHAMP geometry of Single Cup Choke Horn, Olver, et al., p 200

Phase Center = -3 mm at center frequency (10 GHz)

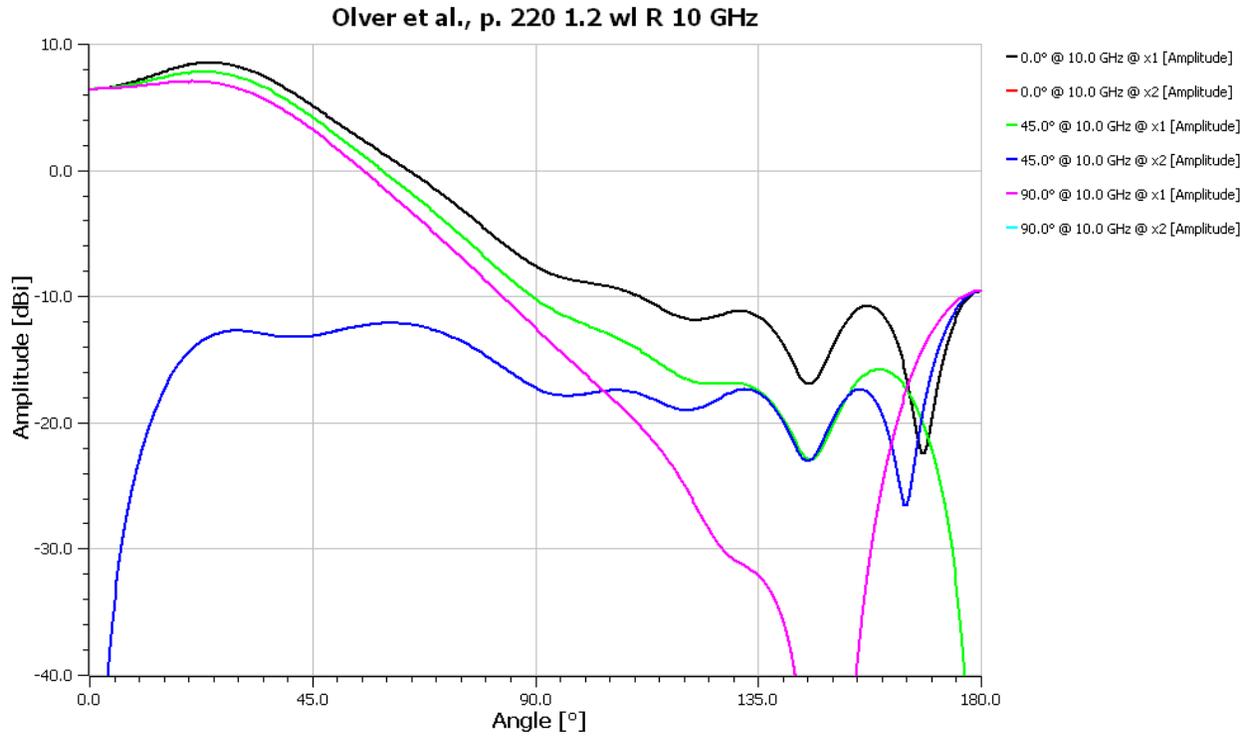


Figure 16 Pattern at 10 GHz (10 GHz Center Frequency)

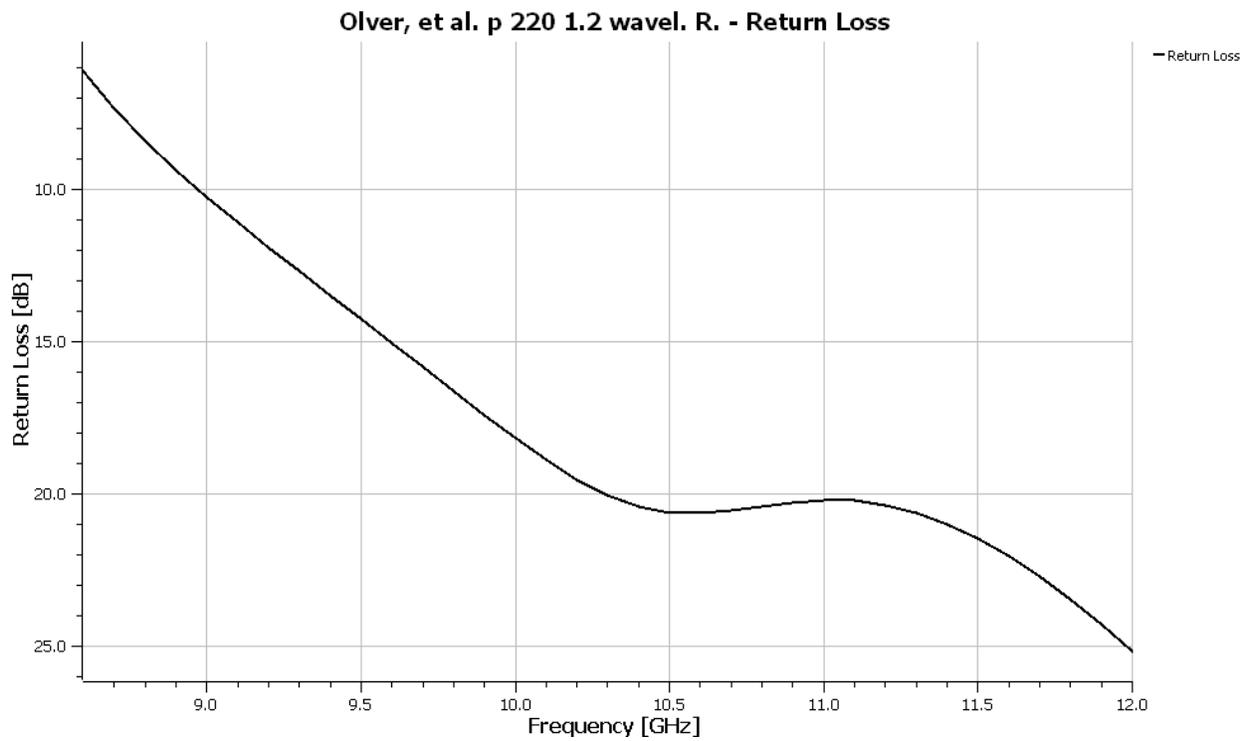


Figure 17 Return Loss of Single Cup Choke Horn, p. 220, Olver, et al.

Chapter 7 Horn Antennas

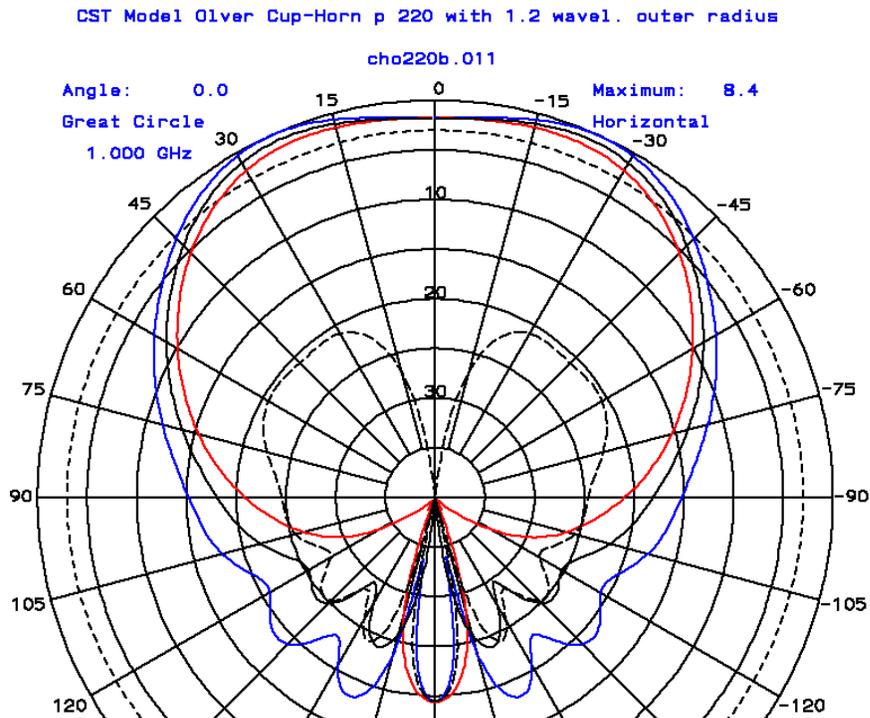
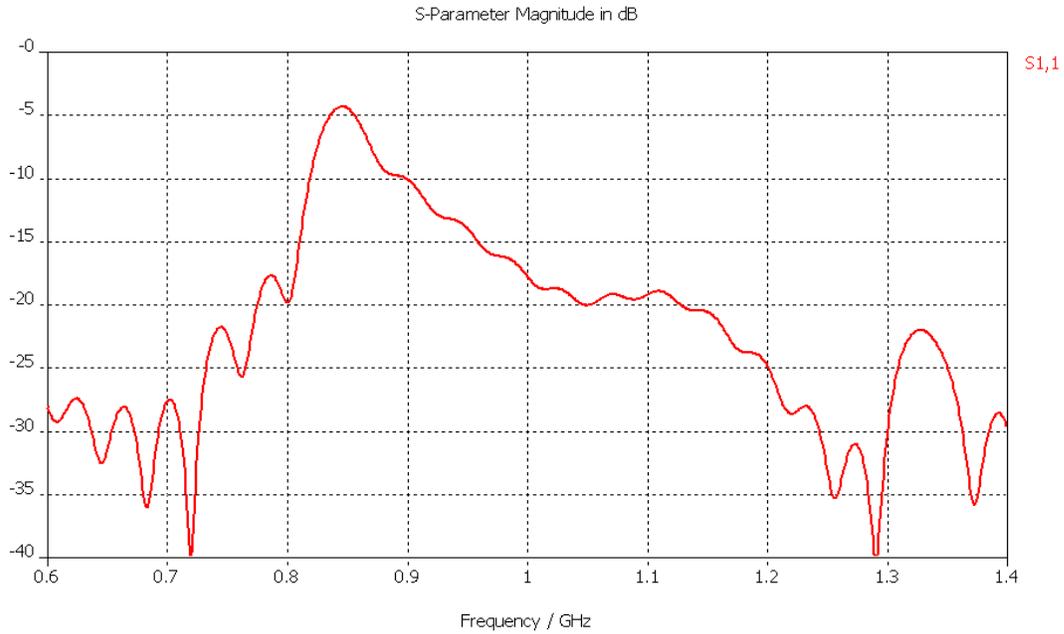


Figure 18 CST Analysis
Olver cup horn p. 220
with 1.2 wavelength
outer choke radius

Figure 19 CST Time-Domain Analysis Olver cup horn p. 220 with 1.2 wavelength outer choke radius

Page 200. Open-ended waveguide with 3 ring chokes $\lambda/4$ deep and 0.267λ width Opt. $f/D = 0.42$

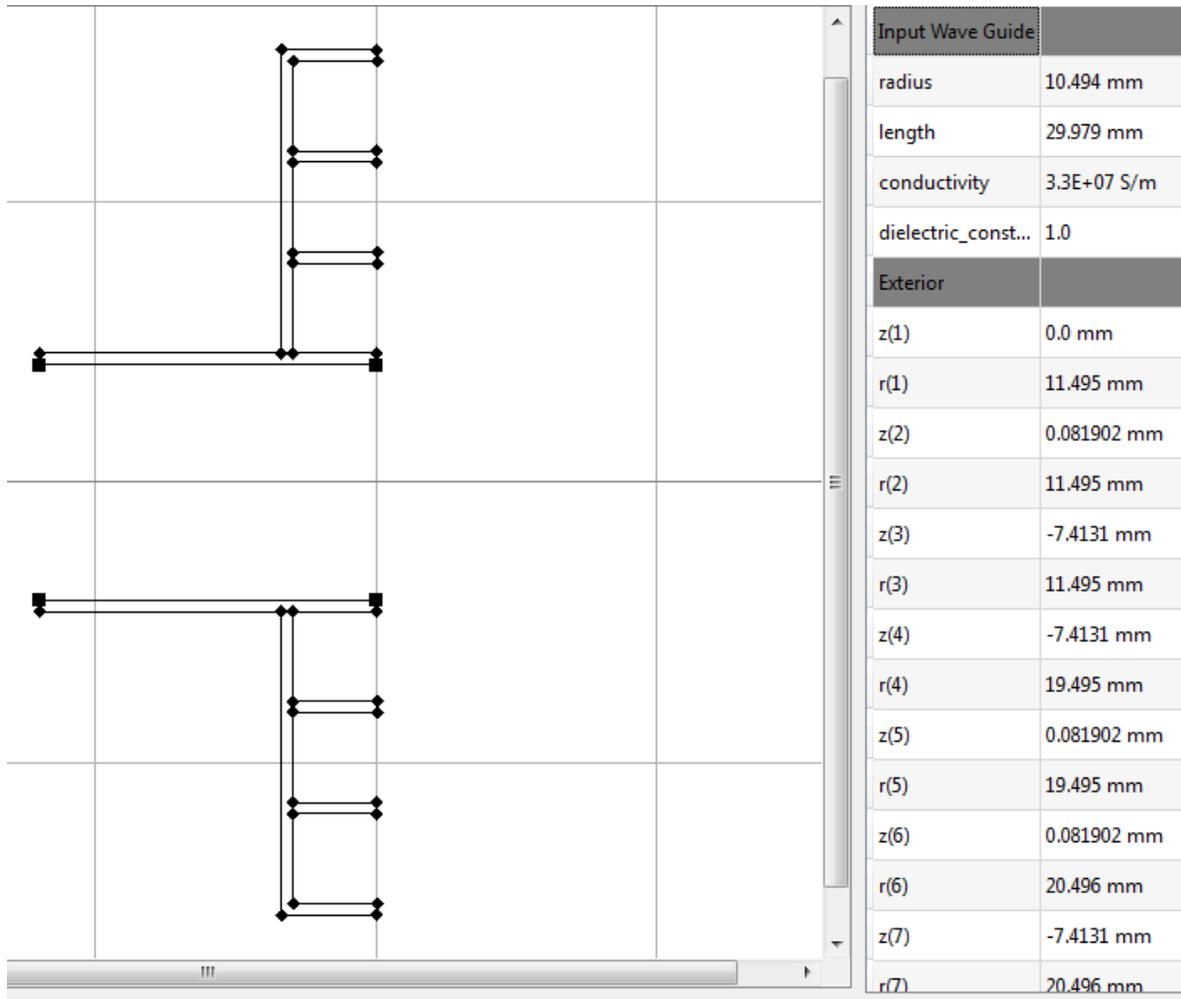


Figure 20 Olver, et al., p. 200 Choke Horn with center frequency 10 GHz

Phase Center = -0.3 mm at center frequency (10 GHz)

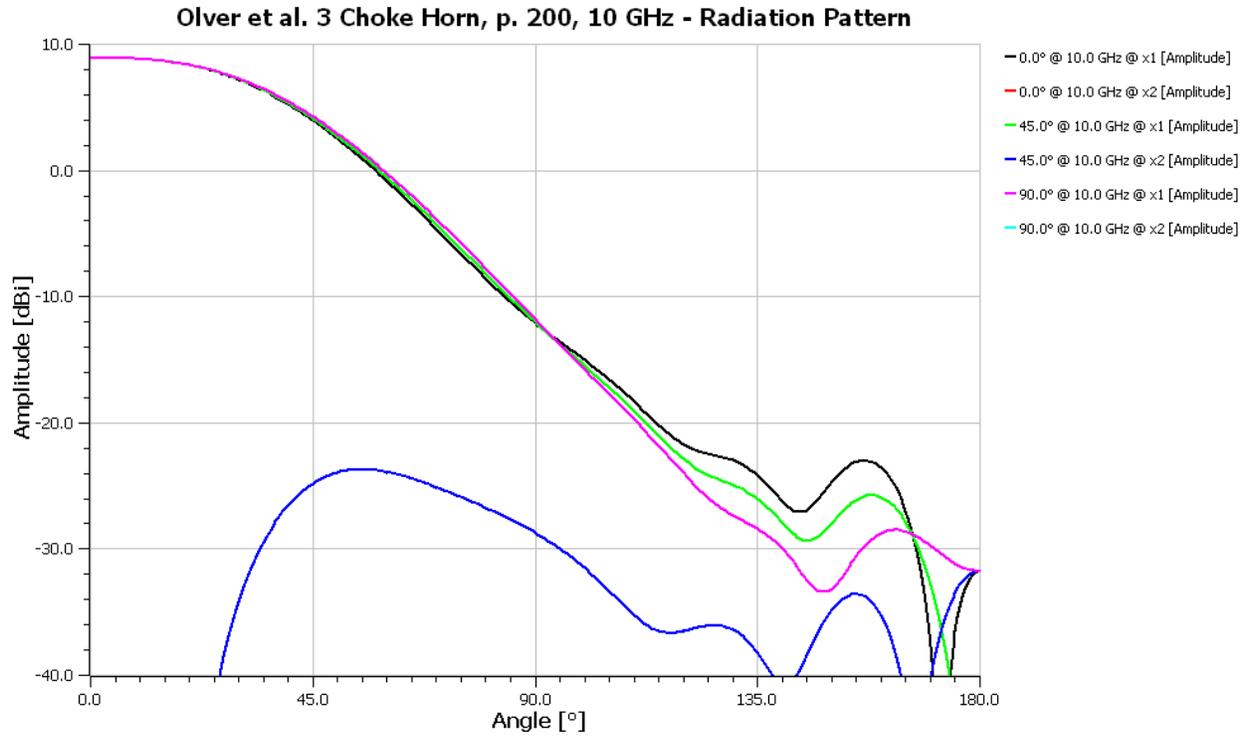


Figure 21 Pattern at 10 GHz (10 GHz Center Frequency)

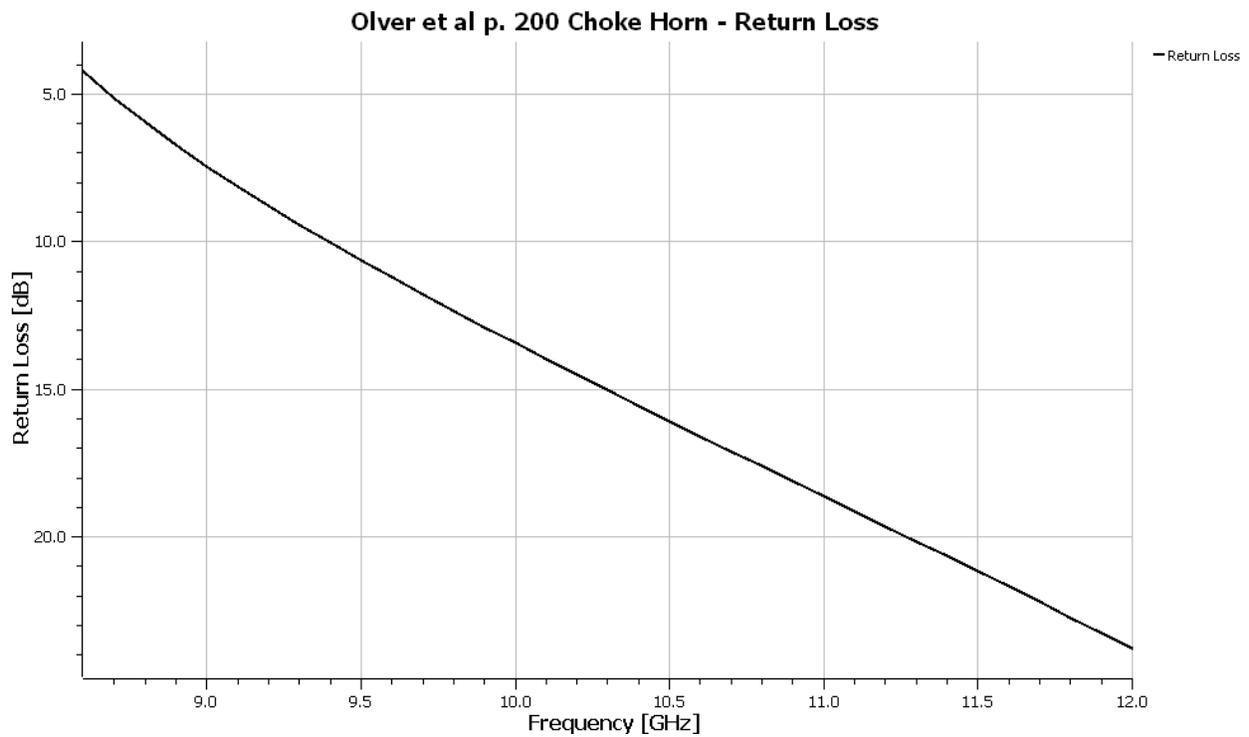


Figure 22 Return Loss of Olver, et. al., 3 Choke Horn Feed, p. 200

VE4MA Kumar Single Cup Choke Horn, 0.48λ deep, 0.488λ wide cup, 0 Cutback Opt. $f/D = 0.34$

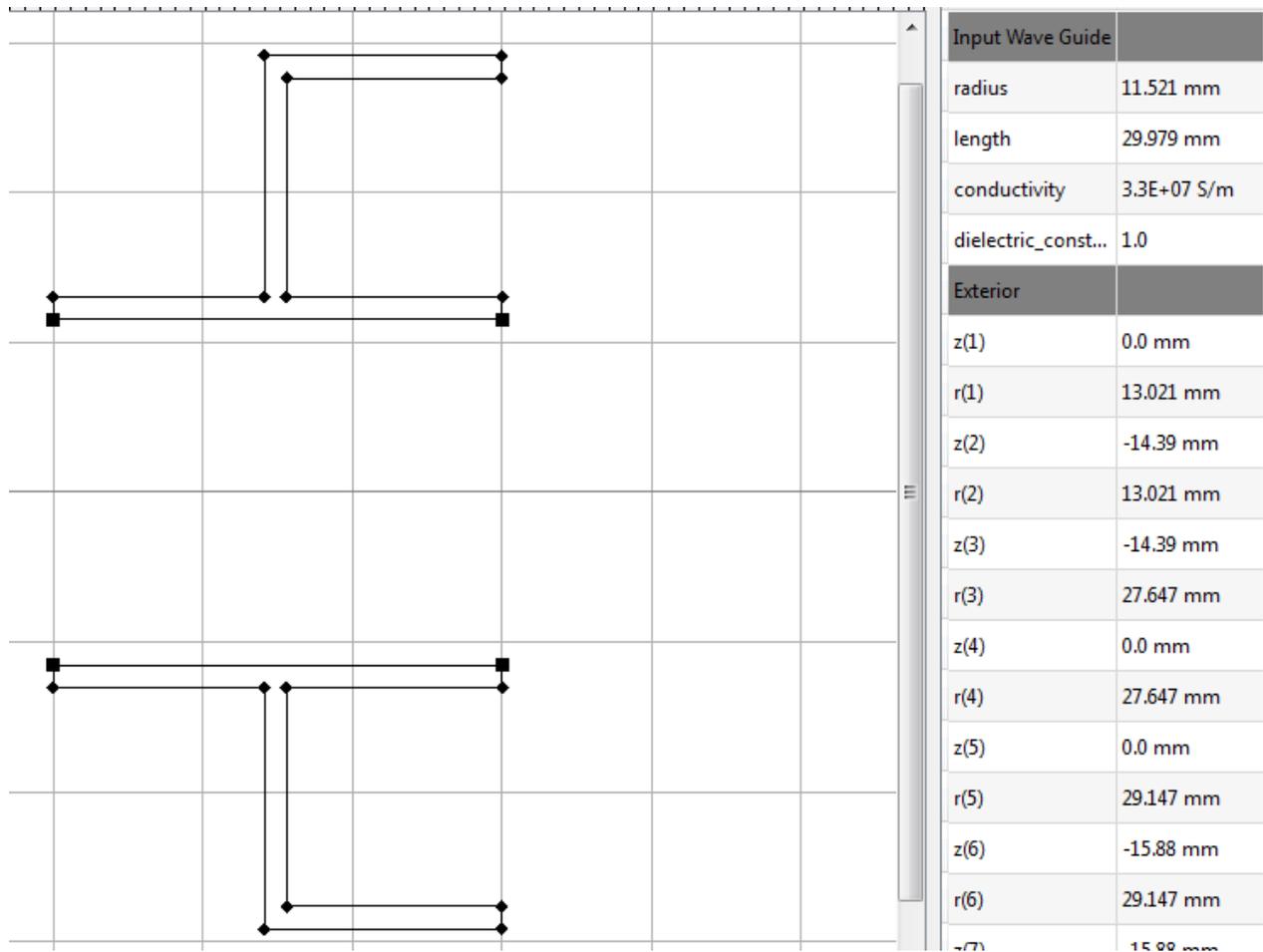


Figure 23 Kumar Horn CHAMP Geometry: A. Kumar, "Reduce Cross-Polarization in Reflector Type Antennas," *Microwaves*, March 1978, pp. 48-51

The beamwidth can be controlled somewhat by increasing the cup cutback from the aperture. Greater cutback produces wider beamwidths.

Phase Center = -3 mm at center frequency (10 GHz)

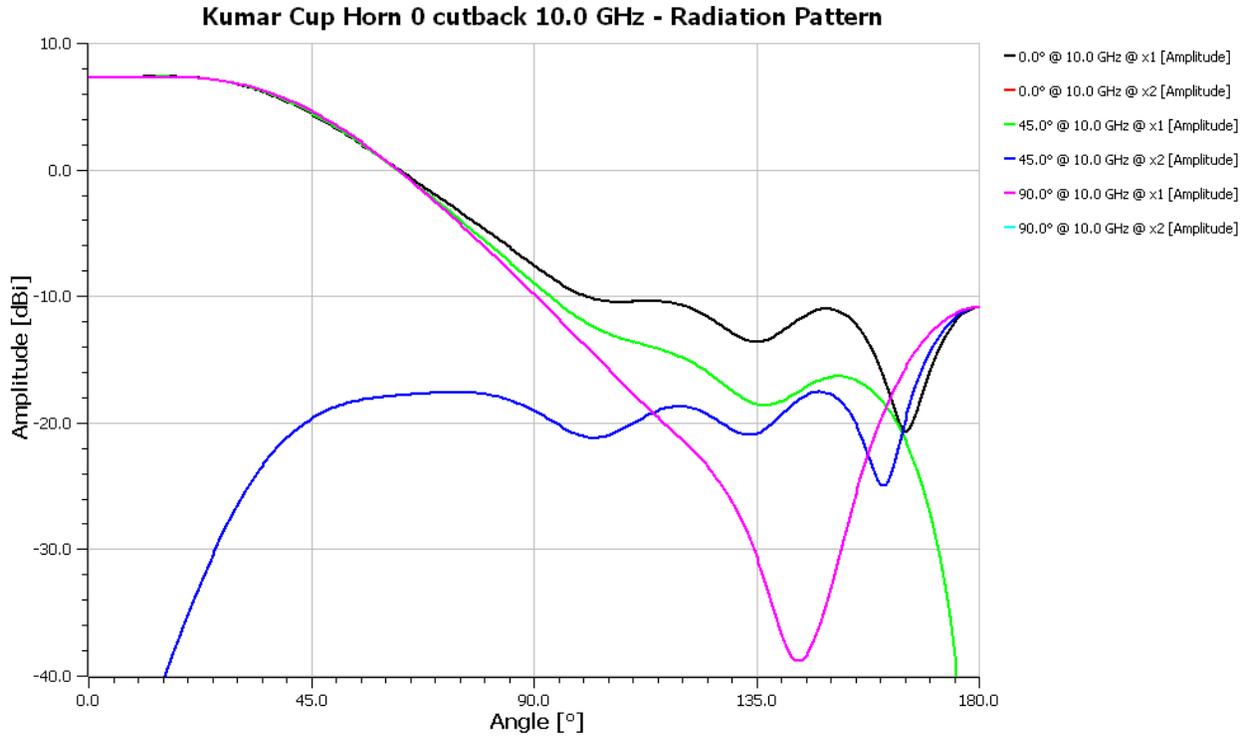


Figure 24 Kumar Cup Horn 0 cutback 10.0 GHz (10 GHz Center Frequency)

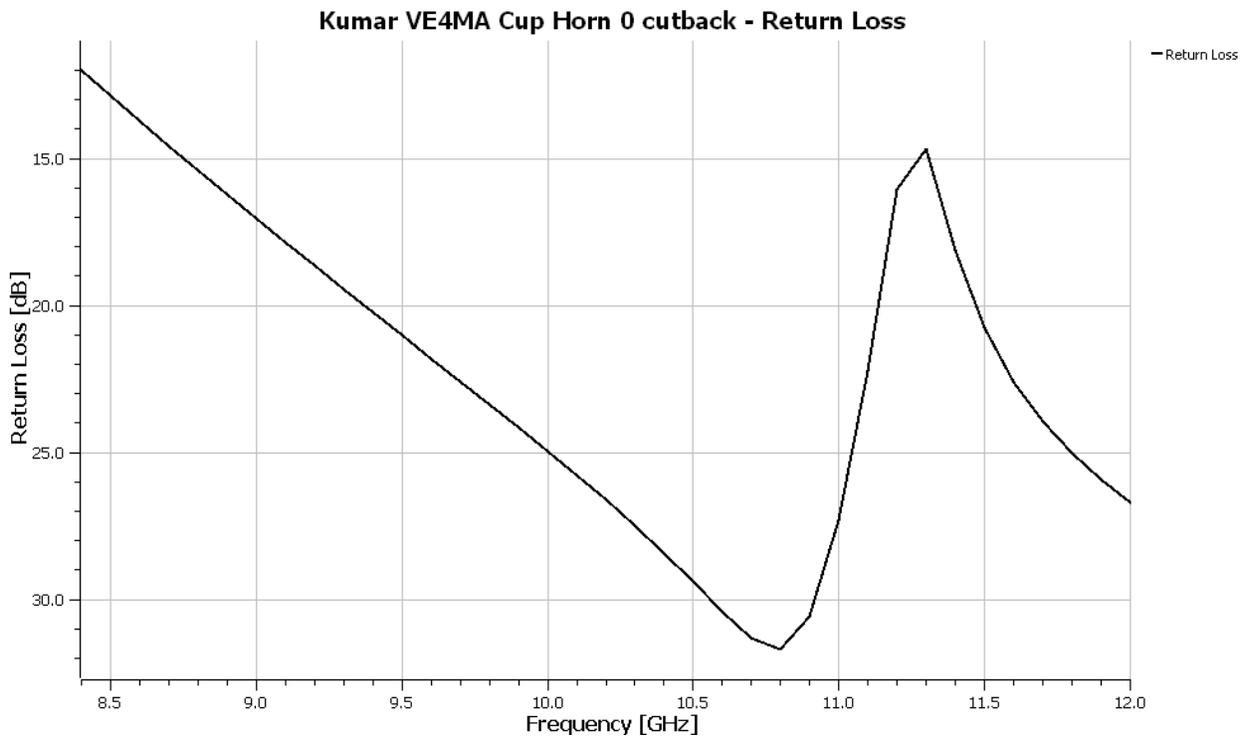


Figure 25 Kumar Cup Horn 0 cutback Return Loss

VE4MA Kumar Single Cup Choke Horn, 0.48λ deep, 0.488λ wide cup, 0.17λ Cutback Opt. $f/D = 0.51$

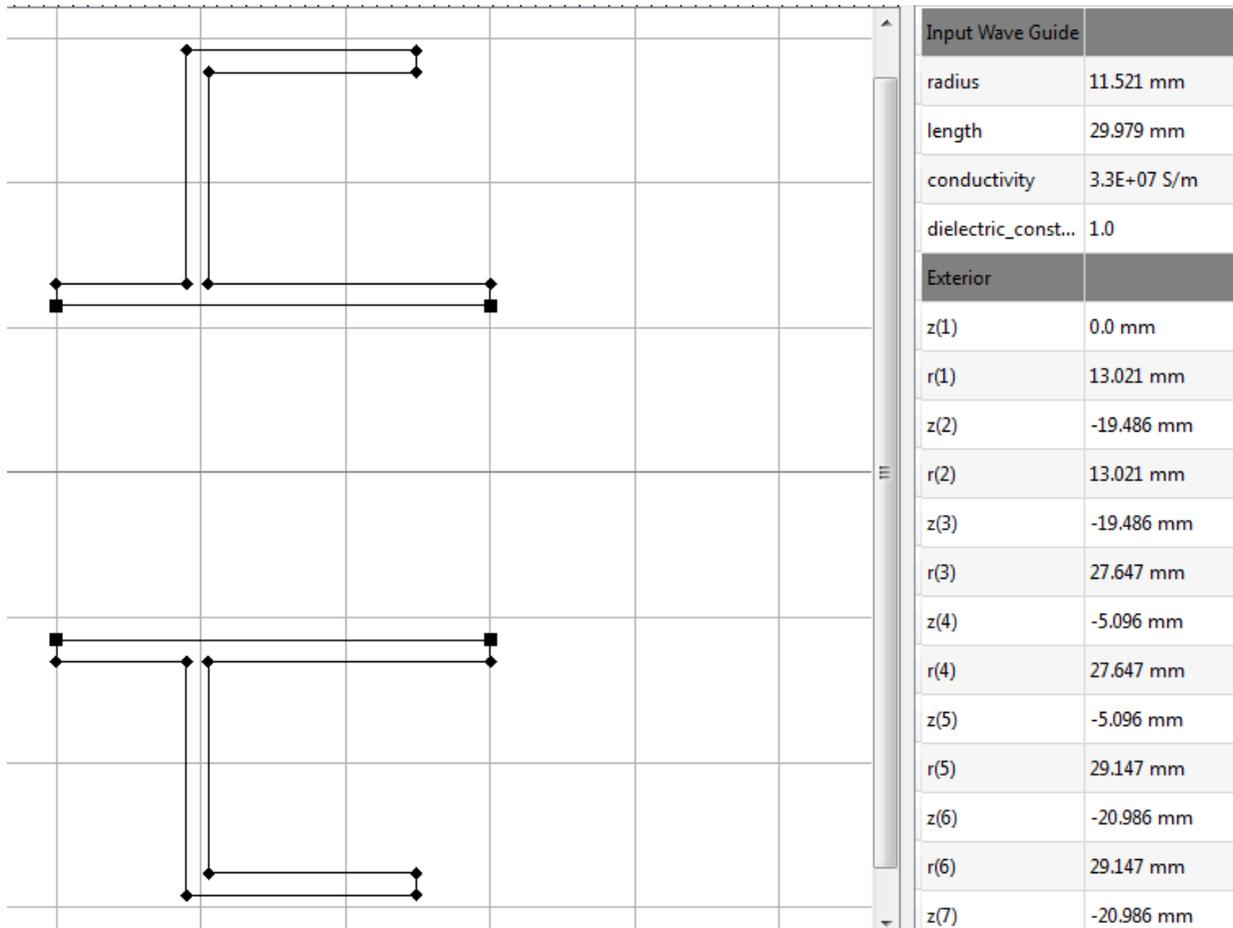


Figure 26 CHAMP Geometry of Kumar Cup Horn 0.17λ cutback

Phase Center = 2 mm at center frequency (10 GHz) (in front of aperture)

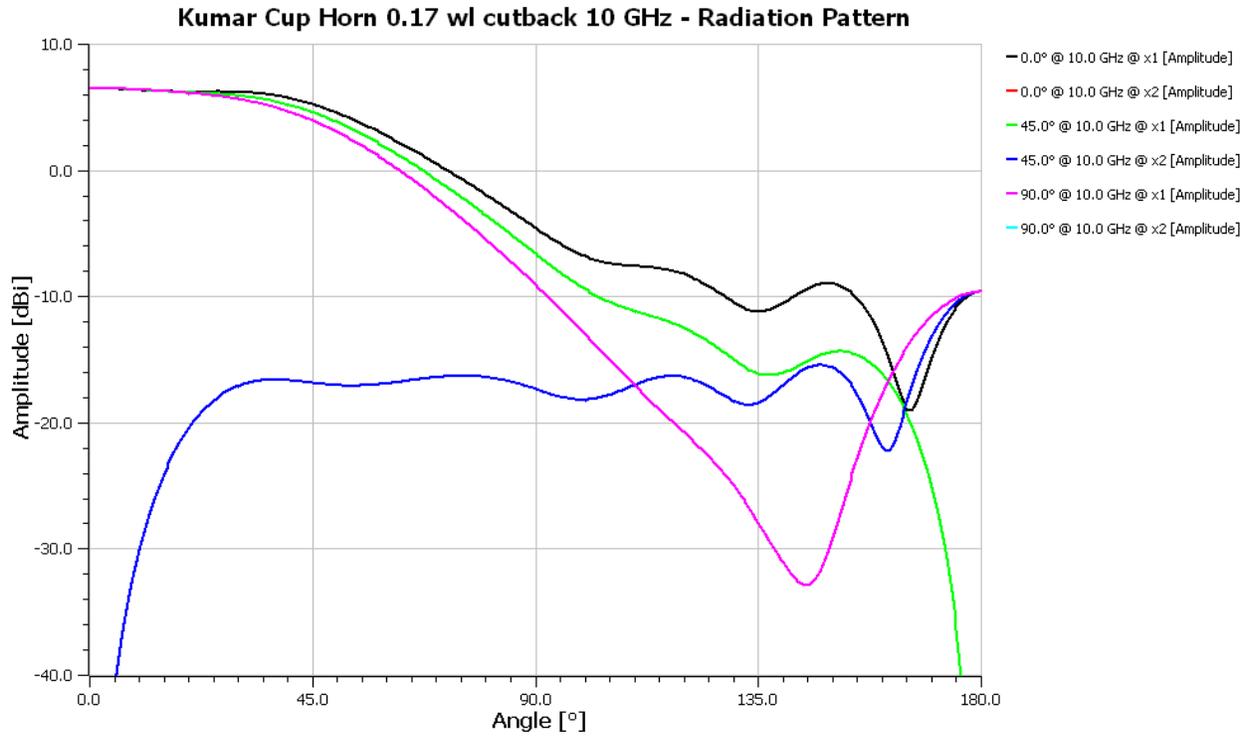


Figure 27 Kumar Cup Horn 0.17 λ cutback 10.0 GHz (10 center frequency)

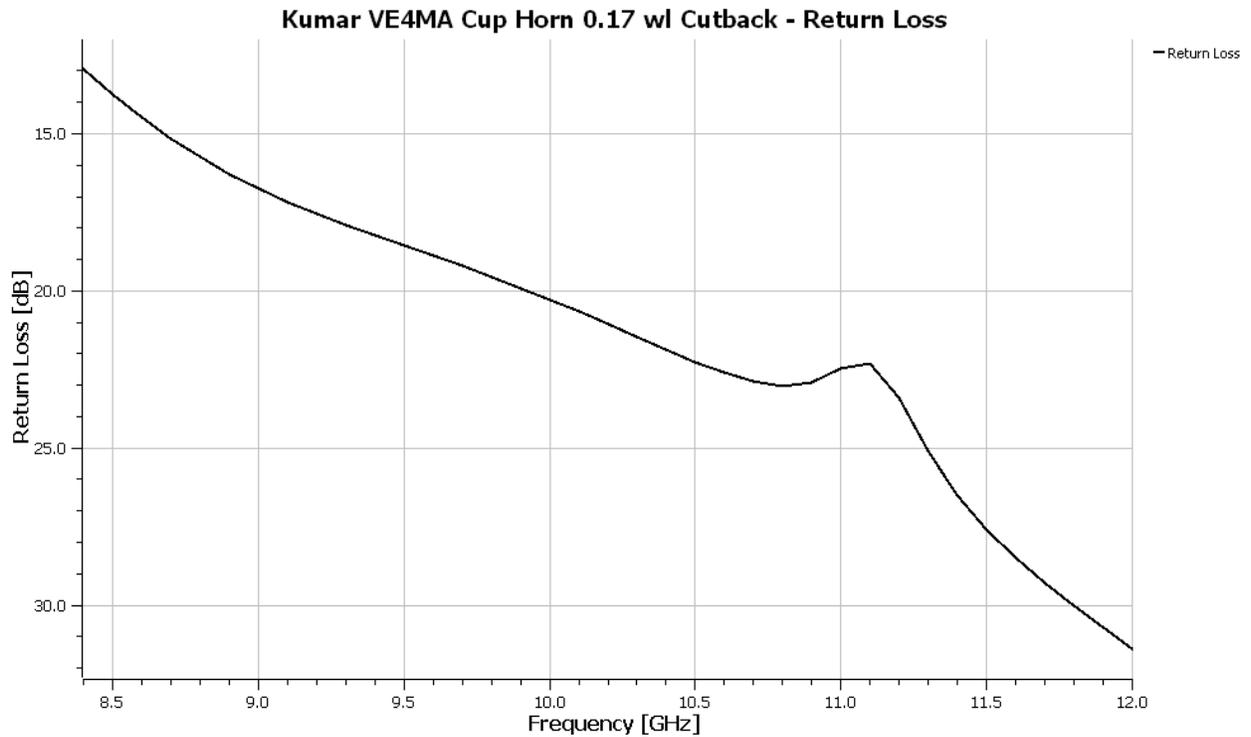


Figure 28 Kumar Cup Horn 0.17 λ cutback Return Loss

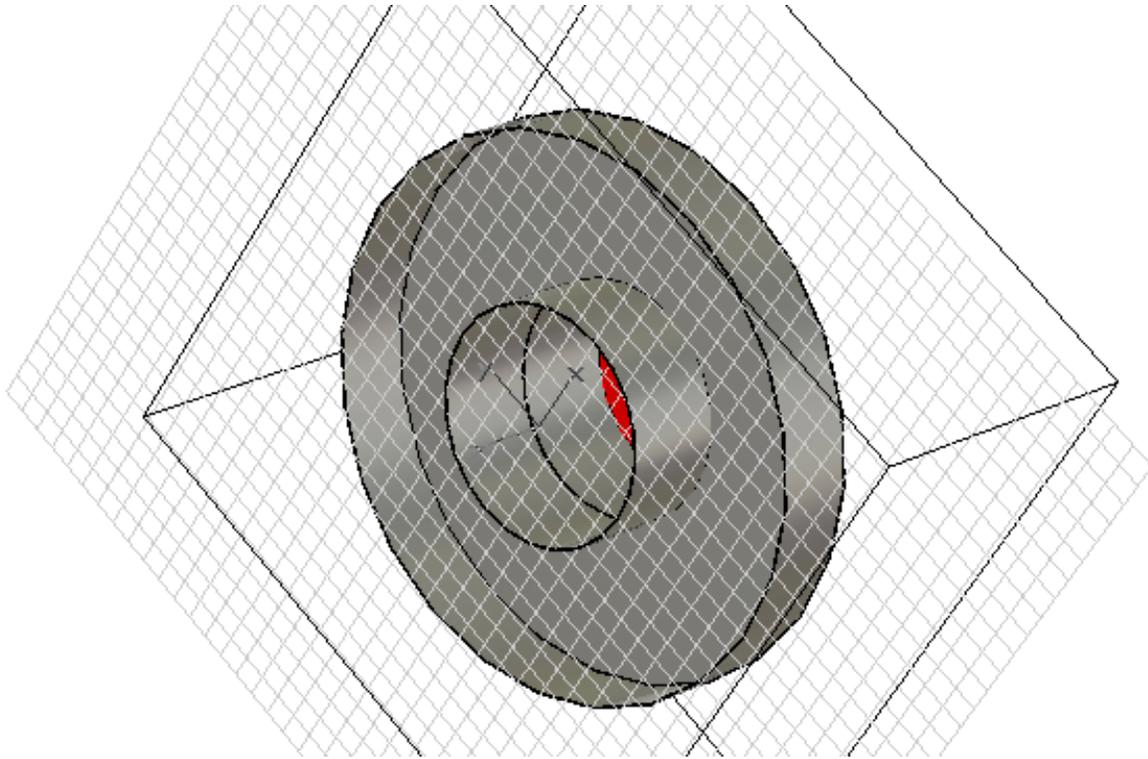


Figure 29 CST Time-Domain Analysis of Wade Sec. 6-3 VE4MA (Kumar) Cup Horn feed) 0.17λ horn projection

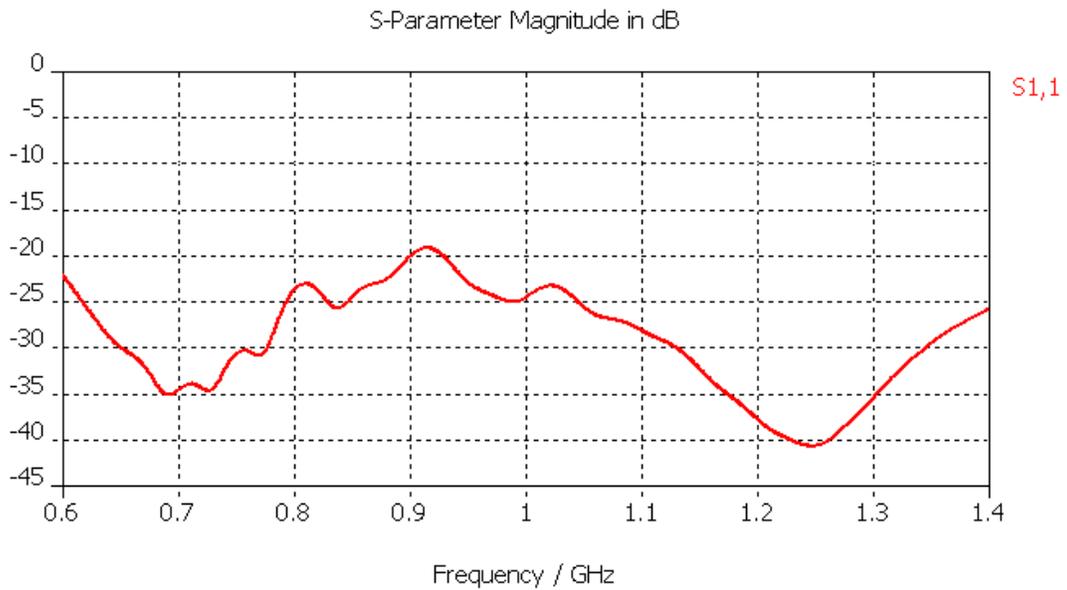


Figure 30 CST Analysis Kumar Horn 0.17λ Horn Projection

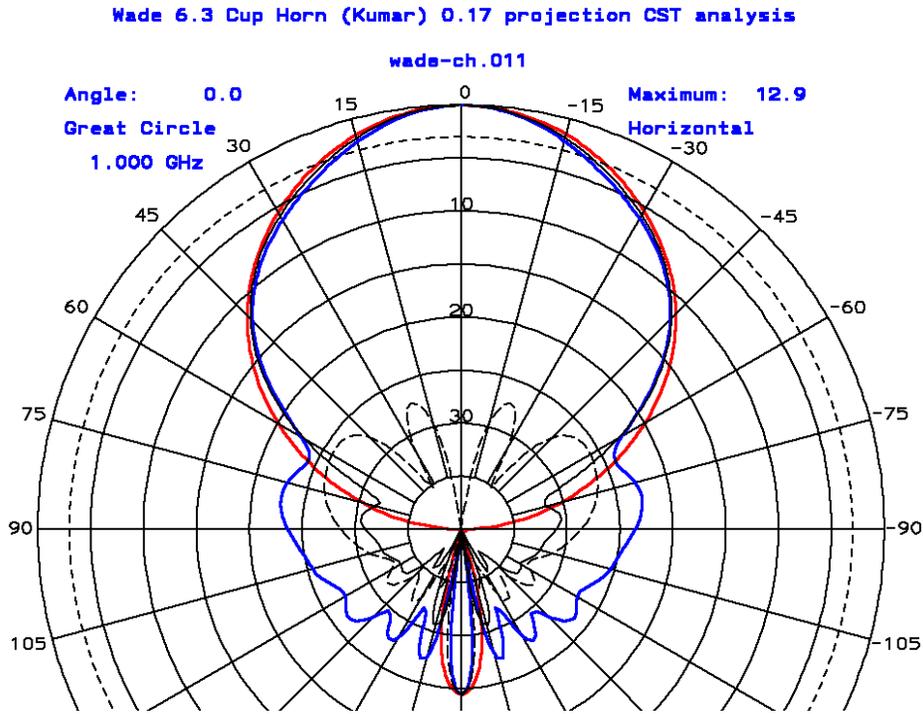


Figure 31 CST Analysis Kumar Horn Blue E-plane, Red H-plane, Black diagonal plane

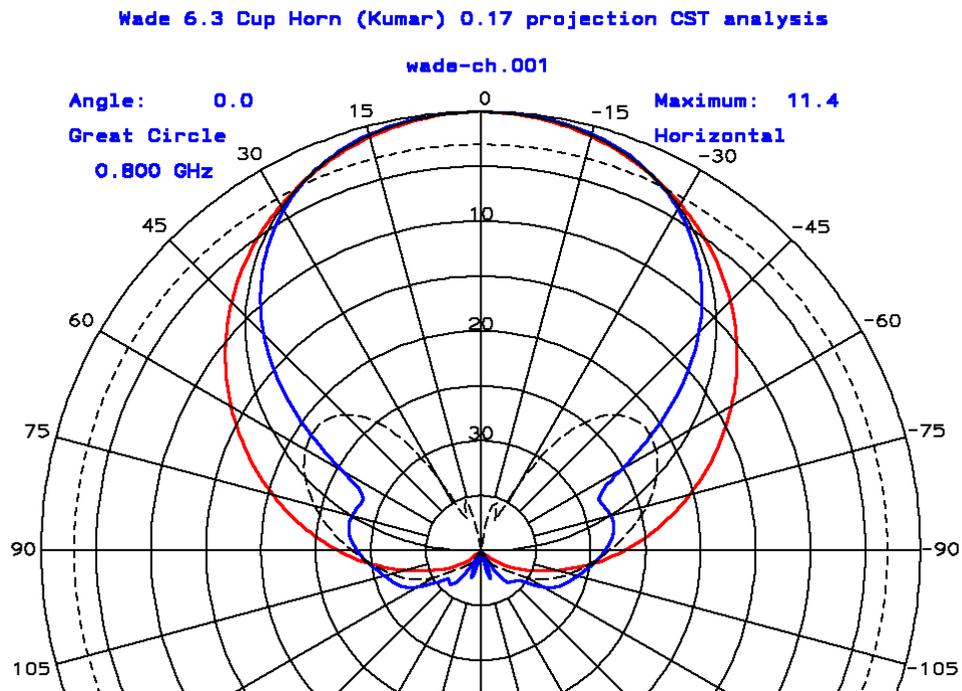


Figure 32 CST Analysis Kumar Horn Blue E-plane, Red H-plane, Black diagonal plane

VE4MA Kumar Single Cup Choke Horn, 0.48λ deep, 0.488λ wide cup, 0.25λ Cutback Opt. $f/D = 0.37$

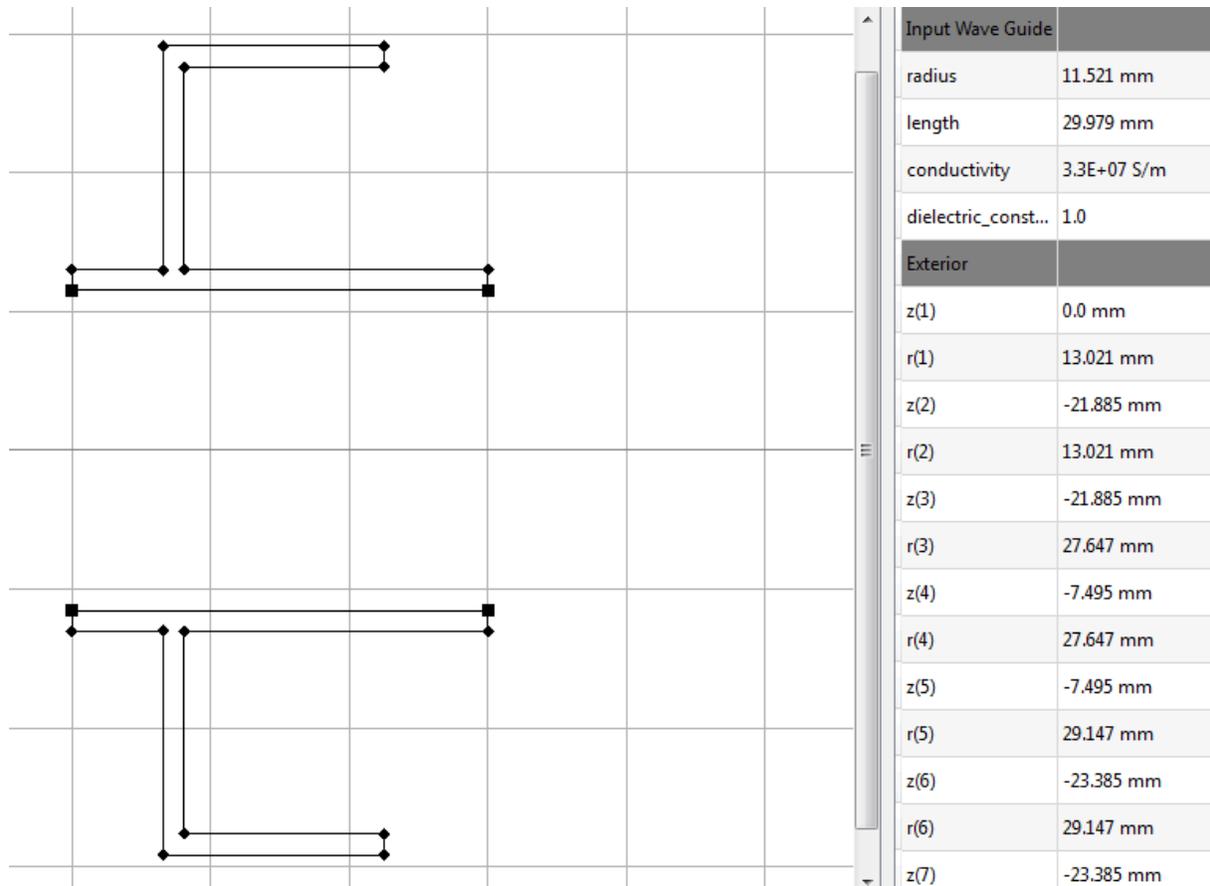


Figure 33 CHAMP Geometry of Kumar Cup Horn 0.25λ cutback

Phase Center = 3.5 mm at center frequency (10 GHz) (in front of aperture)

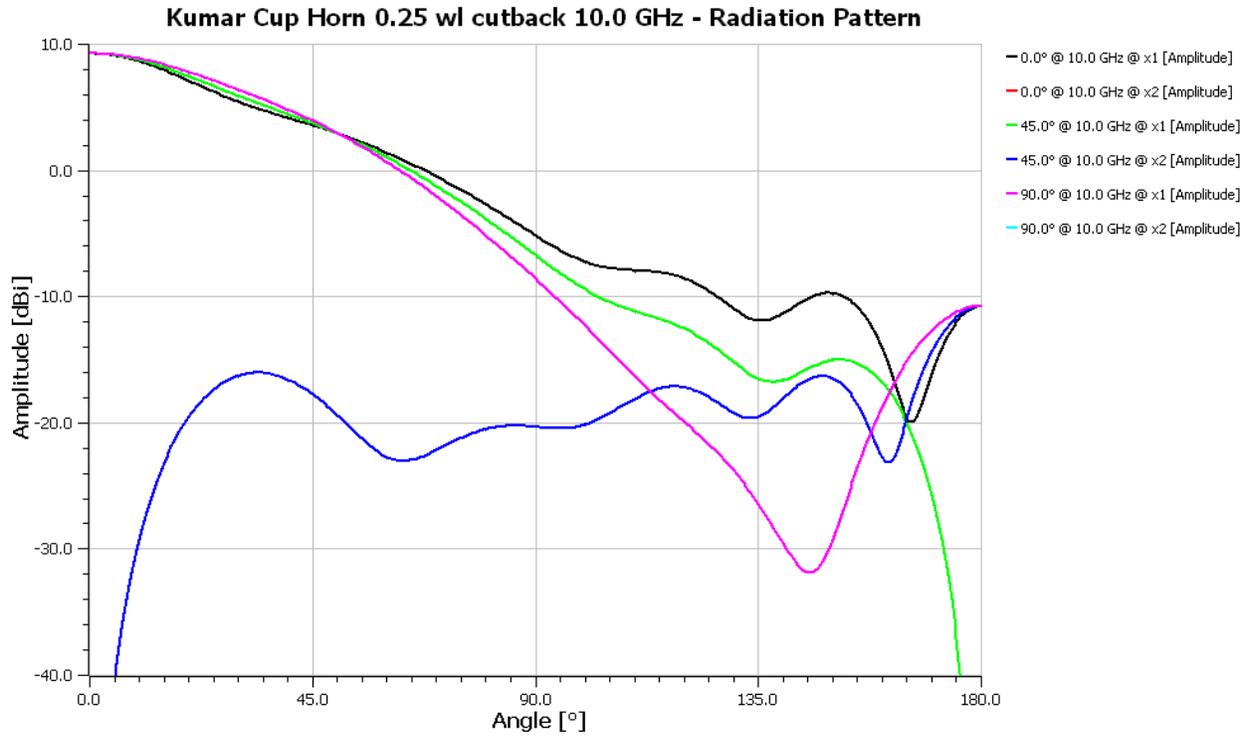


Figure 34 Kumar Cup Horn 0.25 λ cutback 10.0 GHz (10 center frequency)

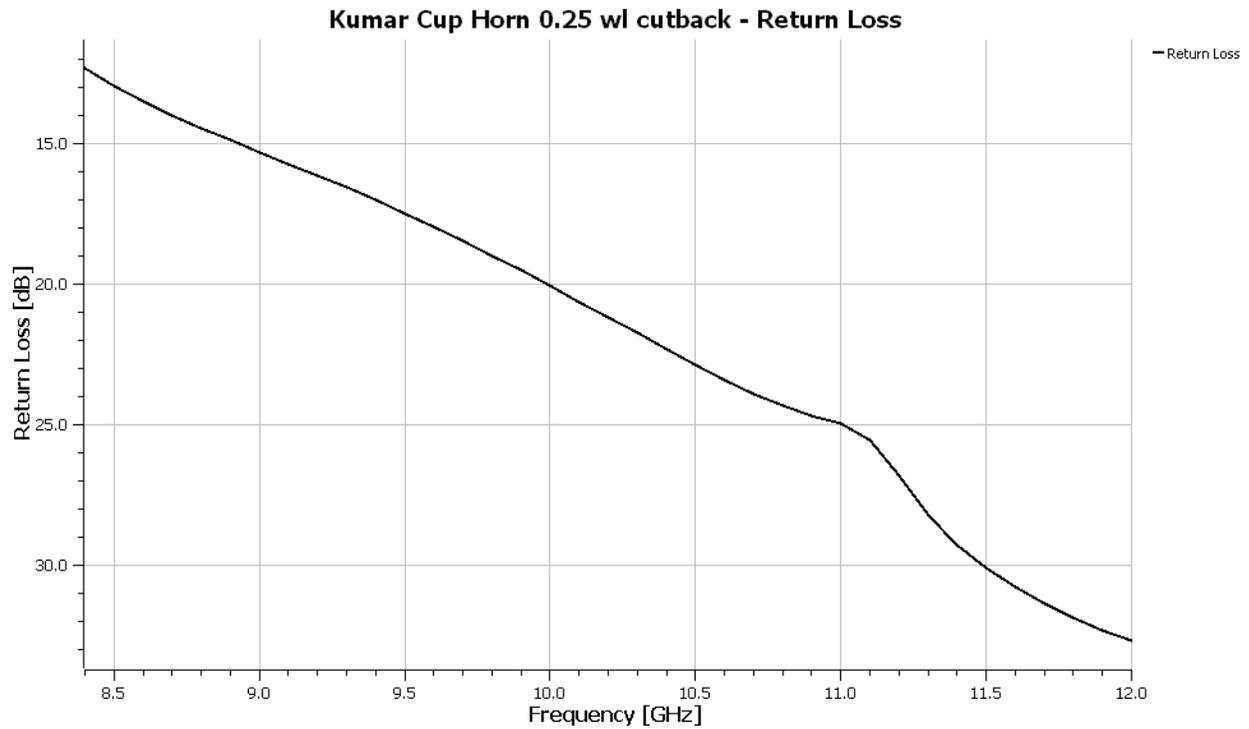


Figure 35 Kumar Cup Horn 0.25 λ cutback Return Loss

VE4MA Kumar Single Cup Choke Horn, 0.45λ deep, 0.65λ wide cup, 0.15λ Cutback Opt. $f/D = 0.32$

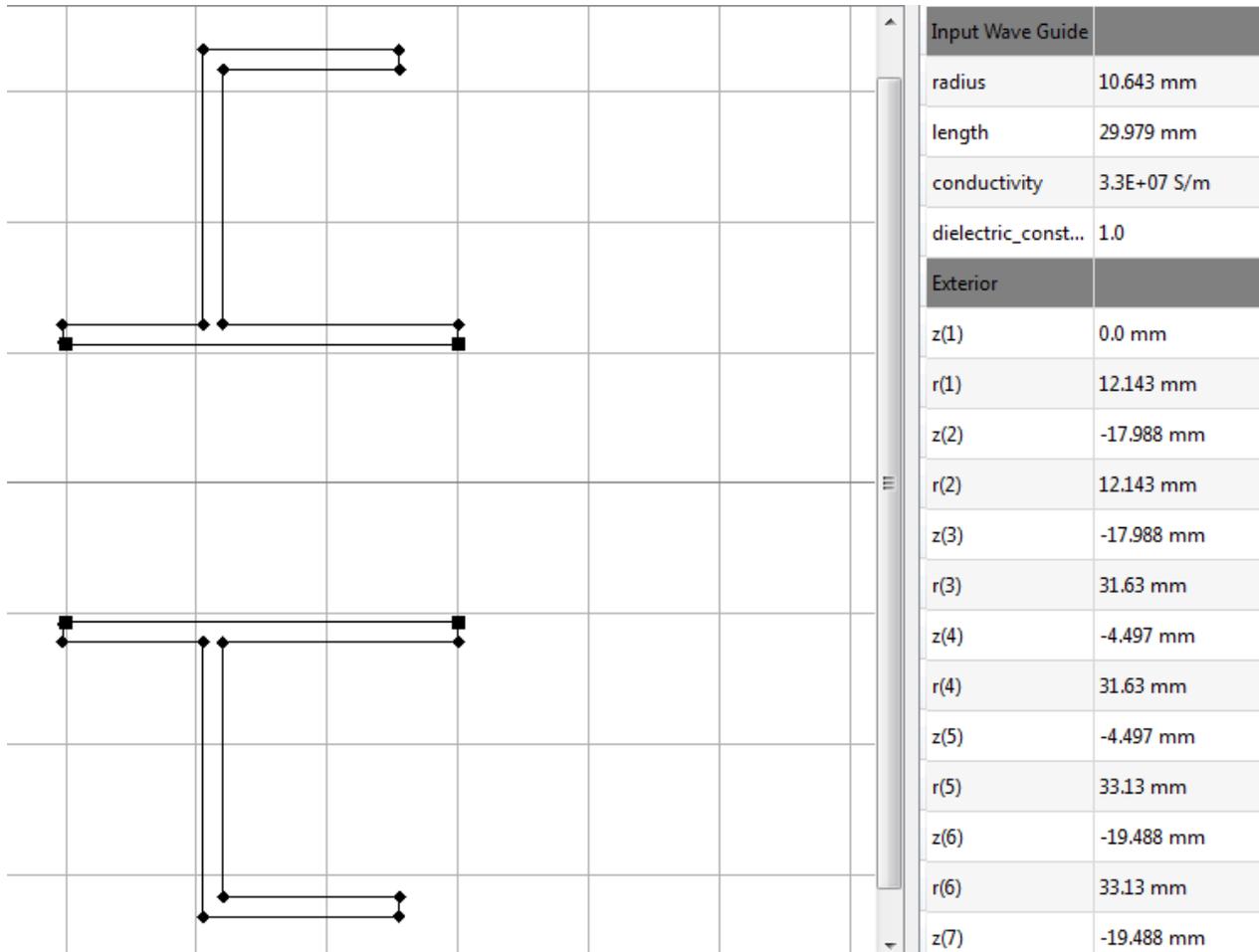


Figure 36 CHAMP Geometry of Kumar Super Cup Horn 0.15λ cutback

Phase Center = 1 mm at center frequency (10 GHz) (in front of aperture)

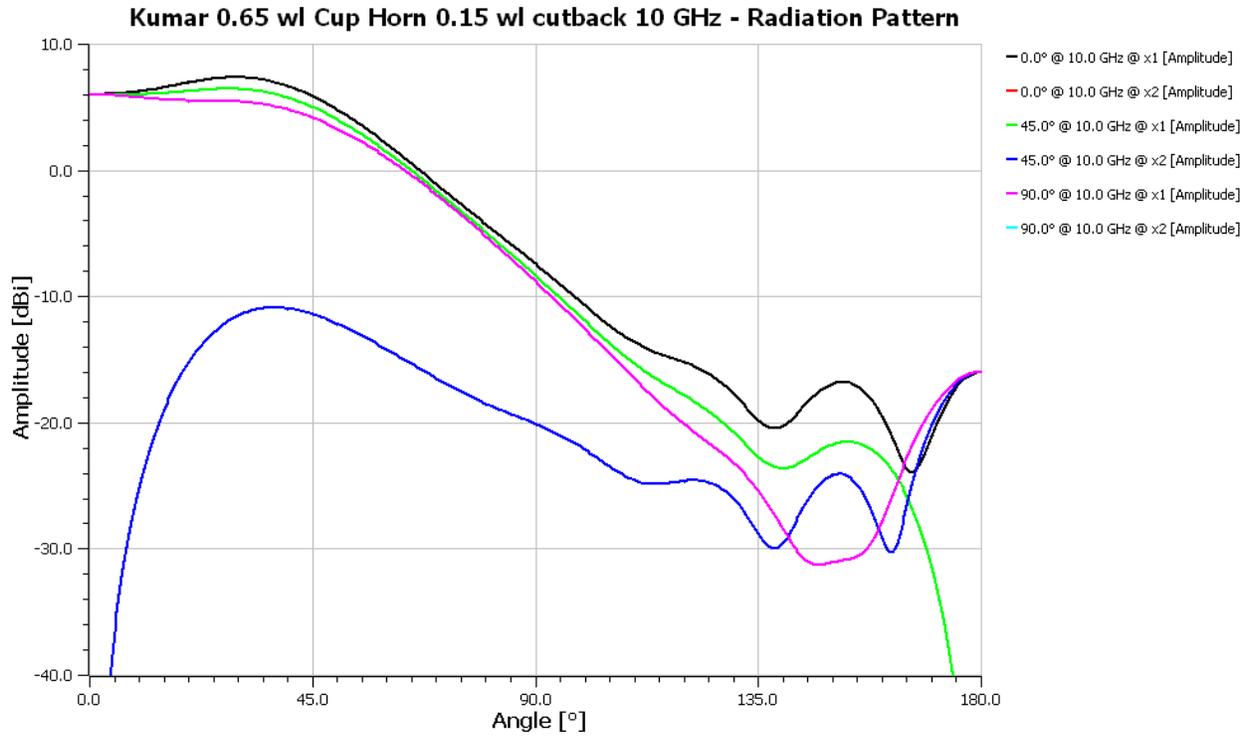


Figure 37 Kumar 0.65 λ Cup Horn 0.15 λ cutback 10 GHz (10 center frequency)

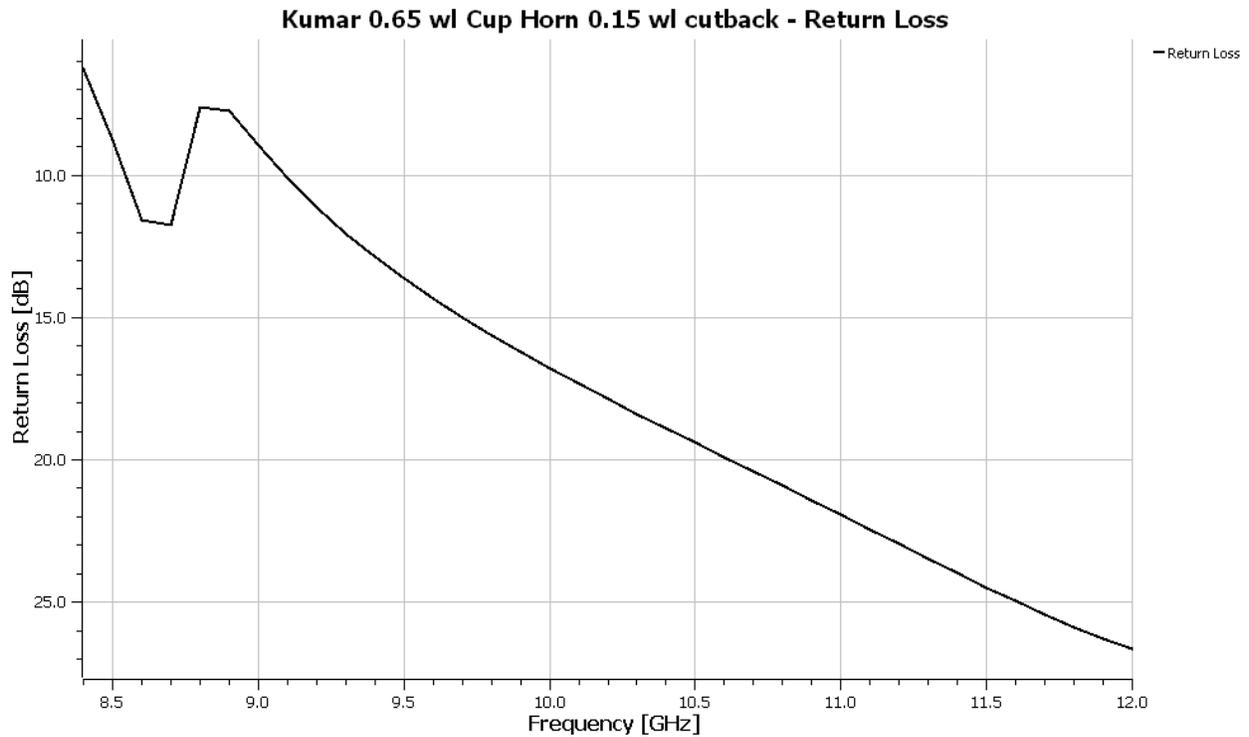


Figure 38 Kumar 0.65 λ Cup Horn 0.15 λ cutback on-axis Return Loss

VE4MA Kumar Single Cup Choke Horn, 0.48λ deep, 0.488λ wide cup, 0.34λ Cutback Opt. $f/D = 0.45$

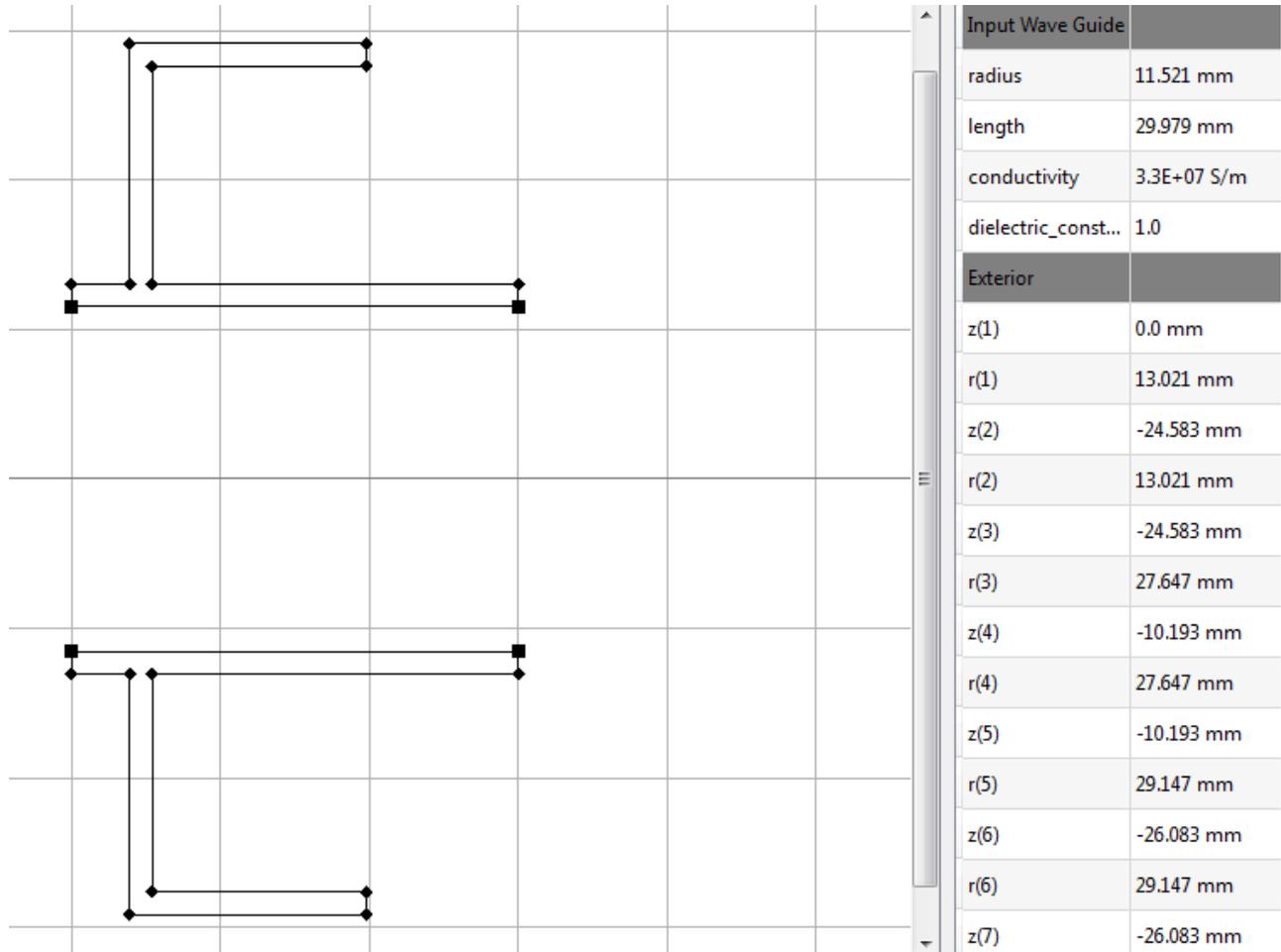


Figure 39 CHAMP Geometry of Kumar Cup Horn 0.34λ cutback

Phase Center = 2.5 mm at center frequency (10 GHz) (in front of aperture)

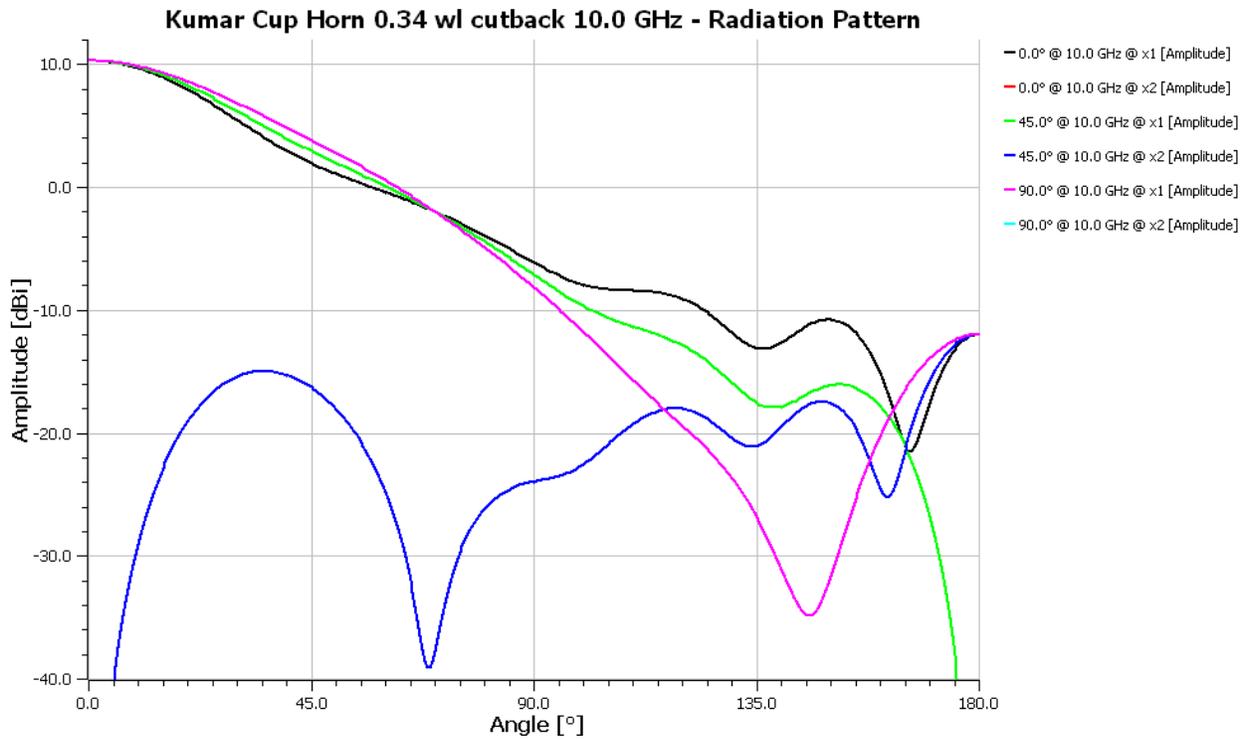


Figure 40 Kumar Cup Horn 0.34 λ cutback 10.0 GHz (10 center frequency)

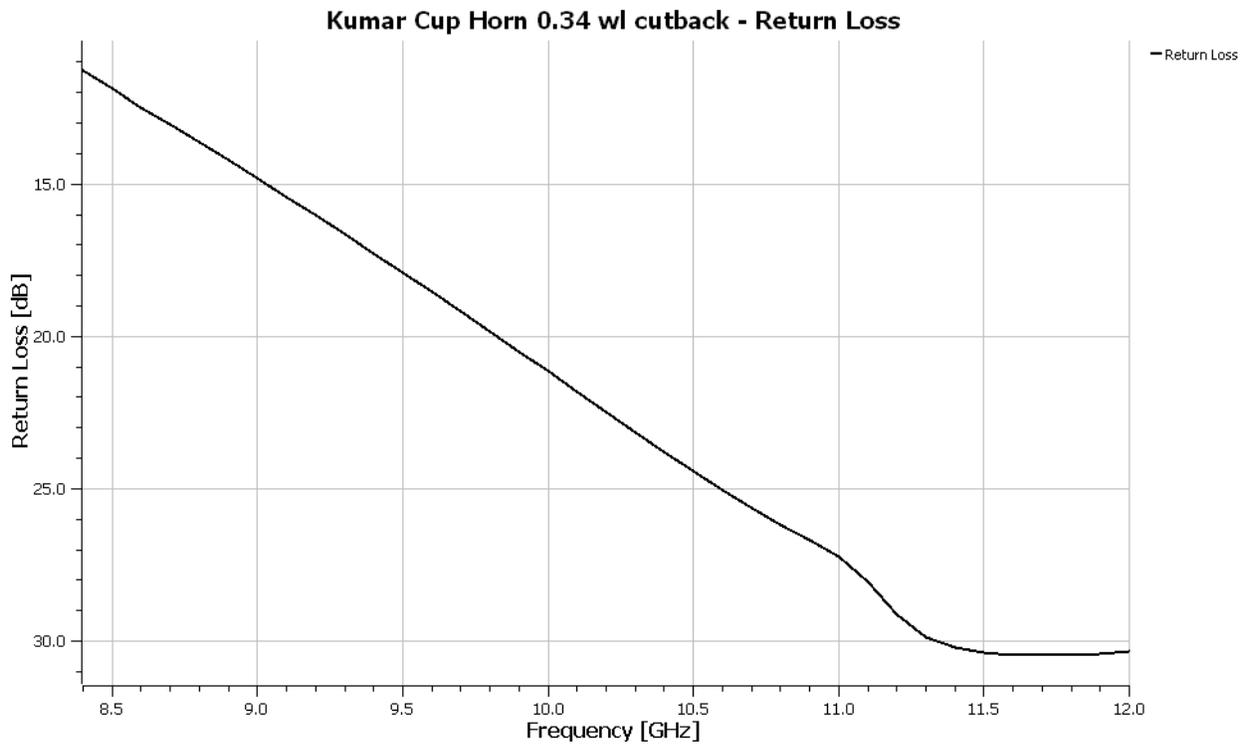


Figure 41 Kumar Cup Horn 0.34 λ cutback Return Loss

EuCAP 2006 Compact Feed 1.5λ Long, 3.1λ Aperture

Opt. $f/D = 0.68$

EuCAP 2006, "Optimized Feedhorn Designs for Compact Antenna Test Range at Limoges University," J. Teniene, A. Arnaud, R. Gonzalo, & C. del-Rio

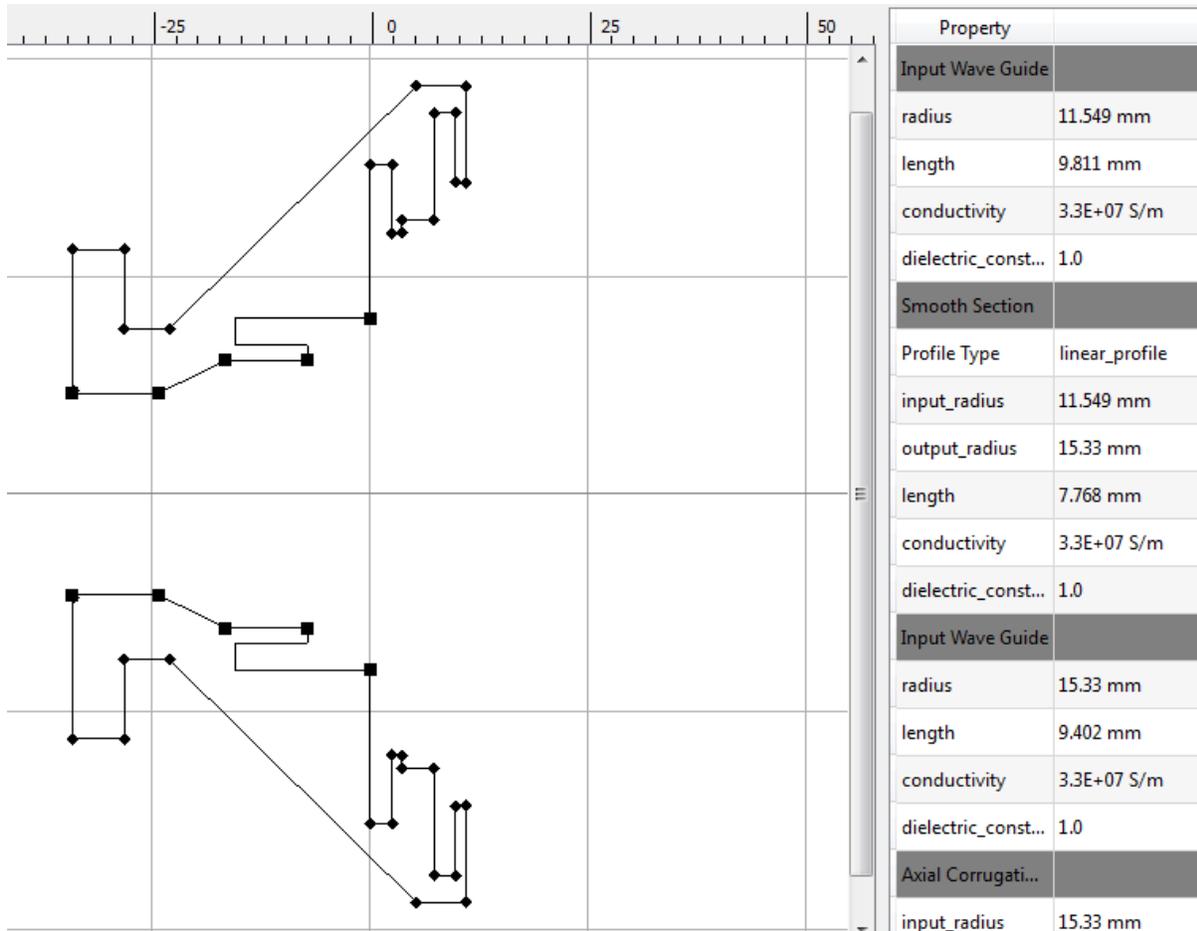


Figure 42 CHAMP geometry of EuCAP 2006 Compact Feed

Phase Center = -9.5 mm at center frequency (10 GHz)

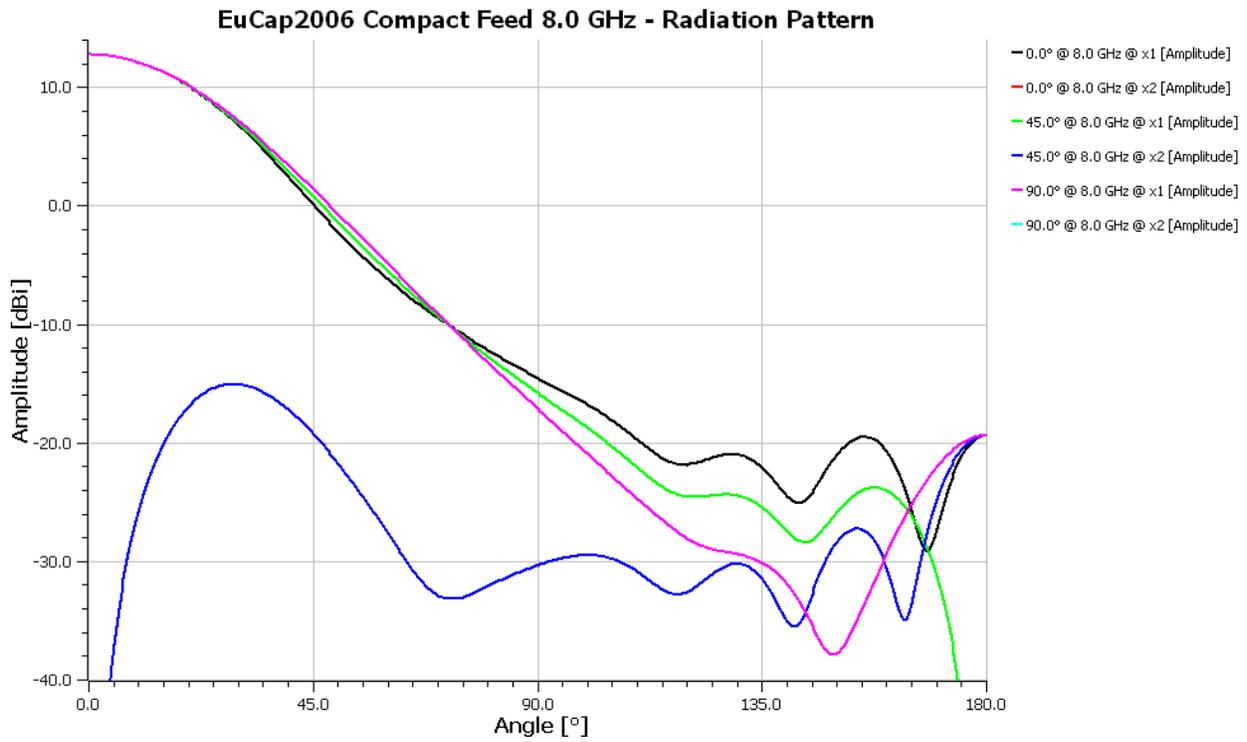


Figure 43 Compact Feed 8.0 GHz (10.0 GHz Center)

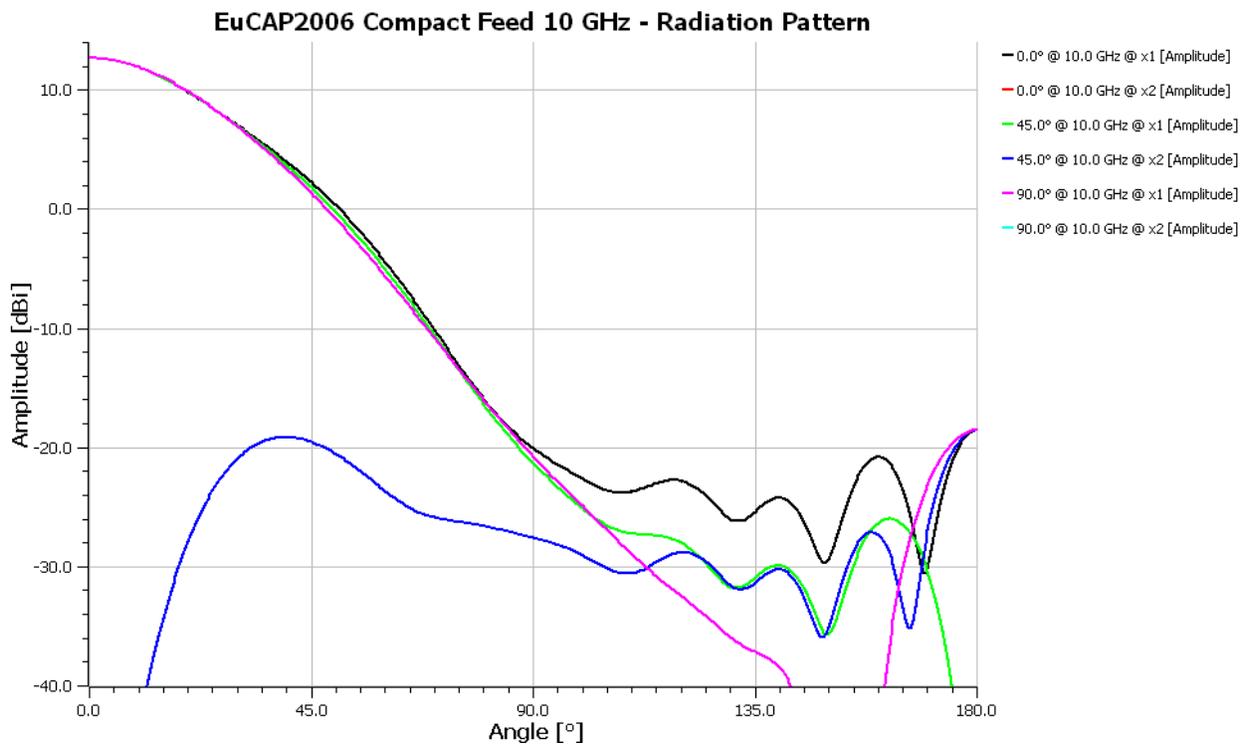


Figure 44 Compact Feed 10.0 GHz (10.0 GHz Center)

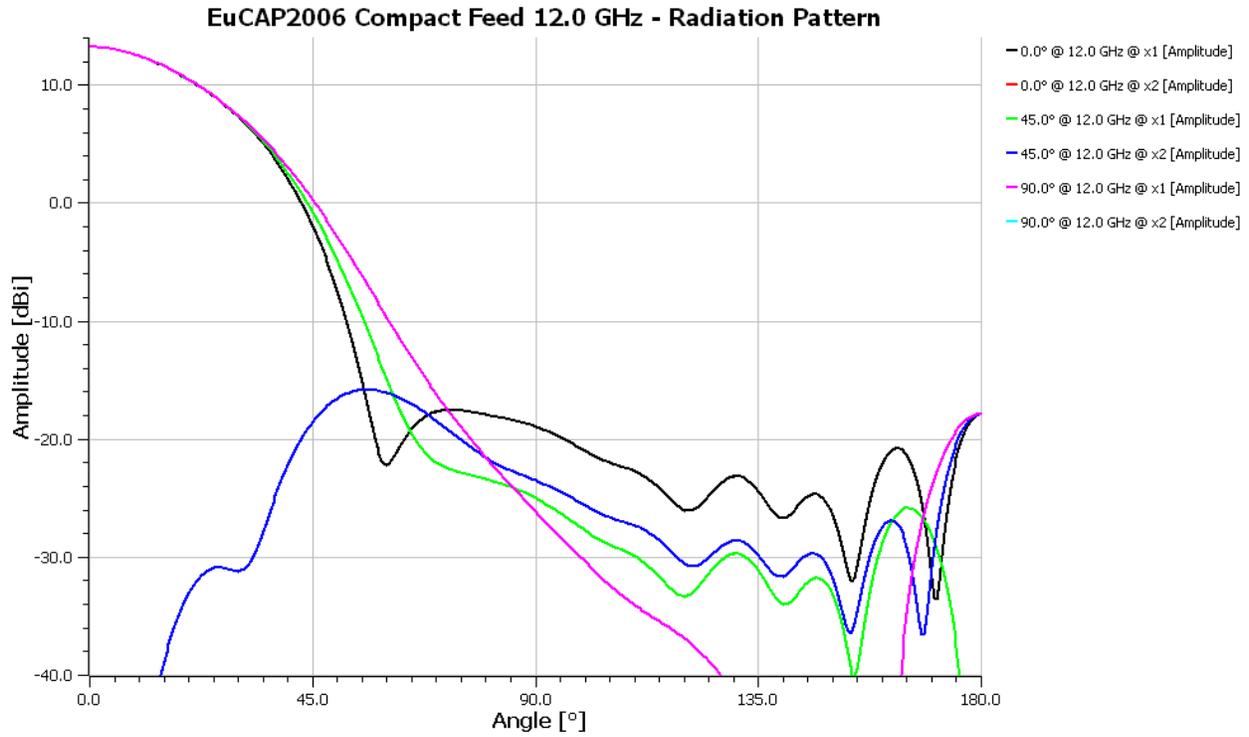


Figure 45 Compact Feed 12.0 GHz (10.0 GHz Center)

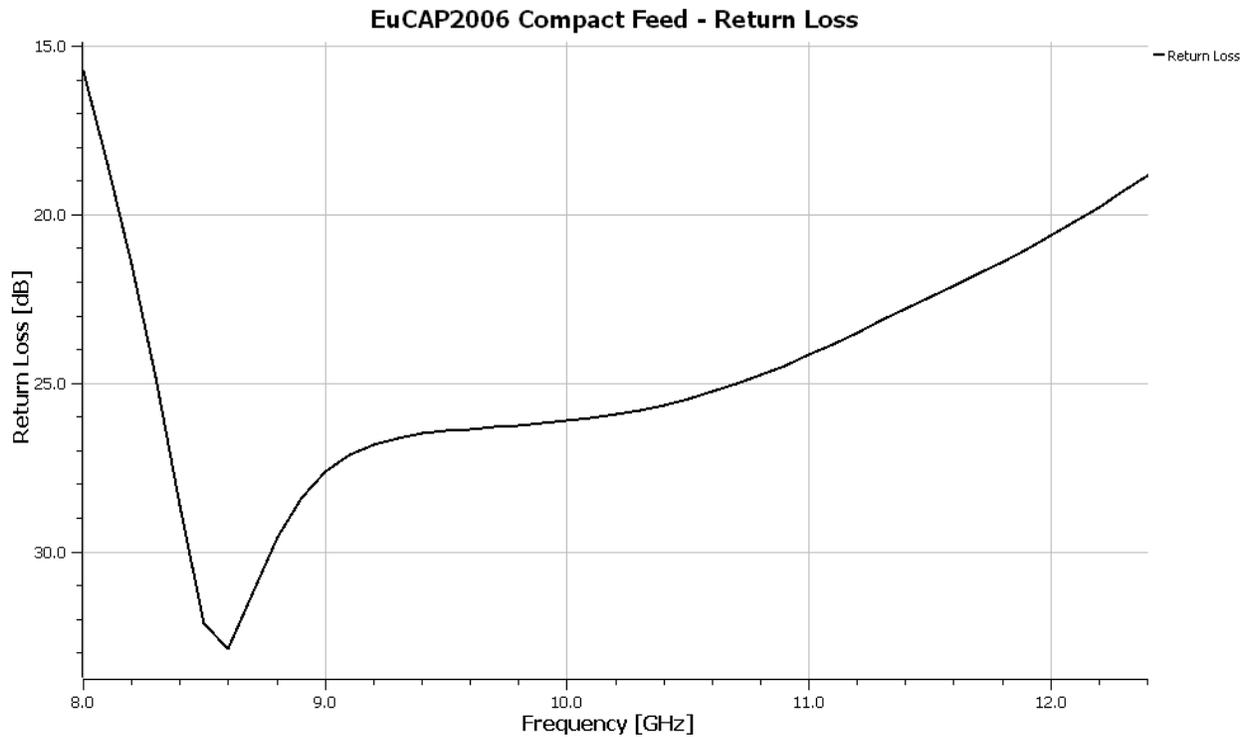


Figure 46 Compact Feed Return Loss

CST Time -Domain Analysis of Compact Feed EuCAP 2006

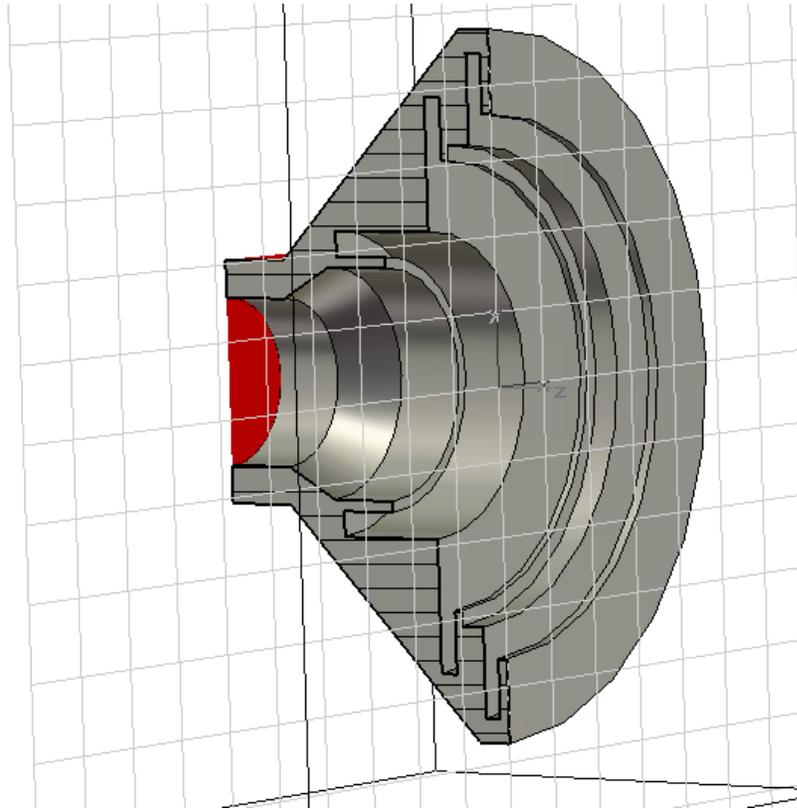


Figure 47 CST Model Cross sectional view of horn with radial and vertical chokes

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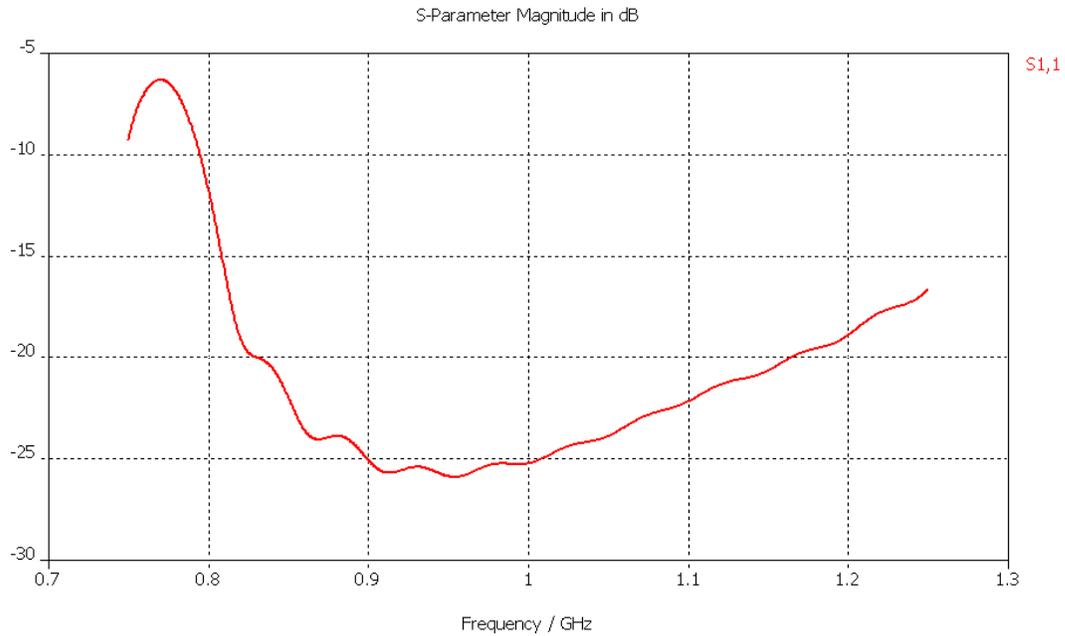


Figure 48 CST Analysis of EuCAP 2006 Compact Feed Return Loss

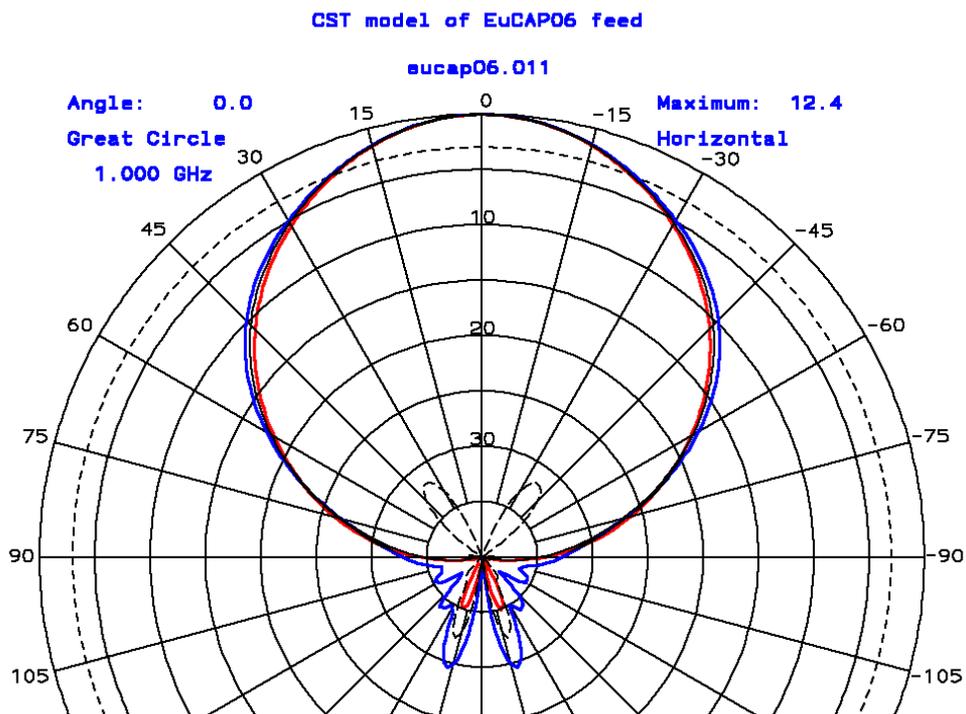


Figure 49 CST Analysis EuCAP 2006 Compact Feed Blue *E*-plane, Red *H*-plane, Black diagonal plane

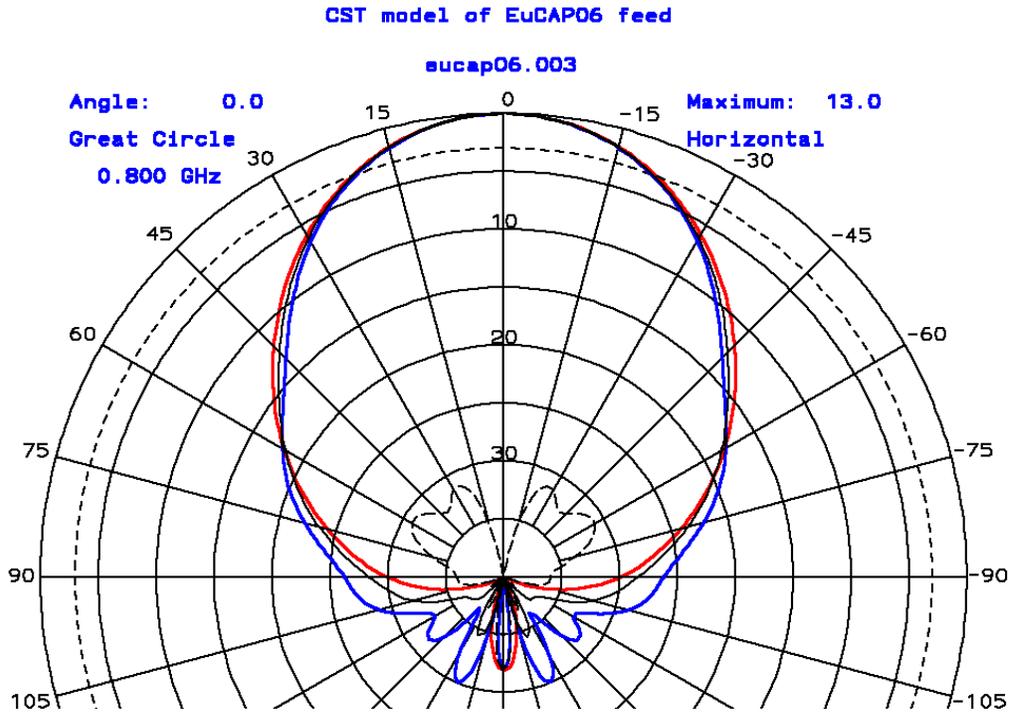


Figure 50 CST Analysis EuCAP 2006 Compact Feed Blue *E*-plane, Red *H*-plane, Black diagonal plane

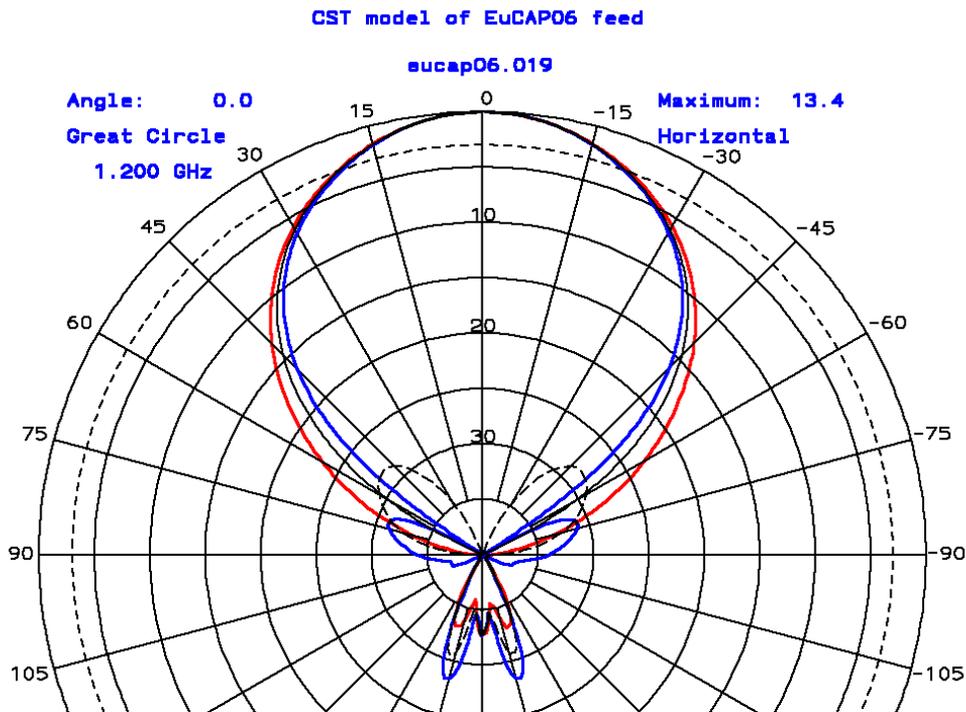


Figure 51 CST Analysis EuCAP 2006 Compact Feed Blue *E*-plane, Red *H*-plane, Black diagonal plane

Dual Band Stepped Choke Horn Volakis, *Antenna*

Engineering Handbook 4th edition, McGraw-Hill, 2007, T.S.

Bird and A.W. Love, Chapter 14, p. 14-38 Opt. $f/D = 0.56$

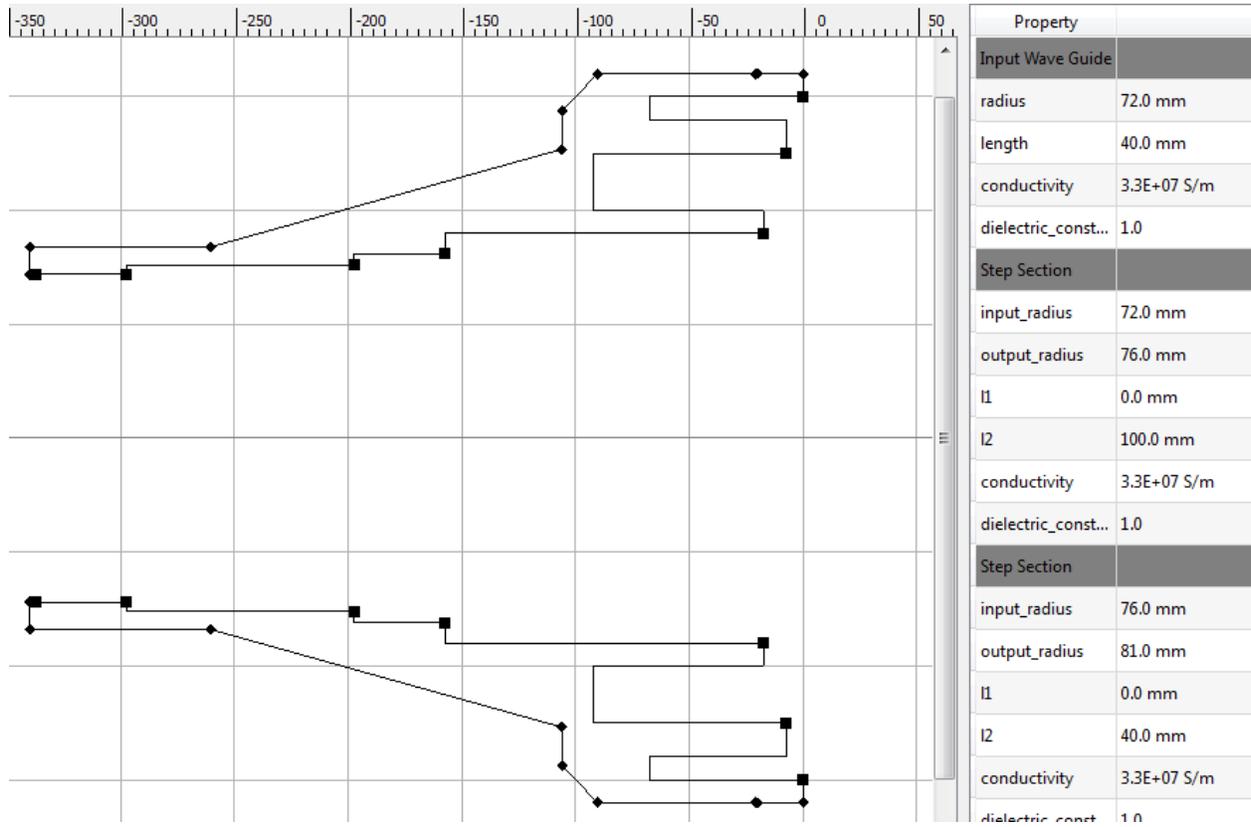


Figure 52 CHAMP geometry of Volakis 14-38 Dual Band Stepped Choke Horn

Phase Center = -35 mm at center frequency (1.75 GHz)

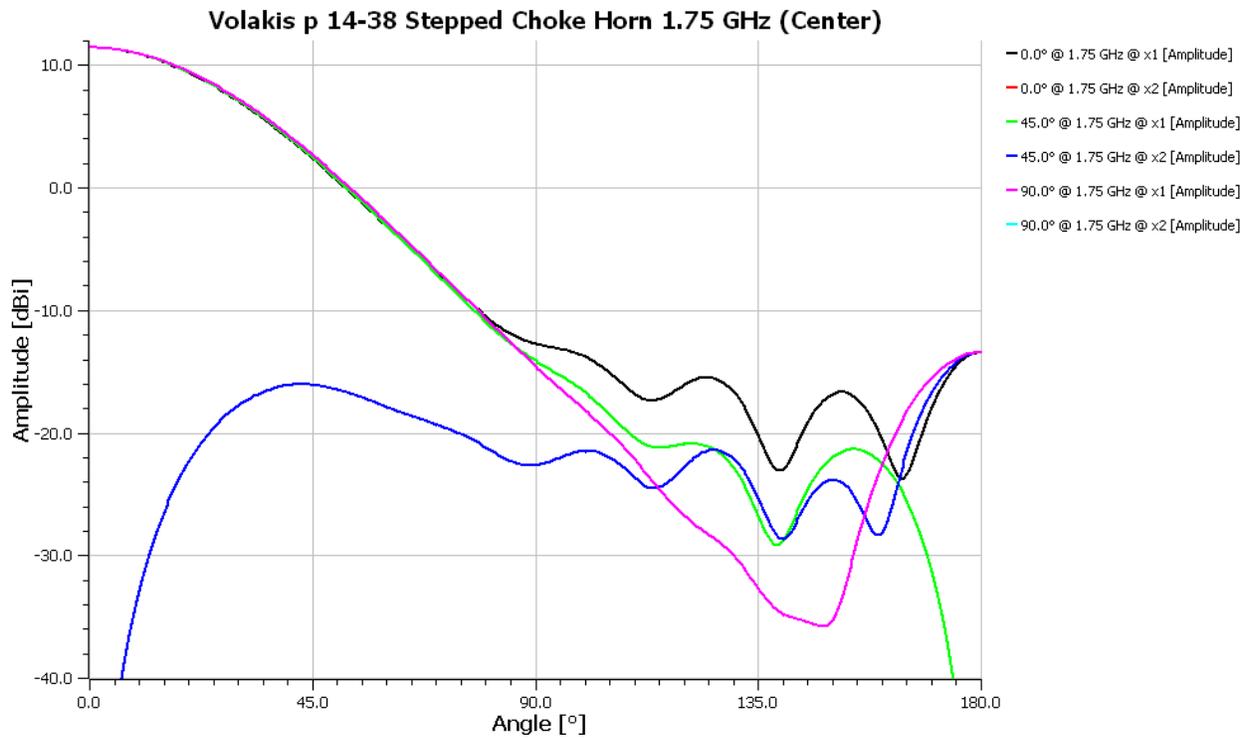


Figure 53 Volakis Stepped Choke Horn 1.75 GHz (Center Frequency 1.75 GHz)

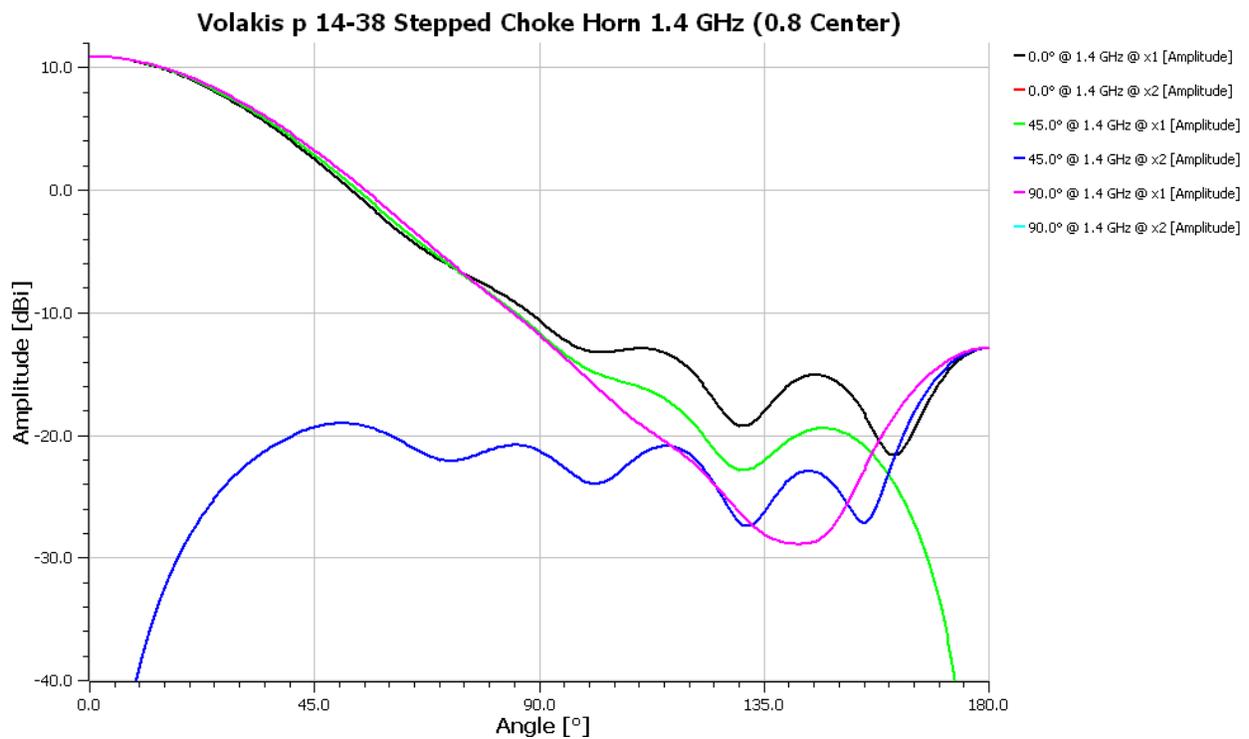


Figure 54 Volakis Stepped Choke Horn 1.40 GHz (Center Frequency 1.75 GHz)

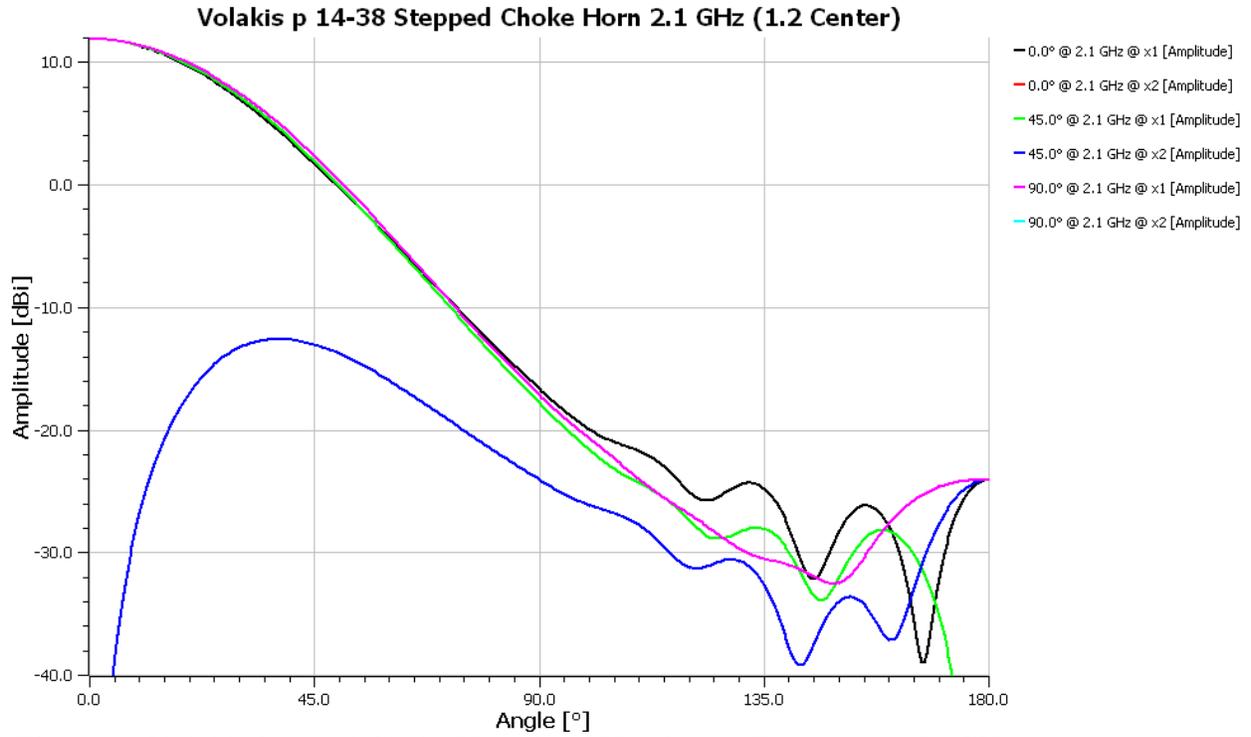


Figure 55 Volakis Stepped Choke Horn 2.1 GHz (Center Frequency 1.75 GHz)

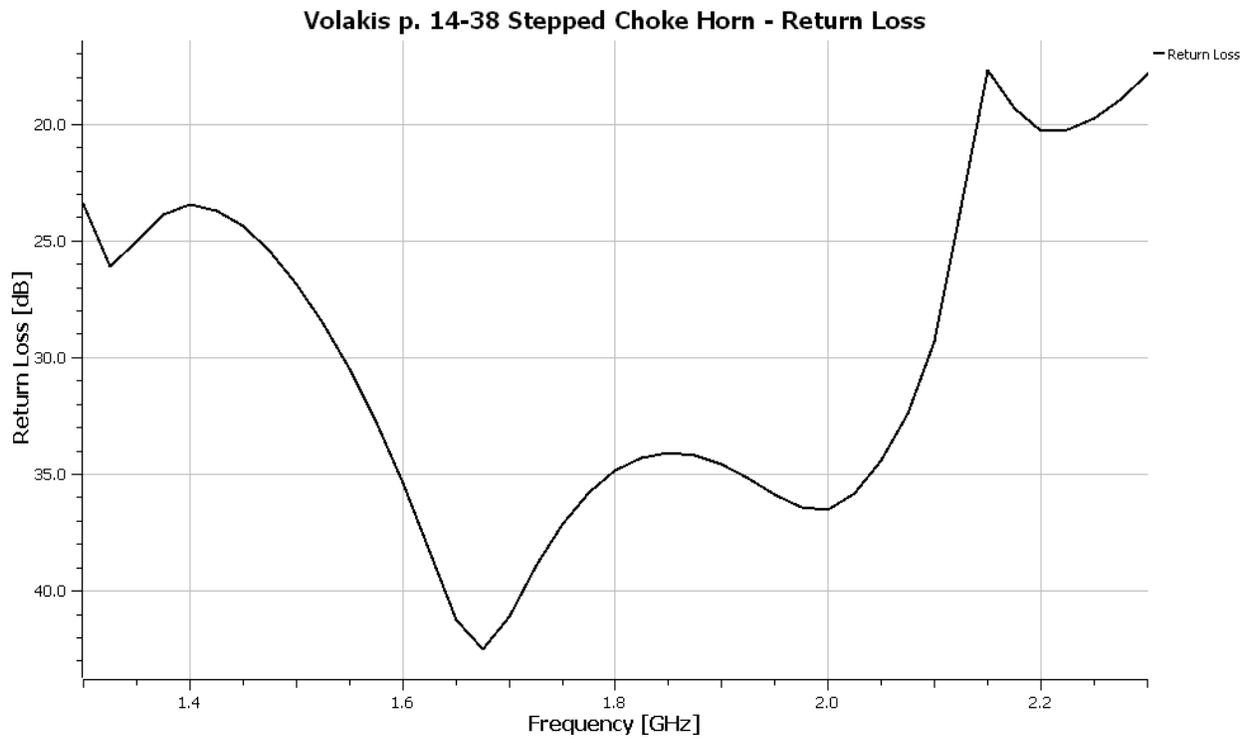


Figure 56 Volakis Stepped Choke Horn Return Loss

CST Analysis of Dual Choke Horn with Multimode Steps

Volakis 14-38

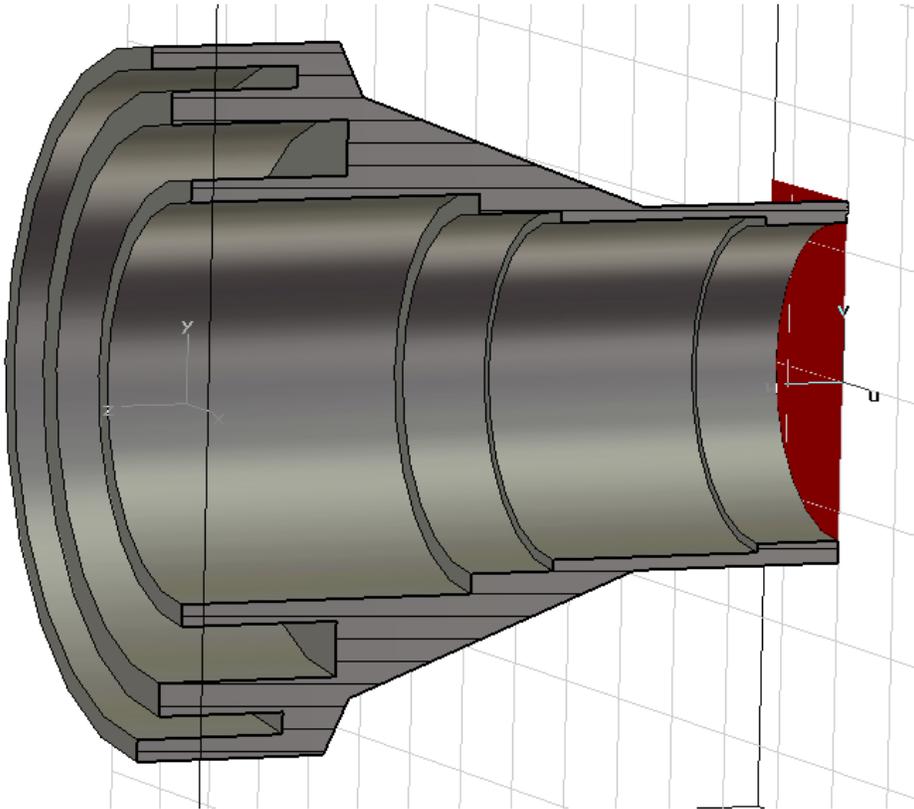


Figure 57 CST Time Domain Model of Volakis 14-38 Choke Horn with Multimode Steps

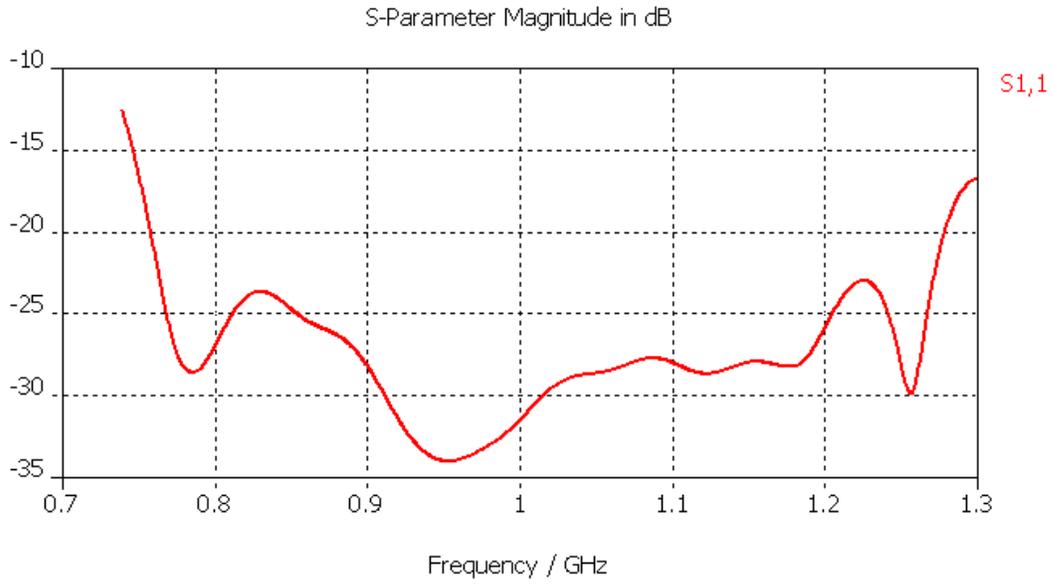


Figure 58 CST Analysis of Volakis p 14-38 Stepped Choke Horn Waveguide port match

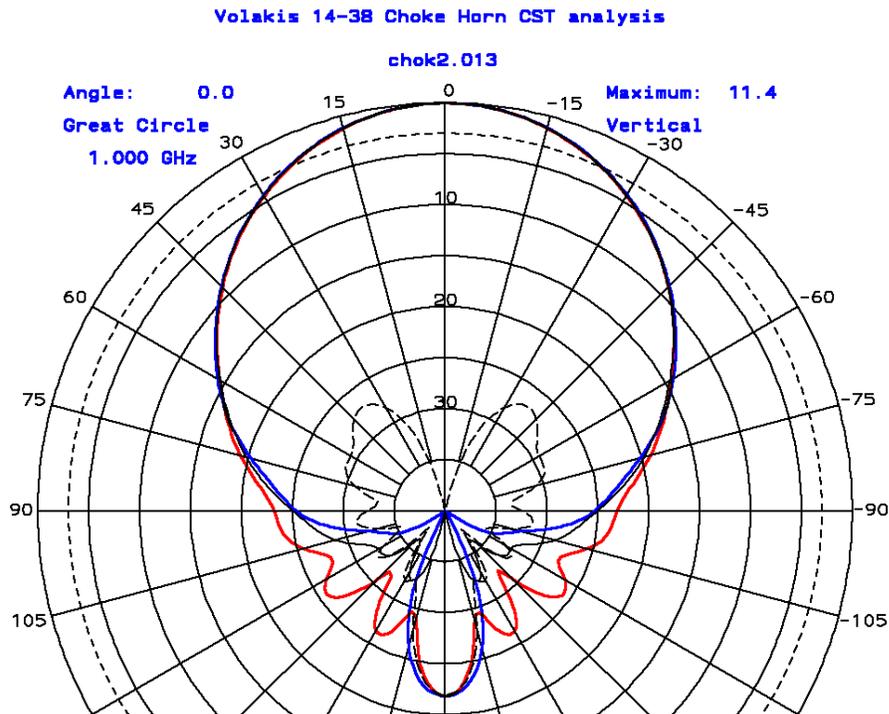


Figure 59 CST Analysis of Volakis p 14-38 Horn Red *E*-plane, Blue *H*-plane, Black diagonal plane

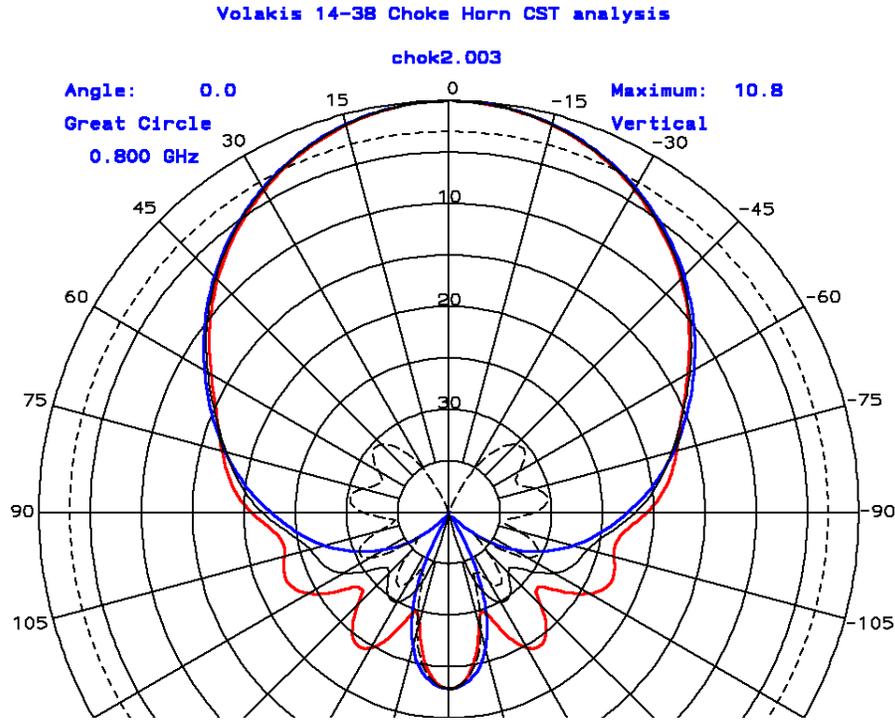


Figure 60 CST Analysis of Volakis p 14-38 Horn Red *E*-plane, Blue *H*-plane, Black diagonal plane

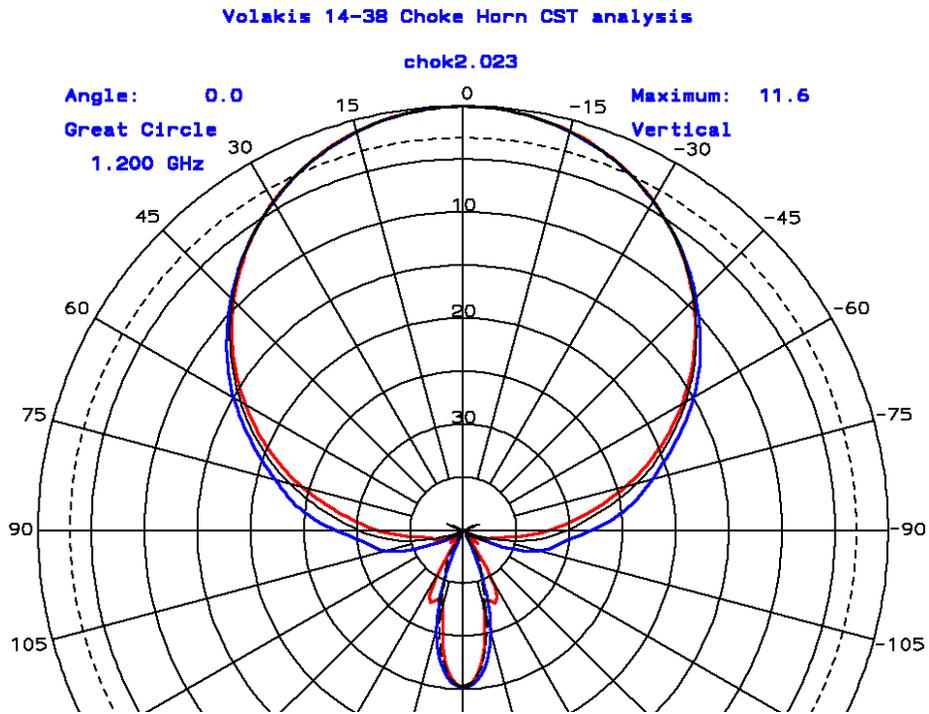


Figure 61 CST Analysis of Volakis p 14-38 Horn Red *E*-plane, Blue *H*-plane, Black diagonal plane