

105090  
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# Final Report Miniaturized Multi-band-Antenna

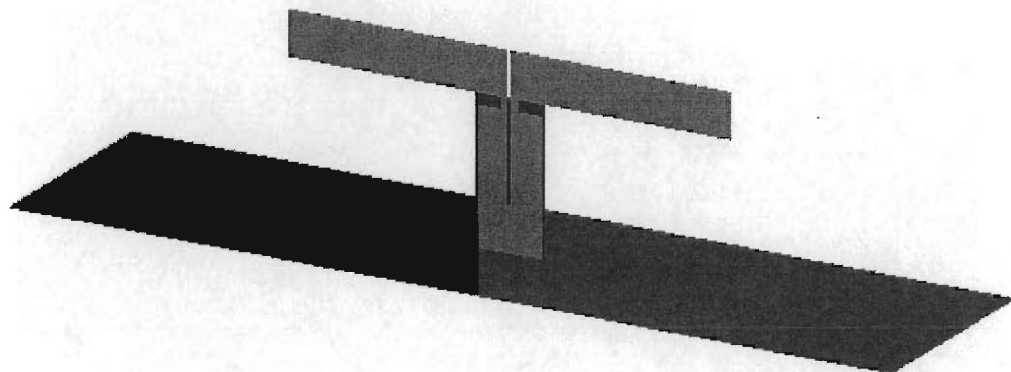
## GEDC-Cartiza

Prof. Joy Laskar

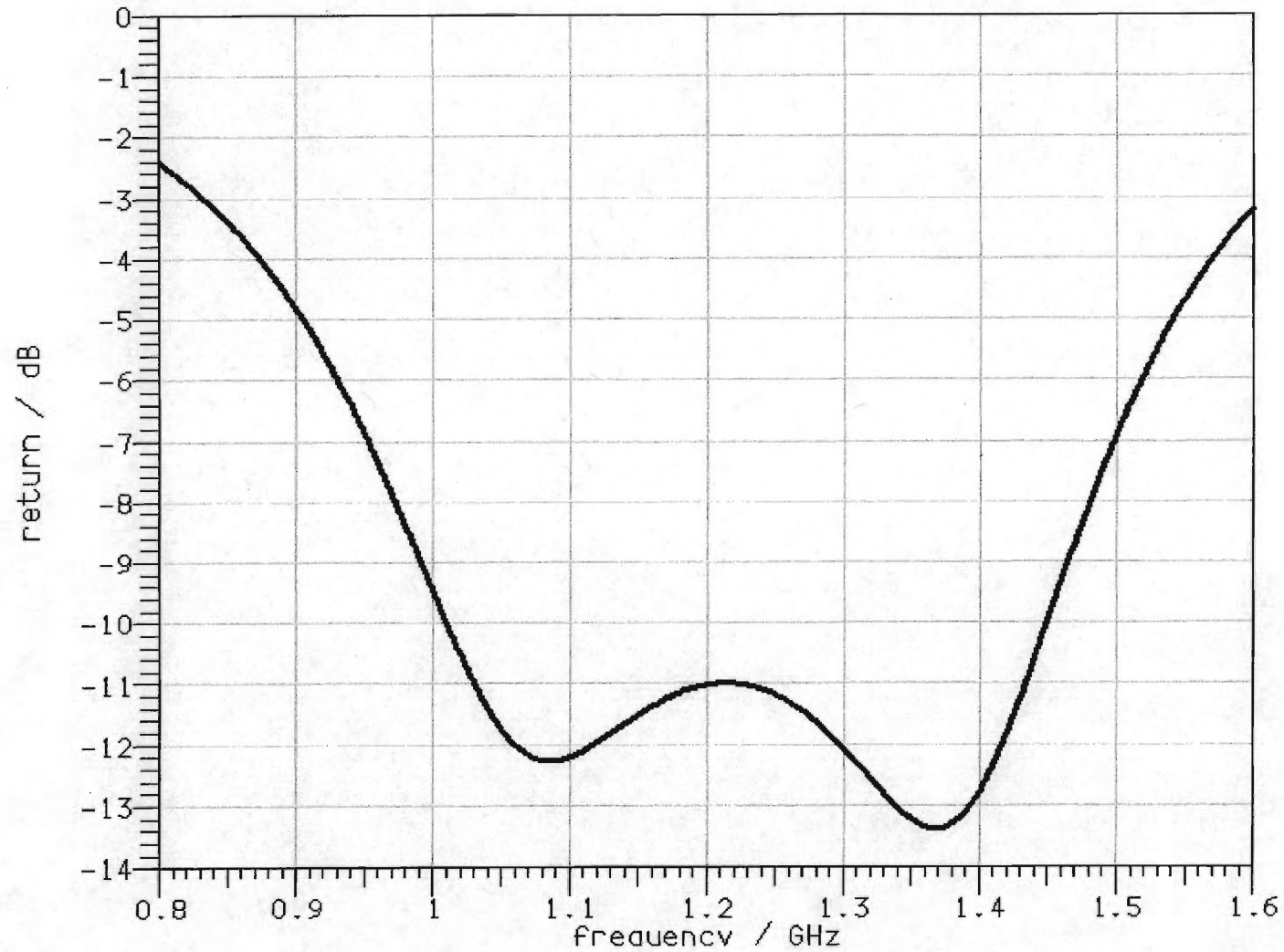
Georgia Electronic Design Center

# Antenna Element Design

# Initial Antenna Configuration

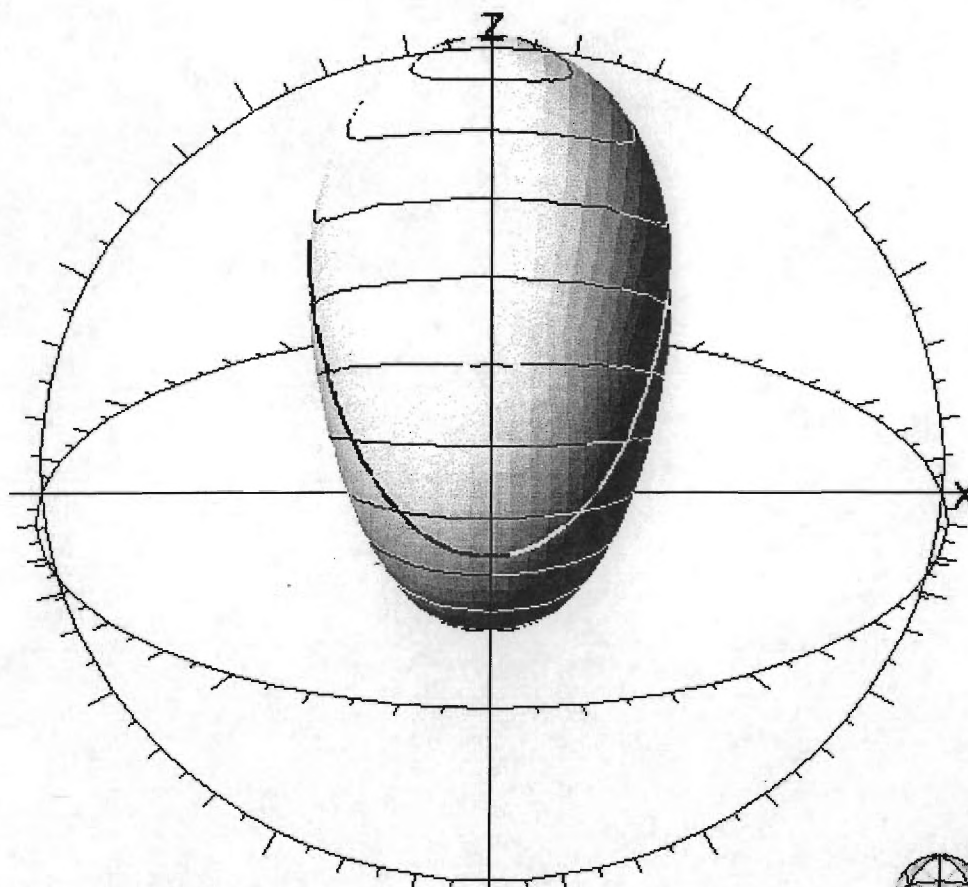


# Return Loss





# Radiation pattern (1.0 GHz)



Directivity: 6.199dBi  
Polrzn. Loss: 0.000dB  
Material Loss: Not Known  
Mismatch: -519.090m dB  
Gain: 5.680dBi

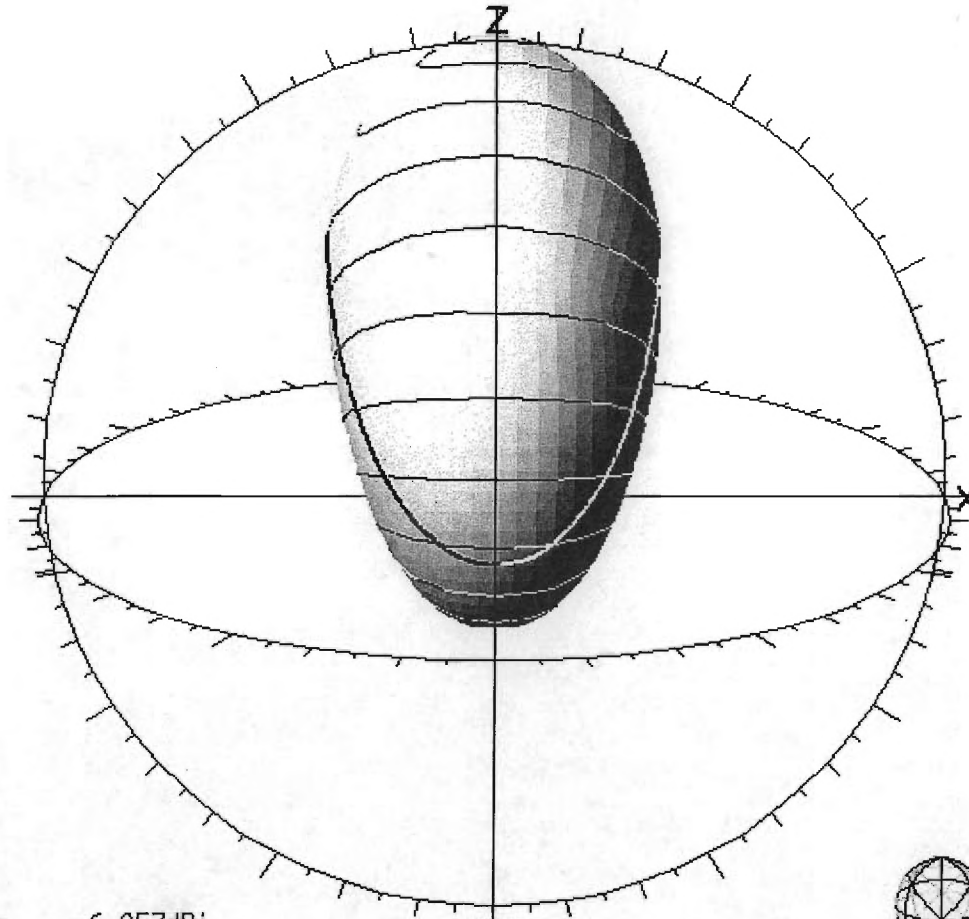
Ant Eff: 88.734%  
Rad Eff: 100.000%

Scale: Linear:  $-\infty$  to 0dB-directivity  
Contour at: -3 dB-directivity  
Frequency: 1GHz



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# Radiation pattern (1.2 GHz)



Directivity: 6.257dBi  
Polrzn. Loss: 0.000dB  
Material Loss: Not Known  
Mismatch: -357.476m dB  
Gain: 5.900dBi

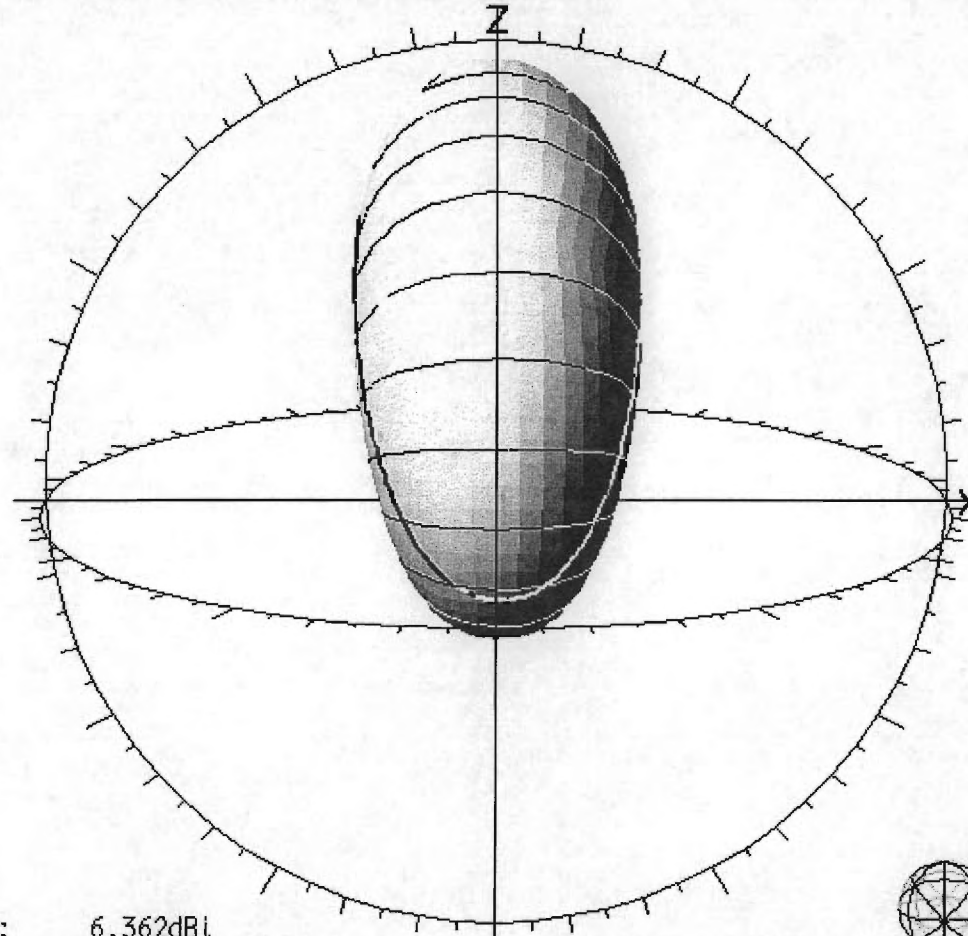
Ant Eff: 92.098%  
Rad Eff: 100.000%

Scale: Linear:  $-\infty$  to 0dB-directivity  
Contour at: -3 dB-directivity  
Frequency: 1.2GHz



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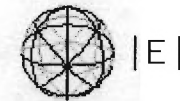
# Radiation pattern (1.4 GHz)



Directivity: 6.362dBi  
Polrzn. Loss: 0.000dB  
Material Loss: Not Known  
Mismatch: -235.687m dB  
Gain: 6.126dBi

Ant Eff: 94.718%  
Rad Eff: 100.000%

Scale: Linear:  $-\infty$  to 0dB-directivity  
Contour at: -3 dB-directivity  
Frequency: 1.4GHz

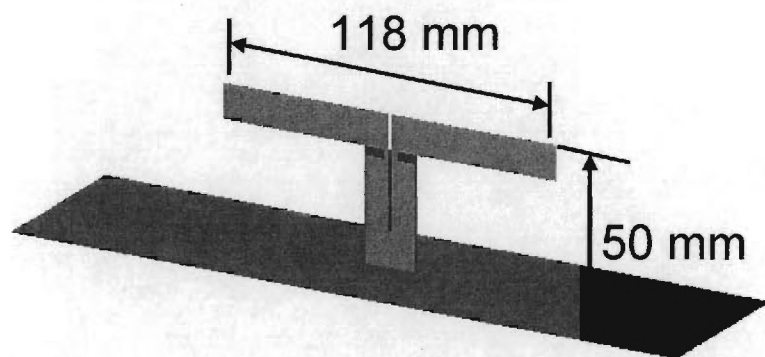


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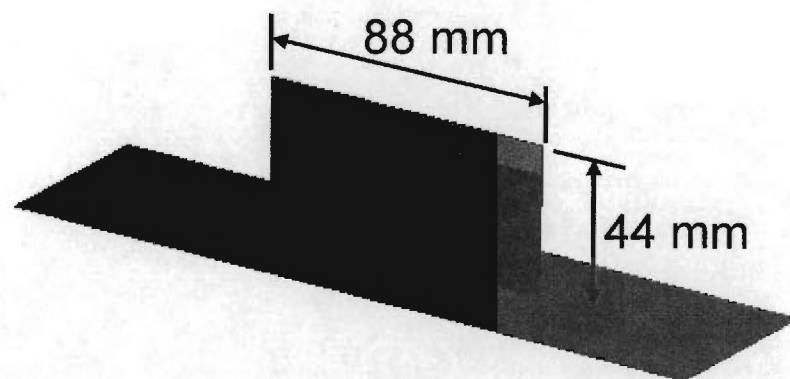
EW01

# A compact antenna element

- Configuration

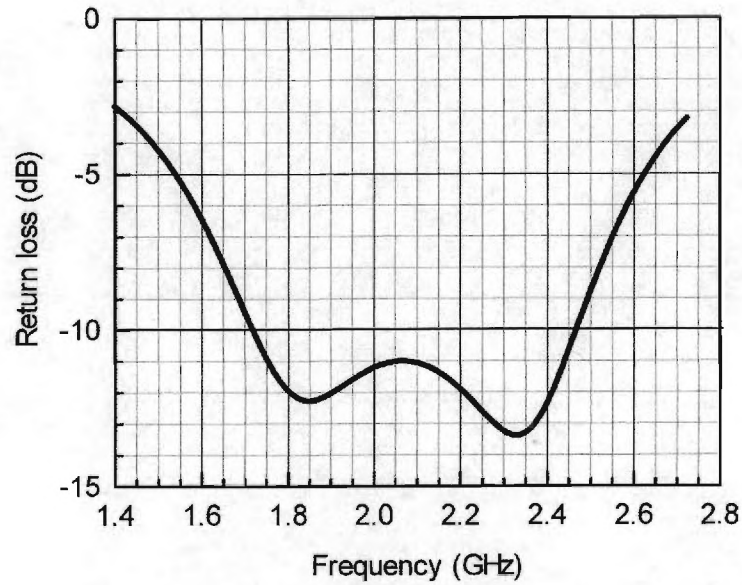


Previous

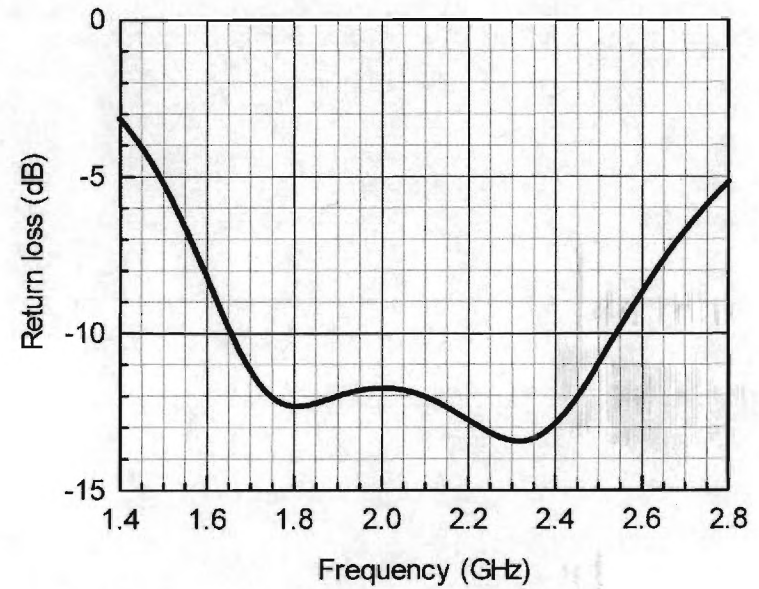


Improved

# Return loss



Previous  
(Bandwidth=35%)

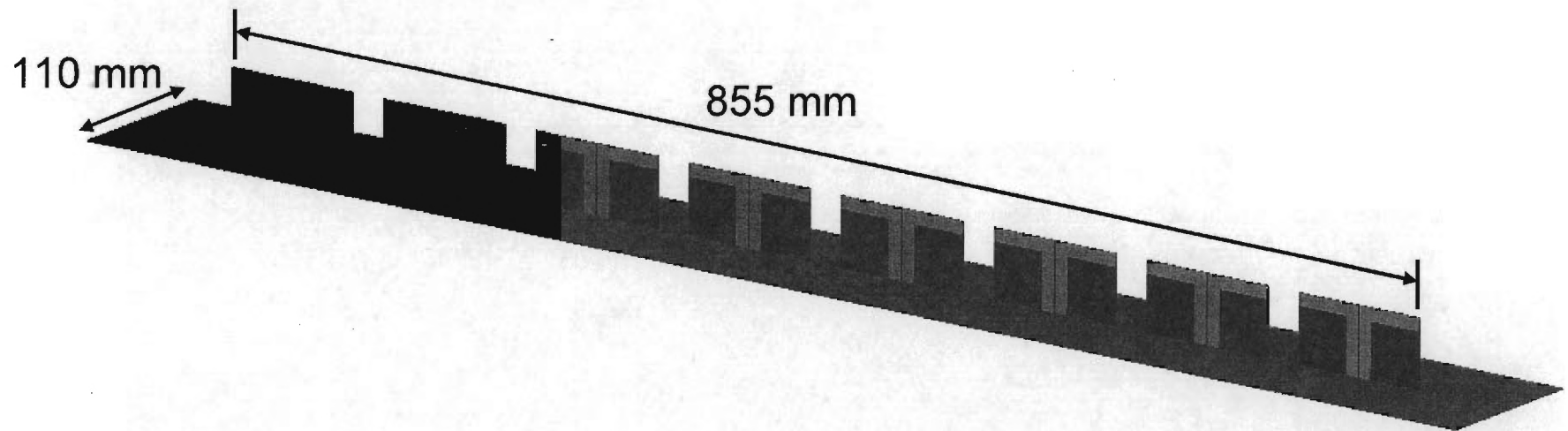


Improved  
(Bandwidth=42%)

# Multi-band Array of Antenna Design

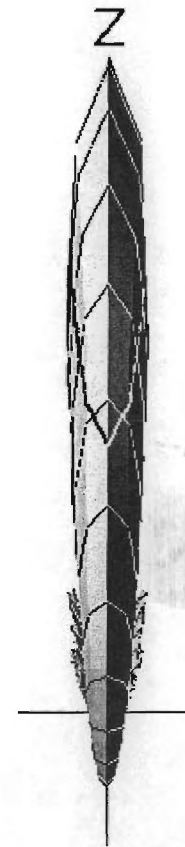
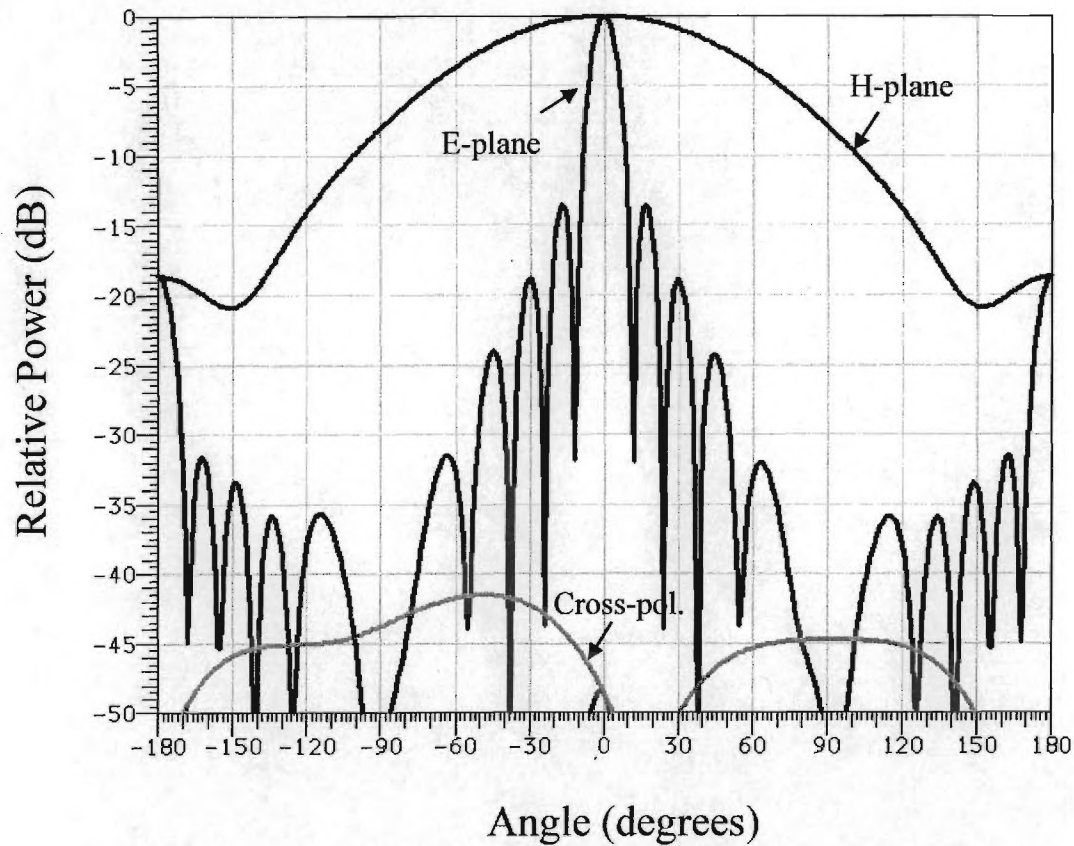
# 8-Element Antenna Array

- Configuration





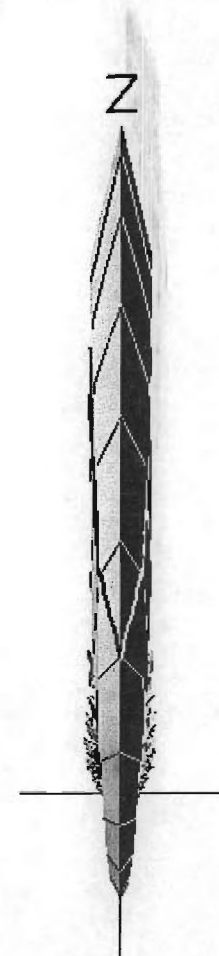
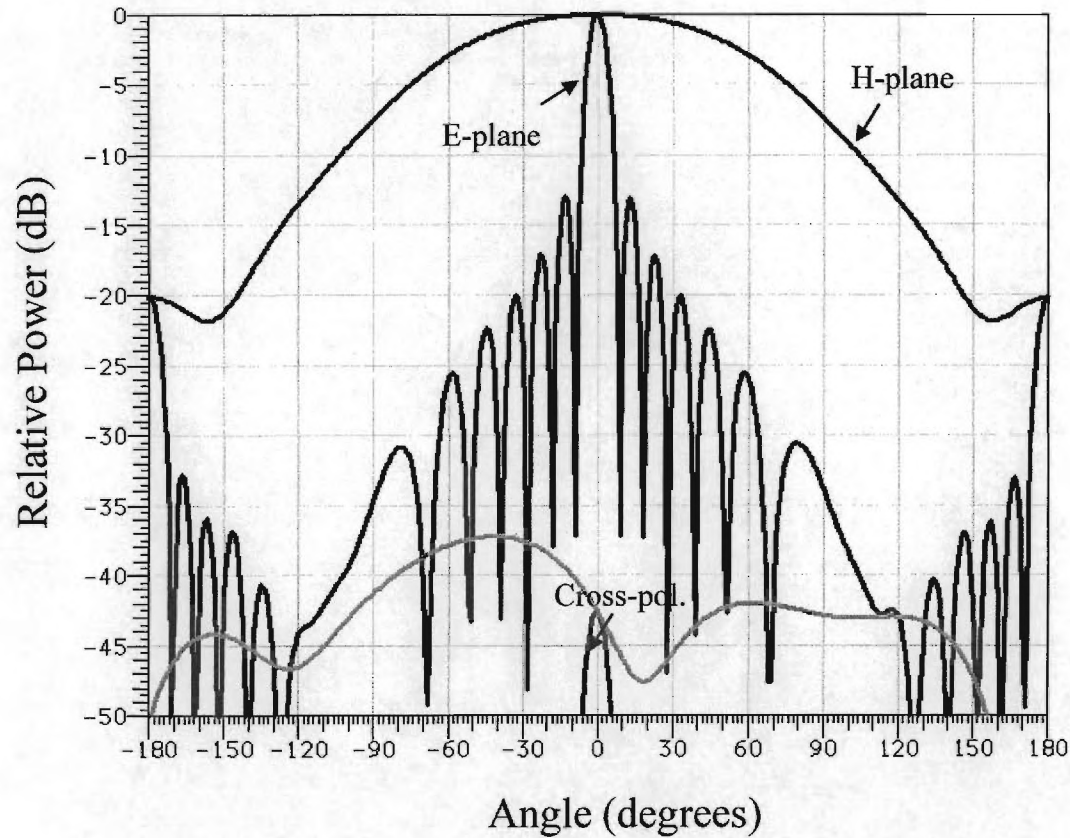
● Radiation patterns - No Radome



At 1.7 GHz  
(Directivity=15.0 dBi)

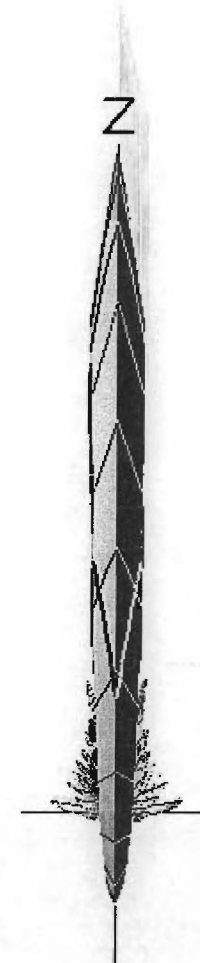
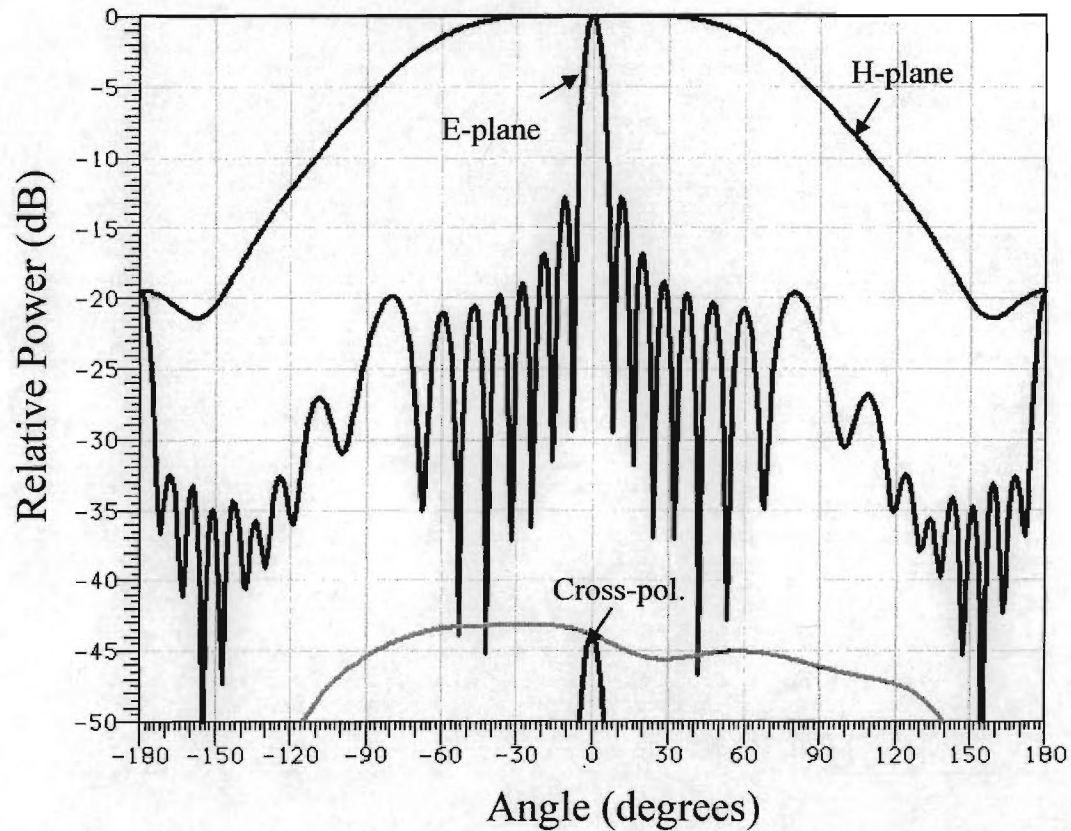


● Radiation patterns - No Radome



At 2.1 GHz  
(Directivity=15.6 dBi)

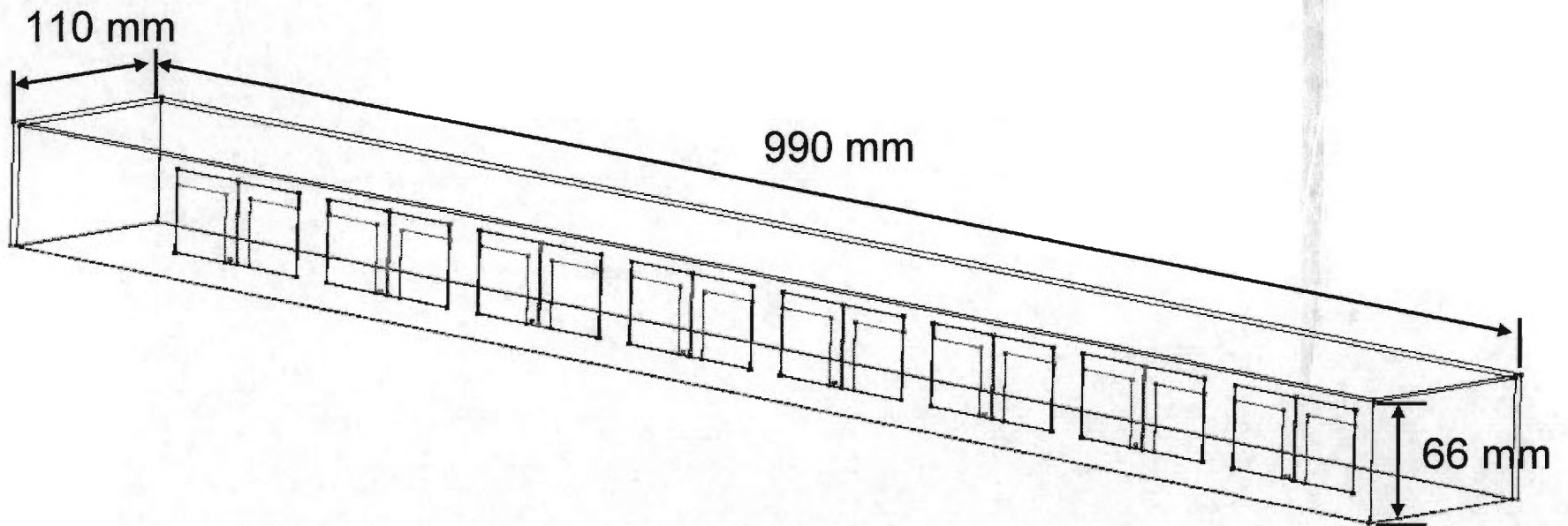
● Radiation patterns - No Radome



At 2.5 GHz  
(Directivity=15.4 dBi)

# 8-Element Antenna Array with Radome

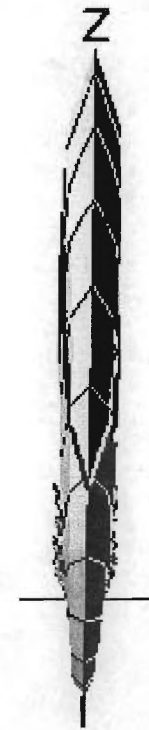
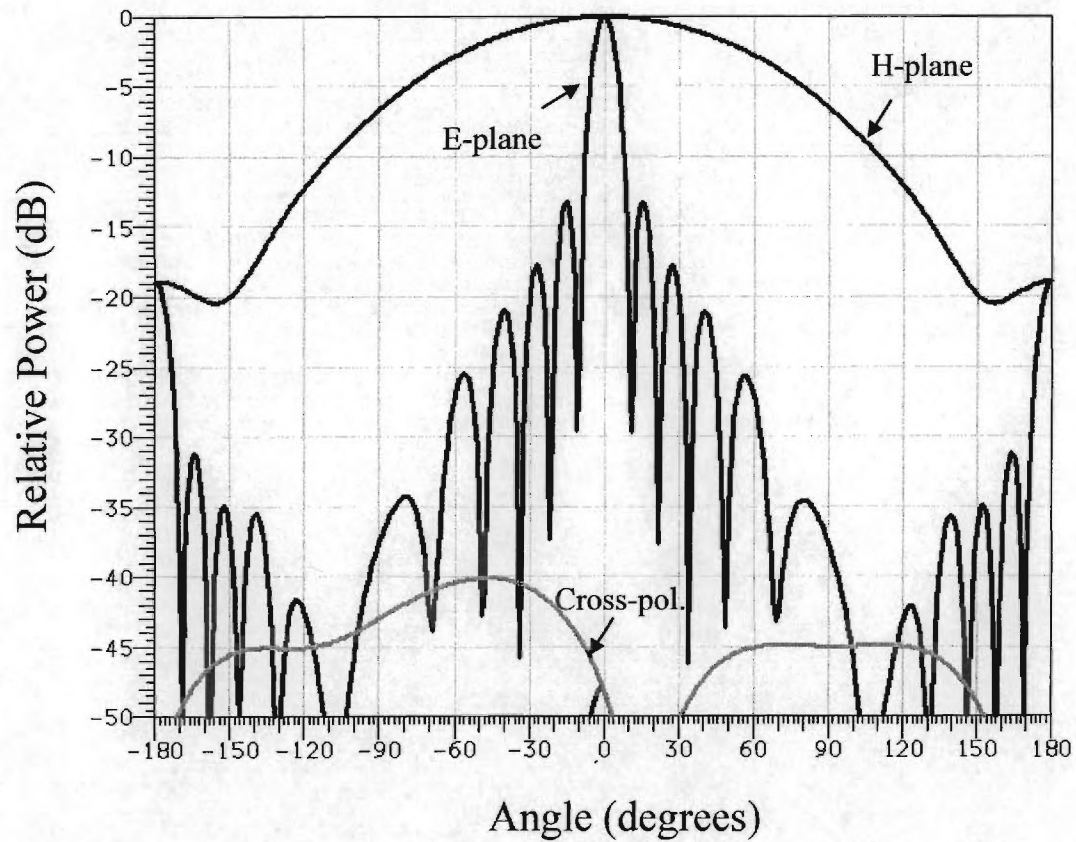
- Configuration



Radome Thickness=2.2 mm

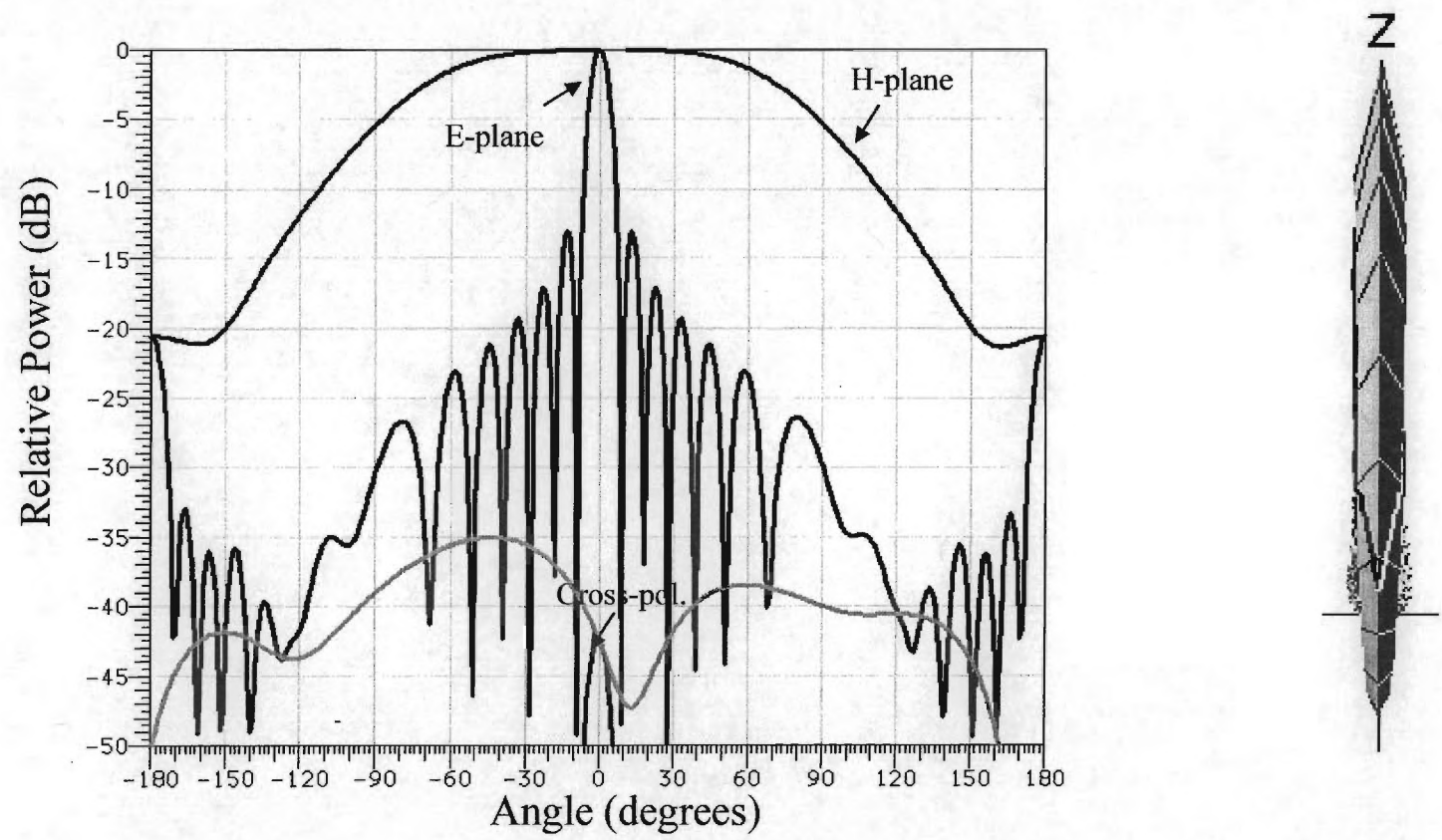
$$\epsilon_r=4.5$$

● Radiation patterns : With Radome



At 1.7 GHz  
(Directivity=14.9 dBi)

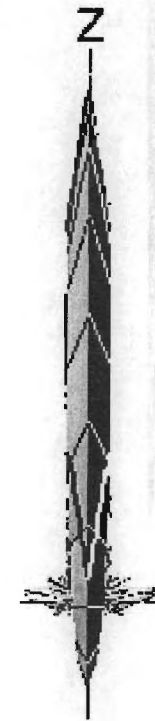
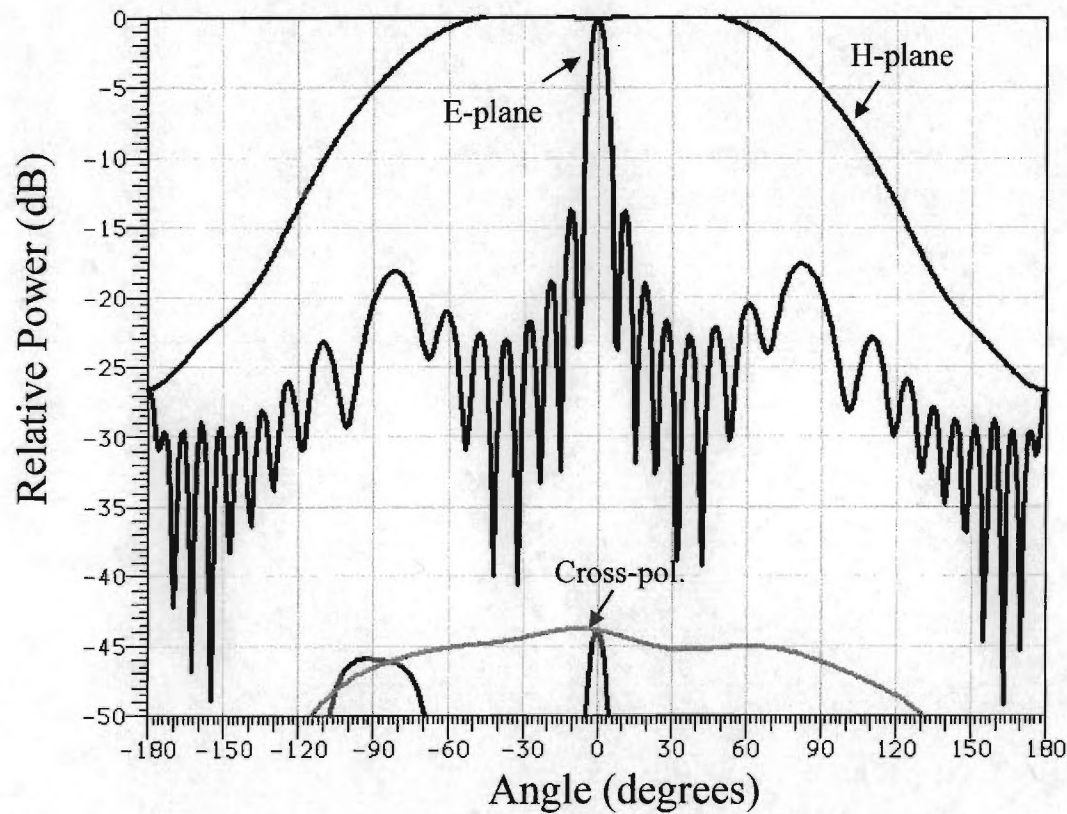
● Radiation patterns : With Radome



At 2.1 GHz  
(Directivity=14.8 dBi)



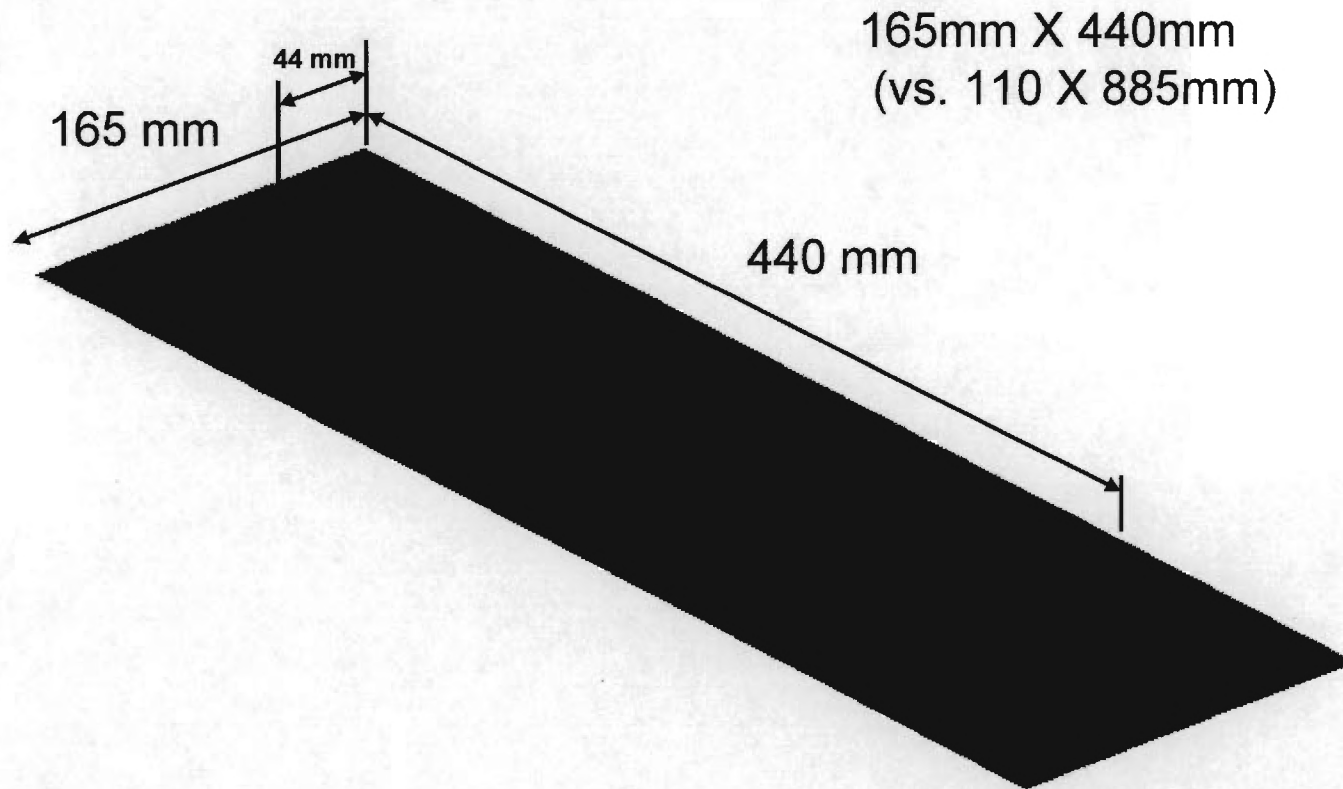
● Radiation patterns : With Radome



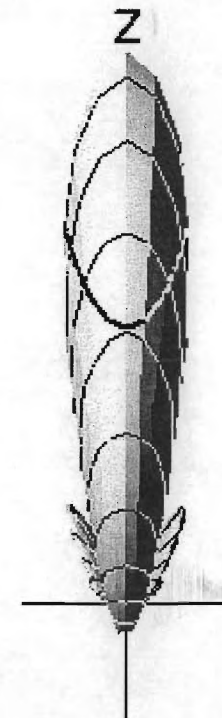
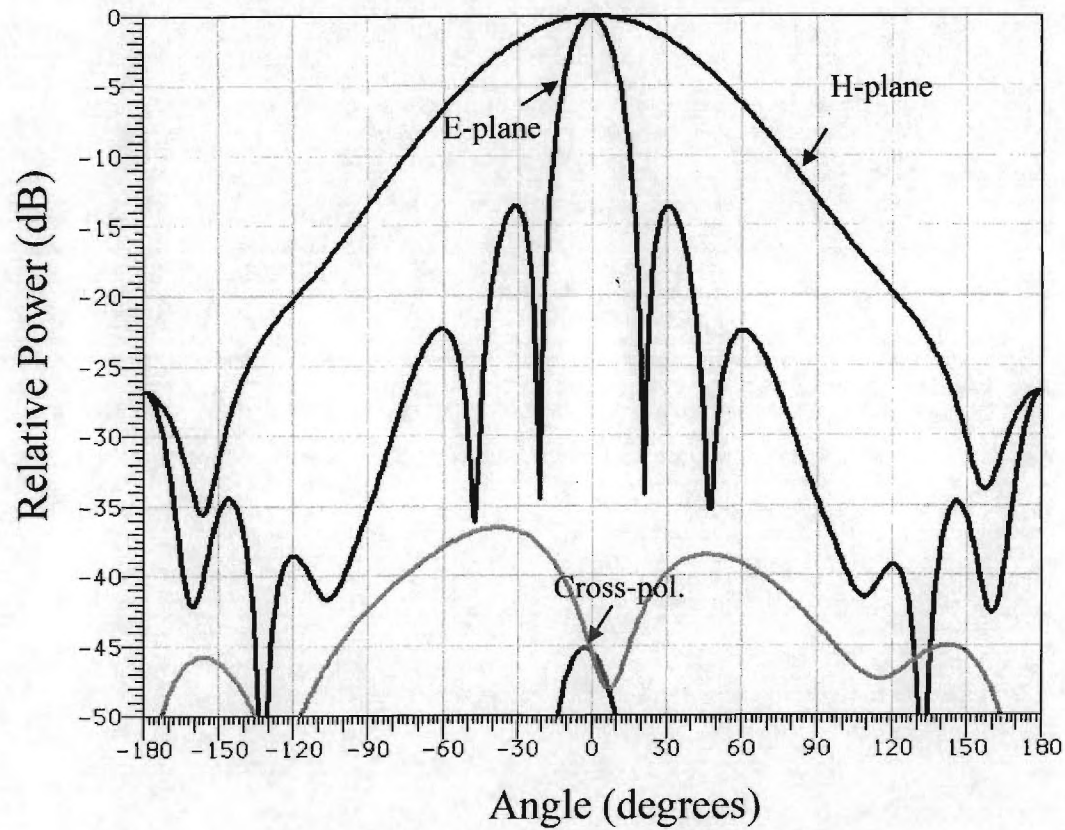
At 2.5 GHz  
(Directivity=15.5 dBi)

# 2x4-Element Antenna Array for miniaturization

- Configuration

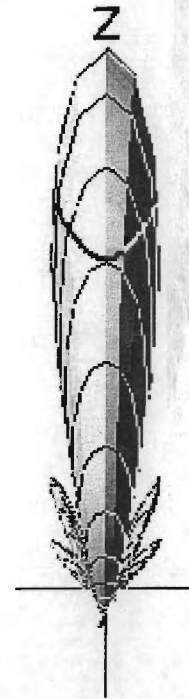
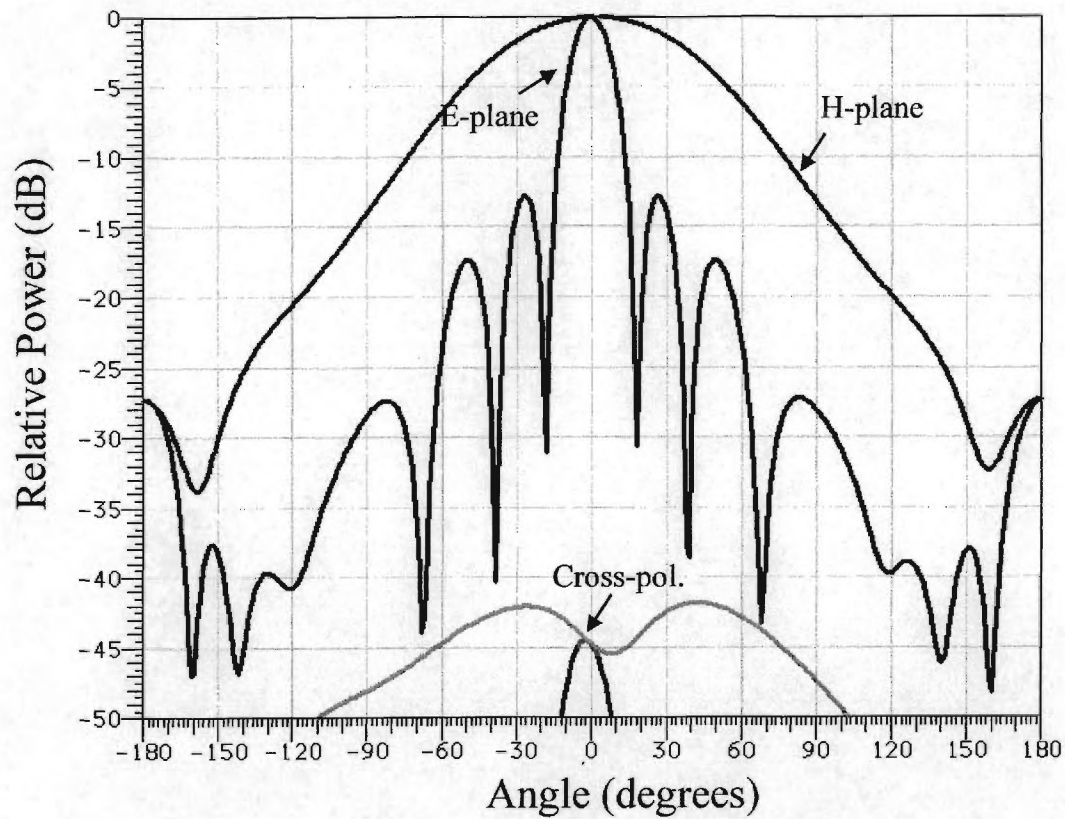


● Radiation patterns

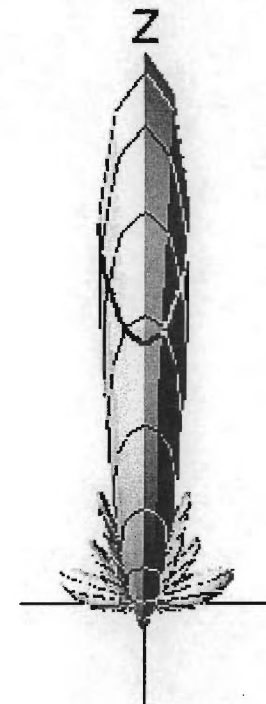
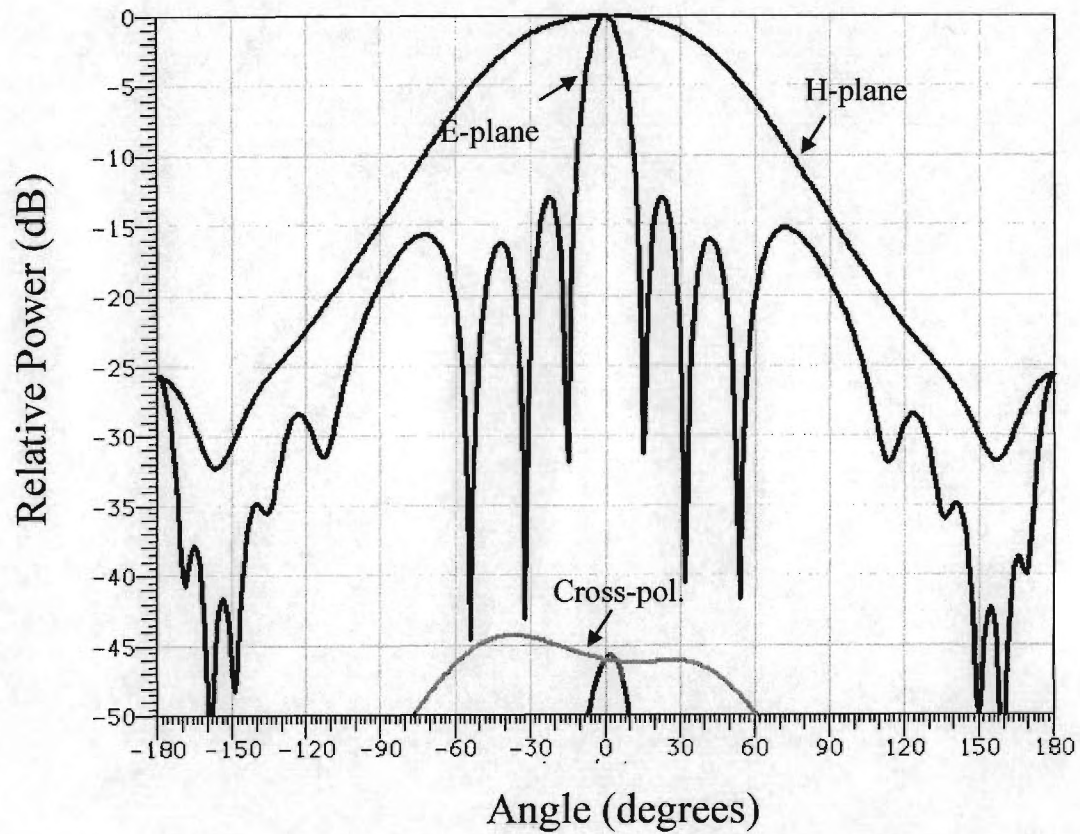


At 1.7 GHz  
(Directivity=13.8 dBi)





At 2.1 GHz  
(Directivity=14.3 dBi)

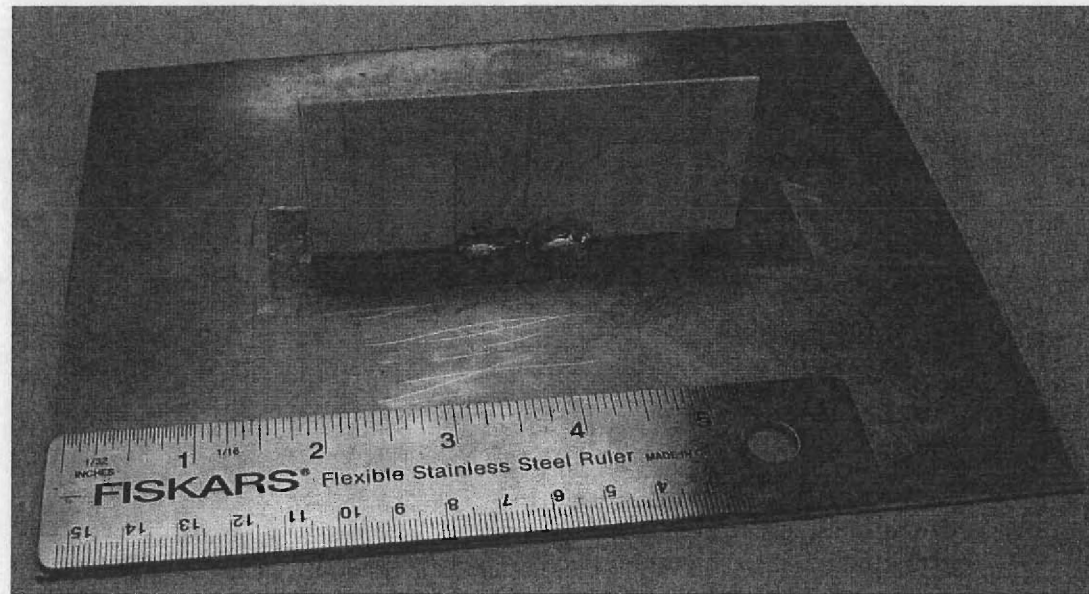


At 2.5 GHz  
(Directivity=14.5 dBi)

# Result of the fabricated Antenna Array

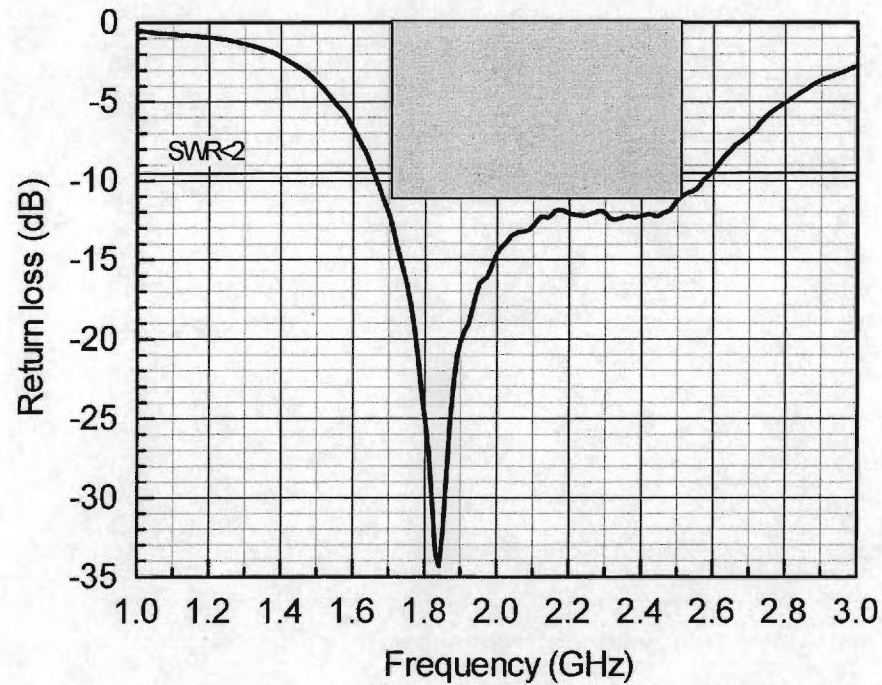
# Antenna Element

- Prototype



# Antenna Element

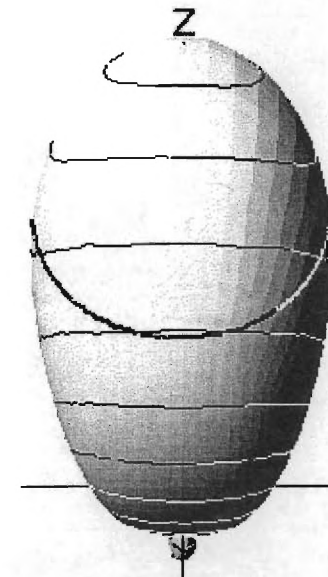
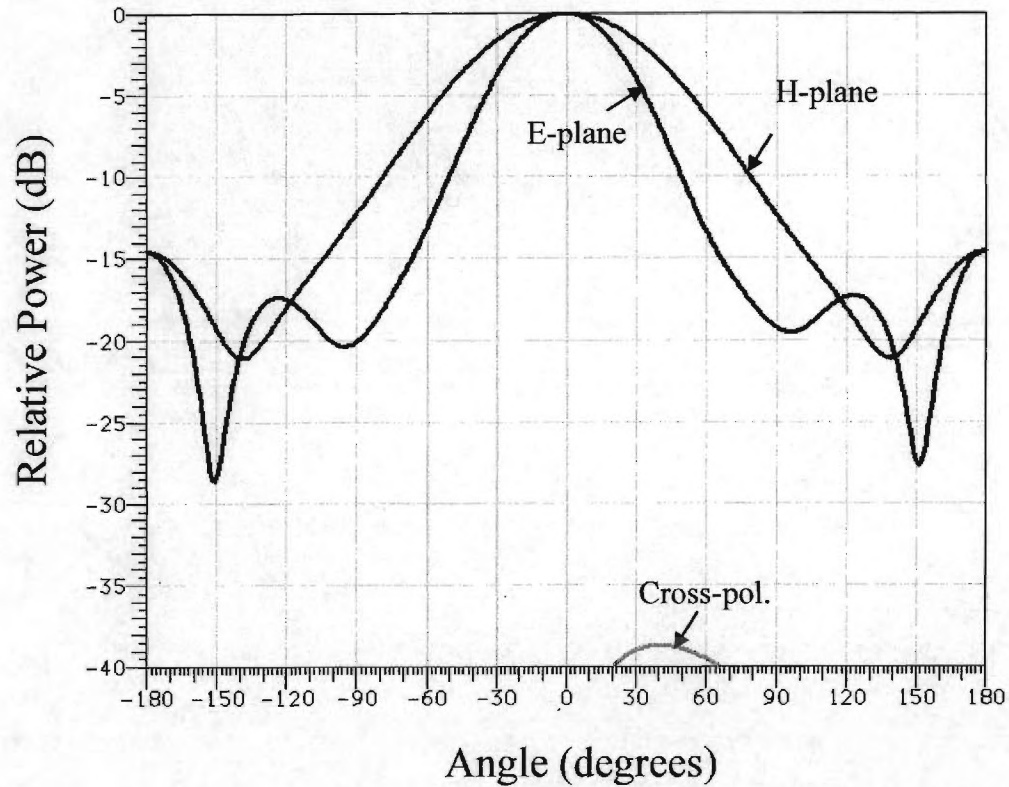
- Measured return loss



Design Frequency: 1.71-2.5 GHz

# Antenna Element

- Radiation patterns (to be measured)

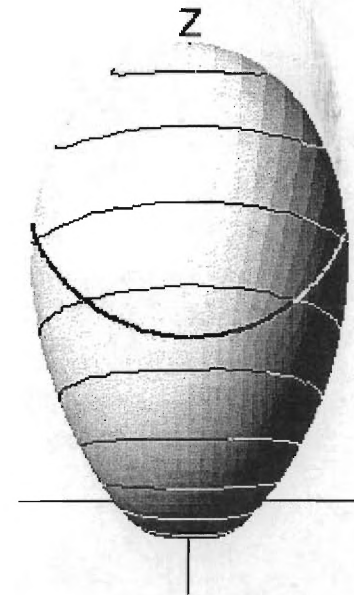
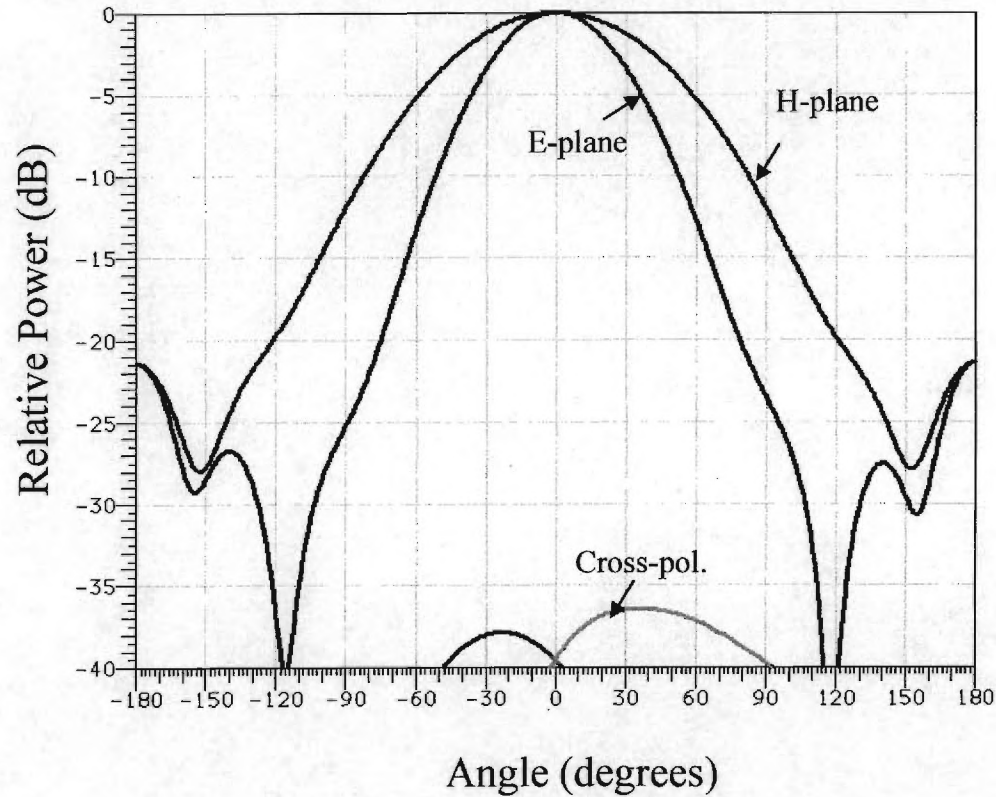


At 1.7 GHz



# Antenna Element

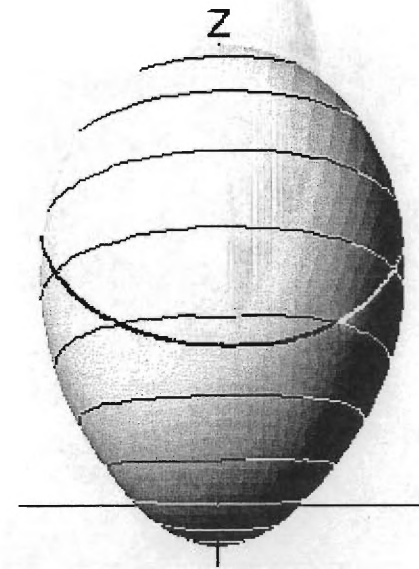
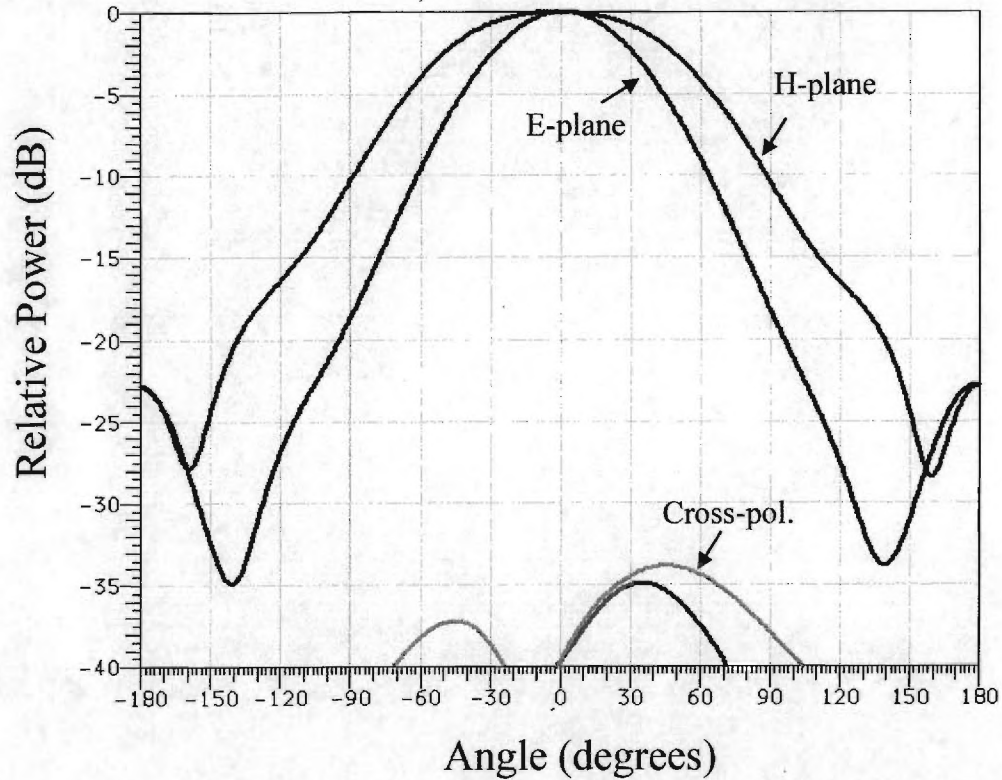
- Radiation patterns (to be measured)



At 2.1 GHz

# Antenna Element

- Radiation patterns (to be measured)

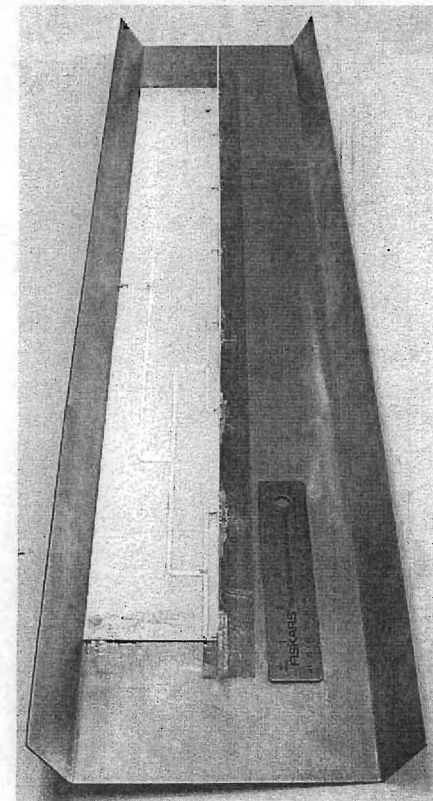
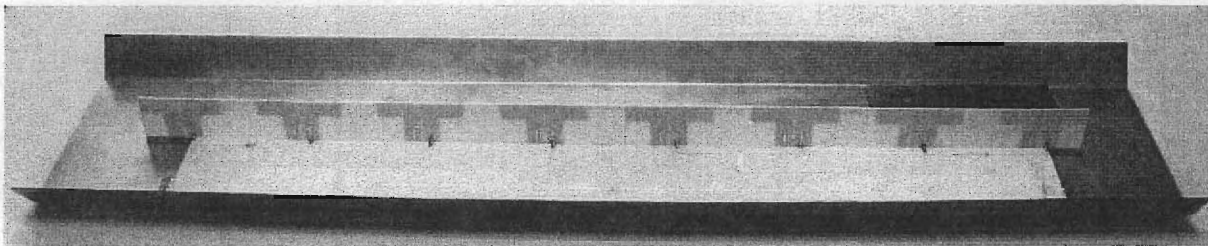
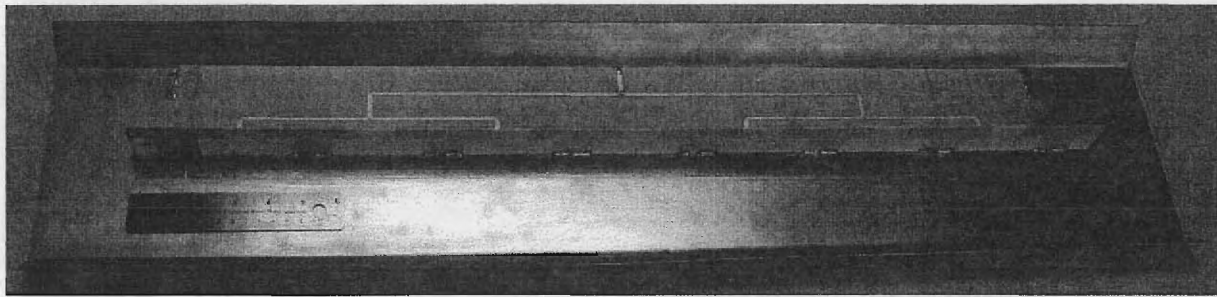


At 2.1 GHz



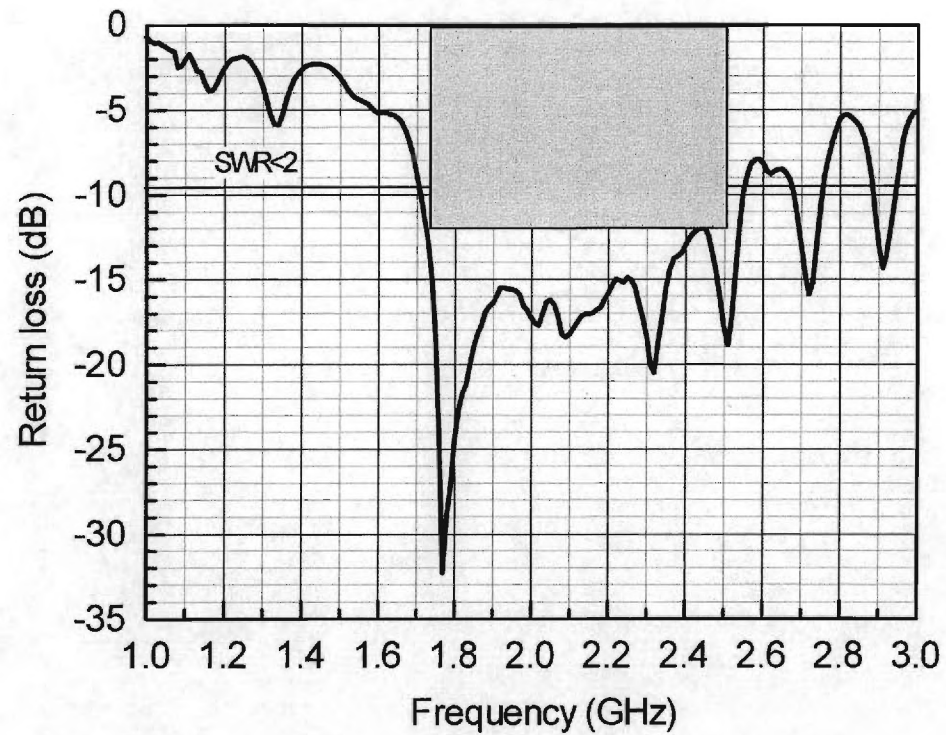
# 1×8-Element Antenna Array

- Prototype



# 1×8-Element Antenna Array

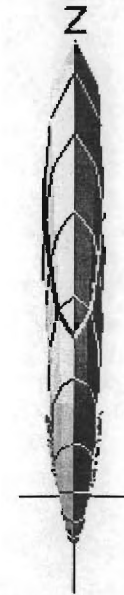
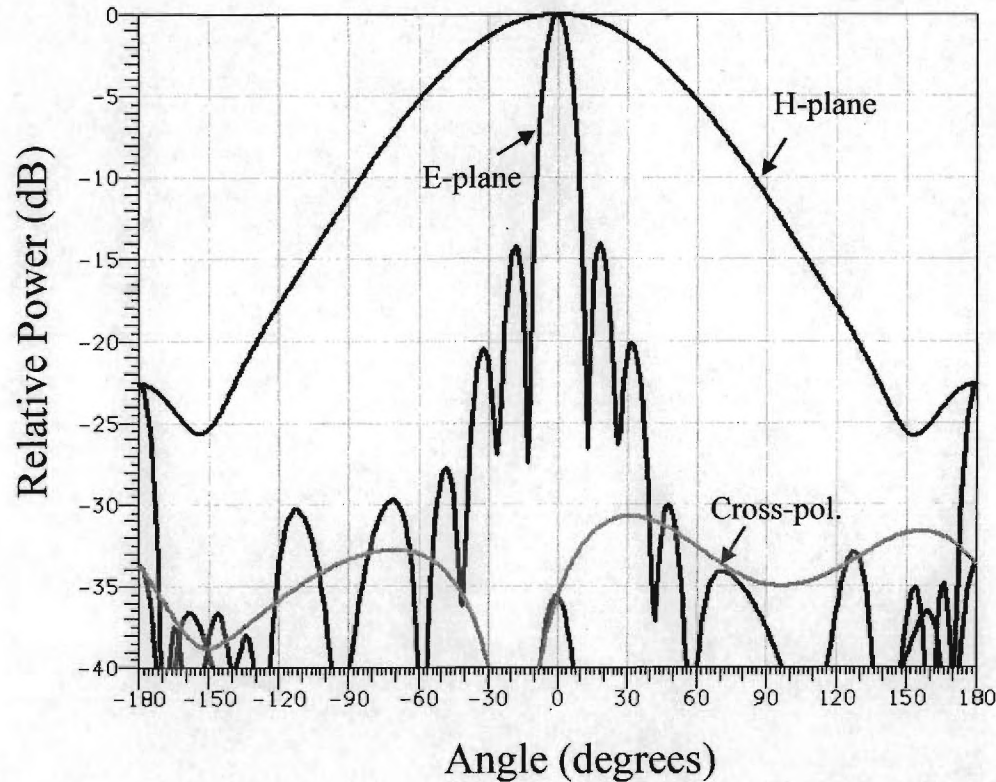
- Measured return loss



Design Frequency: 1.71-2.5 GHz

# 1×8-Element Antenna Array

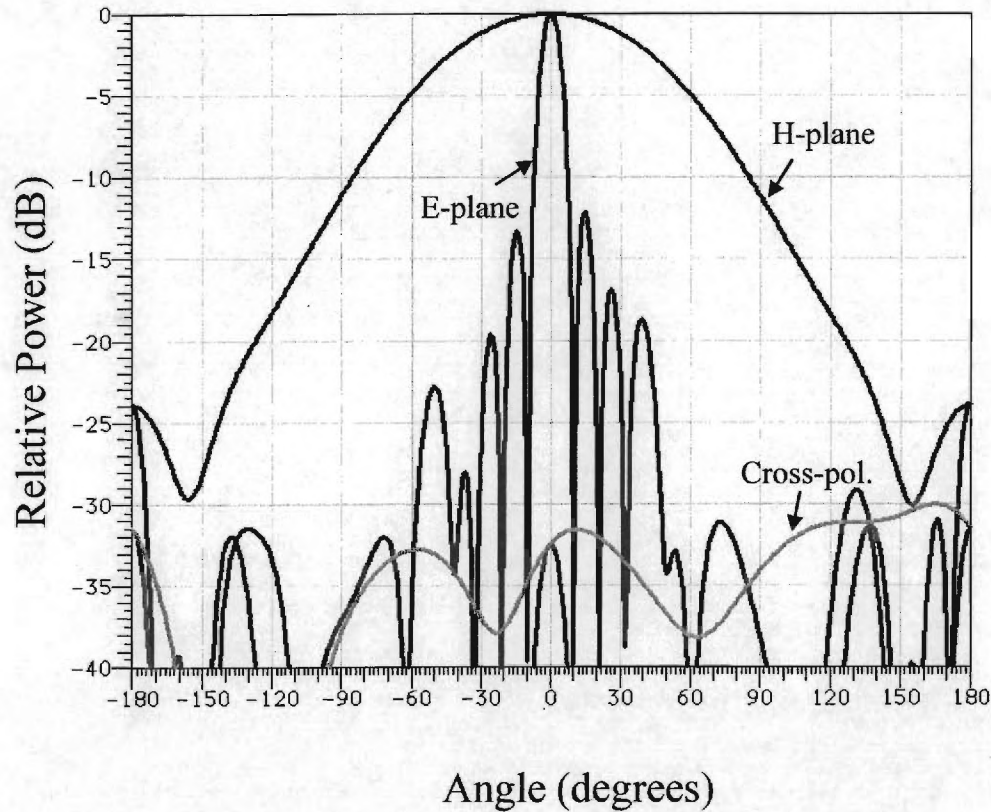
- Radiation patterns (to be measured)



At 1.7 GHz

# 1×8-Element Antenna Array

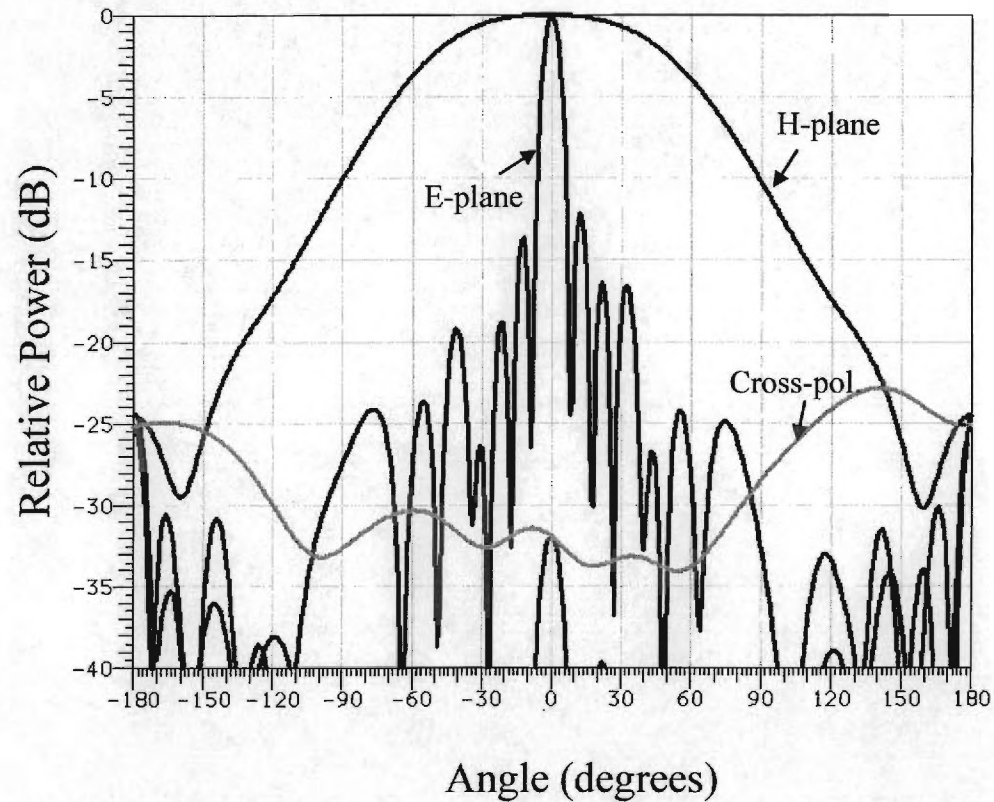
- Radiation patterns (to be measured)



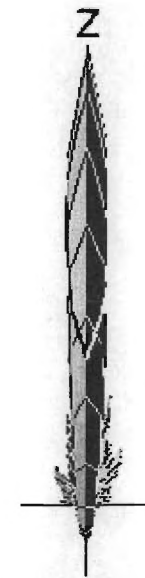
At 2.1 GHz

# 1×8-Element Antenna Array

- Radiation patterns (to be measured)



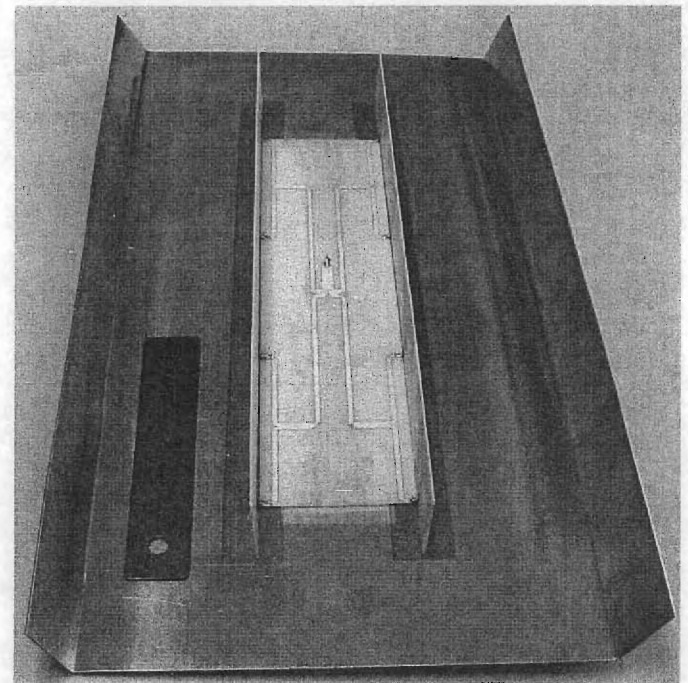
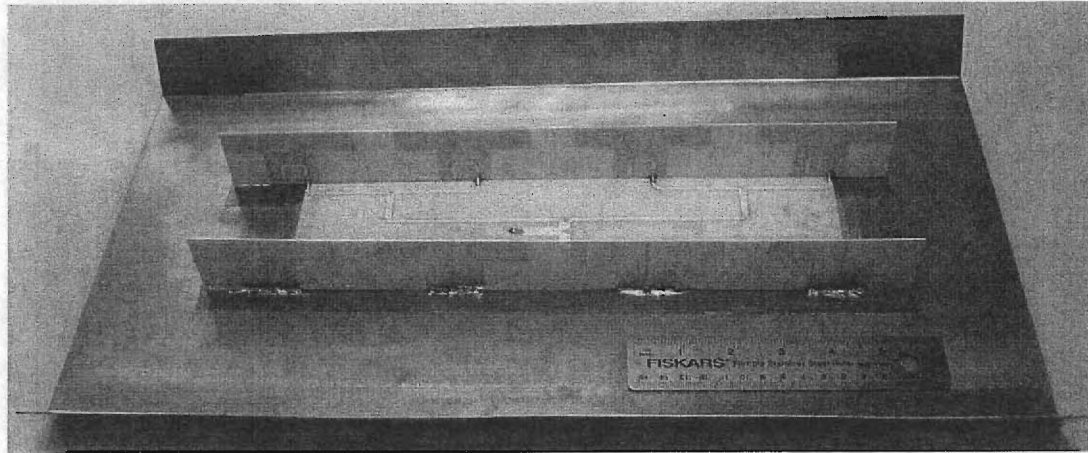
At 2.5 GHz





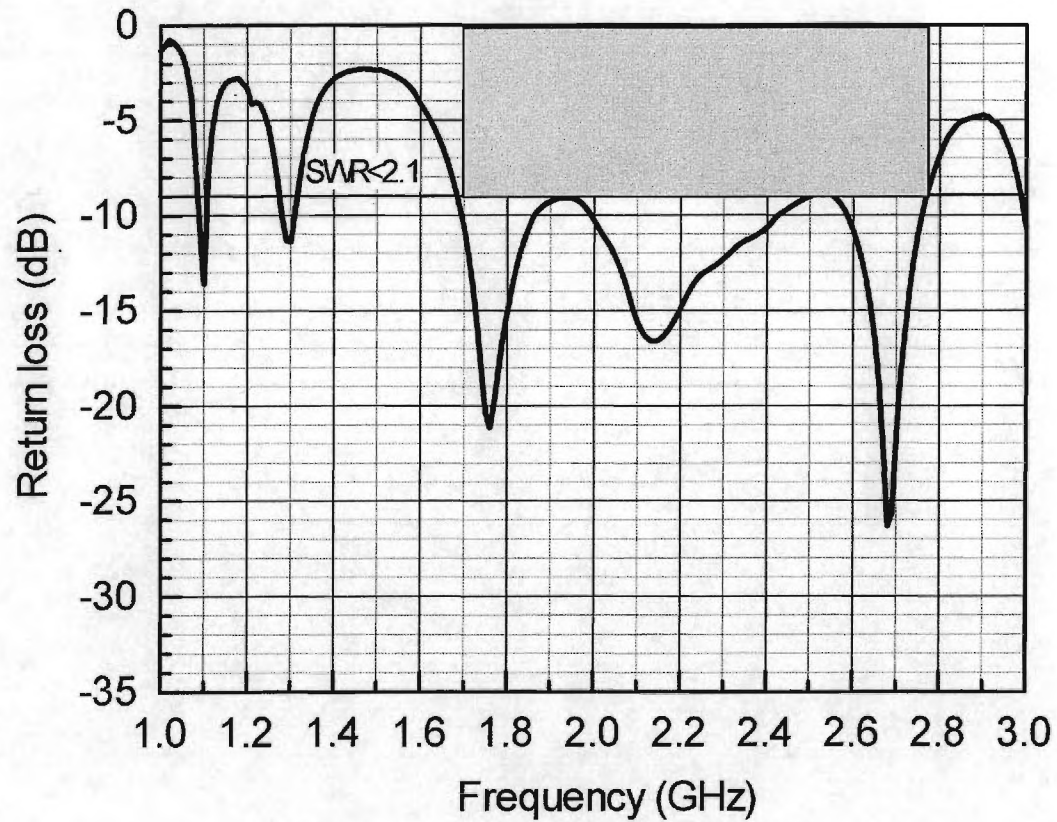
# 2×4-Element Antenna Array

- Prototype



# 2×4-Element Antenna Array

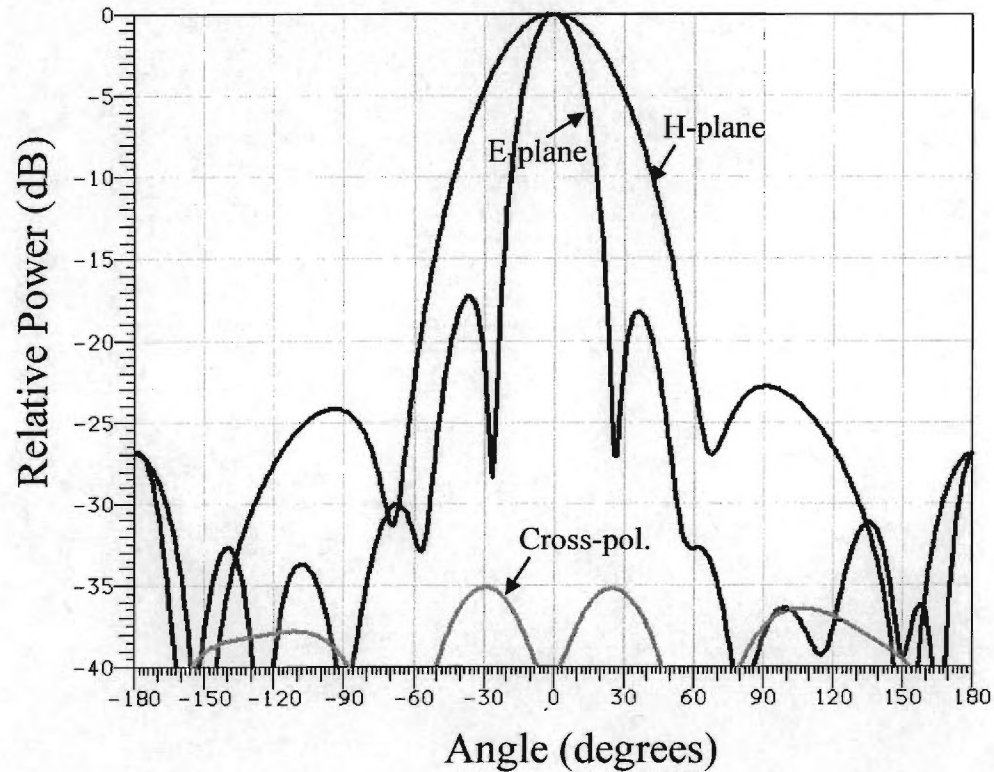
- Measured return loss



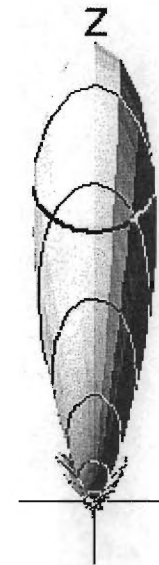
Design Frequency: 1.71-2.5 GHz

# 2×4-Element Antenna Array

- Radiation patterns (to be measured)



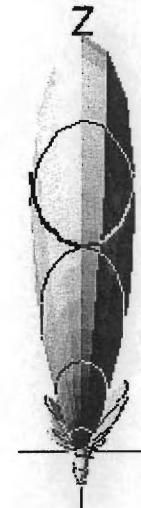
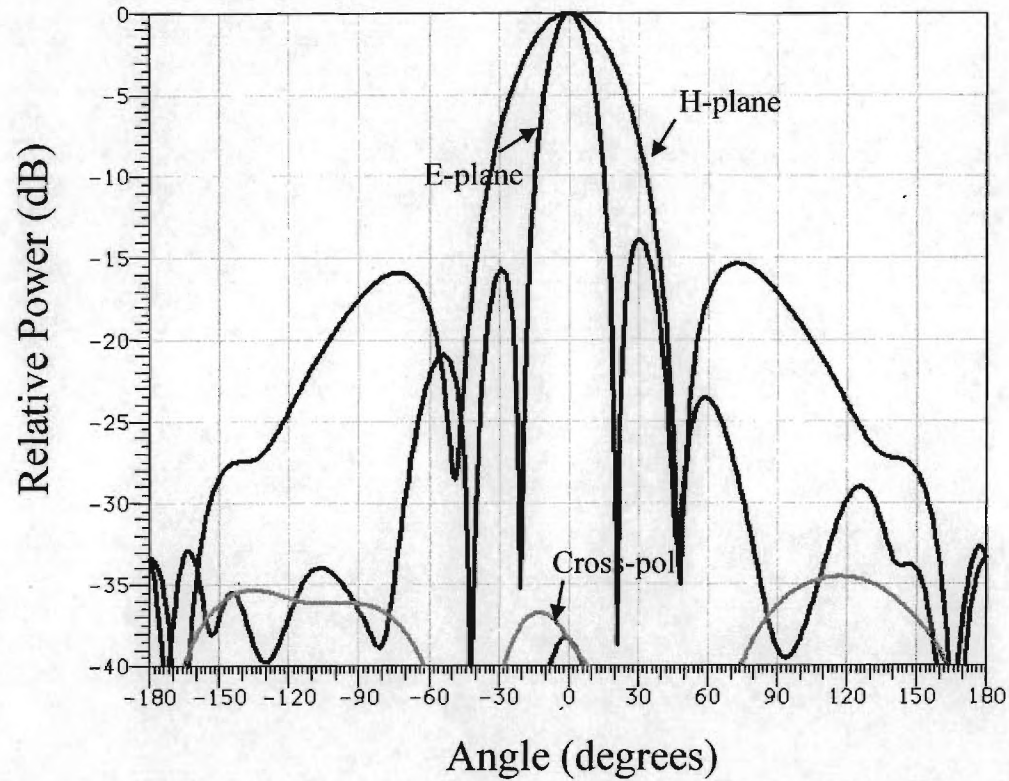
At 1.7 GHz





# 2×4-Element Antenna Array

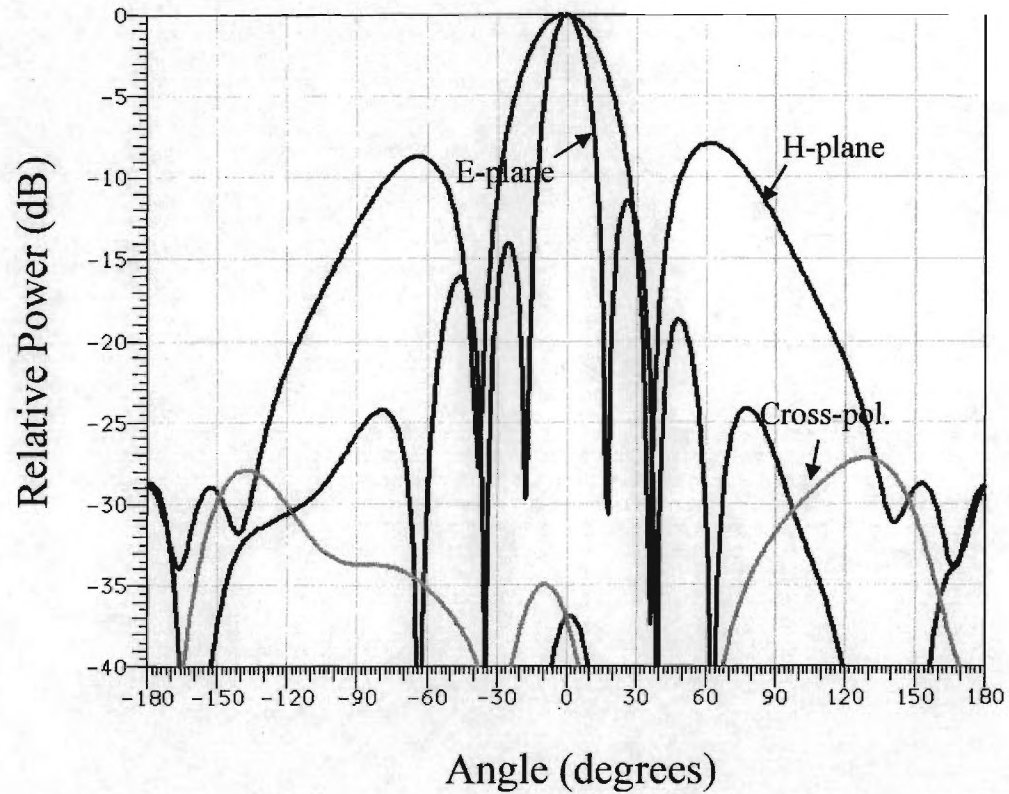
- Radiation patterns (to be measured)



At 2.1 GHz

# 2×4-Element Antenna Array

- Radiation patterns (to be measured)



At 2.5 GHz