

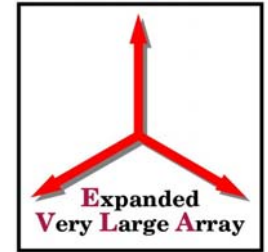
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# Ka-Band Feed Design and Prototype Tests

S. Srikanth  
NRAO/Charlottesville



# EVLA Receiver Bands



Band	Freq. (GHz)	Bandwidth Ratio	Feed Type
L	1-2	2:1	Compact Horn
S	2-4	2:1	Compact Horn
C	4-8	2:1	Compact Horn
X	8-12	1.5:1	Linear Taper Horn
Ku	12-18	1.5:1	Linear Taper Horn
K	18-26	1.44:1	Linear Taper Horn
<b>Ka</b>	<b>26-40</b>	<b>1.53:1</b>	<b>Linear Taper Horn</b>
Q	40-52	1.3:1	Linear Taper Horn

Note: All horns are corrugated horns.

# Ka-Band Feed Details

Aperture ID = 5.44 ( $15.2\lambda$ )

Aperture OD = 6.25

Length = 14.3 ( $40\lambda$ )

Input Dia. = 0.352

$\Theta$  input =  $8^\circ$

$\Theta$  feed =  $10.83^\circ$

(all dimensions = inches)

## Corrugations

Total = 181

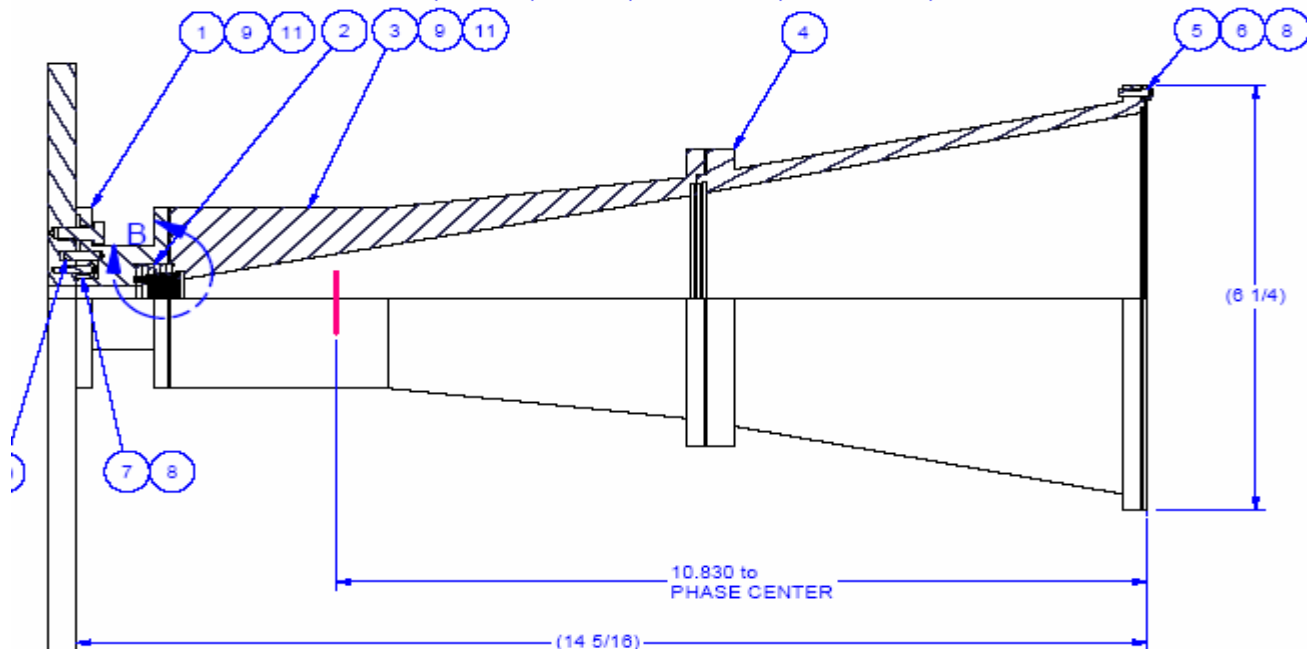
Ring-loaded = 5

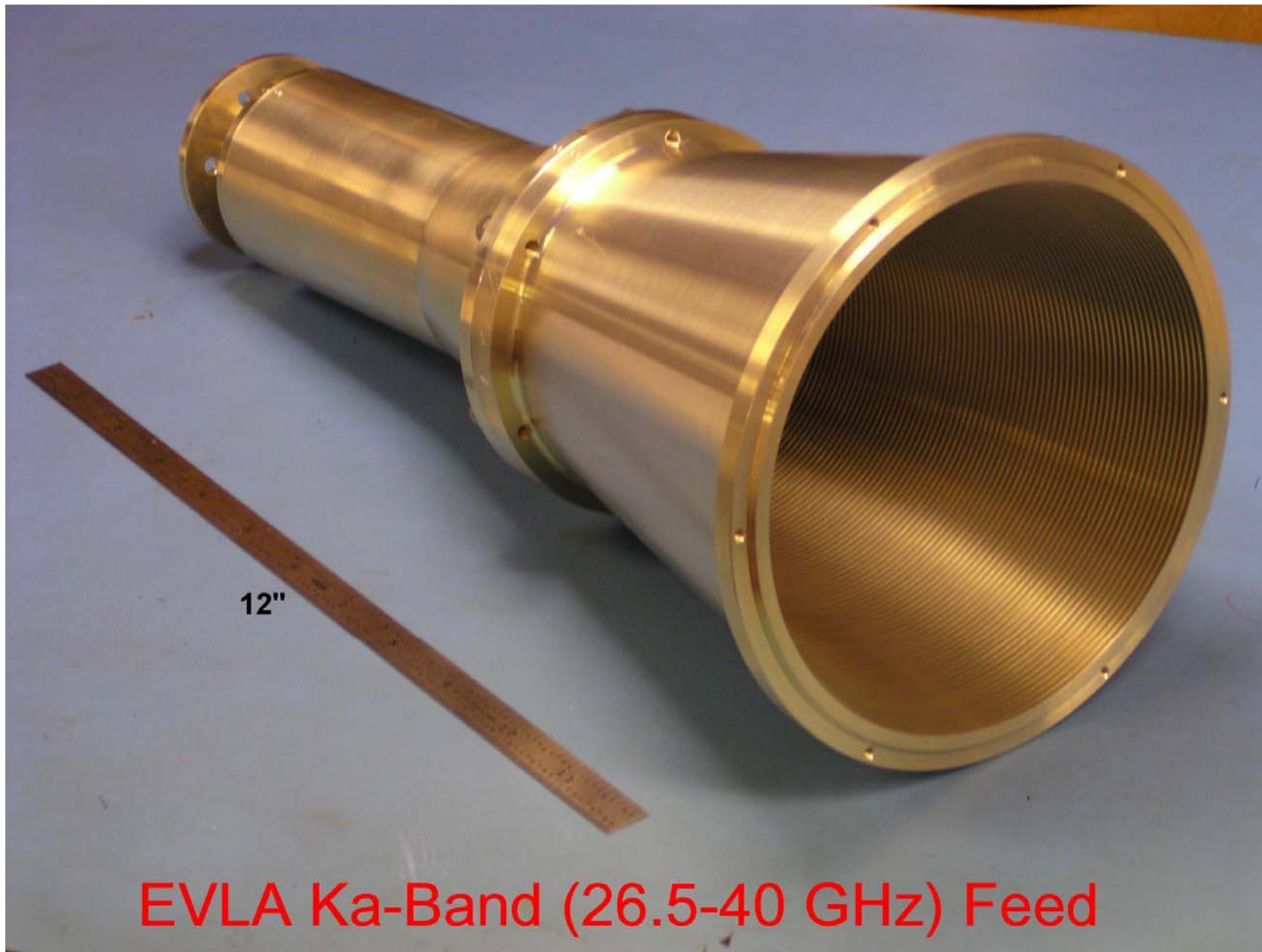
Pitch = 0.074

Flange width = 0.024

Corrug. width = 0.050

No. per  $\lambda$  = 4.8

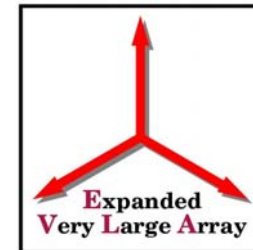




EVLA Ka-Band (26.5-40 GHz) Feed



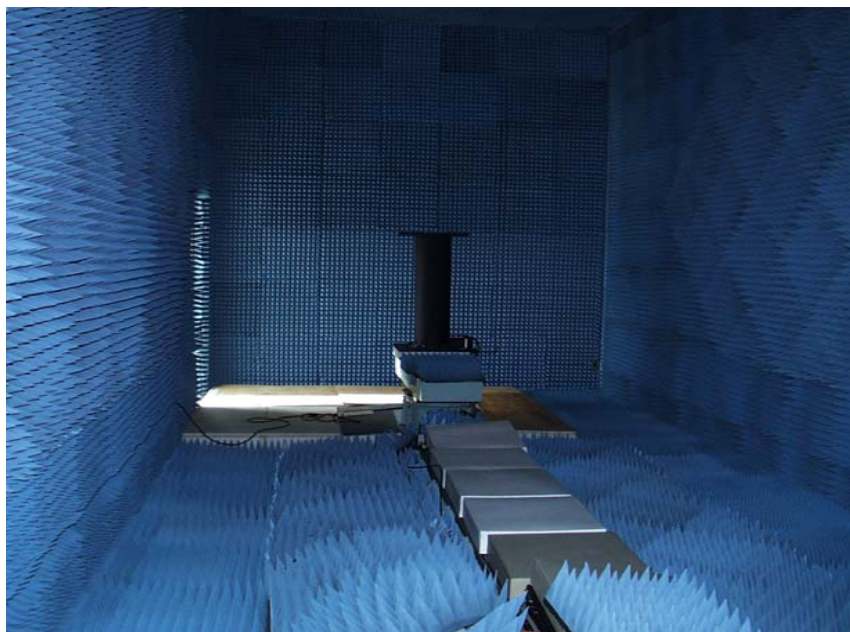
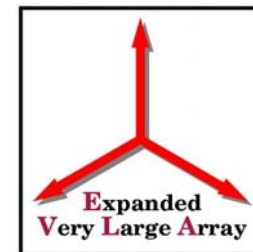
# NRAO Anechoic Chamber Antenna Range



- 8 GHz to 115 GHz
- 37' x 15' x 15'
- 8" pyramidal absorbers - center of walls
- 6" pyramidal absorbers - others
- 2' sphere quiet zone 7 ¼' from rear & side walls
- 2 to 50 GHz 8530A receiver (Agilent Technologies)
- 60 to 115 GHz Oleson Microwave mm heads
- 8360B synthesized sweeper
- Positioner/controller hardware & software ORBIT/FR

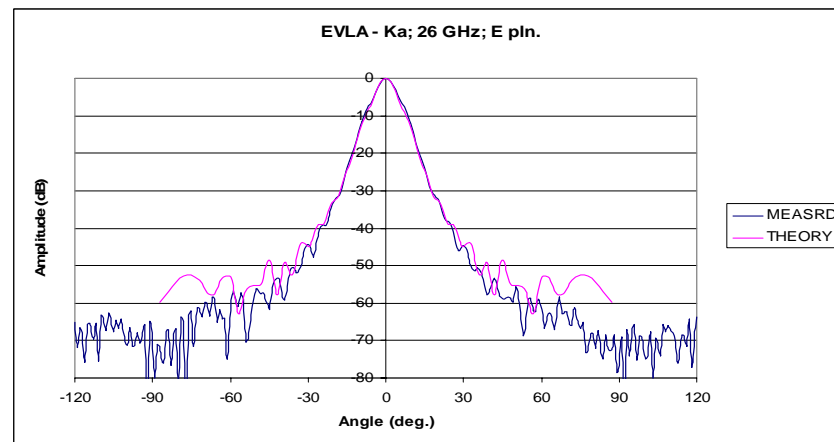
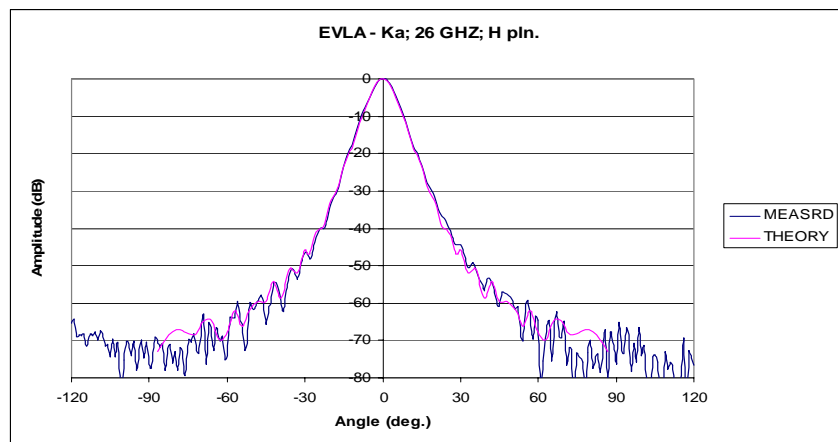
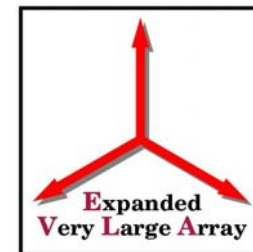


# NRAO Anechoic Chamber Antenna Range



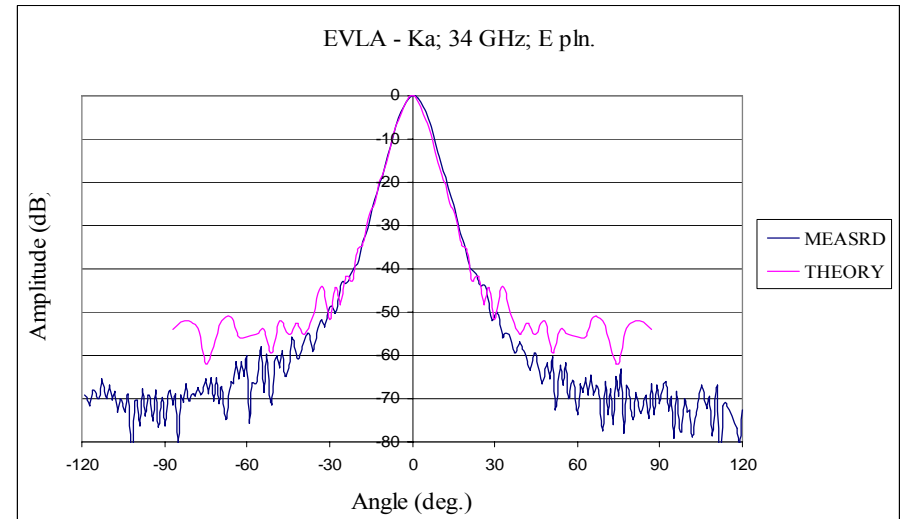
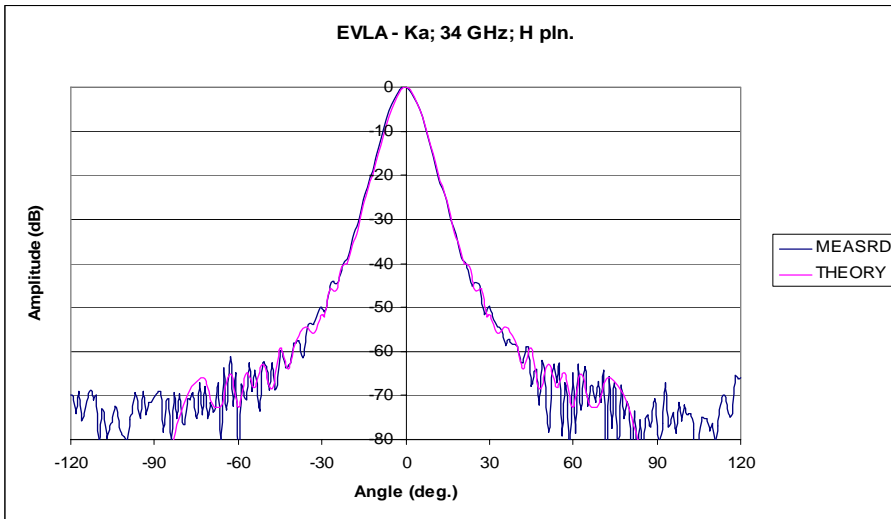
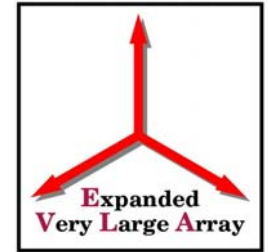


# Theory & Measured 26 GHz





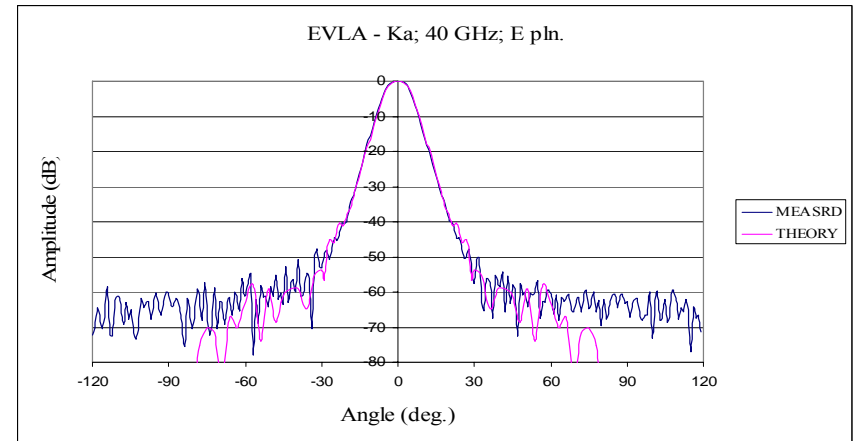
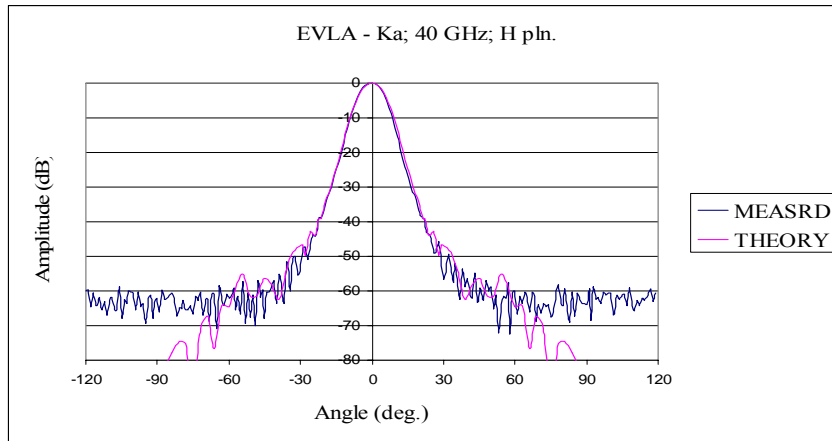
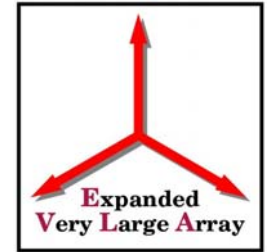
# Theory & Measured 34 GHz





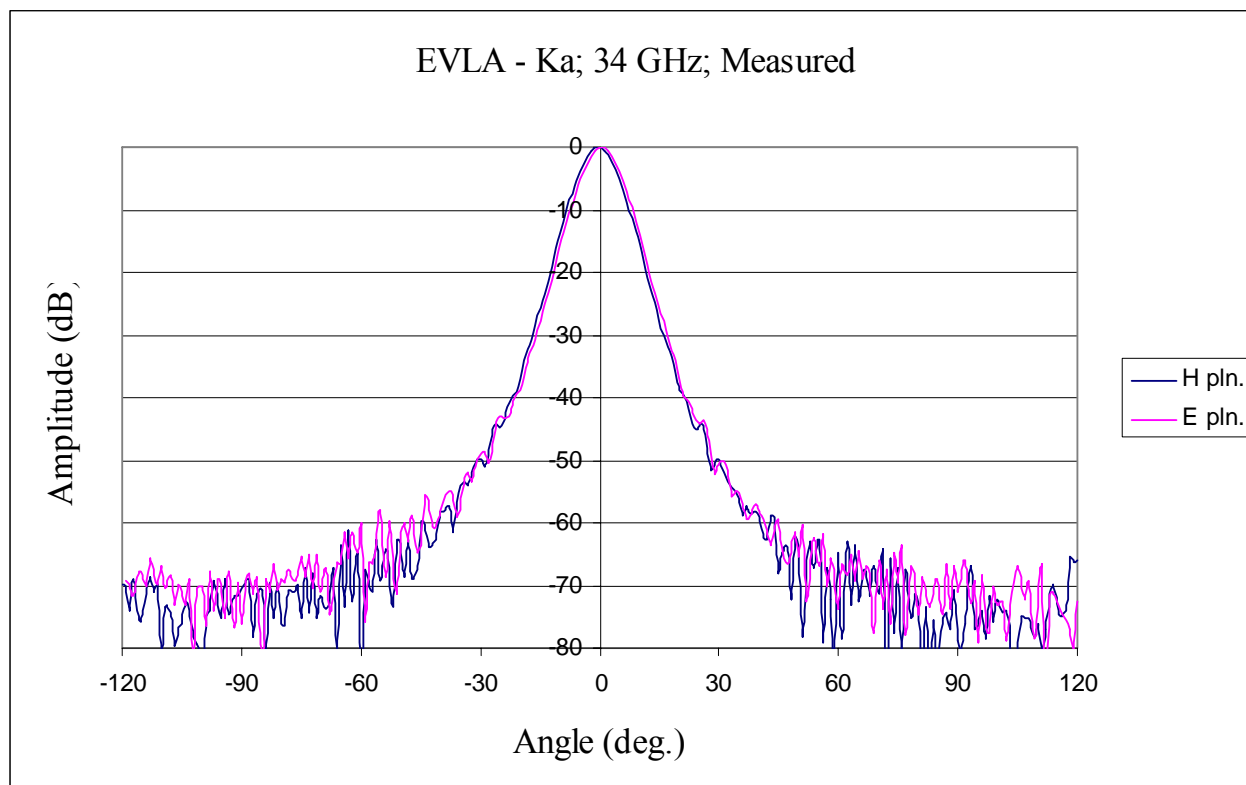
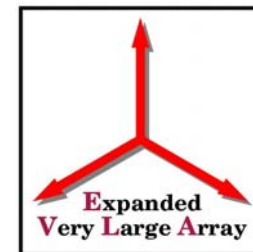


# Theory & Measured 40 GHz



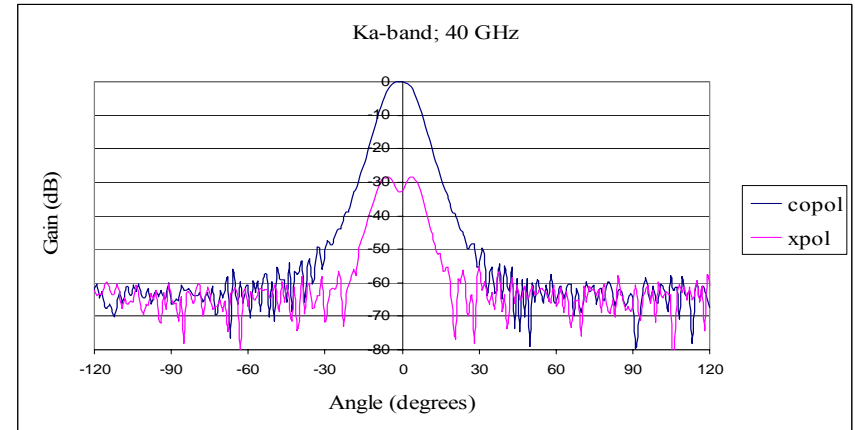
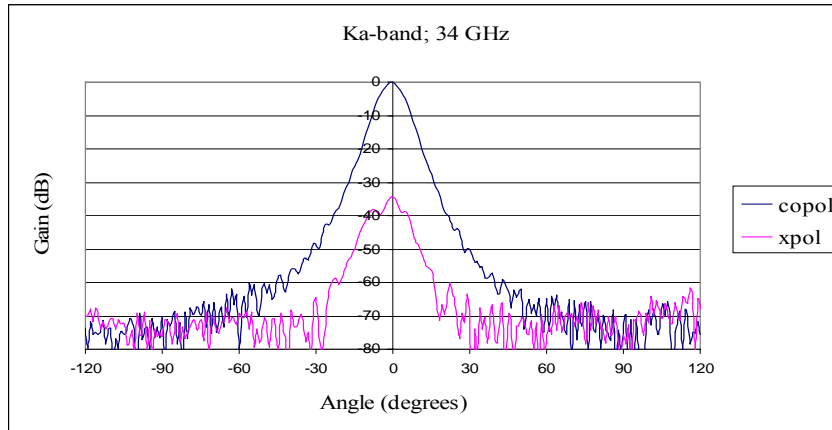
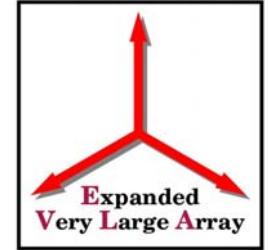


# Measured E- & H-Plane Patterns - 34.0 GHz



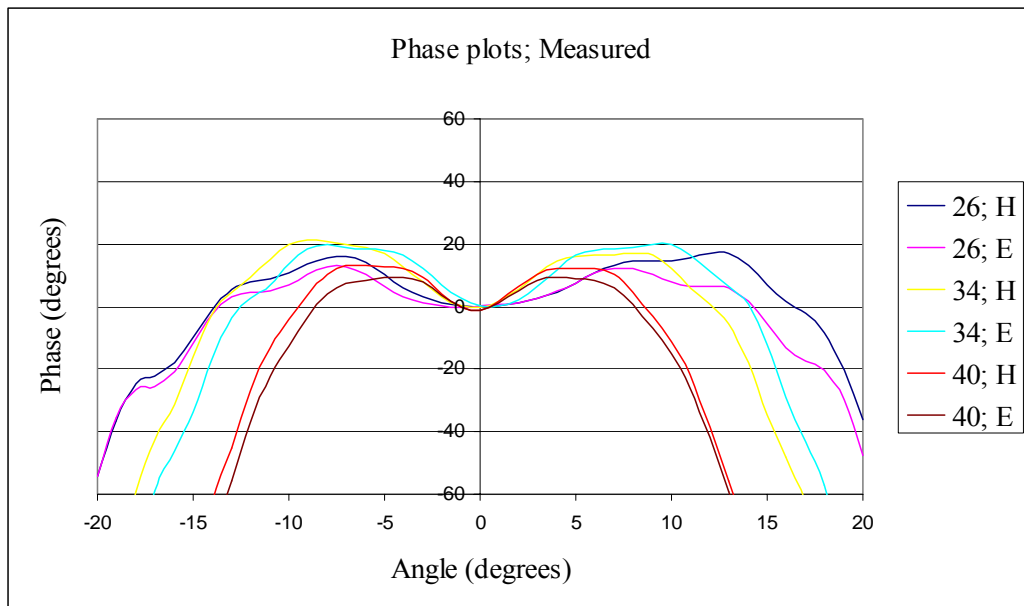
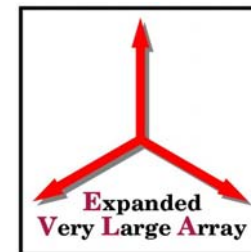


# Co- & X-Polarized Field Patterns - Measured





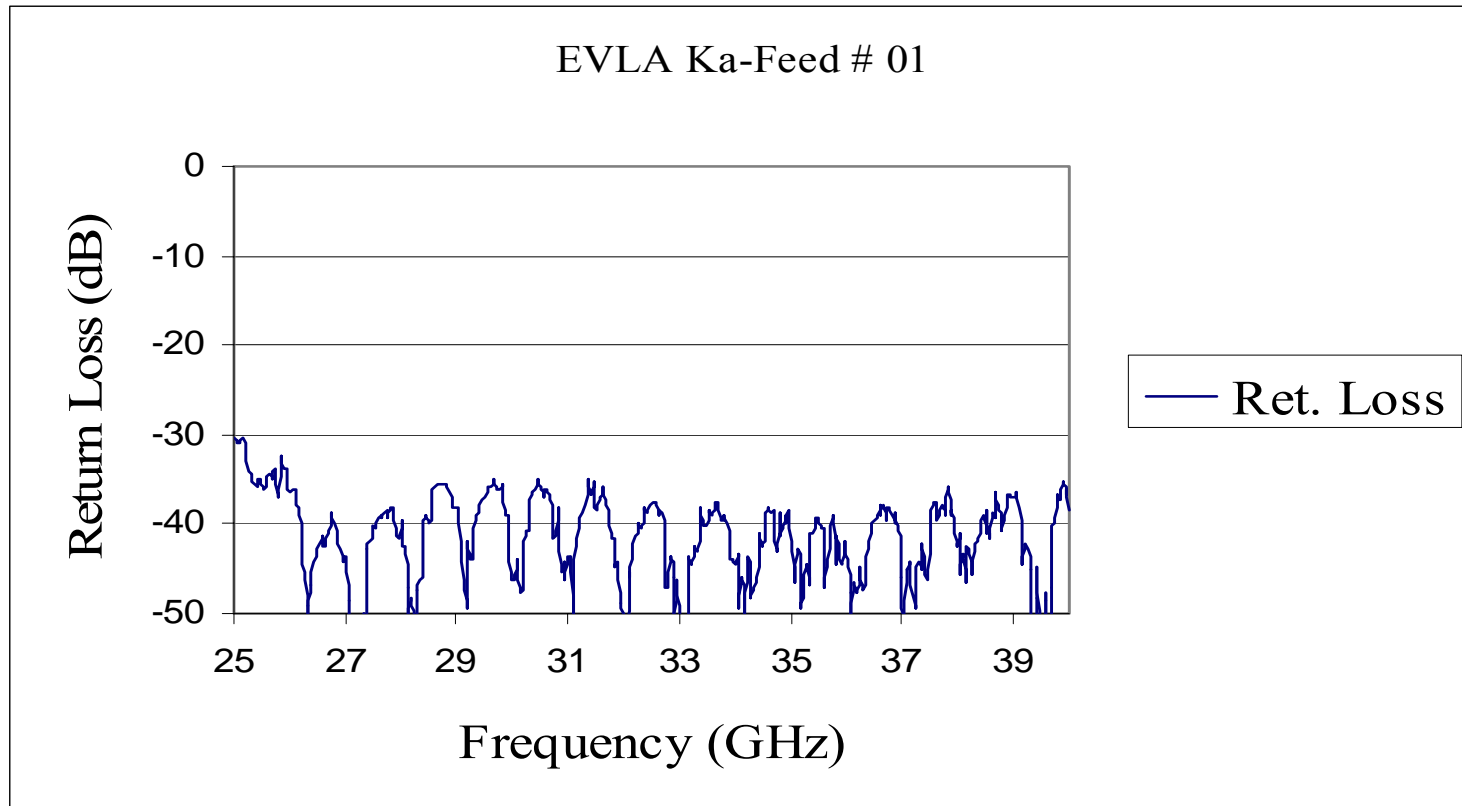
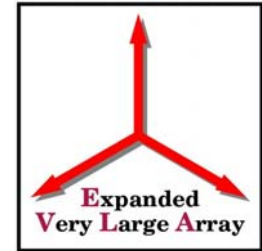
# Measured Phase Patterns



Phase Center Distance (ins)		
Freq. GHz	Meas.	Theory
26.0	8.8	10.3
34.0	10.8	11.8
40.0	12.4	12.6

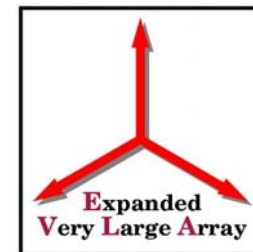


# Measured Return Loss





# Ka-Band Feed Summary



Freq (GHz)	Taper at 9.3° (dB)		X-pol max
	H-plane	E-plane	
26	-12.0	-12.0	-28.3
28	-12.7	-12.8	-31.2
30	-12.7	-12.9	-31.6
32	-13.1	-13.2	-31.6
34	-13.2	-13.4	-35.9
36	-12.9	-13.2	-37.2
38	-13.3	-12.3	-37.3
40	-11.3	-11.8	-28.6
Avg.	-12.7	-12.7	