EVLA Front Ends
• 1 – 50 GHz Coverage
• In 8 Bands
• Dual Circular Polarization
OMTs

Quad-ridge

Bøifot Symmetric Junction
Bands 1 – 2, 2 – 4, 4 – 8
Quad-Ridge OMT & 90° Hybrid
Design Scaled for frequency
Commercial Stripline Hybrids
Bands 12 – 18, 18 – 26, 26 – 40
Corrugated Phase Shifter
Bøifot OMT
18 – 26 GHz in Production Now.
Band 8 – 12
Quad-ridge or Bøifot; depends on size.

Band 45 – 50
Sloping Septum, in Production Now.
Cost per Receiver

Receiver Cost

k$
Advice Sought:

Octave Bandwidth Quad-Ridge OMT

“Headroom”

MMICS
Critical Areas

Octave Bandwidth

2:1 at ~20 dB has been done.

Higher Modes

Above cutoff: affect beam

Below cutoff: “suckouts”

TE$_{21L}$ most troublesome
Quad-Ridge OMT

Design Approach:
Circular-to-Quad-Ridge Waveguide:
  treat as impedance transformer
Quad-Ridge to Coax:
  design for match
Q-R OMT Modes

Trapped Modes
Q \sim 1000
Coupling fairly weak, \sim -25 \text{ dB}
Effect on beam?
“one-pass” loss \sim 0.014 \text{ dB}
Shorting Pins at $\lambda/4$

Short out TE11 modes

Pass TE21$_L$ mode to absorber

Assures one-pass for TE21$_L$
Headroom

What is it?

How Defined? (TOIP? 1dB? 1%?)

How Measured?

How Much Do We Need?

“As much as we can get, or...”
Headroom Against What?
Narrow-Band
Pulsed
Noise-like
Component Variations
How Much Can We Afford?

Dollars

Tsys

Size and Power Dissipation
MMIC Solution for a High Dynamic Range “Solar” Capable Receiver
⇒ Ka-Band ⇐