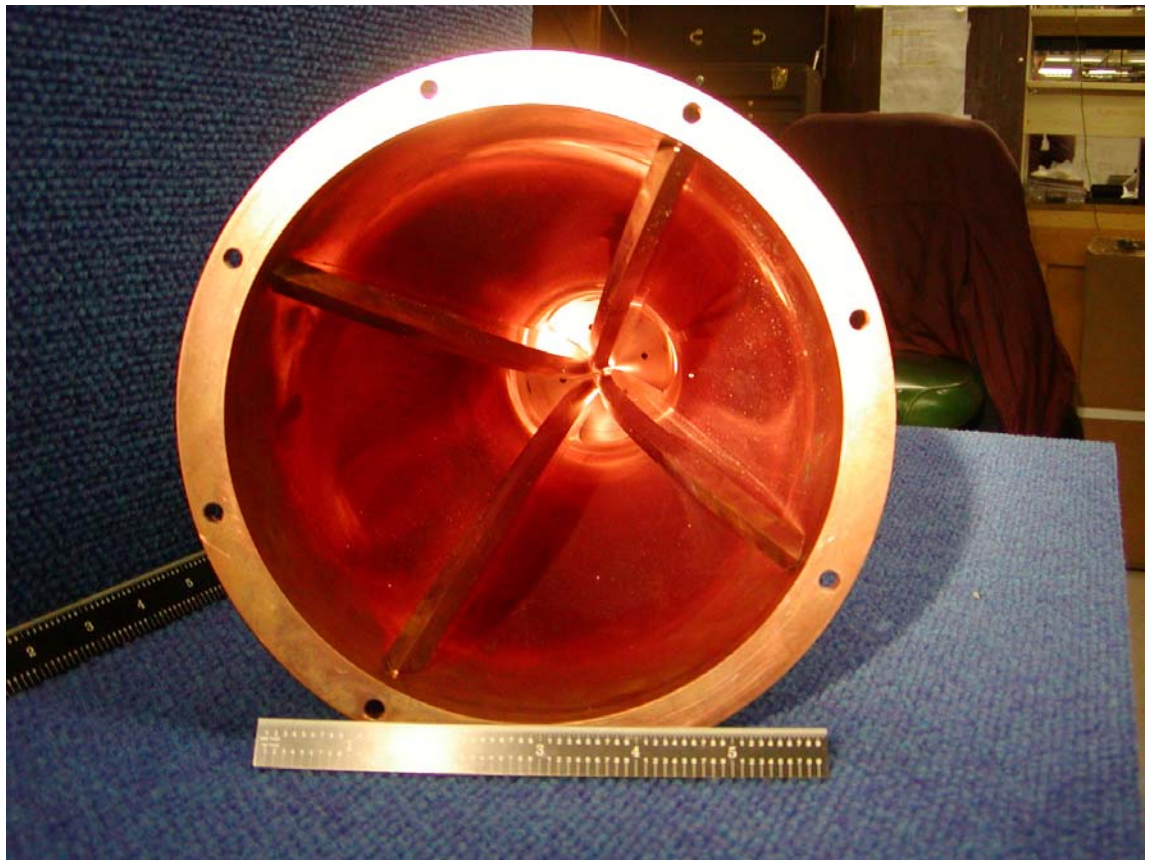
Feed & Front End PDR

Quad-Ridge Ortho-Mode Transducer

Quad-Ridge OMT
1.3 – 1.7 GHz

Quad-Ridge OMT
View of ridges



Characteristics

- Dual (linear) polarization over 2:1 frequency ratio.
- Resolve dual circular polarization by means of 90-degree hybrid.
- Prototype at C-band for ease of manufacture.

Ellipticity

- Defined as 20 Log (voltage axial ratio).
- To be less than 1 dB across band
- 0 dB requires equal amplitudes and 90 degree phase shifts.
- OMT produces equal amplitudes, small phase shift.

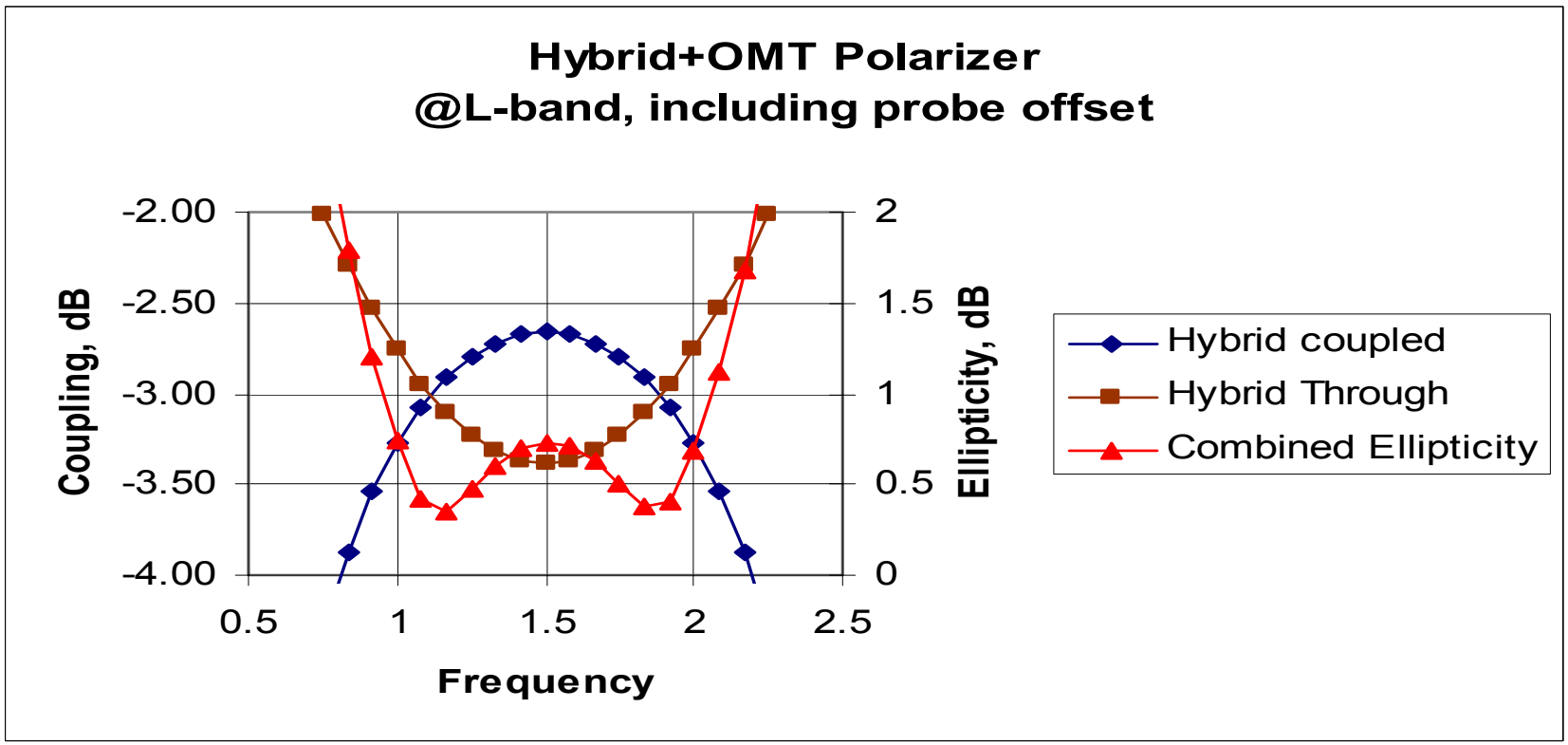
OMT Phase Shift

- Ridged waveguide to coaxial transitions within OMT must be offset.
- Difference in path length leads to phase difference at OMT output.
- This can be compensated to first order by different line lengths to the hybrid.
  - Operating frequency is far above cutoff frequency, so phase velocity is nearly linear.

Hybrid Characteristics

- Phase shift is inherently 90 degrees over the full band. But:
- Amplitude split varies across the band.

Ellipticity of Combined OMT & Hybrid.



Possible Problems

- Length at L-band
  - Less than 1 meter available without modifying floor.
- The “Third Mode”
  - Corresponds to TE21 in circular waveguide.
  - Able to propagate in ridged sections.
    - Resonances (“suck-outs”).
    - Feed pattern affected.
  - Can be suppressed.