ANTENNA RESEARCH ASSOCIATES

Creating the World's Most
Remarkable Antennas Since 1963

PESA TECHNOLOGY

Passive Electronically Scanned Array (PESA) technology, also known as **passive phased array**, is a phased array antenna, where the beam of radio waves can be electronically steered to point in different directions, in which all the antenna elements are connected to a single transmitter and/or receiver. The antenna is capable of producing multiple beams which can be optimized to steer without changing the antenna orientation. Beams are formed by shifting the phase of the signal emitted from each radiating element, to provide constructive (or destructive) interference so as to steer the beams in the desired direction.

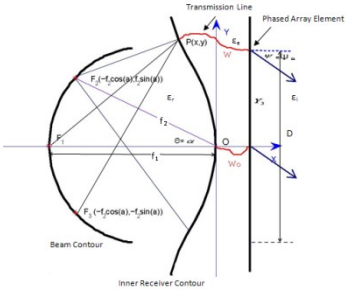
ADVANTAGES

- High gain
- Large scan angles
- Conformal geometry
- Low production cost
- Fault tolerant
- No adjustments needed

The different electrical lengths between a specific input and all output ports, generates linear progressive phase shifts across the output ports of the lens. Dummy ports are also an integral part of the Rotman lens and serve as an absorber for the spillover of the lens and thus it reduces multiple reflections and standing waves which typically deteriorate the lens performance.

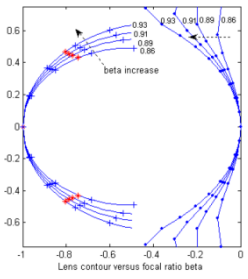
ARA'S ROTMAN LENS DESIGN PROCESS

1



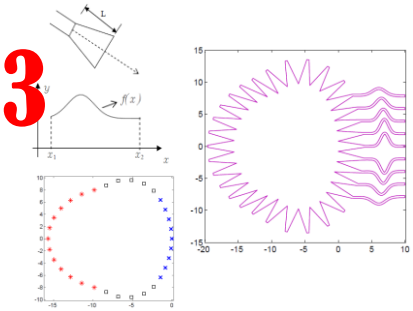
Phase Centers

2



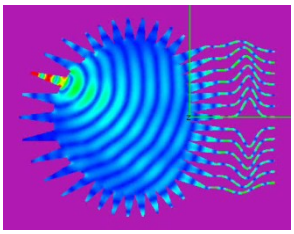
Phase Error Minimization

3



Port Design, T implementation

4



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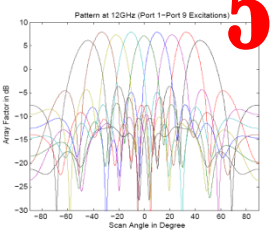
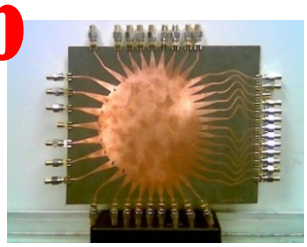


Full Wave Simulation

6

Fabrication



Measurement

Design for Ku/Ka/Q/V/E Bands for <5W power handling

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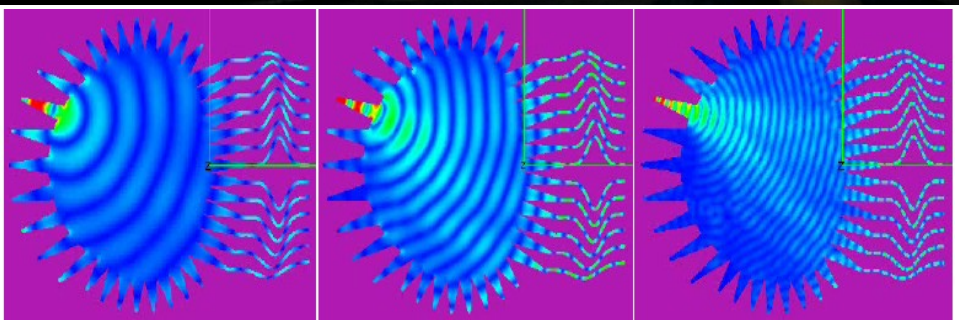
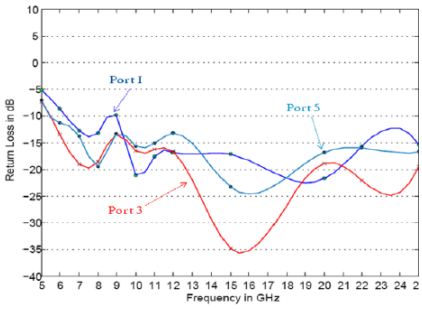
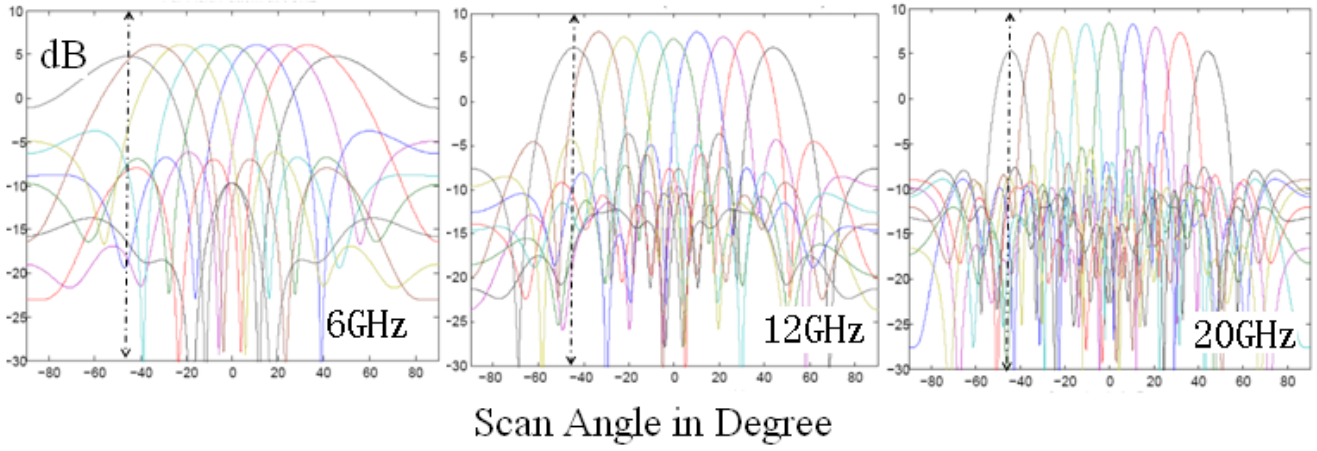




Multiple Bands (Tx and Rx) can share same aperture - Limited by size of switch network



APPLICATIONS

- Telemetry
- Electronic Warfare
- Surveillance
- Mobile Broadband
- Weather Research
- Oil and gas prospecting
- Broadcasting
- Radar
- Satellite Comms

DESIGN CONSIDERATIONS

(Advantages) PESA Technology is ideal for electrically steerable antennas where *Cost* and *Power Consumption* are critical factors. New products can be developed in as little as six months.

(Disadvantages) PESA Technologies require switching times to be matched to the waveform, as beam switching can require 200 to 300 microseconds. High power PESA applications are typically financially prohibitive.

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