

# Differential Delay Shifter

## For Beam Steering Antennas

Menlo Micro has developed a 3.6 GHz 2-bit digitally controlled differential delay shifter providing up to four discrete delay states, with applications targeting 5G beam steering and phased array antennas.

The delay shifter achieves extremely high linearity, low insertion loss, and operates with ultra-low supply current. It is built on Menlo's breakthrough Ideal Switch™ technology and achieves a delay state change of 10  $\mu$ s, with a reliability of over 3 billion switching operations.

This innovative, patented design has many advantages over conventional switched phase shifters including true differential time delay, miniaturized form-factor, superior RF performance, and long operating life under extreme environmental conditions. The design can be easily adapted to cover broadband frequency ranges and delay line values.

### FEATURES

- 3.6 GHz Band Operation
- 4 Discrete Delay States
- +44 dBm Max Input Power
- IP3: Greater than 90 dBm
- Insertion Loss: 0.2 dB
- High Reliability: > 3 Billion Operations

### APPLICATIONS

- Beam Steering Antennas
- DAS
- Phased Array Applications
- Weather and Military Radar

### MARKETS

- 5G Cellular Infrastructure
- Aerospace
- General Purpose RF Front End Systems



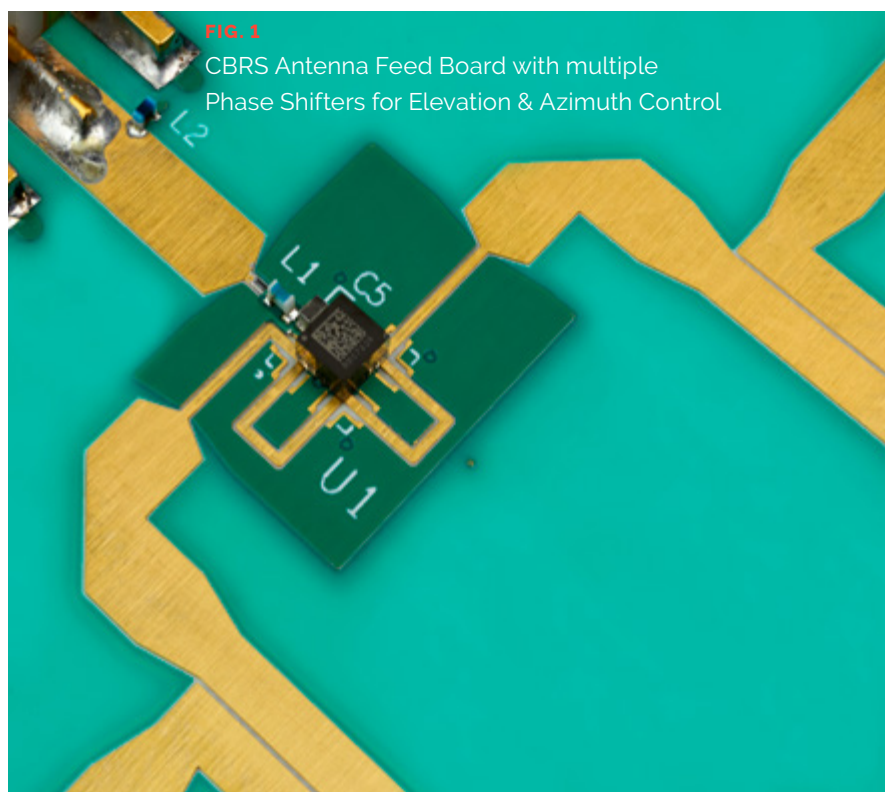
## EXAMPLE REFERENCE DESIGN

The 3.6 GHz CBRS-Band Beam-Steering Antenna developed by Menlo Micro demonstrates the performance of the Ideal Switch Delay Shifter in a real-world application.

This design demonstrates how with a small number of miniaturized, high performance delay shifters, the beam can be directed in both horizontal and vertical directions.

## IDEAL SWITCH PHASE SHIFTER ADVANTAGES

- Can be used for standalone RF/Analog beam-forming as well as in hybrid beam-forming solutions
- High linearity with low insertion loss
- True differential time delay
- Scalable delay lines for additional states and frequency coverage
- Small form-factor – 13mm x 13mm, can be miniaturized further



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