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Microelectromechanical Slow-Wave Phase Shifter Method of Use

Researchers at the University of South Florida have developed a true phase shifter using a Microelectromechanical Systems (MEMS) topology that overcomes typical limitations of capacitor-only distributed MEMS transmission line (DTML).

A true time delay (TTD) phase shifter is a component frequently used in microwave and millimeter wave radar and communications systems to control the time delay imposed upon a signal. The most common implementation of TTD components is in the form of a monolithic microwave integrated circuit (MMIC). In the past few years, new implementations of TTD components have been developed based on radio frequency (RF MEMS). However, there are typically physical limitations associated with these implementations. For example, as the capacitance changes, the characteristic impedance changes along with the desired change in propagation constant thus causing mismatch between TTD devices and the system with which it is integrated.

Distributed micro electro-mechanical transmission lines (DMTLs) are frequently employed for high performance applications. A common drawback of DMTLs is that the amount of phase shift is proportional to the difference in the loaded and unloaded impedance, thus restricting the achievable differential phase shift per unit length.

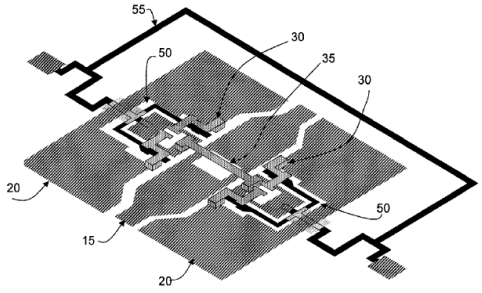
To these ends, researchers at USF have developed a device and method that improves upon the capacitance-only TTD device architecture. The slow-wave device in accordance with the present invention produces true time delay phase shifting that enables large amounts of time delay without significant variation in the effective characteristic impedance of the transmission line.

ADVANTAGES:

- **Well suited for high performance applications**
- **Small size**
- **Cost efficient**

Efficacious TTD!

Large Time Delay with Very Low Variation in Characteristic Impedance



View of the Slow Wave Unit Cell

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University of South Florida | Technology Transfer Office
813.974.0994 (office) | 813.974.8490 (fax)
patents@research.usf.edu
http://www.usf.edu/research-innovation/pl/