

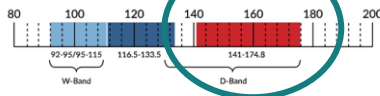
Characterization of a D-Band Electric-Inductive-Capacitive Metamaterial-Based Transmission Line Phase Shifter

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STATUS QUO



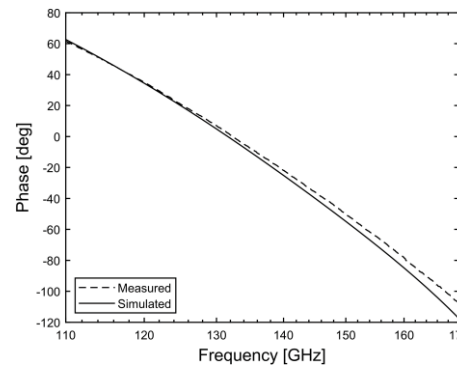
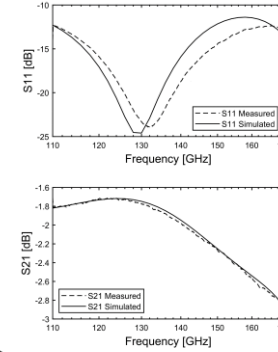
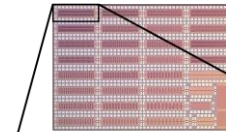
D-band 110-170 GHz



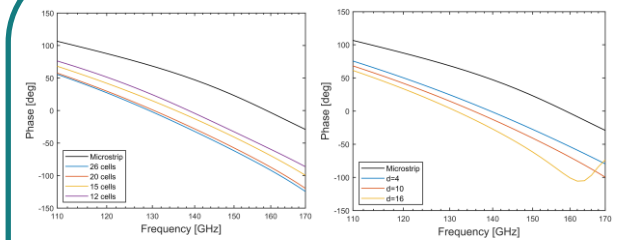
- ✓ Need for tunable phase shifters at mm-frequencies (D-band)
- ✓ Active phase shifters presents non-linear behavior and high losses

DESCRIPTION

- ✓ Effective EM model
- ✓ Comparison between simulations and experiments
- ✓ Many prototypes have been manufactured



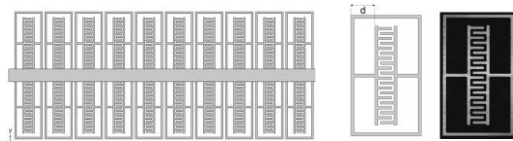
QUANTITATIVE IMPACT



- ✓ 60°-100° quasi-linear phase shift in band
- ✓ 45-49% size reduction
- ✓ 2.2 dB average insertion loss in the full band
- ✓ 7% maximum relative error of the model



NEW INSIGHTS



Metamaterial-based phase shifters

- ✓ Metamaterial devices presents
 - Higher linearity
 - Low power consumption
 - Bidirectional response
- ✓ Better performances in both transmitting and receiving systems

PROPOSED CONCEPT GOALS

- ✓ Realization of a passive phase shifter @ 140 GHz
- ✓ Good agreement between simulations and measurements.
- ✓ Use of SiGe 0.13 μm technology stack for high frequency applications.
- ✓ Possibility to achieve tunable phase shifting through the addition of active elements.