

A Low Insertion Loss Variation 10-35 GHz Phase Shifter

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Abstract : This paper presents a wideband True Time Delay (TTD) phase shifter with low insertion loss variation. The circuit benefits from a controllable resistive load shunt with transmission line segments to optimize return loss variations, addressing the unbalanced capacitive nature of the varactor. The phase shifter reduces the complexity of the calibration process because the dependency of insertion loss on voltage controls is improved up to 3 dB. The TTD phase shifter provides a continuous changing delay time of 6.4 ps with low insertion loss (IL) in the 10-35 GHz frequency range. The proposed circuit benefits from lowloss phase shifters with a small footprint. Fabricated using a 65 nm CMOS process, the TTD phase shifter occupies only $388 \times 615 \mu\text{m}^2$ of chip area, achieving a 20% improvements compared to conventional TTD phase shifters.

Keywords : millimeter-wave phased-array, true time delay phase shifter, insertion loss variation, compact size

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