Abstracts

V-band 2-b and 4-b low-loss and low-voltage distributed MEMS digital phase shifter using metal-air-metal capacitors

Hong-Teuk Kim, Jae-Hyoung Park, Sanghyo Lee, Seongho Kim, Jung-Mu Kim, Yong-Kweon Kim and Youngwoo Kwon. "V-band 2-b and 4-b low-loss and low-voltage distributed MEMS digital phase shifter using metal-air-metal capacitors." 2002 Transactions on Microwave Theory and Techniques 50.12 (Dec. 2002 [T-MTT] (Special Issue on 2002 International Microwave Symposium)): 2918-2923.

Low-loss digital distributed phase shifters have been developed using micromachined capacitive shunt switches for V-band applications. Instead or conventional metal-insulator-metal capacitors, high-Q metal-air-metal capacitors were used in series with the microelectromechanical system (MEMS) shunt capacitive switches to minimize the dielectric loss. The operation voltage for the phase shifters was also reduced by applying the bias directly to the MEMS shunt switches through choke spiral inductors. Fabricated 2-b (270/spl deg/) and 4-b (337.5/spl deg/) distributed phase shifters showed low average insertion losses of 2.2 dB at 60 GHz and 2.8 dB at 65 GHz, respectively. The average phase errors for 2-b and 4-b phase shifters were 6.5% and 1.3%, respectively. The return losses are better than 10 dB over a wide frequency range from 40 to 70 GHz. Most of the circuits operated at 15-35-V bias voltages. These phase shifters present promising solution to low-loss integrated phase shifting devices at the V-band and above.

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