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RF Generation at 200 MHz Using a SiC Schottky Diode Lumped NLTL*

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Nonlinear transmission lines (NLTLs) have been used with great success to generate high power radio frequency (RF). Generally, their operation consists of a lumped line based on the nonlinear behavior of the LC section components, capacitors or inductors, as a function of the applied voltage or current, respectively. However, considering high power signals, the employment of ceramic capacitors in capacitive lumped lines is restricted to frequencies around 80 MHz, since at high voltages their parasitic impedances limit the NTLTL maximum operation frequency. On the other hand, the use of low-voltage variable capacitance diodes has enabled the operation of NLTLs at higher frequencies (250 MHz). In addition, with the advent of high-voltage silicon carbide (SiC) Schottky diodes, it is expected that NLTLs can operate at higher power and frequencies. This paper presents the construction of a nonlinear transmission line based on SiC Schottky diodes to generate RF at high-frequency. Its working principle is presented, where the voltage dependence of the diode capacitance is modeled. The experimental and simulation results were also compared and discussed. Generation of oscillations at a frequency of about 200 MHz was obtained.

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