

A novel approach to frequency-dependent power limiters (FDPLs) is proposed. RF microelectromechanical systems (MEMS) switches are integrated with bandpass filters to form a power limiter, where the output RF power is limited to specific levels, based on the frequency bands. Both the nonplanar and planar versions of FDPLs are presented using circulators and hybrids, and RF MEMS-based power limiters are analyzed theoretically and experimentally for one frequency band. The limiter attenuates the high-power signal only within the bandwidth of the integrated filter. The design of the proposed power limiter is expanded to achieve power limiting for various frequency bands. The flatness of the threshold level can be set to the desired value by controlling the return loss of the filters used in the FDPL circuit. Measured results for an FDPL circuit are presented, demonstrating that the limiting power level can be controlled by adjusting the dc bias of the MEMS switches. The commercially available electrostatically actuated switches OMRON and Radant are employed for the realization of the FDPL. Additionally, a varactor-based tunable filter is designed and implemented in FDPL circuits. The tunable FDPL circuits are fabricated and measured, demonstrating the feasibility of realizing adaptive FDPLs.