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Plasma-Based Tunable High Frequency Power Limiter ABBAS SEMNANI, SERGEY MACHERET, DIMITRIOS PEROULIS, Purdue University — Power limiters are often employed to protect sensitive receivers from being damaged or saturated by high-power incoming waves. Although wideband low-power limiters based on semiconductor technology are widely available, the options for high-power frequency-selective ones are very few. In this work, we study the application of a gas discharge tube (GDT) integrated in an evanescent-mode (EVA) cavity resonator as a plasma-based power limiter. Plasmas can inherently handle higher power in comparison with semiconductor diodes. Also, using a resonant structure provides the ability of having both lower threshold power and frequency-selective limiting, which are important if only a narrowband high-power signal is targeted. Higher input RF power results in stronger discharge in the GDT and consequently higher electron density which results in larger reflection. It is also possible to tune the threshold power by pre-ionizing the GDT with a DC bias voltage. As a proof of concept, a 2-GHz EVA resonator loaded by a 90-V GDT was fabricated and measured. With reasonable amount of insertion loss, the limiting threshold power was successfully tuned from 8.3 W to 590 mW when the external DC bias was varied from 0 to 80 V. The limiter performed well up to 100 W of maximum available input power.

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