

## **Diamond RF Diodes**

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Favorable material properties such as extreme thermal conductivity, high input power attenuation, low on resistance and high reliability make diamond among the most promising materials for high power RF applications such as limiter/receiver protector systems. RF diodes are the core component in receiver protector systems. To meet the needs of this application, we demonstrate successful diamond-based RF diode fabrication, starting with plasma enhanced chemical vapor deposition growth of p-i-n layers on <100> diamond substrates, microfabrication, and RF characterization. Diode characterization is conducted from dc to 25 GHz with results closely matching RF diode structures fabricated on <111> diamond substrates. We find that the capacitance and contact resistance values are improved over previously reported <111> devices, with values as low as  $5 \cdot 10^{-13}$  F/cm<sup>2</sup> and  $5.2 \cdot 10^{-3}$  W·cm<sup>2</sup>. Additionally, we have begun work on new pathways for further reducing these values and enabling receiver protector circuits with higher power handling requirements.