

High Power Solid-State THz Source Development

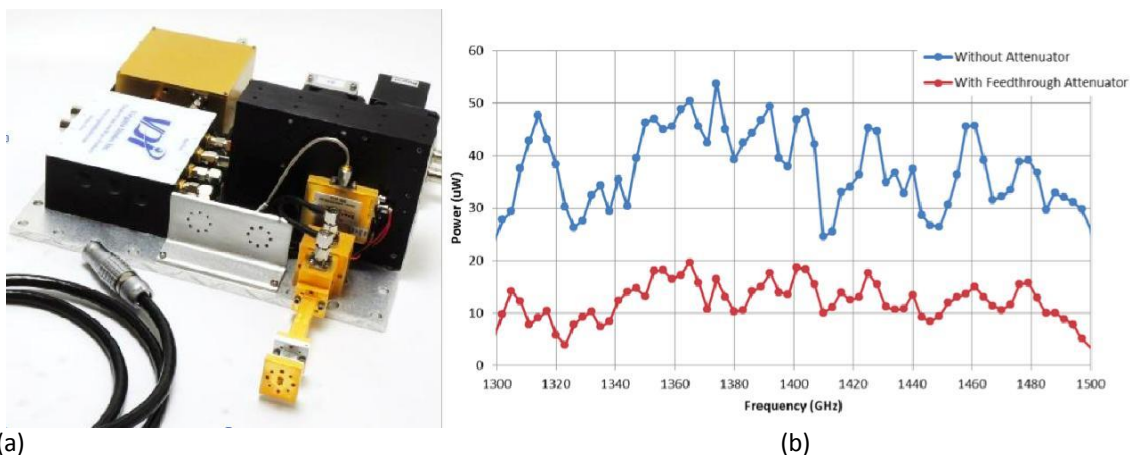
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This talk will describe recent work at Virginia Diodes on high power THz sources. In particular, one focus has been on the development of high power varactor multipliers in the 50-250 GHz range for use in driving THz multipliers covering 1-3 THz. Careful thermal design to remove heat from the diodes has allowed for unprecedented output power from multiplier chains without the need for power combining, e.g. 2 W at 55 GHz and 175 mW at 220 GHz.

One application for this high drive power has been to allow the integration of the THz multipliers into the cryogenic Dewar alongside the HEB mixer, thus simplifying the coupling of LO power to the mixer and reducing losses. The high power drive multipliers are placed outside the Dewar, and then a waveguide vacuum feed-thru and a thermal break are used to couple the power into the THz multipliers mounted on the cold-stage. By generating excess drive power the losses in the waveguide feed-thru can be overcome, allowing for the proper drive of the THz multipliers. One example of such a system is shown in Fig. 1 below, and more examples will be discussed at the workshop.



(a)

(b)

Fig. 1. (a) Photograph and (b) measured output power from a 1.3-1.5 THz source. The power is measured at ambient with and without an attenuator between the varactor drivers and the THz multipliers.