GENERATION OF MILLIMETRE AND SUB-MILLIMETRE WAVES BY PHOTOMIXING IN A 1.55 μm WAVELENGTH PHOTODIODE.

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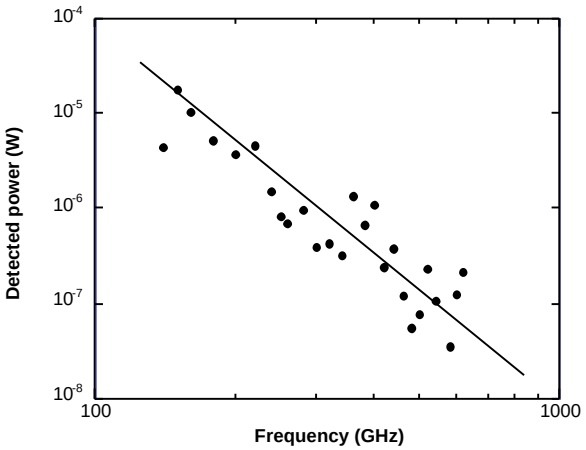
We report on the generation of radiation at frequencies from 70 GHz to above 600 GHz by photomixing in a commercially available 70 GHz bandwidth photodiode[1]. This work is motivated by the potential of using such sources as phase references and local oscillators in the ALMA telescope[2]. The InGaAsP photodiodes were fixed in W-band waveguide mounts which had adjustable backshort tuning. The photodiodes were driven by two 1.55 μm diode lasers at total input powers of up to +10 dBm. Fixed tuning allowed the generation of power across the full waveguide band from 75 GHz to 110 GHz, with a variation below 5 dB across the majority of the band. A maximum, non-saturated, mm-wave power of –7.5 dBm (180 μW) was obtained at 110 GHz with a corresponding power conversion efficiency above 1 %. Detected power decreased approximately as (frequency)$^{-4}$ above 150 GHz, as shown by the line in the above figure. The frequency dependence is consistent with the characteristics of the photodiode and waveguide mount.



1. u^{2}t Innovative Optoelectronic Components GmbH, Tangermünder Weg 18, D13583 Berlin, Germany

2. J. M. Payne, W. P. Shillue and A. Vaccari, Proc. Int. Topical Meeting Microwave Photonics, Melbourne, pp.105 - 108, IEEE (1999).