Abstracts

Saturation characteristics of fast photodetectors

Pao-Lo Liu, K.J. Williams, M.Y. Frankel and R.D. Esman. "Saturation characteristics of fast photodetectors." 1999 Transactions on Microwave Theory and Techniques 47.7 (Jul. 1999, Part II [T-MTT] (Special Issue on Microwave and Millimeter-Wave Photonics)): 1297-1303.

Saturation of photodetectors is measured in the time domain using optical pulses of different duration and in the frequency domain using amplitude-modulated optical carriers. In the time domain, saturation is characterized by a reduction in peak photocurrent and growth of a pulse tail indicating that significant carrier velocity reduction is occurring as the opposing space-charge field persists. In the frequency domain, saturation is characterized by a reduction in response to a sinusoidal signal. The time-domain saturation measurements are shown to result in substantially larger 1-dB compression currents than frequency-domain measurements for the same photodiode. Transient space-charge calculations and a spectral analysis based on Gaussian pulses are shown to help to explain the apparent differences and to correlate the measured results from the time and frequency domains.

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