Abstracts

Modeling of Microwave Top Illuminated PIN Photodetector Under Very High Optical Power (Short Papers)

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In this paper, we present a theoretical study and a numerical simulation of a classical long wavelength top illuminated PIN photodetector for microwave applications under very high optical power. The modeling includes a monodimensional drift-diffusion model for the device and takes into account the external circuit. At first, this modeting is validated using experimental results from the literature. Second, we consider a classical InP/GaInAs/InP photodiode grown on N/sup +/ InP substrate. The presented results show that the distortion and the saturation of the microwave signal at 20 GHz are due to the space charge effect in the photodetector and also to the depolarization of the device because of the external circuit. The main parameter influencing these phenomena are the optical power, the bias voltage, the optical spot width and the modulation depth. In case of small optical spot, the effect of the external circuit is neglectable, while it contributes to the decrease of the microwave responsivity in case of large spot. The maximum output power is calculated in different cases and we can expect up to 12 dBm microwave ontput power for a 5 V reverse bias voltage.

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