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EFFECT OF THICKNESS OF INTRINSIC LAYERON PHOTO CURRENT IN P-I-N PHOTO SENSOR

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Abstract—*The thickness of intrinsic layer of p-i-n photo sensor play a great role in the function of p-i-n photo sensor. A p-i-n photo sensor is basically a diode having two terminals and it restricts the negative voltage on the anode terminal with respect to the cathode terminal but conducts current when a positive voltage applied to the anode. The p-i-n photodiode is made of an intrinsic layer sandwiched between a p-n junction. The intrinsic layer has a thickness ranging from 10micrometer to 50 micrometer. Thickness is designed on the basis of rated breakdown voltage of the photodiode. The intrinsic layer is made of very low concentration of n- type that is of the order of* 10^{13} cm^{-3}*. The outside p- and n- layers are heavily doped.*

The wide intrinsic layer provides unique features of high breakdown voltage in reverse bias and charge storage in the forward bias. The lightly doped intrinsic layer is completely depleted in the reversed bias condition and the achievement of breakdown voltage is depending on the product of critical electric field of silicon and the thickness of intrinsic layer.

The electron concentrations as a function of intrinsic layer thickness reveals that there is no electrons accumulation at P^+ *- i interface, while they accumulate at the* N^+ *- i interface (more than* 10^{16} cm^{-3} *) which yields high charge gradient. This will setup diffusion current that is balanced by drift current build up by the field gradient.*

It is seen that the concentration of photo generated electrons and its lifetime is increased as the thickness of the intrinsic layer is increased.