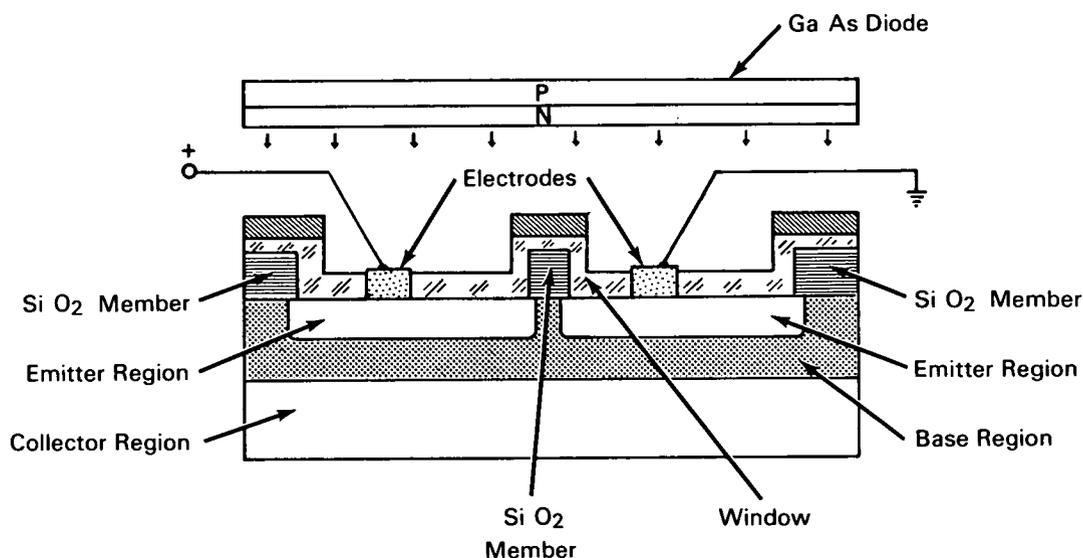


NASA TECH BRIEF



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Optically Driven Switch Turn-Off Time Reduced By Opaque Coatings



The problem:

To reduce the turn-off response time of an optically driven silicon switch. Turn-off time of the switch is lengthened by the absorption of photons by the passivating silicon dioxide members which causes carriers to be trapped or stored in the base region.

The solution:

Place an opaque covering over the passivating silicon dioxide members to prevent photon absorption.

How it's done:

The switch includes a pair of space planar emitter regions set in a base region formed above a collector region. Passivating silicon dioxide members cover those portions of the emitter-base junctions that extend to the upper semiconductor surface. Windows of a suitable transparent material cover the upper sur-

faces of the emitter regions. Only two small portions that serve as the input and output electrodes of the switch are not covered by the windows.

When a suitable light source, such as a forward biased gallium arsenide diode, illuminates the upper surface of the normally off silicon switch, an electrical circuit is established between the two emitter regions. Removal of the light turns the switch off.

The use of an opaque coating over the silicon dioxide prevents photon absorption so that carriers are not trapped or stored in the surface of the base region, thus materially shortening turn-off response. In the absence of an opaque coating, the turn-off time for the silicon switch is longer than desired for some purposes, being as great as a few milliseconds. When an opaque coating is used, response times on the order of 80 microseconds may be obtained.

(continued overleaf)

Note:

Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
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Reference: B66-10141

Patent status:

No patent action is contemplated by NASA.

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