

SHORT CHANNEL IGBT WITH IMPROVED FORWARD
VOLTAGE DROP AND IMPROVED SWITCHING POWER LOSS

ABSTRACT OF THE DISCLOSURE

A cellular insulated gate bipolar transistor ("IGBT") device has a reduced length of the channels of the individual cells that is formed by reducing the channel drive in time from the customary 120 minutes at 1175°C to between 60 and 90 minutes at 1175°C. The process also permits the use of a higher minority carrier lifetime killing electron radiation dose to improve switching power loss while reducing SOA by only a small value. Alternatively, the increased concentration region located in the active region between spaced bases is initially driven in at a temperature of about 1175°C for about 12 hours, rather than the customary 8 hours, and the channel drive in time is reduced from 120 minutes to 60 minutes. The shorter channel length, when combined with the deeper enhancement region, allows for higher lifetime electron irradiation doses or heavy metal diffusion temperatures.

Fig. 3