

An Improved Protection Circuit Design for Fast Detection of Short-circuit in IPM

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Abstract

A Short-circuit protection plays a vital role in the overall reliability of intelligent power module(IPM), and where the shorter the duration of short-circuit fault, the smaller the impact on the module. The conventional VCE(sat) detection circuit suffers from a blanking time problem, and thus to solve this problem, this paper aims to improve the IPM short-circuit fast detection and protection circuit with integrated shunts, to achieve the ultra-fast detection and protection of IPM short-circuit faults. For the improved circuit, the selection method for the component parameters of a compensation link of the improved circuit is proposed, and the functions for the remaining parts in the circuit are introduced. Finally, through experiments, it is verified that the improved circuit can quickly detect various short-circuit faults, and correspondingly start shutting down the switching tube at 490ns. Compared with the conventional method, the detection time of the proposed method and short-circuit loss for modules under different short-circuit faults are significantly reduced.

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