

Dr. Alberto Castrazzi

Title: "Fail-to-open short-circuit failure mode in SiC power MOSFETs, device characterization and system level exploitation"

Abstract:

"A class of SiC power MOSFETs have recently been found to feature a fail-to-open failure mode, with the device going into permanent automatic shut-down mode. Such behavior is extremely interesting for the application. In the frequent case of power converters designed with parallel connected devices or multi-chip power modules, a fail-to-open implies loss of a single device, but does not compromise the possibility to still operate the system, even if at reduced power levels (hopping home modality). More recently, it has also been shown that in the case of progressive moderate damage accumulation, the degradation of the device characteristics can be recovered to a stable state by ad-hoc biasing of the device itself. This talk will review the degradation and failure mechanisms leading to fail-to-open signature, will present evidence of stable device recovery capability and present ideas and solutions to make use of such feature in the application. The results are substantiated by extensive functional and structural device characterization"