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## Reliability Study of Silicon Carbide Schottky Diode with Fast Electron Irradiation (Conference Paper)

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### Abstract

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The impact of fast electron exposure upon the performance of commercial silicon carbide Schottky diodes has been studied. Under 3 MeV electrons, absorbed dose of 10 and 15 MGy at room temperature, the forward current density-voltage characteristic of INFINEON and STMICROELECTRONICS devices have been decreased by 4.6 and 8.2 orders of magnitude respectively. The reduction is associated with the significant rise in the series resistance (INFINEON: 1.45  $\Omega$  to 121 $\times 10^3$   $\Omega$ ; STMICROELECTRONICS: 1.44  $\Omega$  to 2.1  $\times 10^9$   $\Omega$ ) due to the irradiation-induced defects. Besides that, the reverse leakage current density in INFINEON increased by one order of magnitude while reverse leakage current density in STMICROELECTRONICS decreased by about one order of magnitude. We have also observed an increase in ideality factor (INFINEON: 1.01 to 1.05; STMICROELECTRONICS: 1.02 to 1.3) and saturation current (INFINEON: 1.6 $\times 10^{-17}$  A to 2.5 $\times 10^{-17}$  A; STMICROELECTRONICS: 2.4 $\times 10^{-15}$  A to 8  $\times 10^{-15}$  A) as a result of electron irradiation. Overall, for particular devices studied, INFINEON have better quality devices and more radiation resistance compared to STMICROELECTRONICS. © 2018 IEEE.

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### Indexed keywords

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Current density Diodes Electric resistance Electrons Heat radiation  
Schottky barrier diodes Silicon carbide

Engineering uncontrolled terms

Fast electron irradiations Irradiation -induced defects Orders of magnitude  
Radiation resistance Reverse leakage current Schottky diodes Series resistances  
Silicon carbide schottky diodes

Engineering main heading:

Electron irradiation

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