

# Optically-activated cascode configuration for 650 V GaN FET devices and packaging parasitic inductance effects

Hemmat, Zahra

Mojab, Alireza

Moreno, Enrique

Ahmadiparidari, Alireza

Paryavi, Mohsen

Alizadeh, Mehrdad

Michael, Ernest Alexander

© 2018 Elsevier GmbH In this paper, a novel optically-activated cascode structure is proposed to be used with a normally-on gallium nitride (GaN) field-effect transistor (FET) device to achieve an overall normally-off configuration. Using this novel configuration, cost-effective infrared (IR) lasers can be utilized instead of expensive ultraviolet (UV) lasers to activate this structure which includes a wide-bandgap-material device (GaN FET). Furthermore, the effect of parasitic inductance available in the package and connections of this proposed configuration is evaluated using Silvaco TCAD simulations. In practice, one high-power normally-on FET device is connected in series with a low-power optical switch (OS) to make the proposed overall normally-off cascode structure. The capability of being optically-activated for the proposed structure has many advantages over the conventional electrically-activated cascode structures including but not limited to: more immunity to electromagnetic