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Long Term Evaluation of GaN HEMT under Overcurrent Operations

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Abstract- As Silicon is reaching the theoretical limit, wide bandgap devices such as Gallium Nitride (GaN) transistors are being investigated as replacements for Silicon in high voltage and high temperature applications. To have a better understanding of GaN power devices operating under long term high peak current conditions, GaN devices were switched under the following conditions: high peak current of 330 A, 20-65 V, 0.5 –75 Hz, and 20 μ s pulse width. The device under test was rated for forward blocking voltage of 100 V and continuous drain current at 90 A and threshold voltage of 1.5 V. The device is a HEMT device and was manufactured by GaN Systems. This paper will discuss the long term evaluation and failure analysis of the devices. Results will show the peak current and IV characteristics both forward and reverse as a function of the number of shots taken. The RLC ring down circuit that was used as the testbed of the experiments will be shown in the paper. The device operated up to 5 million shots. Measurements taken were IV curves and transconductance, and threshold voltage of the device.

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