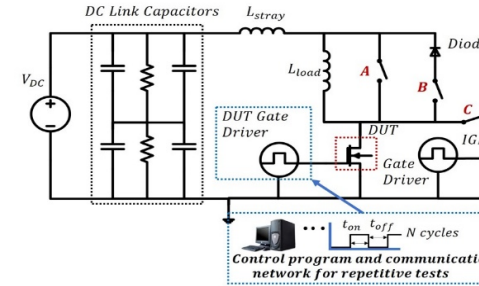


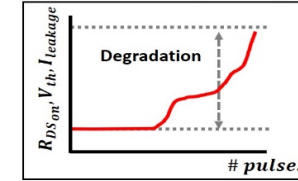
**Project Title:** Surge Energy Robustness of GaN Power Devices and Modules: Application-driven Evaluation and Physics-of-Failure Modeling

**Objectives:** Evaluate the surge energy robustness of GaN power transistors and modules; unveil the withstand mechanisms, withstand capability and failure mechanisms.

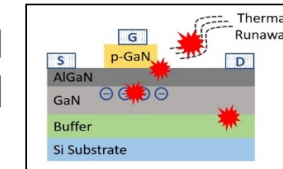
**Deliverables:** (a) A unified surge-energy robustness characterization platform for GaN power transistors; (b) physics-of-failure models for three mainstream E-mode GaN devices; (c) device robustness evaluation under an aerospace-application-specific surge-energy mission profile.



Degradation under repetitive pulses



Identification of failure mechanisms



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## WBG Technology Impact

1. A comprehensive and unified surge-energy ruggedness testing platform for GaN power transistors
2. Unbiased evaluation of surge-energy withstand capability of commercial GaN devices using different E-mode technologies
3. Provide the physics-of-failure models for different commercial GaN devices and GaN modules
4. Evaluate the surge-energy robustness under a surge-energy mission profile in aerospace applications
5. Remove the roadblocks for widespread adoption of GaN devices in the systems requiring surge-energy robustness

## Additional impacts

1. **Market Adoption:** Provide independent assessment, and give the end user community the ruggedness information of commercial GaN power transistors
2. **Device Benchmark:** Benchmark the surge-energy ruggedness of commercial GaN power transistors with SiC and Si power devices at similar energy and thermal stresses
3. **Workforce development and education:** Undergraduate and graduate student involved through direct support and through collaboration. Graduated students will form the new WBG workforce experienced in GaN power device technologies.