Automated Double Pulse Test System for Switching Loss Characterization

Kyle Goodrick, Daniel Costinett, Edward Jones
The University of Tennessee, Knoxville

MOTIVATION

- Find the optimal device for power electronics circuits through standardized and automated testing
- Use automated DPT to accurately determine turn-on and turn-off loss for different power devices

IMPROVEMENTS OVER CONVENTIONAL DPT

- Faster
  - Multiple measurements captured in full resolution
  - Data automatically imported into MATLAB
  - I-V misalignment automatically calculated & corrected
- Safer
  - No user interaction required
  - No potential exposure to high voltages (400+ Volts)
- More Generalized
  - Can be quickly altered to test different devices and test setups
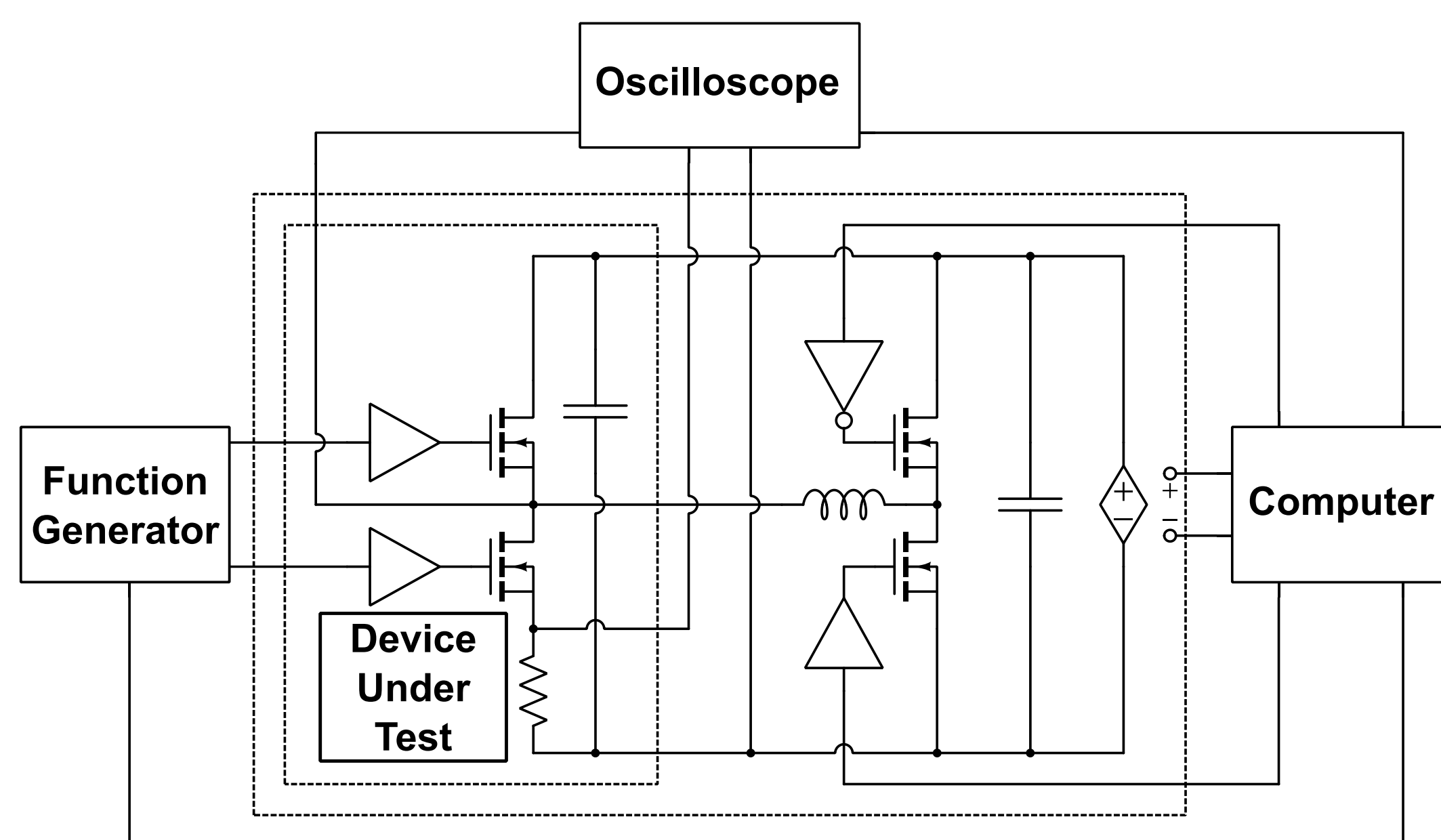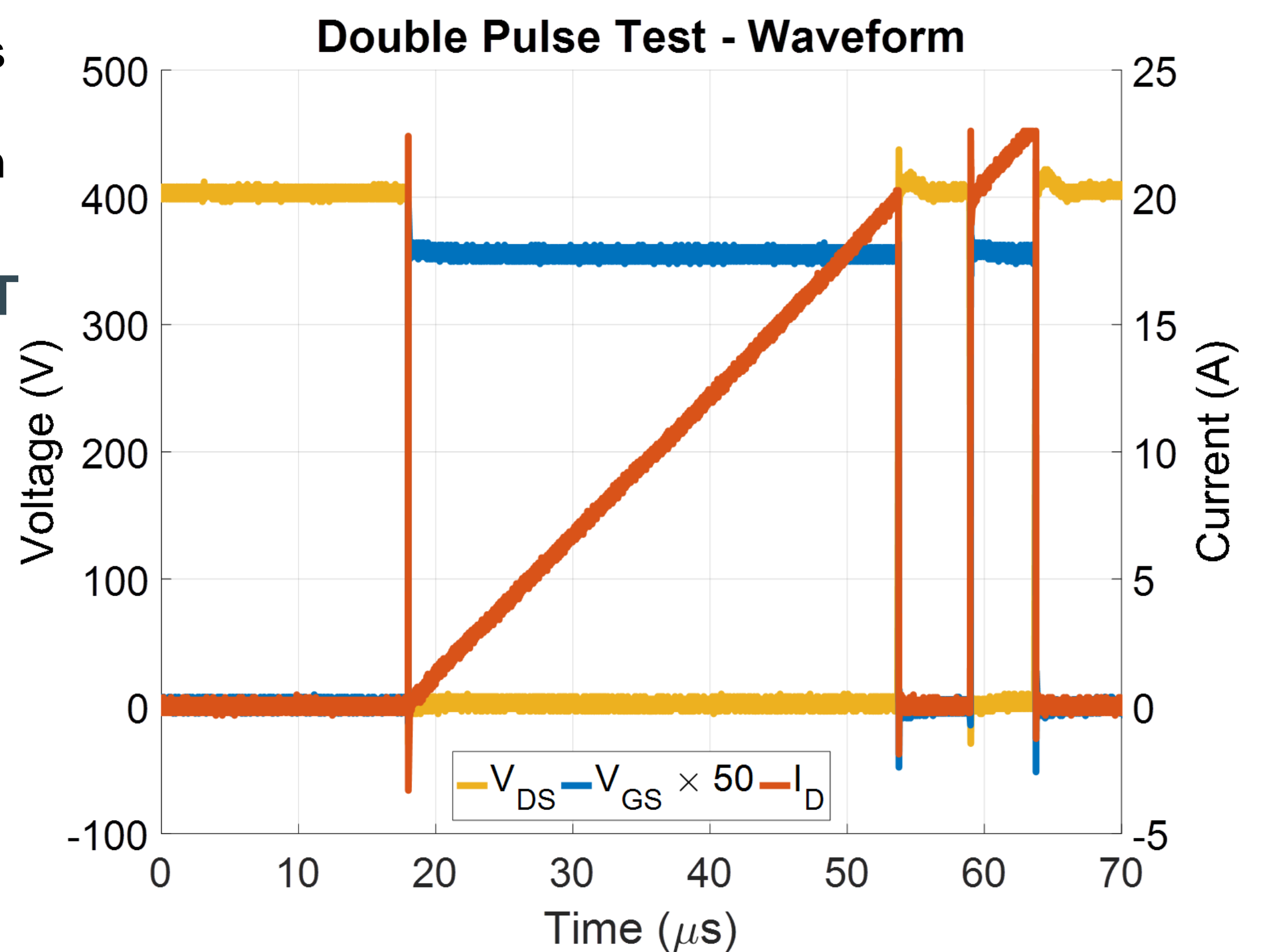
Left: Circuit Schematic for Double Pulse Tester
Right: Example waveform of Double Pulse Test zoomed in on the turn off transient.
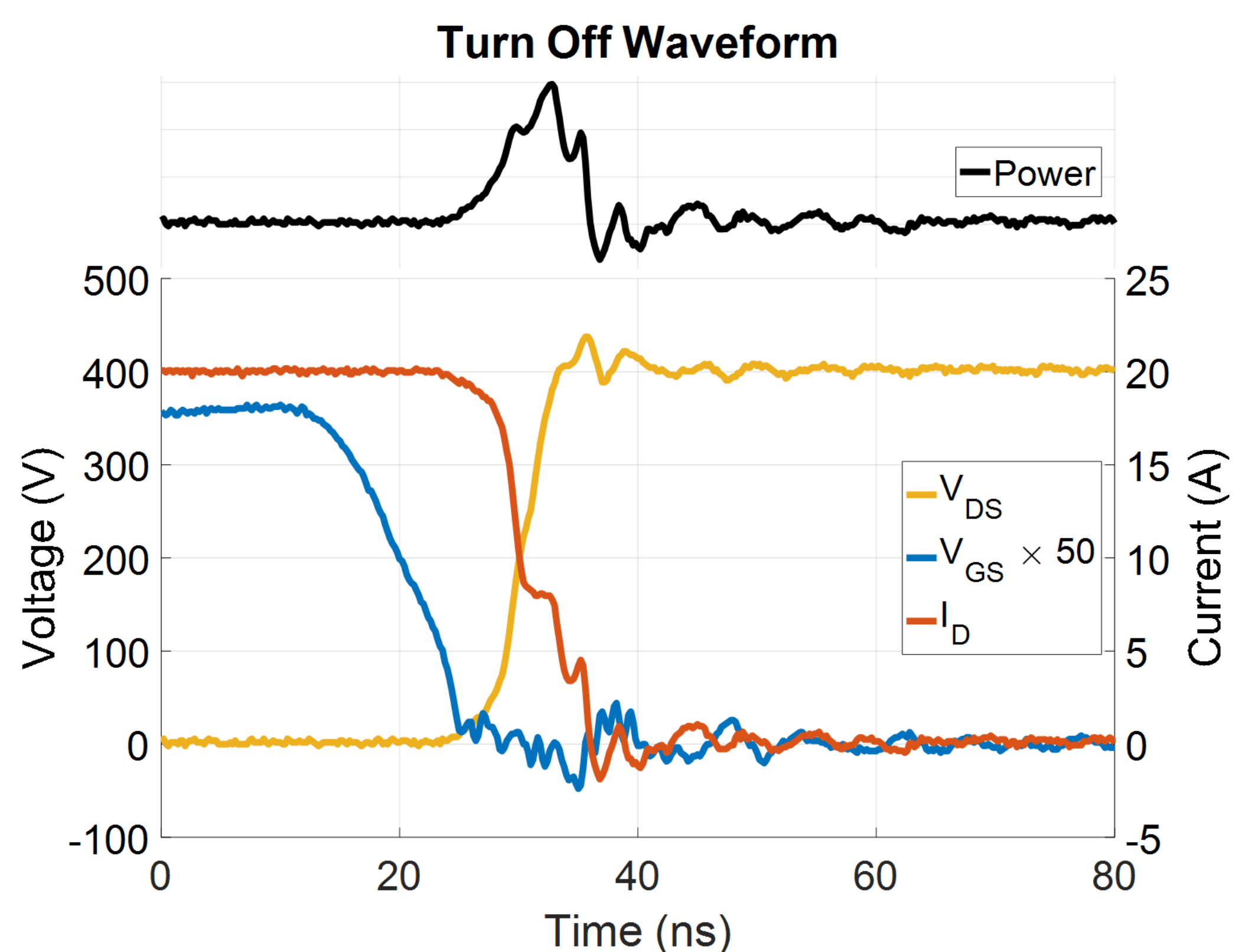
RESULTS

- GaN device testing matches previously reported values

FUTURE WORK

- Algorithm Improvements
  - Specific waveform segment extraction
  - Improve handling of signals with significant ringing
  - Improved error checking / measurement verification
- Generalized test board
  - Generic board that can be used to test multiple devices
- Integration with device database
  - Device information stored in database for design automation and trend tracking