

OBJECTIVES

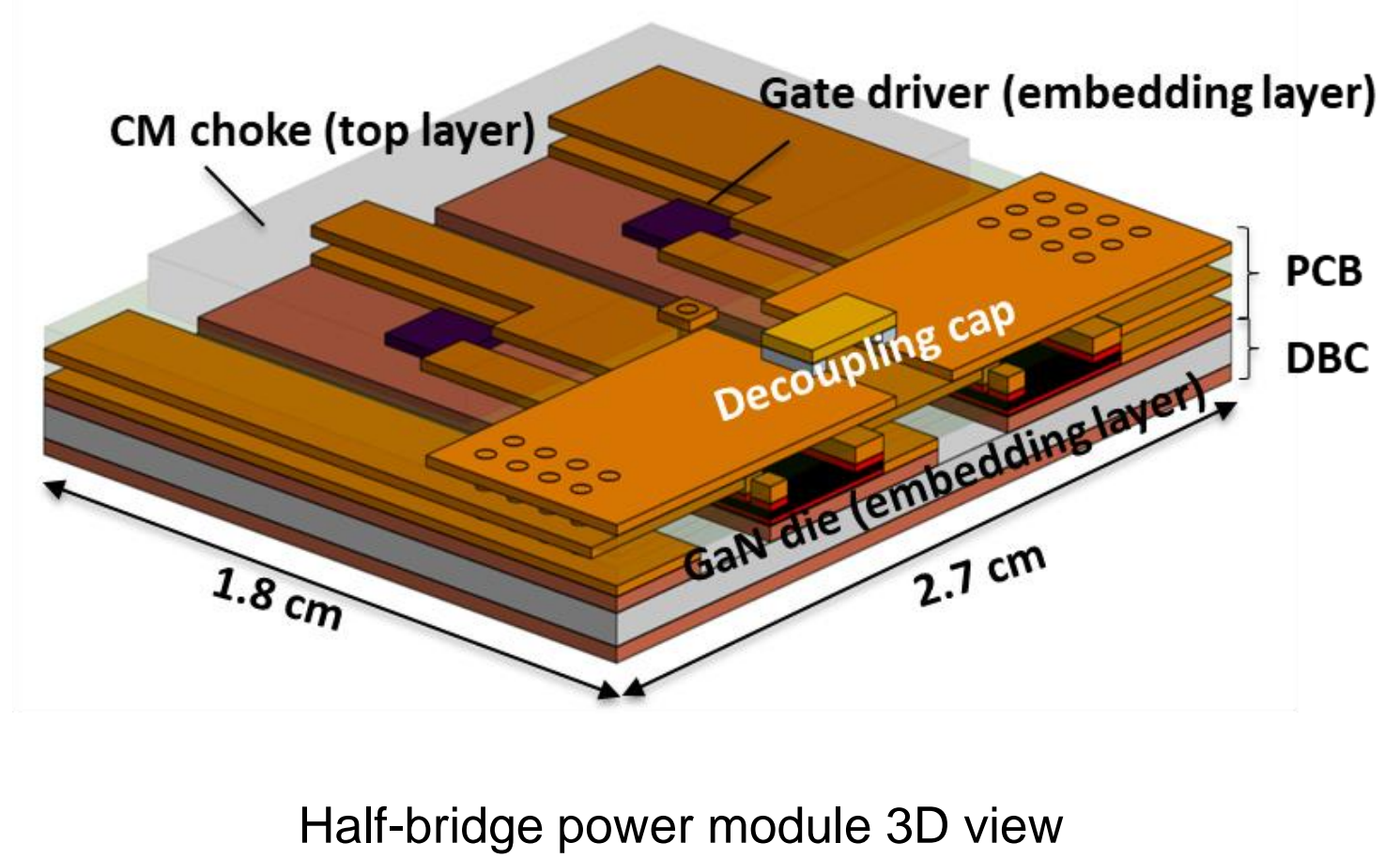
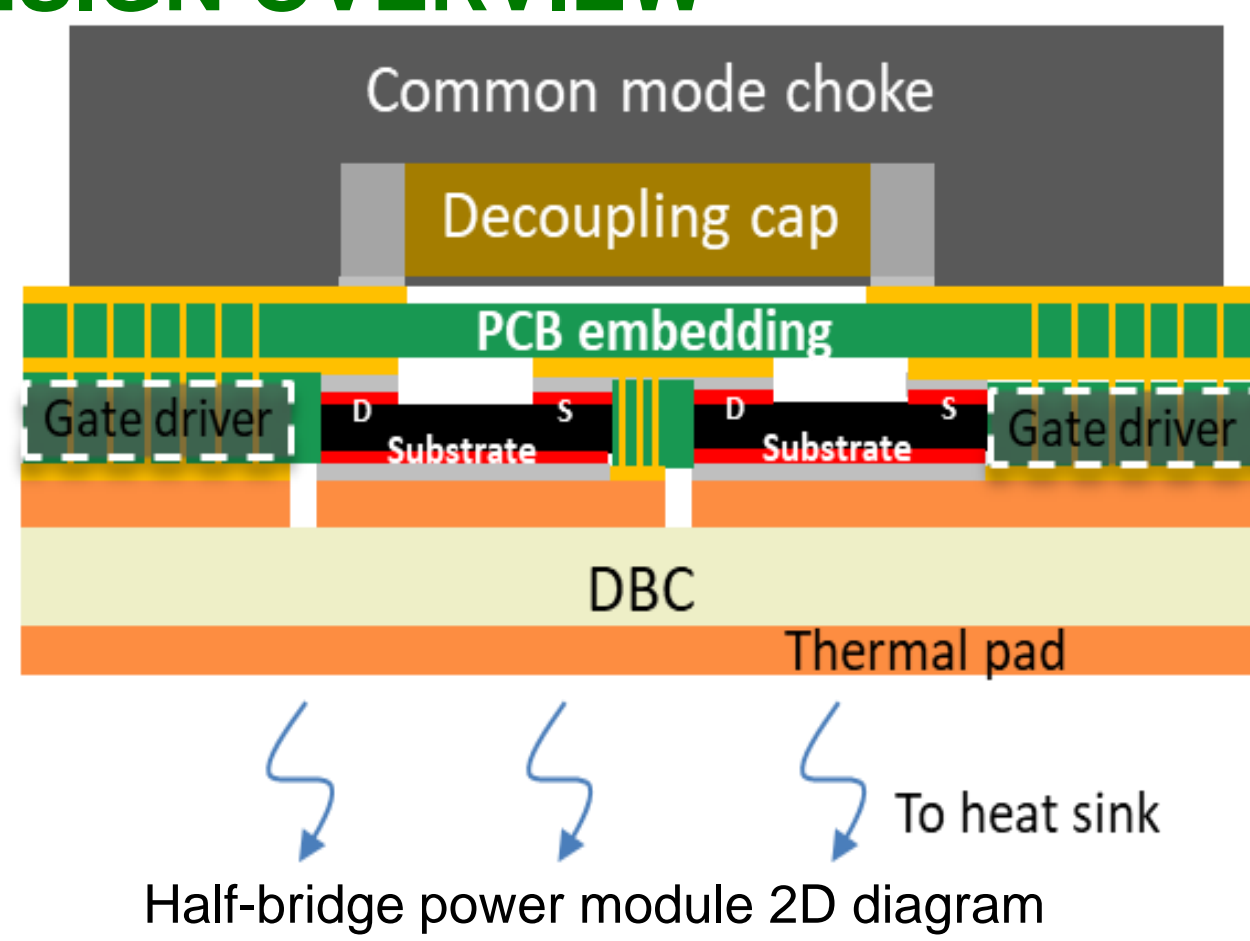
Develop a half-bridge GaN power module with:

- high power density, aiming at 400 V/25 A operation and dimension of 3 cm X 2 cm.
- high integration with in-package decoupling capacitors, integrated gate drivers and common mode filter.
- superior electrical and thermal performance with low parasitic inductance and double-sided cooling.
- low cost and immediate application in EV battery chargers and DC converters.

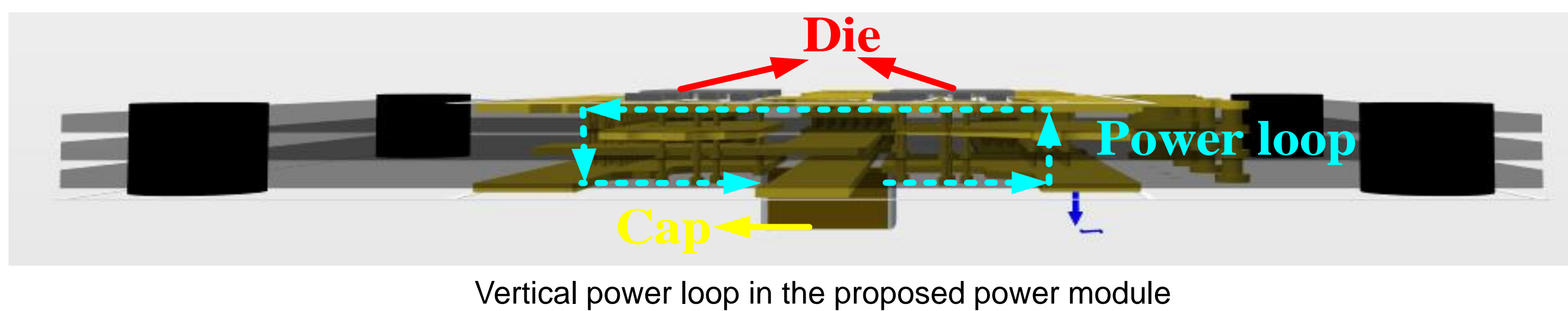
CHALLENGES

- Compact-design requirements in components selection and design considerations.
- Integration process and high-frequency, high-power tests

MODULE DESIGN OVERVIEW

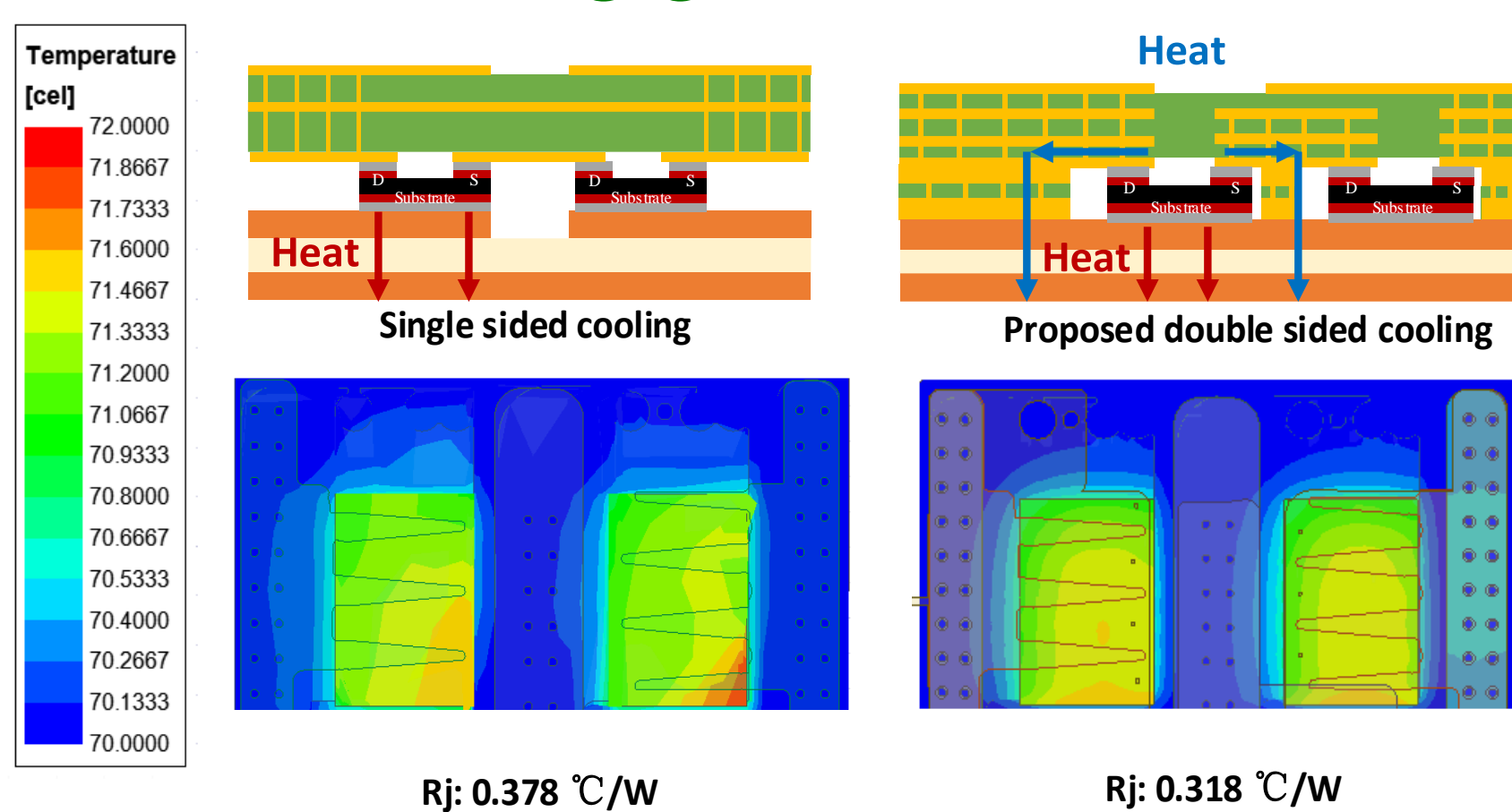


PARASITIC ANALYSIS

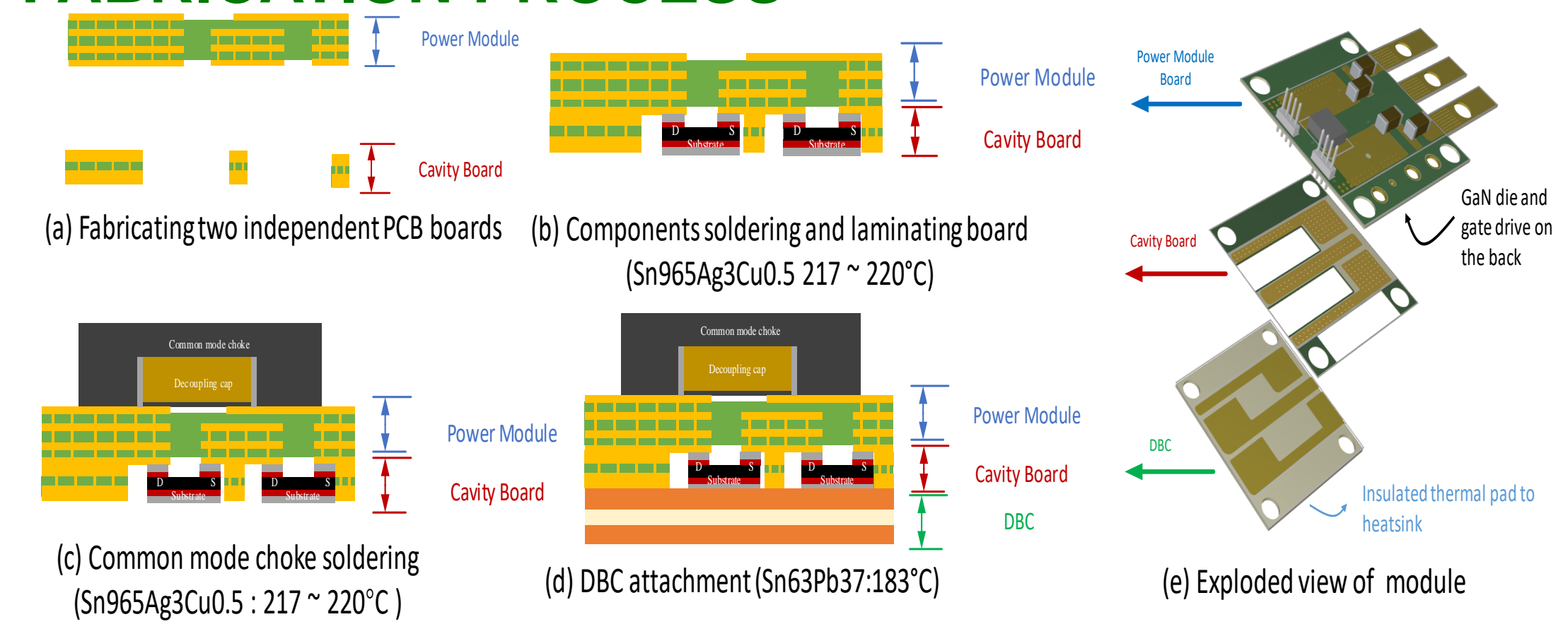


- Power loop inductance: 1.27 nH
- Gate loop inductance: 0.3 nH

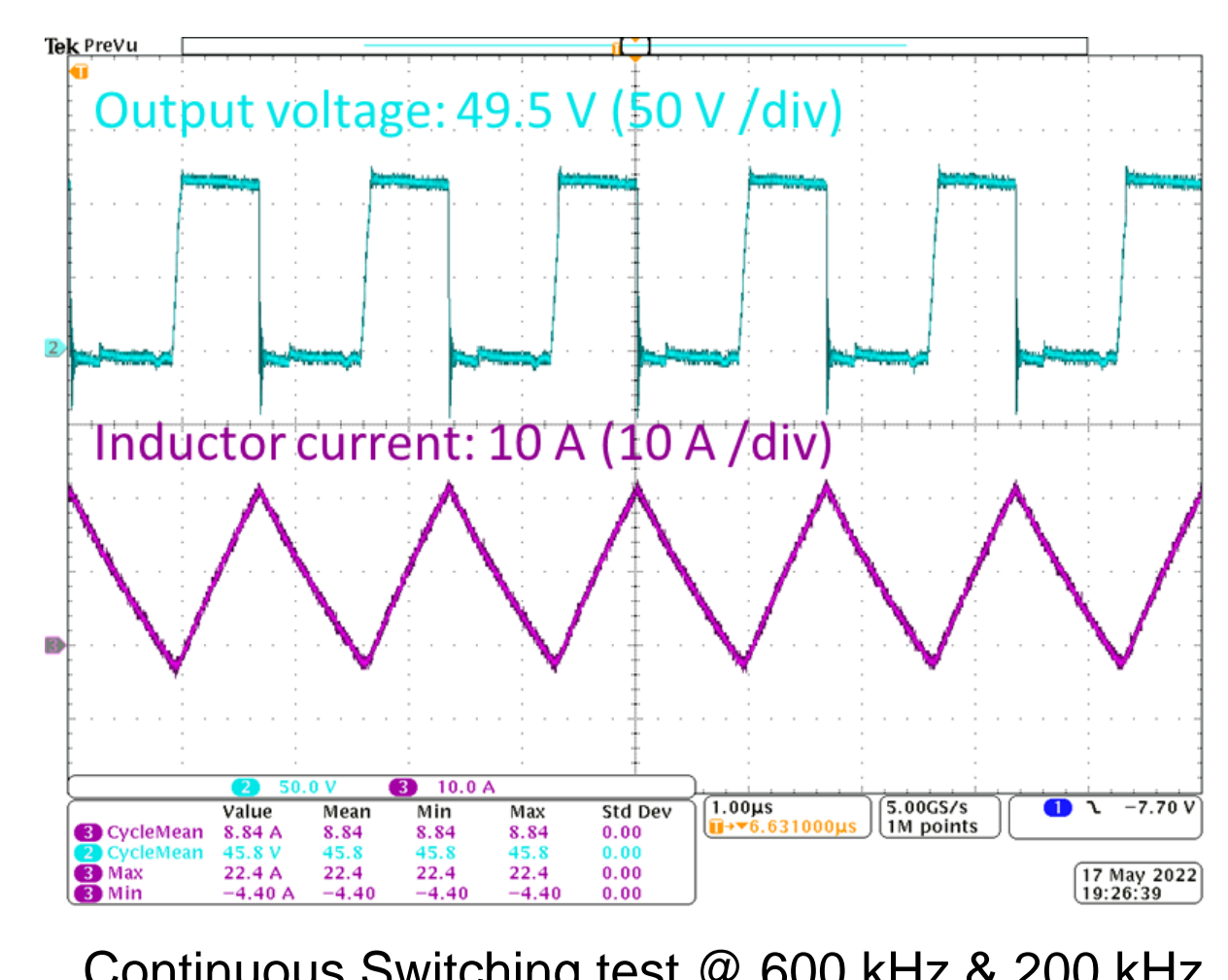
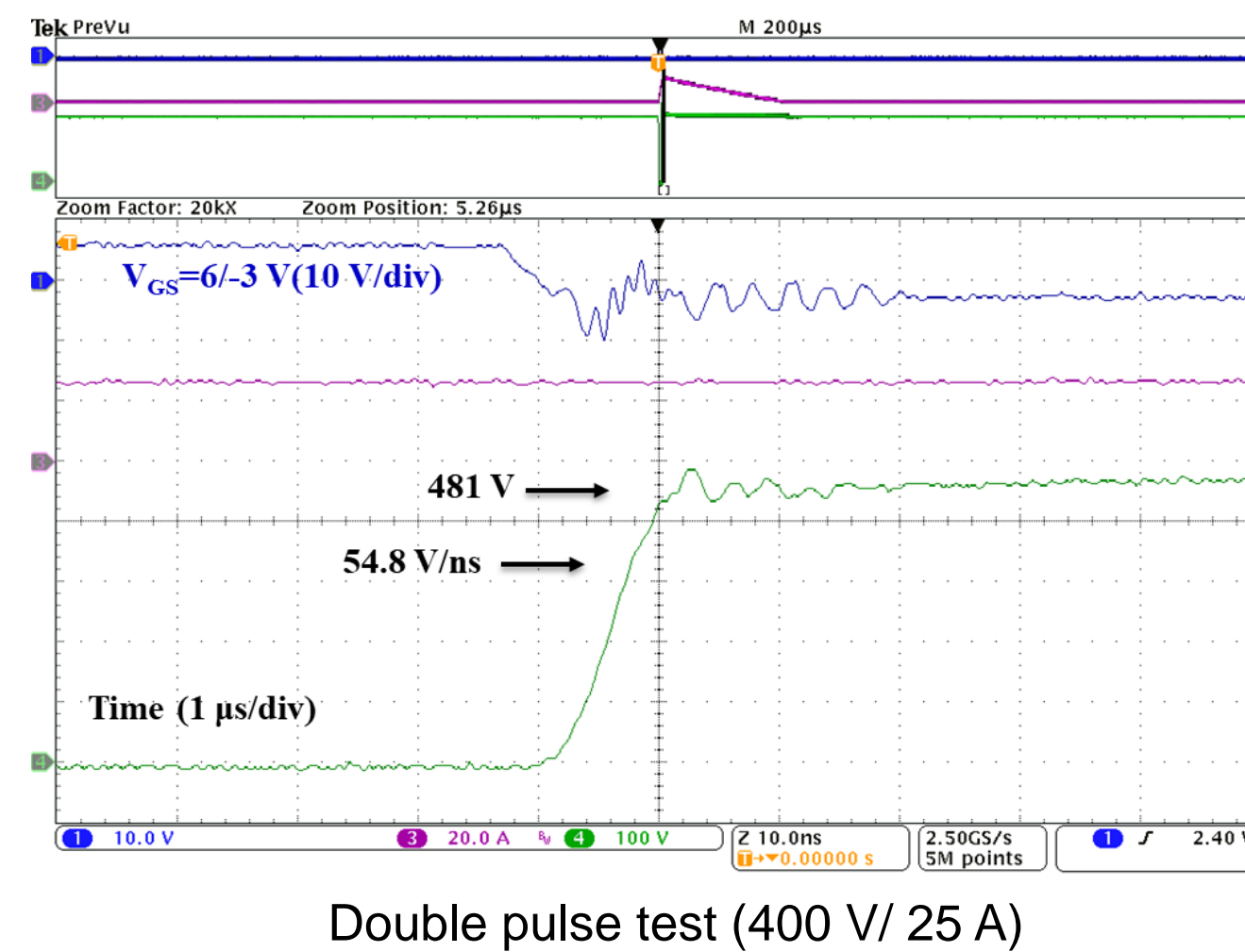
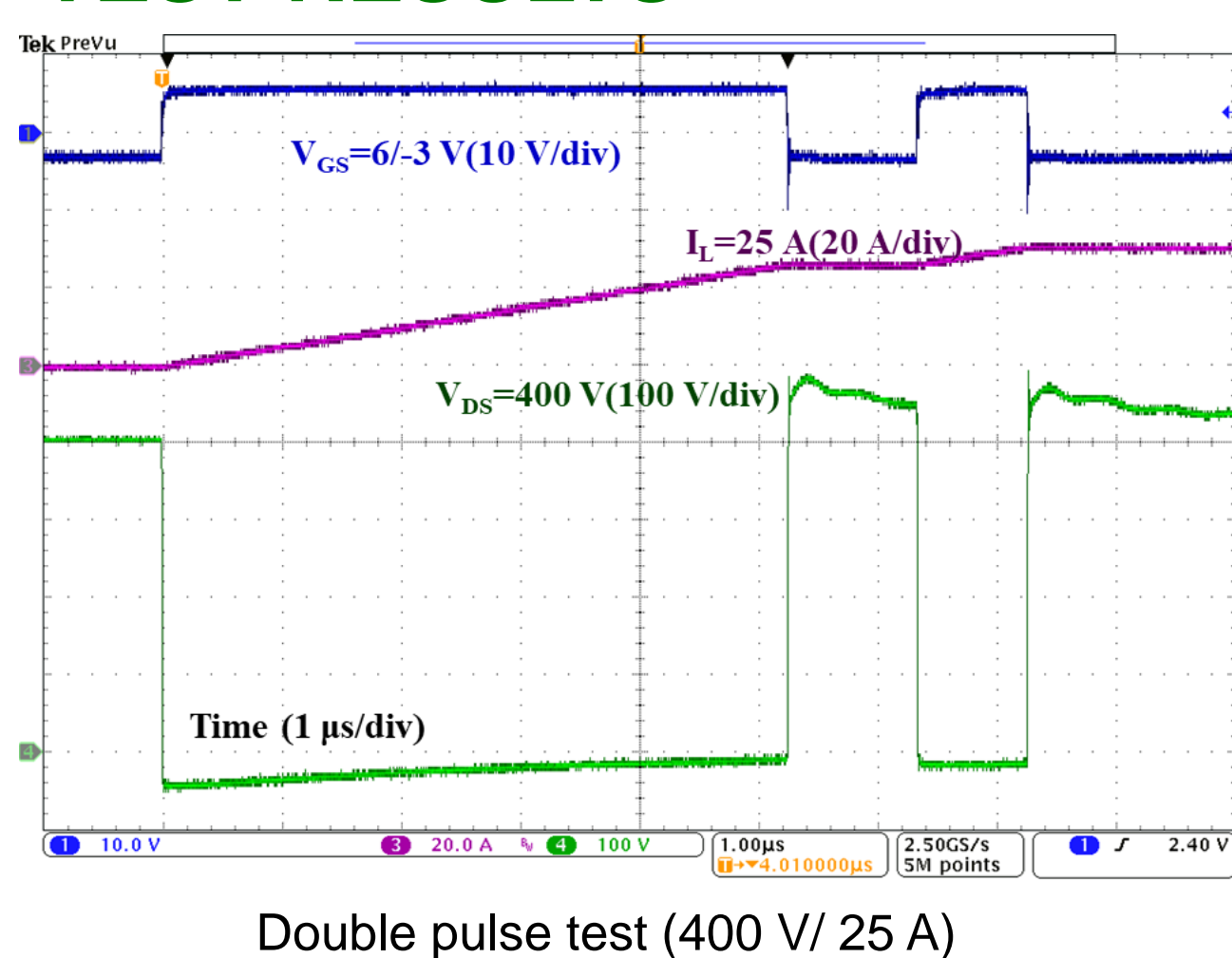
THERMAL ANALYSIS



FABRICATION PROCESS



TEST RESULTS



CONCLUSIONS

- A compact (27mm x 18mm) embedded half-bridge GaN power module with double-sided cooling, low inductance, low thermal resistance, and integrated gate driver is designed
- The experimental results validate the module performance under 10 kW (400 V/25 A) with 1.03 nH power loop inductance and less than 5 % overshoot voltage.

