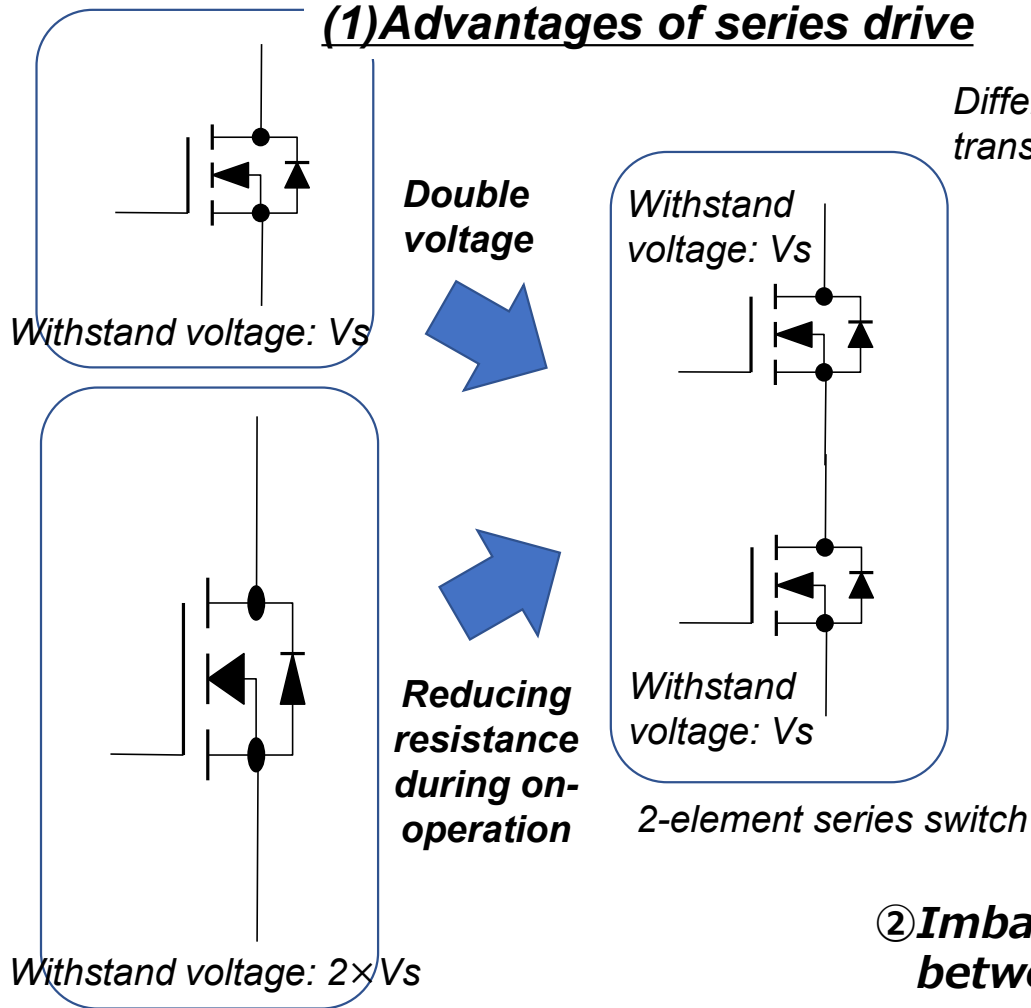
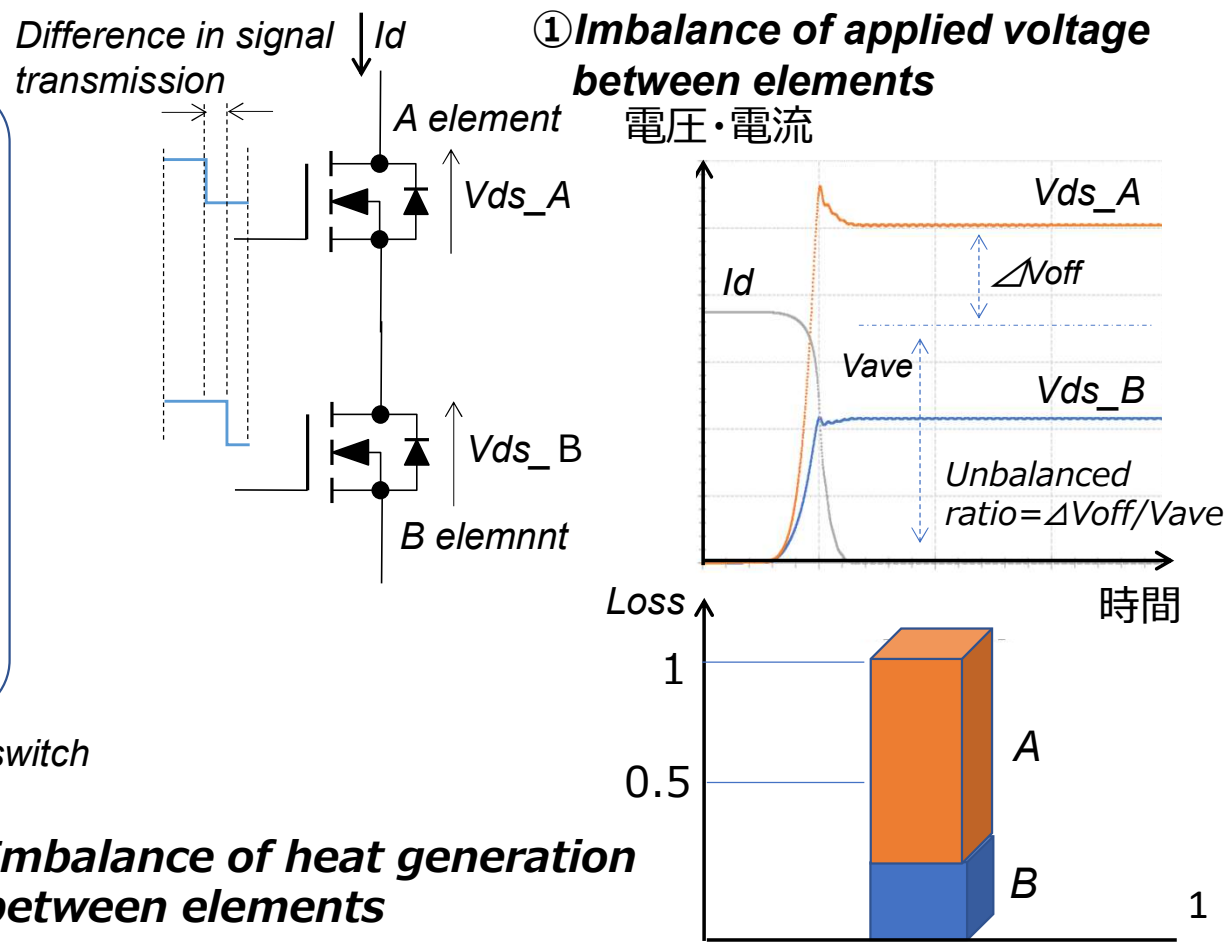


Purpose: Realizing of power semiconductor module series drive technology for low loss and low cost of power electronics equipment

(1) Advantages of series drive



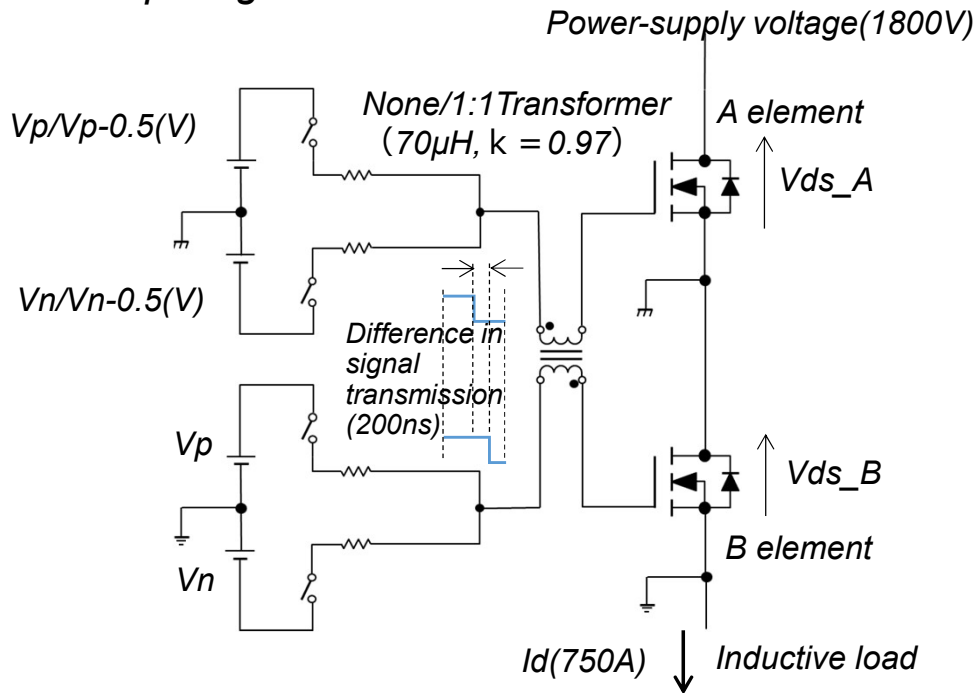
(2) Challenges of series drive



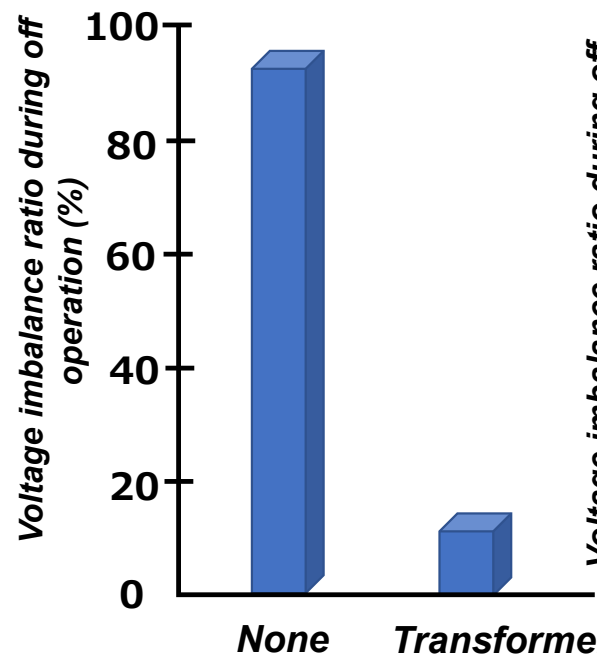
Research summary: When the magnetic coupling method ⁽¹⁾ is used to drive SiC power semiconductors in series, the effects of gate signal and gate voltage deviation are verified using a circuit simulator.

(1) Verification conditions

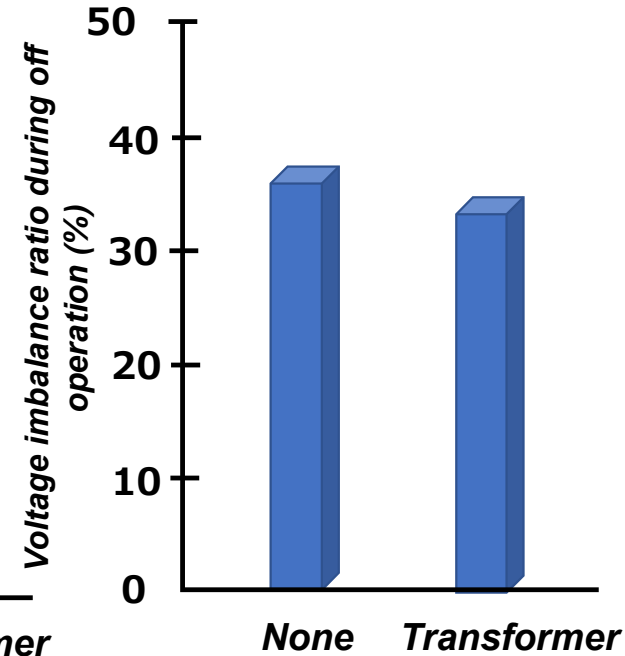
- ① Target device
3.3kV/750A, SiC-MOSFET/SBD power module
- ② Configuration and conditions of magnetically coupled gate drive circuit



(2) Simulation result



(a) There is a difference in 200ns gate signal transmission
(No difference in gate voltage)



(b) There is a 0.5V difference in gate voltage (same amplitude potential difference)
(No difference in gate signal)

***The magnetic coupling method has a large effect on signal differences and a small effect on gate voltage differences.**

(1) Kiyooki Sasagawa, Yasushi Abe, and Kouki Matsuse, "Voltage-Balancing Method for IGBTs Connected in Series", IEEE TRANSACTIONS ON INDUSTRY APPLICATIONS, VOL. 40, NO. 4, JULY/AUGUST 2004, 1025-1032 (2004)