A Comparative Study of Silicon Carbide Merged PiN Schottky Diodes with Electrical-Thermal Coupled Considerations

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(a)

(b)

(c)

(d)
Figure S1. The simulated static forward characteristics, with unipolar and bipolar current plotted separately, of (a) Device 1, (c) Device 2, and (e) Device 3 at $T = 25$–$600 \degree C$. The percentage of unipolar and bipolar current in total current of (b) Device 1, (d) Device 2, and (f) Device 3, extracted from (a), (c) and (e).
**Figure S2.** Voltage waveforms and I-V trajectories of the three devices during the surge current tests: (a)(b) for Device 1, (c)(d) for Device 2, and (e)(f) for Device 3.

**Figure S3.** (a) The structure functions of the three devices. The junction-to-case thermal impedance could be determined by the bifurcation point of the solid and dashed lines. The zoomed-in structure function and its derivative of (b) Device 1, (c) Device 2, and (d) Device 3, as well as the extracted thermal resistance and capacitance of each layer.
Figure S4. The heat paths inside the chip, the solder, and the copper plate of the device during (a) the thermal impedance measurement and (b) the surge process.