materials

MDPI

Supporting information

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

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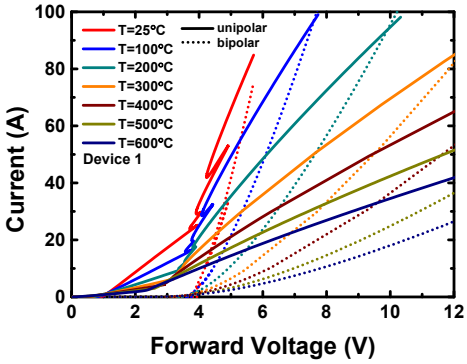
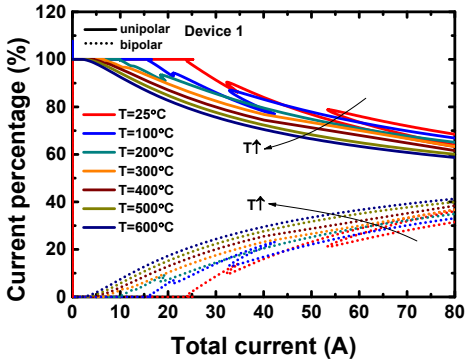


(**a**)



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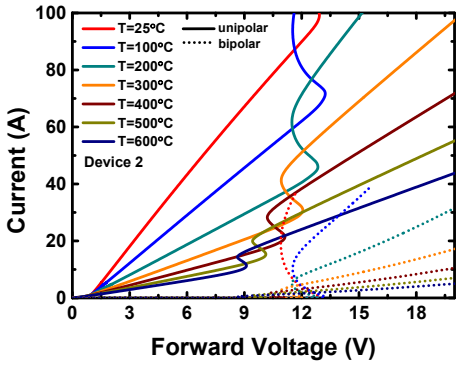

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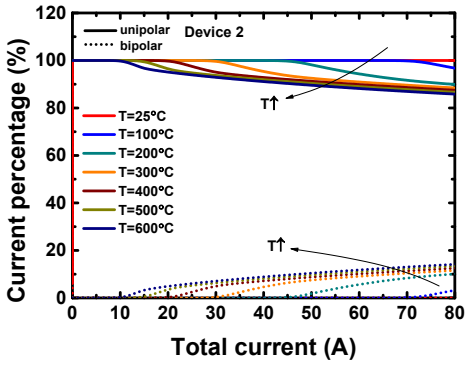

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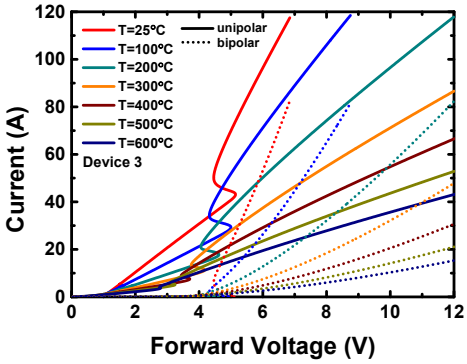

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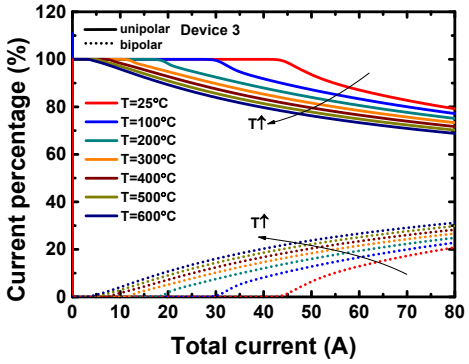
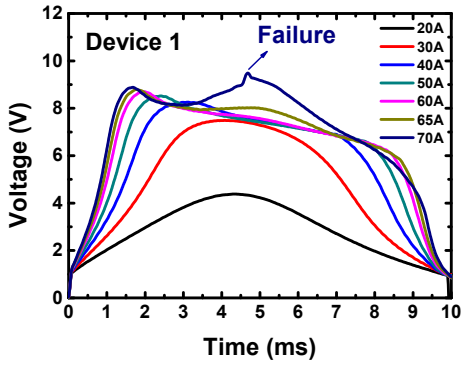
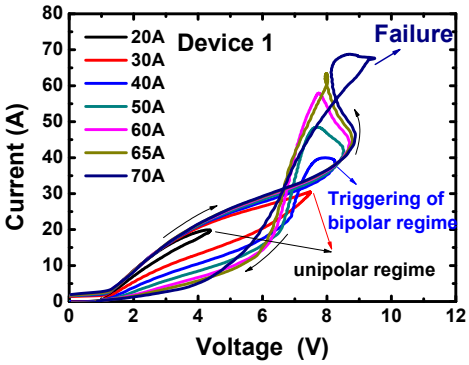


(**f**)

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 °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**).



(**a**)



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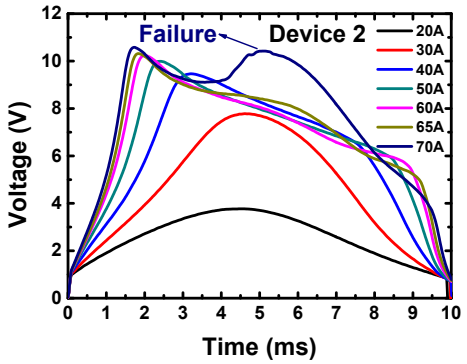

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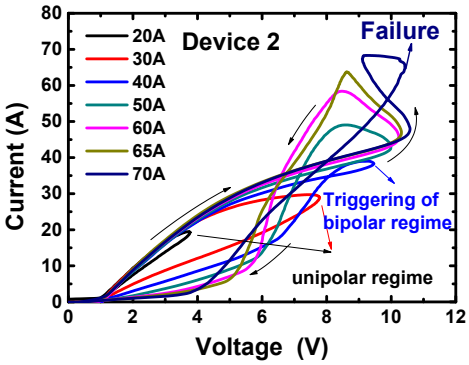

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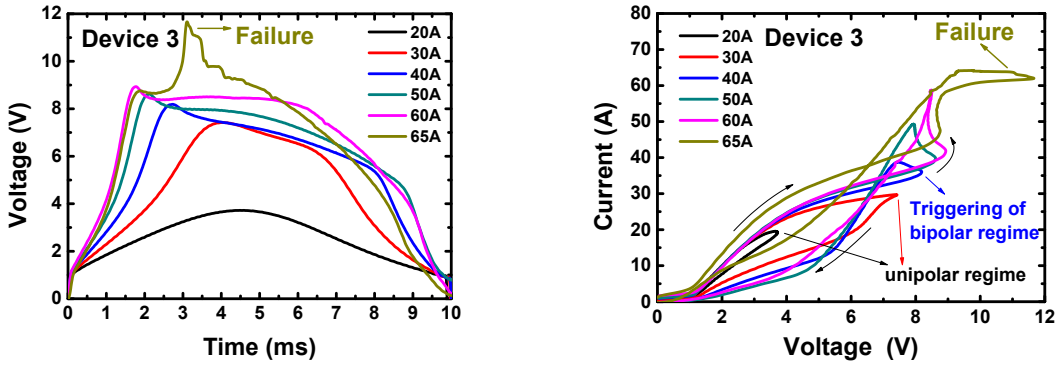
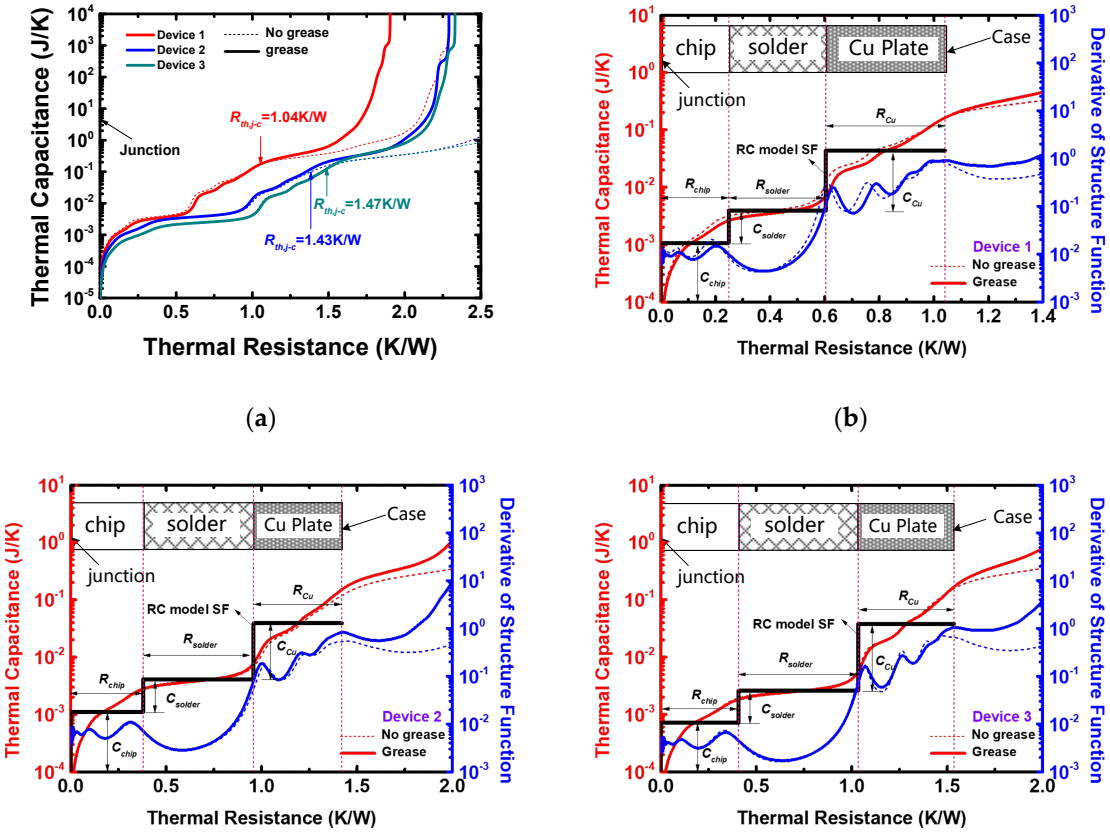


(**e**) (**f**)

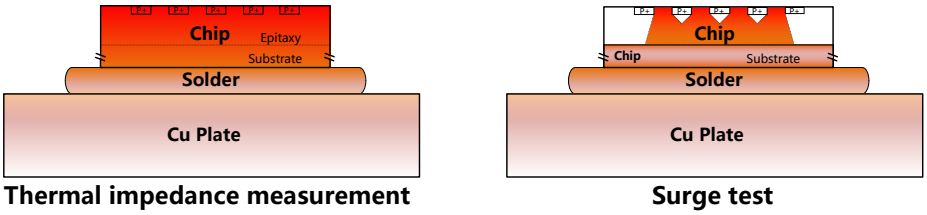
Figure S2. Voltage waveforms and I-V trajectories of the three devices during the surge current tests: (**a**)(**b**) for Device 1, (**c**)(**d**) for Device 2, and (**e**)(**f**) for Device 3.



(**a**) (**b**)

(**c**) (**d**)

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.



(**a**) (**b**)

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.