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Zhou et al.(10) **Pub. No.: US 2022/0361315 A1**(43) **Pub. Date: Nov. 10, 2022**(54) **CHIP-ON-CHIP POWER DEVICES
EMBEDDED IN PCB AND COOLING
SYSTEMS INCORPORATING THE SAME**(71) Applicant: **TOYOTA MOTOR ENGINEERING
& MANUFACTURING NORTH
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(57) **ABSTRACT**

Printed circuit board (PCB) substrates include at least one pre-preg layer interposed between one or more electrically conductive layers, power device stacks, each having a power device embedded within the PCB substrate in a vertical stack configuration, and a flat heat pipe positioned between the power device stacks within the at least one pre-preg layer, one surface of the flat heat pipe directly bonded to a first one of the power device stacks and an opposite surface of the flat heat pipe thermally coupled to a second one of the power device stacks.

