

ABSTRACT OF THE DISCLOSURE

MEMS HEAT PUMPS FOR INTEGRATED CIRCUIT HEAT DISSIPATION

A cooling mechanism within an integrated circuit includes an internal pump for circulating thermally conductive fluid within closed loop channels. The cooling channels are embedded within an integrated circuit die, such as in interlevel dielectric layers between metal levels. The channels are formed by engineering deposition of a layer to line trenches and form continuous voids along the trenches. Exemplary heat pumps comprise cavities, formed in communication with the channels, covered by piezoelectric actuators. Preferably, the actuators are wired to act in sequence as a peristaltic pump, circulating the fluid within the channels. The channels are positioned to carry heat from active devices within the integrated circuit, and a heat sink carries heat from the die.

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