Design of a Heat Trap for Optimal Heat and Current Conduction on Soldering Pads

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Abstract

Electronic circuit boards often need the use of heat traps on many of their soldering pads, as ground or high current lines, to make the automated soldering process possible.
The aim of this work is to optimize a soldering pad with a heat trap that allows the soldering process, and at the same time assures the best electrical conductivity diminishing the generation of excessive Joule heating.
With the use of COMSOL Multiphysics® and the Heat Transfer Module it was possible to evaluate different geometries and types of soldering pads to fulfil the proposed task.
2D and 3D simulations were realized on several parametric sweeps for varying geometries, testing the heat dissipation in transient and stationary state, and heat generation for stationary currents.
An optimal geometry could be analyzed to recognize its advantages over different designs, and also define its limitations to restrict important values for the circuit board as maximum current and maximum heat allowed.

Figures used in the abstract

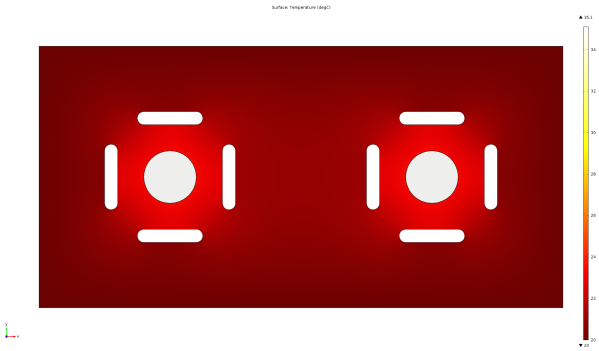

Figure 1: Heat Dissipation of geometry 1.

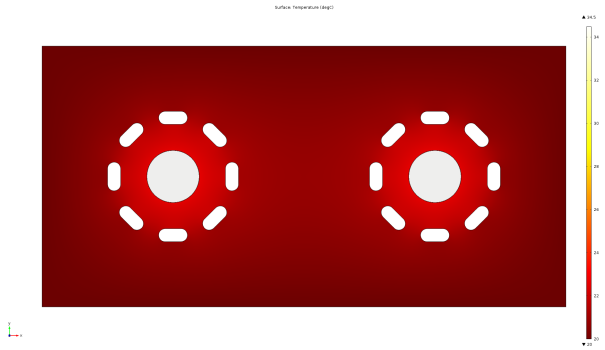

Figure 2: Heat dissipation of geometry 2.

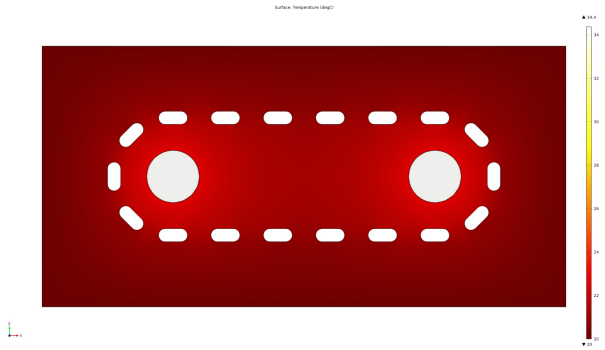

Figure 3: Heat dissipation of geometry 3.

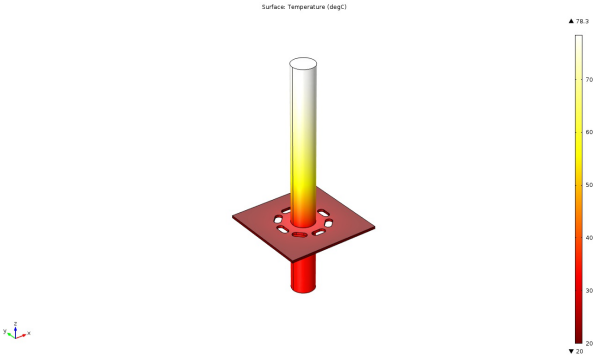

Figure 4: Single Heat trap maximum Temperature.