

# Effect Of Heat And Mechanical Properties On Thermal Vias Of PCB Mounted With LED Driven Of QFN Packa

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## Abstract

### Introduction:

The semiconductor and IC package manufacturer are continuously seeking for miniaturization devices to fix into a small space. An unfortunate miniaturization of devices will have an effect on heat dissipation density, which leads to low rate of heat dissipation to the ambient. As a result, the chip temperature increases which eventually degrade the entire system of the circuit. Therefore, in this paper the heat transfer and mechanical analysis of LED IC driver QFN package is presented by using COMSOL Multiphysics.

### Use of COMSOL Multiphysics:

Heat transfer module in COMSOL Multiphysics helps to analyze the heat transfer within the computational domain. The QFN package mounted on the PCB is designed with Solidworks and imported to COMSOL Multiphysics 5.1 using Livelink. The necessary inputs on the respective domain information, material, boundary inputs, etc are fed to COMSOL.

### Results:

QFN packages are mounted on different FR-4 PCB design. This analysis is carried out with two different configurations at room temperature 25°C. 1. PCB with hollow thermal vias coated with copper and 2. PCB with filled paste in the vias. The heat dissipation and the changes in mechanical properties of different PCB design are investigated. The thermal resistance of thermal vias is expected to decrease after the introduction of paste in the PCB package.

### Conclusion:

The influence of the thermal via configuration, i.e., the hollow thermal via and the vias with the filled in paste, will increase the amount of the heat transfer. Therefore, the functionality of the IC driver will be efficient as the operating temperature is maintained to be in the compatible range. The temperature distribution in the QFN package will give us the optimized design of the thermal vias and hence, an efficient driver configuration can be generated.