Conventional power modules consist of a multilayer structure joined together by solder material and use bond wires to connect to the top metallization of the chip (Fig. 1).

Solder joints and bond wires are the weakest links in conventional power modules and limit their reliability. Due to a mismatch of their coefficients of thermal expansion of the components of the module, a temperature induced stress develops, which under cyclic load produces fatigue of these components and ultimately failure of the power module.

The goal of this Thesis is to study through simulation the effect of selected parameters on the thermomechanical response of a power module.

Main Topic:
- Thermo-Mechanical Reliability
- Finite Element Simulation

Prerequisites:
- Experience with Matlab programming (or equivalent)
- Experience with Ansys Mechanical (not mandatory)

Fig 1. Conventional power module [Modelling for the lifetime prediction of power semiconductor modules, Ch. 5 of “Reliability of Power Electronic Converter Systems”, Chung, Wang, Blaabjerg, Pecht]

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