

# Predictive Modeling and Mitigation of Warpage in Optical MEMS Die attach process on PCB

## Context:

Optical MEMS devices are increasingly critical for Lidar and AR automotive applications. Accurate prediction and compensation of package warpage is essential for maintaining precise optical alignment and long-term reliability. Teams must develop a predictive model to simulate warpage/ deformations of the die attached to the PCB substrate during a dynamic thermal profile.

## Challenge:

- Research key factors causing warpage in microelectronic packages (including mirror MEMS) and identify the critical material properties and interaction mechanism.
- Model the MEMS die, PCB and any intermediate layers (underfill or adhesives) considering the different material properties and their interactions under thermal and mechanical stresses.
- Define the thermal profiles, include mechanical stresses from PCB mounting and run the simulation to predict warpage and deformation.
- Propose design and/or material selection guide to mitigate observed warpage.

If you select this challenge, use in the emails title code: **Ch1**

Source: Benkoula Safia; Vernhes Pierre; Choisel Nicolas; Braisaz Regis; Cruz Rodolfo; Rey Stephanie (2023). Addressing sub-micron thermal warpage: Industrial application on semiconductor devices. 2023 IEEE 73rd Electronic Components and Technology Conference (ECTC). doi:10.1109/ECTC51909.2023.00037

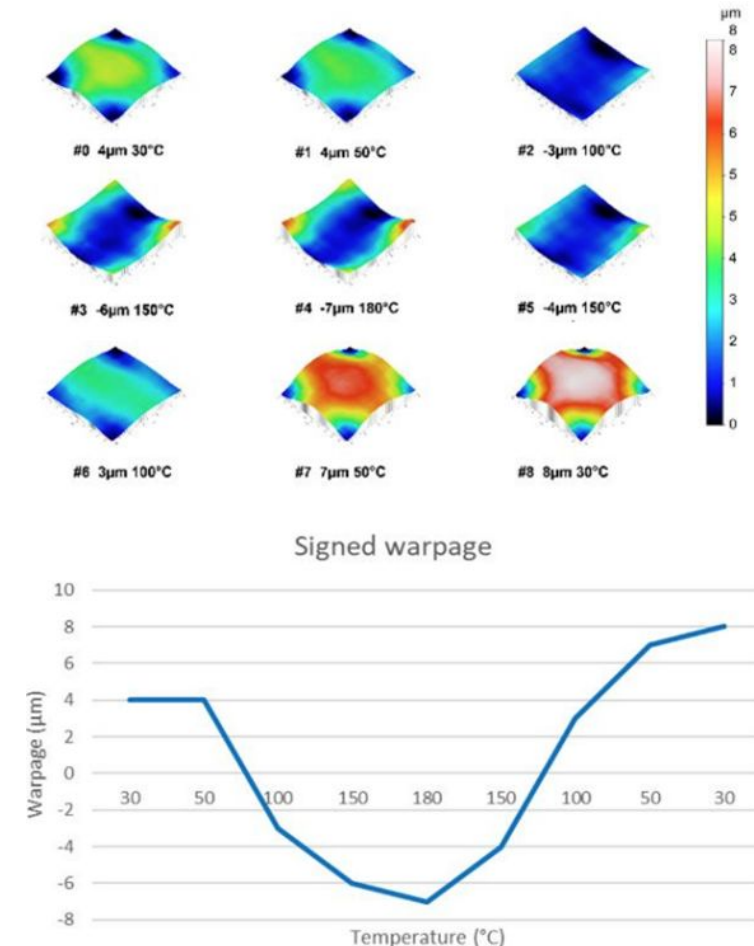


Fig1. Absolute warpage of optical package during thermal profile