

THE 1-UP STRIP WARPAGE CONTROL OF LEAD FRAME PACKAGE

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ABSTRACT

Strip level warpage is important for improving package manufacturing processes yield. Moreover, the process induced warpage in strip level can be one of the major contributors to package level warpage variation at end of line after singulation. Nowadays, the application of 1-up strip molding is driven by the purpose of cost saving in assembly factories. The warpage of 1-up strip after molding is more difficult to control.

Intrinsic package warpage is largely driven by coefficient of thermal expansion mismatch between the various packaging material constituents. For a certain lead frame package design, there are many factors that affect the warpage, such as die thickness, lead frame thickness, mold cap thickness and mold compound, et al. Suitable combinations of these factors will be the solution to the warpage control.

This paper proposes a method to find solution to the 1-up strip warpage control for lead frame package. Both FEM simulations and actual molding tests are conducted. Shadow moiré method was adopted to measure the warpage of the entire strip at elevated temperatures. Mold cap thickness, lead frame thickness, die thickness, mold compound and even die attach material play roles in the warpage control. Full DoE of actual tests will be very costly and time-consuming. In this paper, only few tests were conducted with several mold compounds firstly. The FEM simulation results were correlated with actual tests to determine the crying and smiling warpage boundary for satisfying warpage requirement in simulation. The effect of each factor (mold cap thickness, lead frame thickness, die thickness, mold compound and die attach material) on warpage was simulated and discussed.

REFERENCES

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