

Improving the Robustness of a Board-Mounted DFN Package

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I. OVERVIEW

- A DFN (dual flat no lead) is a leadframe-based package that has metal pads only along the two sides of the bottom surface.
- As shown in Fig. 1, the metal pads are soldered to the PCB (printed circuit board) to create the required electrical connection.

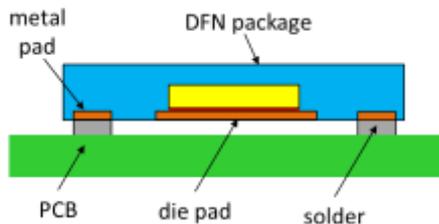


Fig. 1. Package mounted on a PCB.

II. PROBLEM IDENTIFICATION

- A DFN package crack was reported and subsequent investigation was conducted.
- It was found out that the crack was encountered on a package mounted on PCB with no solder on die pad as shown in Fig. 2.

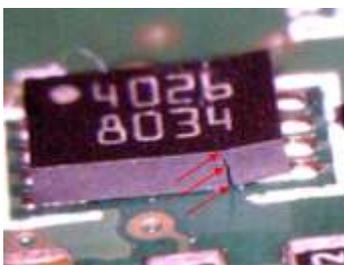


Fig. 2. DFN package crack.

III. FAILURE MECHANISM UNDERSTANDING

- To understand the failure mechanism and find a solution, mechanical modeling using finite element method was conducted.
- Three different cases were modeled with force applied on the top surface of the package as shown in Fig. 3.

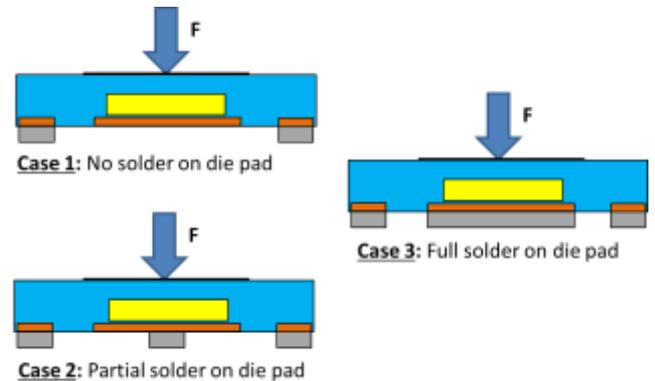


Fig. 3. Modeled cases.

IV. PROCESS SOLUTION AND IMPROVEMENT

- Location of maximum stress shows that the failure is primarily due to the external force causing the package to bend and crack.
- From the modeling result (Fig. 4), the use of full solder on die pad connection to PCB is the best solution, showing the lowest induced package stress.
- Using partial solder would not significantly improve the robustness since the solder has the tendency to just spread out and not provide enough support.

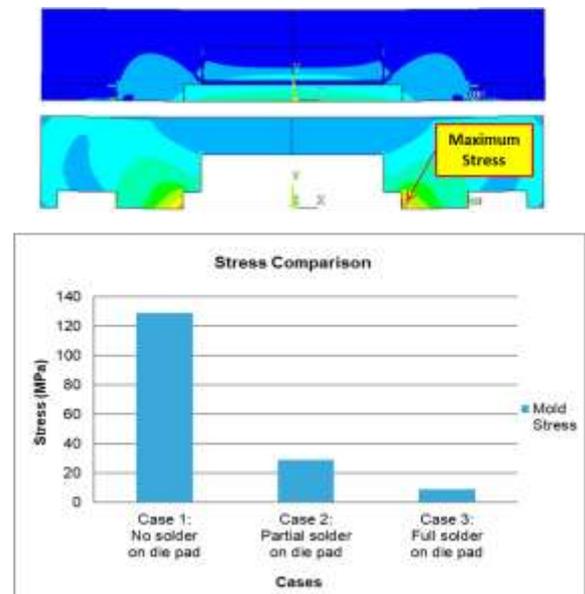


Fig. 4. Mechanical modeling result.