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Substrate IC Package with Die Attach Cavity Pad

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Keywords**—***Substrate; die attach flow; adhesive glue; IC package; lead contamination; non-stick on lead.*

I. Overview

- Substrate material or the substrate stack-up played a very important role in packaging industry, not only because it represents a great portion of the cost but also has a great influence on package performance
- Substrate-based integrated circuits (IC) packages in Fig. 1 have stack-up made of a core dielectric material, prepreg material, copper traces and vias for the input-output (I/O) signal connections, and covered with top and bottom soldermask material

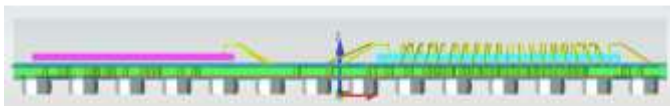

Fig. 1. Cross-sectional view of a substrate-based IC package.

II. Problem Identification

- Contaminated leads were encountered on a substrate-based package, with contaminants coming from the adhesive glue as encircled in Fig. 2

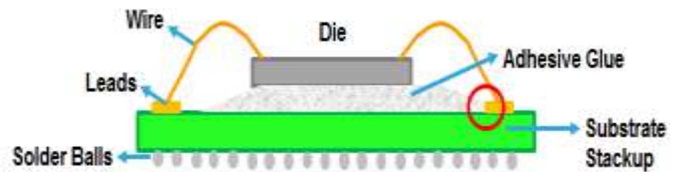

Fig. 2. Adhesive glue flowing into the leads.

- Clearly, a control is needed for the flow and volume of the adhesive glue to eliminate occurrence and risks of lead contamination
- Contaminated leads may cause wirebond process anomalies or defects like lifted stitch, lifted ball, and non-stick on lead

III. Package Design Solution

- The substrate IC package is augmented in Fig. 3 and improved to have a depth part or cavity pad for the die attach area particularly for the adhesive glue
- The improved design controls the flow and volume of the adhesive glue preventing it to progress into the leads

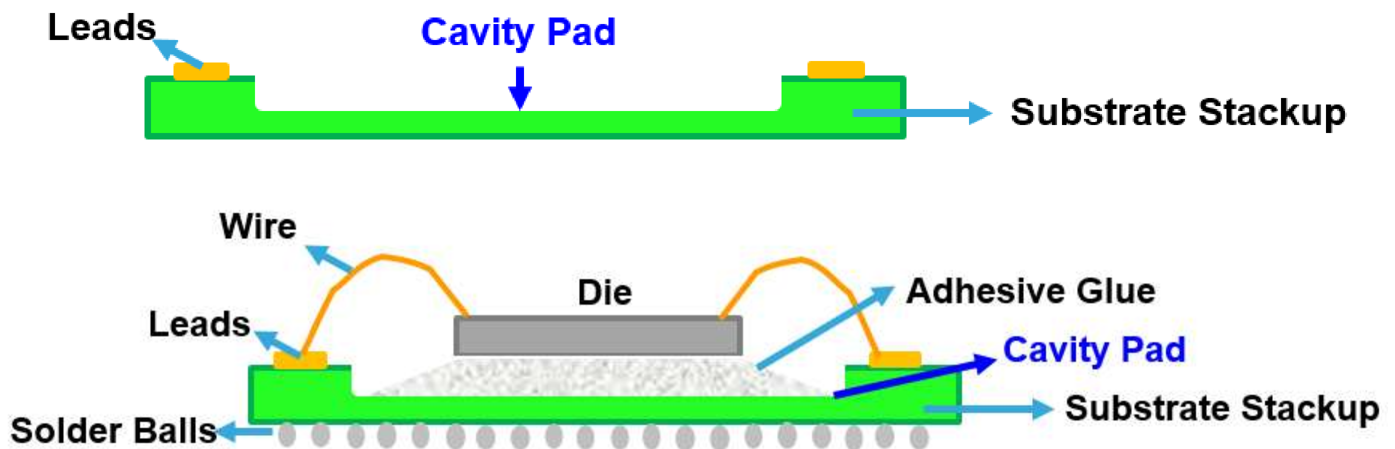

Fig. 3. Improved substrate-based IC package with the die attach cavity pad.

- The design prevents lead contamination, and help mitigate wirebond-related process defects such as lifted stitch, lifted ball, and non-stick on lead or pad

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