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Specialized Interposer for Critical Wirebonding on Substrate LGA Semiconductor Package

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Keywords— *LGA; wirebonding; interposer; substrate; wire sweep.*

I. Background of the Study

- The trend in semiconductor packages is to become smaller, hence tighter clearances in the design
- With tight clearances in Fig. 1 denoted by A-D parameters, wirebonding from die to bond finger becomes more critical and challenging, and risk of wire-related rejects increases

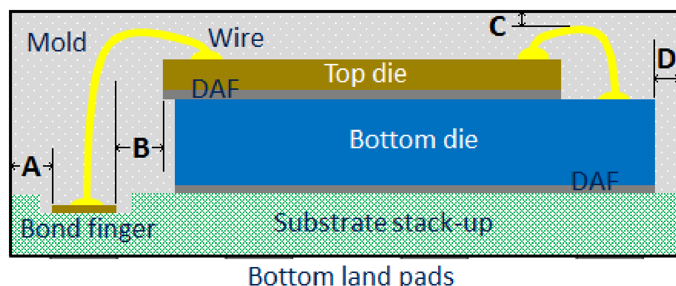

Fig. 1. Cross-sectional illustration of substrate land grid array (LGA) semiconductor package.

II. Problem Identification

- High wirebond looping has low resistance against the drag force/stress that molding compound applies during molding process, causing wire sagging and sweeping
- With tight clearance between edge of die and bond finger (parameter B), wire-to-die short and wire-to-wire short could happen

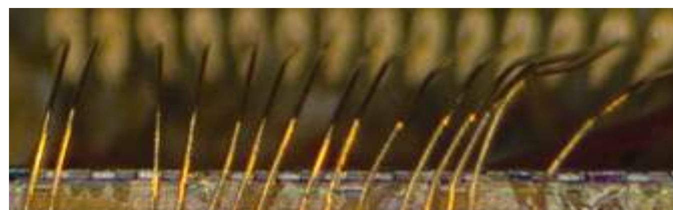

Fig. 2. Wire sagging and sweeping.

- Possibility of high parts per million (ppm) level in terms of wire breakage, due to large height difference and formation of wire looping

III. Package Design Solution

- A specialized interposer is designed in Fig. 3 to reduce the wire loop span, thus increasing the wire strength and providing strong loop to prevent wire sagging and wire sweeping during molding process
- The interposer acts as an electrical interface between the top die through the wire and the substrate bond fingers

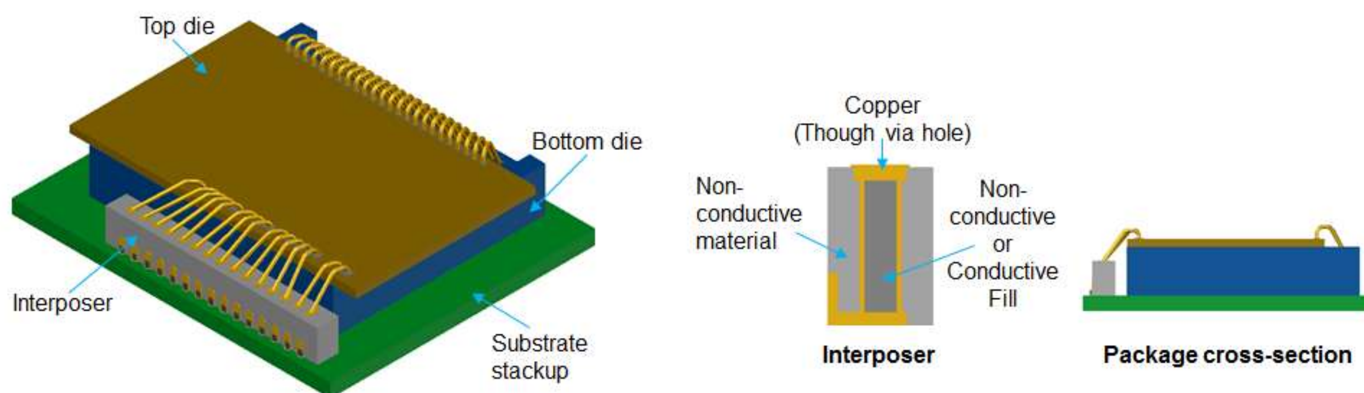

Fig. 3. Substrate LGA semiconductor package with specialized interposer.

- The design helps prevent wire-to-die and wire-to-wire shorting due to tight clearances during wirebonding process
- With the specialized interposer, ball neck strength of the wires is increased, thus preventing neck damage during formation of a low loop and in turn increasing the package reliability
- Interposer could also provide a widespread connection or a wider pitch that could allow rerouting of the wires if needed