

Quad Flat Package with Embedded ESD Diode on Leads

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I. BACKGROUND OF THE STUDY

- As the die technology becomes smaller, faster, and thinner, circuit metallization also becomes smaller, thus the semiconductor device like that of the quad flat package (QFP) shown in Fig. 1 becomes more sensitive and susceptible to electrostatic discharge (ESD) damage

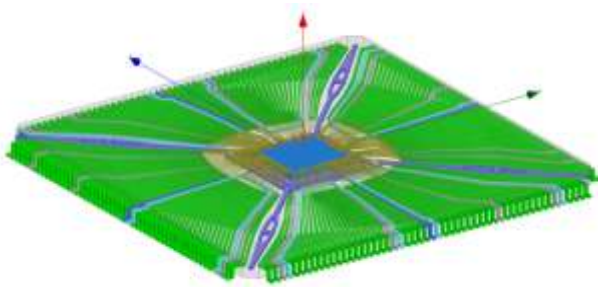


Fig. 1. Semiconductor QFP leadframe package.

- With market cycle time becoming more demanding, there is a need to adapt to the latest trends and address package related issues at the soonest as possible

II. PROBLEM IDENTIFICATION

- There are existing semiconductor integrated-circuit (IC) packages that do not have ESD and/or electrical overstress (EOS) protection circuitry at the die level, thus susceptible to ESD/EOS-related damages
- An example of such defect manifestation is shown in Fig. 2, with the device eventually damaged



Fig. 2. Example of ESD/EOS-damaged QFP device.

III. PACKAGE DESIGN SOLUTION

- The semiconductor QFP leadframe package is embedded with ESD diode/s on the leads in Fig. 3
- The ESD diode is mounted or attached using conductive/sintered glue, solder bump, or any conductive adhesive material between the lead or signal pin and the diepad or ground, and could also be mounted between any two signal pins or leads

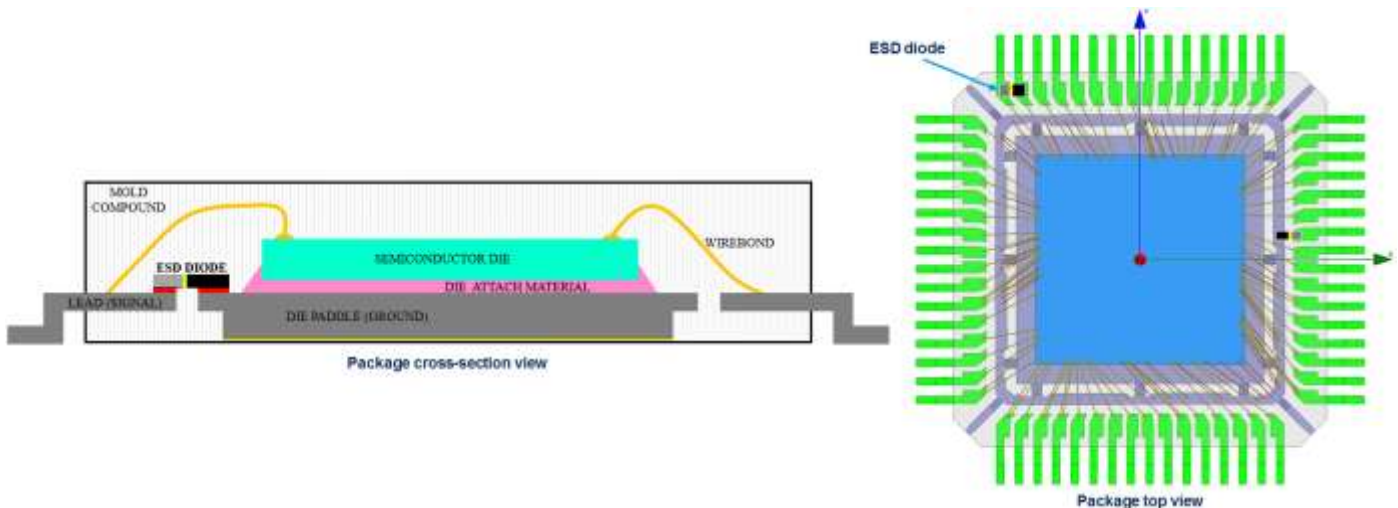


Fig. 3. Semiconductor QFP device with ESD diodes attached on leads.

- By incorporating an ESD diode component inside the package, ESD/EOS-sensitive package without internal ESD/EOS die circuitry could now be protected against ESD/EOS-related damages