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Leadframe Paddle Enhancement for Delamination-Free Packaging

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Keywords**—** *Silicon die; Semiconductor Die; Interface; Design Improvements; Delamination.*

I. Overview

- A QFN-mr (Quad Flat No-grid Multi-row) is a type of packaging technique under surface mount devices wherein it is capable of higher number of I/O (Input/Output) count than conventional QFN devices.
- The technology uses leadframe as carrier for the silicon die with an encapsulation material of epoxy mold compound to conceal the wiring and functional circuitry of the die.

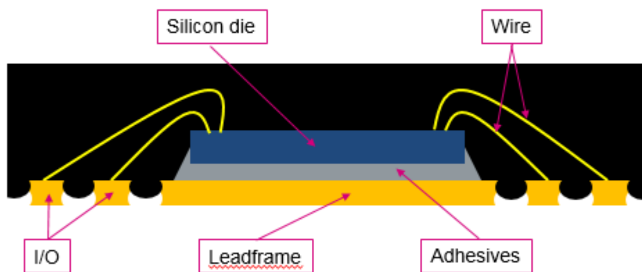

Fig. 1. QFN-mr device

II. Problem Identification

- Delamination is one of the foreseen detractor in qualifying a new architecture, list of direct and alternative material for QFN-mr device.
- SAM (Scanning Acoustic Microscopy) shows occurrence of delamination between epoxy mold compound and silver material localized at the corner paddle.

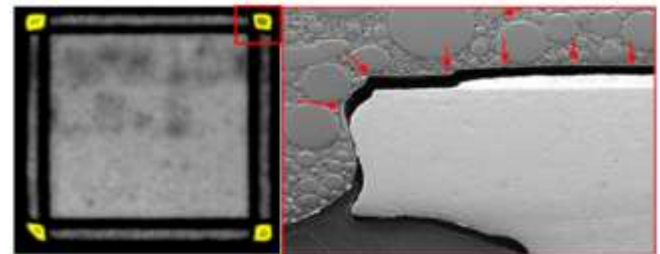

Fig. 2. Delamination on corner paddle

- 100% of sample submitted for reliability test shows similar manifestation of delamination

III. Design Solution and Improvement

- Understanding the signature of defect inside the package construction, a proposal of modification in the current configuration of plating technique is suggested and proven to resolve the localized delamination issue.
- The new design of leadframe paddle with exposed copper on corner portion is done through selective plating technique during leadframe fabrication.
- Shown in Fig. 3 is the illustration of the new design of leadframe paddle with the corner portion is changed to copper

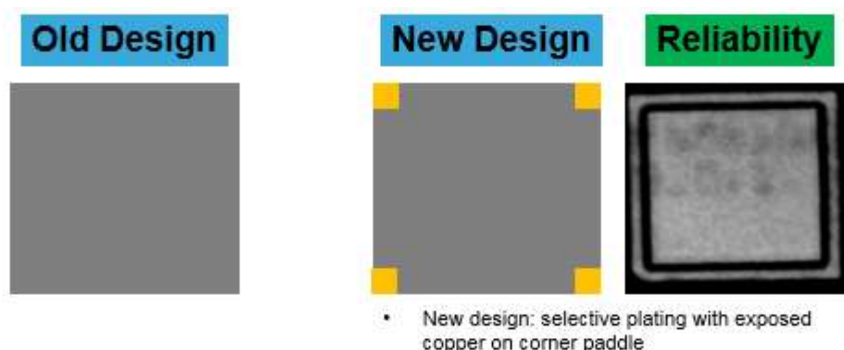

Fig. 3. New leadframe paddle design

- Changing the plating material to copper promotes strong adhesion between epoxy mold compound and oxide present on the copper-oxygen interaction.