International Research Journal of Advanced Engineering and Science
ISSN (Online): 2455-9024

Specialized Cutting Technique for QFN Leadframe Semiconductor Package

Rennier S. Rodriguez, Frederick Ray I. Gomez
Central Engineering & Development, Back-End Manufacturing & Technology, STMicroelectronics, Inc.
Calamba City, Laguna, Philippines 4027

Abstract**—***The paper presents a specialized cutting technique for package singulation without using the conventional mechanical blade.*

Keywords**—** *Package singulation; cutting technique; QFN.*

I. Background of the Study

- Package singulation process is one of the known sawing techniques on QFN (quad flat no-lead) leadframe semiconductor manufacturing to separate the encapsulated leadframe into individual units
- Conventional package sawing or singulation process uses a mechanical blade to cut through the metal and mold material according to defined package size of the product

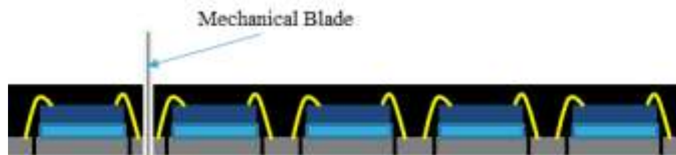

Fig. 1. Singulation of individual unit from the encapsulated leadframe strip.

- Conventional package singulation technique comes with some process/assembly related rejections:
  - Metal burrs
  - Un-cut
  - Shallow cut
  - Delamination due to singulation
  - Topside chippings
- Package chip-out was evident on Device Z with measurement greater than the specification limit of 125µm

Fig. 2. Device Z topside chip-out.

- Parameter optimization, blade selection and evaluation, and ensuring planarity and calibration can help mitigate the package chip-out, but still cannot be totally eliminated due to the degradation of the mechanical blade

II. Design Solution

- A specialized cutting technique for QFN assembly is introduced without the use of mechanical blade to singulate or separate the unit individually
- The process is realized through modification of the mold tool design, maximizing the deflash process, and employing chemical etching process

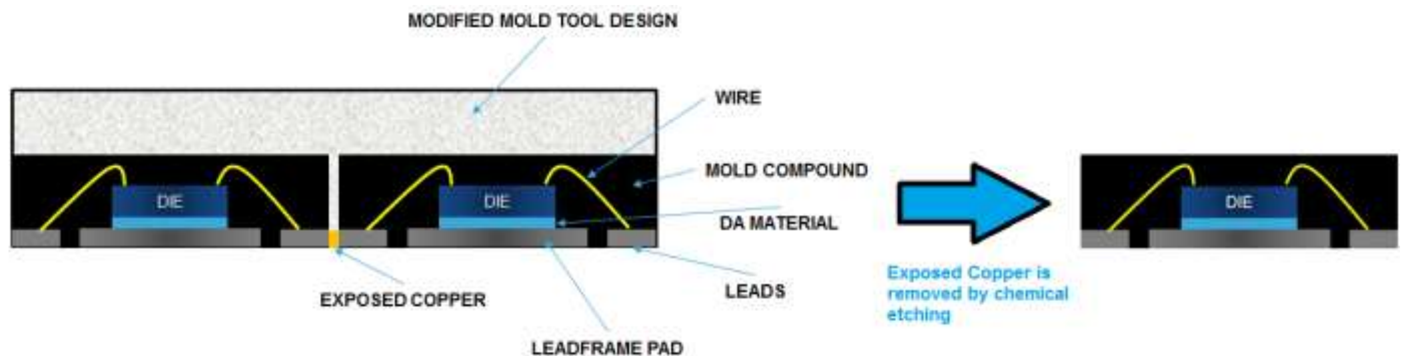

Fig. 3. Specialized cutting technique for QFN leadframe semiconductor package.

- The specialized cutting technique is an advancement in QFN technology, supporting assembly yield improvement and cost