

Reduction of Tape Sticking Effect on Leadframe Platform for Thin Applications

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I. OVERVIEW

Driven by the direction for smaller devices, the development of thinner version of leadframe become one of the key contributor for miniaturization. Leadframe semiconductor carrier or just leadframe shown in Fig. 1 is the metal structure inside semiconductor integrated circuit (IC) device which carry the signal from the silicon die to board level application. During IC assembly, the backside of the leadframe is attached to polyimide tape which supports the frame/carrier during front-of-line processes such as the die attach, wirebond process.

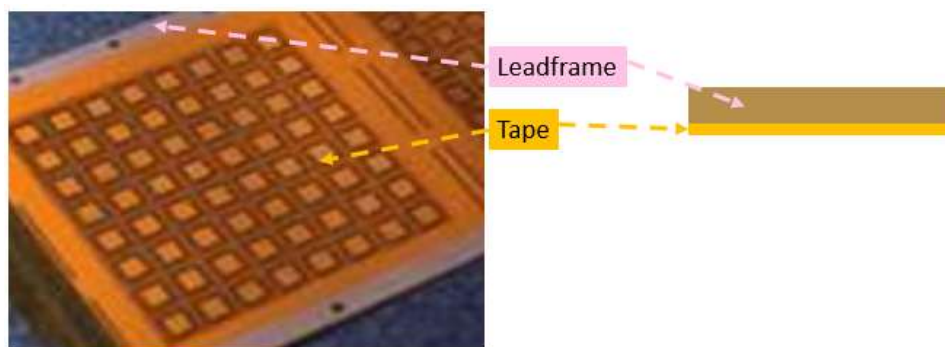


Fig 1. Example of leadframe semiconductor carrier.

The leadframe also acts as insulator for the silicon die during transport and assembly isolating potential electrostatic discharge (ESD) damages from the mechanical module.

II. PROBLEM IDENTIFICATION

Specific to front-of-line processes, the thinner version of leadframe is highlighted with “flimsy” structure with several potential risks identified from the beginning of the development. Crumpled strip shared in Fig. 2 is one of the major issues that was encountered during the initial workability build, mainly due to weak structure. Investigating deeply on the occurrence of the rejection, it was found out that the tape exhibits “static friction” effect to the current platform which the sticking effect of the leadframe from the platform produces bending and later on creates crumpled strips during mechanical transport.

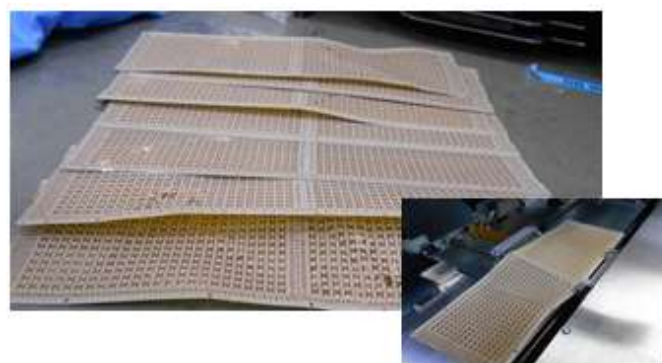


Fig 2. Crumpled strips during mechanical transport.

The occurrence of crumpled strips during assembly makes the whole leadframe strips to be rejected including the bonded silicon die. Normally, this issue is avoided as much as possible since this may result to an external customer complaint, with impact to the functionality and reliability of the semiconductor product.

III. PACKAGE DESIGN SOLUTION AND IMPROVEMENT

There are multiple proposals and suggestions for the resolution of crumpled strips such as tape replacement, however, this may result to expensive alternative approach. In lieu to this, an improvement in the design is conceptualized wherein the flat surface platform is modified to have “groove” configuration on the surface that has contact to the leadframe tape. Shown in Fig 3. is the augmented and improved structure of the platform which is incorporated with “groove” configuration.



Fig. 3. Semiconductor leadframe platform augmentation.

Through incorporating “grooves” in the platform, the “tape sticking” and “static friction” effect on the platform is minimized into a workable level.