Packaged and Wafer Level Semiconductor Failure Analysis

Project Code: SJK2a-06

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Project Overview

Introduction

Semiconductor Failure analysis (FA) is the process of determining how or why a semiconductor device has failed. It is often performed as a series of steps known as FA techniques. Failure analysis is necessary in order to understand what caused the failure and how it can be prevented in the future.

Microprobing of a semiconductor device offers failure analysts a fundamental tool for electronic testing. Probing individual conductors and devices lets analysts selectively inject, and measure the effects of, real-time currents and voltages on individual semiconductor devices under varying conditions. This form of analysis proves critical when analysts must locate and identify specific types of failures. It employs a special piece of equipment known as a “probe station”.

Aim and objective

This project will examine the way to improve the reliability of the measurement data acquired by using a microprobing station. It helps to identify failure locations by using electrical characterization.
Implementation

The project can be divided into 3 stages:

1. Studying state: Getting familiar and handling of the equipment and relevant knowledge

2. Measuring state: Performing measurements
   a). contact resistance investigation
   b). resonant method and coaxial cable investigation
   c). constant current method

Finalizing state: Analyzing measurement data and developing the system model
A procedure to use the probe station machine has been developed. Moreover, the way to obtain a stable contact as well as the behavior of coaxial cable has been investigated and illustrated in this project.

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<th>Subject investigated</th>
<th>Significance of the investigation</th>
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| Stable contact resistance | - To obtain stable and repeatable data  
-- Overdrive of 10μm has the minimum contact resistance |
| Coaxial cable behavior | - Investigation of behavior of coaxial cable and verification of the coaxial cable model |
| Resonance method | - A method introduced to estimate the probe station parasitic effect  
-- A mean value of $C_0=33.0645\text{nF}$ is obtained as the parasitic capacitance of probe station |
| Constant current method | - Another method introduced to estimate the probe station parasitic effect |