Overview

This project was focused on the area of power MOSFET device’s characterization. In order to carry out the characterization work efficiently, automation must be needed. Two automation tools were successfully designed and implemented in the two areas: Capacitance Measurement and automatically characterization.

1. Capacitance Measurement

Aim and objectives

An automatic Capacitance measurement program was written to fully characterize the capacitance characteristics of power devices. A fancy graphical user interface was implemented which help users to do the characterization work in the simplest way.

Methodology

- Two instruments (LCR meter and Semiconductor Parameter Analyzer) were used and controlled by the computer to carry out the measurement automatically.
- Measurement was focused on the internal capacitance change due to the change of drain-to-source voltage (V_{DS}) of the device.
- LCR meter will capture the measurement data while Semiconductor Parameter Analyzer step up the V_{DS} in each pulse.
- The measurement data was stored in computer and plotted as waveform by the program.
Results and Conclusions

- Six testing fixtures for the transistor devices were etched and built
- The user interface program is written by Microsoft Visual C++ 6.0.
- Waveform data is saved in spreadsheet format.
- Waveform graph is plotted on the panel of the program using National Instruments Measurement Studio 6.0.
- Five waveform can be plotted on the panel: $C_{iss}$, $C_{oss}$, $C_{rss}$, $C_{gs}$, and $C_{ds}$. 
2. Automatically Characterization in Power MOSFETs

Overview
Design a system which can find the characterizations of the high current power MOSFET devices by using a programmable High Power Curve Tracer called Tektronix 371B automatically and controlling the movement of Electroglas 1034X prober machine.

Implementation

Stage I: Design a program to control the movement of Prober Machine.

Stage II: Design a program to control the curve tracer.

Stage III: Data collect from curve tracer.

Stage IV: Extract data back to computer

Program Flow

- Control movement of chuck in manual mode
- Fine tune the position of chuck in machine
- Set the step size
- Set the horizontal and vertical scale for the defined data
- Set the Voltage reference
- Data Storage
- Curve Tracer (Output waveform)

Automatically find the result for the high power MOSFET devices