Advantech Machine Automation Solutions:
IC Wafer Prober and Tester

Location: **Taiwan**

Background

Wafer testing is a crucial step performed during semiconductor device fabrication. It is performed by a piece of testing equipment called a wafer prober. The process of wafer testing can be referred to in several ways: Wafer Final Test (WFT), Electronic Die Sort (EDS) and Circuit Probe (CP) are common.

This project demanded advanced data acquisition devices to activate wafers and measure their electronic characteristics. Advantech's solution included high sampling rate analog input/output DAQ modules, and a convenient software development kit that satisfied technical requirements.This comprehensive solution effectively controlled costs and shortened development time for IC wafer testing machines.

System Requirements

The customer required precise measurements for wafer electrical characteristics on the wafer prober. To achieve this goal, the customer needs a high speed DAQ system to send signals to activate the wafers, and accurately measure the electrical characteristics of the wafers to detect any potential defects to ensure wafer quality. Besides, the amount of peripheral limit switches/devices needs to be controlled in time for precision positioning.

Project Implementation

iDAQ-934

4-Slot USB 3.0
iDAQ Chassis

iDAQ-841

8-ch, 16-bit, 1MS/s/
ch Analog Input iDAQ
Module

iDAQ-821

10kS/s, 16-bit, 4-ch
Analog Output iDAQ
Module

iDAQ-751
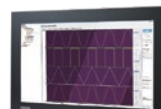
48-ch TTL DI/O
iDAQ Module

ACP-4340

4U Rackmount Chassis

AIMB-788

Industrial ATX Motherboard
LGA1700 12th Gen Intel®
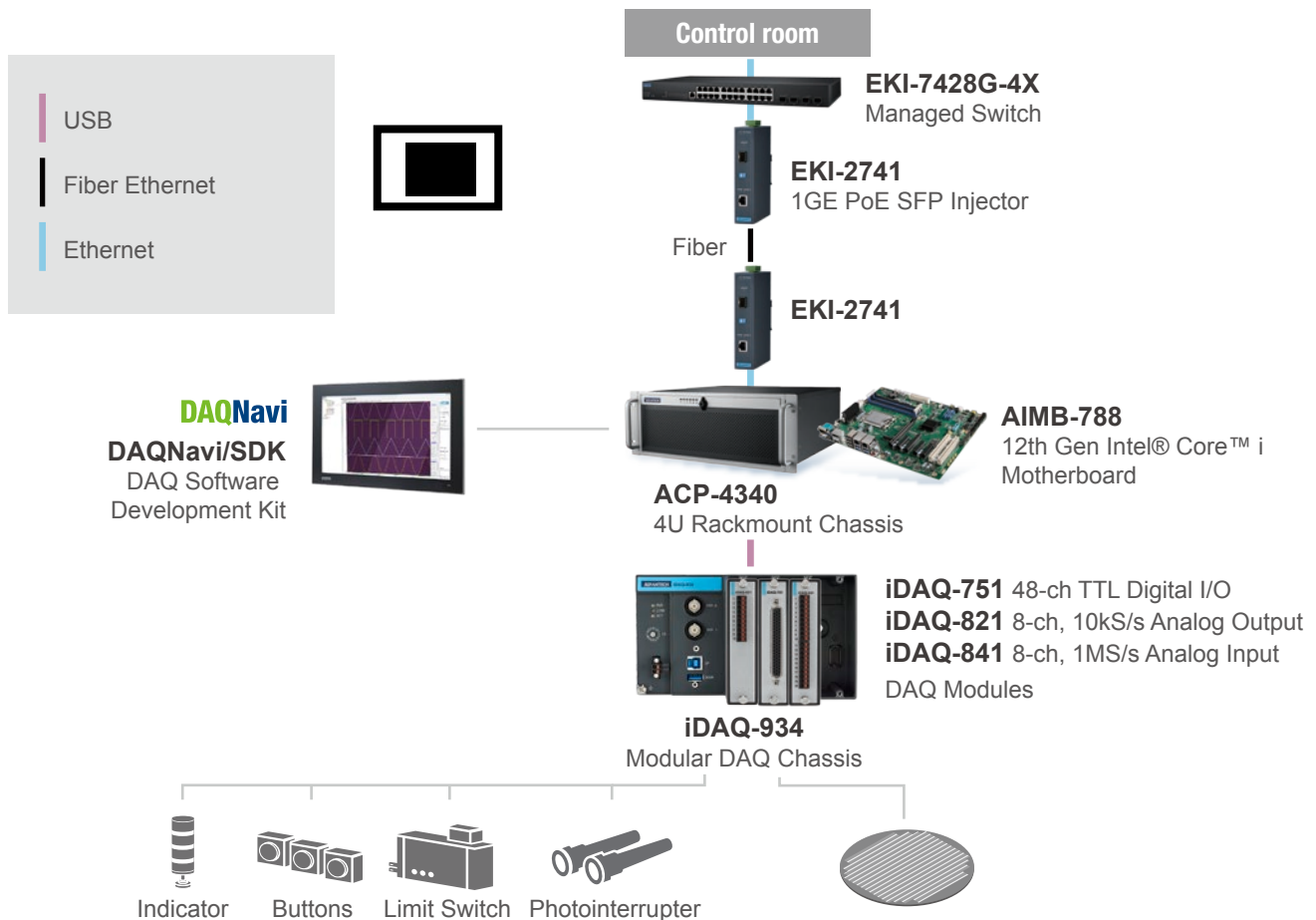Core™ i9/i7/i5/i3 CPU

DAQNavi/SDK

DAQ Software
Development Kit

System Description

To enable the high speed electrical testing of wafers, iDAQ modular DAQ system is a perfect solution that empowers test and measurement on the wafer probing equipment.

The iDAQ-751 controls up to 48 peripheral limit switches/devices in time, while the high-density digital I/O module satisfies precise positioning requirements. The iDAQ-821 DAQ modules offer 8-ch analog output with 16-bit resolution of test signals to activate the wafers. After the activation, the iDAQ-841 can measure 8-ch analog inputs of wafer electrical characteristics with 1 MS/s sampling rate in a short time span, and transfer the data back to industrial PC with embedded DAQNAvi software for defect detection. The information can also be transmitted through EKI-7428 managed switch to control room MES system.

System Diagram

Control room

EKI-7428G-4X
Managed Switch

EKI-2741
1GE PoE SFP Injector

Fiber

EKI-2741

DAQNavi
DAQNavi/SDK
DAQ Software
Development Kit

AIMB-788
12th Gen Intel® Core™ i
Motherboard

ACP-4340
4U Rackmount Chassis

iDAQ-751 48-ch TTL Digital I/O
iDAQ-821 8-ch, 10kS/s Analog Output
iDAQ-841 8-ch, 1MS/s Analog Input
DAQ Modules

iDAQ-934
Modular DAQ Chassis

USB

Fiber Ethernet

Ethernet

Indicator   Buttons   Limit Switch   Photointerrupter

Why Advantech?

Advantech high speed DAQ series with the DAQ software development kit, DAQNavi, are great companions for wafer electrical characteristics testing on wafer probing equipment. The iDAQ series has modular and scalable I/O modules and USB 3.0 hub which not only fulfills wafer probing technical requirements, but also shortens the development time of wafer prober. Along with industrial PC and connectivity devices, such as EKI series PoE injector and managed switch, the data can be transmitted back to the control room to carefully ensure wafer quality.