

XACT-830A

Hot Carrier Degradation (HCI) Test System

High Performance System for your HCI, NBTI, OTF and BTS Tests

Key Features

- Perform tests for NMOS and PMOS transistors
- Reduced test time due to high performance measurement resolutions
- Oven temperature range:
 - Room Temperature to 350°C
 - -30°C to 200°C (Standard)
 - -60°C to 200°C (Option)
- Ultra accurate and stable Stress Voltage Source:
 - Drain: $\pm 200V @ 10mA$ per DUT
 - Gate: $\pm 200V @ 1mA$ per DUT
 - Bulk: $\pm 10V @ 10mA$ per DUT
 - Source: 0V
- Incorporating In-House "Hot Switching" methodology between Stress and Measurement to eliminate relaxation during NBTI Test
- Capable of performing fast NBTI measurement, each measured parameter can be achieved < 300usec
- Capacity up to 48 DUTs
- Capable of retrofitting system to perform as Wafer Level Reliability Tester
- Wide range of measurement parameters
- Free programmable working points
- Extended data analysis software following JEDEC Standards
- Error Calculation on reliability parameters

XACT-830A HCI/NBTI/BTS/OTF Test System Basic Features

The XACT-830A test system is a high performance tester for evaluating the quality and reliability of all types of transistors, under either room temperature or temperature and coupled with voltage stress. This system is an in-situ system, where the changes in the transistor characteristic parameters are monitored continuously with a high measurement resolution. This system can be easily retrofitted to support Wafer Level Reliability Test.

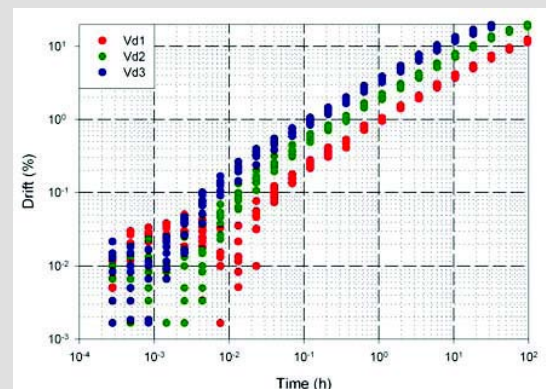
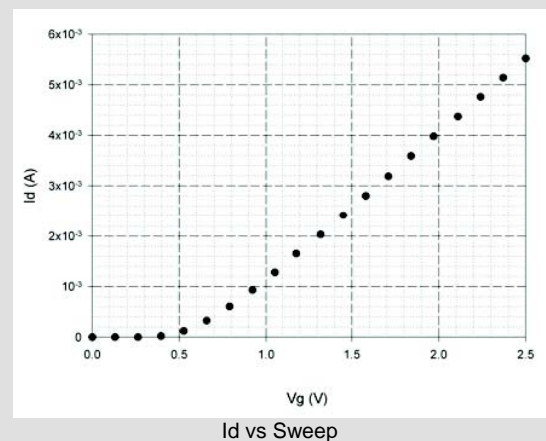
Environmental "ECO-GREEN" Chamber with Burn-In Boards

The newly developed ECO-GREEN chamber is build using high quality insulation material within the chamber to prevent heat lost to the environment. This resulted in energy saved on the air conditioning to cool down the room to obtain optimum room temperature. Besides being environmental friendly, we made sure we do not compromise on the temperature stability and uniformity of the chamber.

The system holds four pieces of the BIBs. The BIB comes with either fixed path up to the package pins or has the flexibility to jump to the assign package pins. Each BIB comes with a various number of Zero Insert Force (ZIF) sockets depending on the test packages.

Stress Voltage Source

Each system is equipped with four pieces of the Stress Voltage Cards, SVSC, and each card is capable of delivering two different groups Voltage Supply. Therefore, in total, each system can have up to eight different Voltage Supplies. The first group set the voltage for DUT 1 to DUT 6 and the second group for DUT 7 to DUT 12.



Id, saturation. Typical drift curves of parameter Id(sat). Each source can have its own Drain/Gate voltage. Repeatability below 0.2%

Each group of the Voltage Supply consists of 3 Stress Voltage Source; Drain, Gate and Bulk. The common ground of the Voltage Supply is used for the Source and is fixed at 0V. Each Stress Voltage Source contains 6 Stress Drivers and they are a voltage follower. Each Driver is current limited such that when one DUT is shorted, it will not effect the others DUT.

Stress & Measurement Multiplexer Card, SM & MM

The switching system is made up of 2 cards, the Stress Multiplexer and the Measurement Multiplexer. They are connected in parallel to the same DUT pins. The Stress Multiplexer connects the Stress Drivers to the DUT and the Measurement Multiplexer connects the SMU to the DUT. The "Hot Switching" technique is used to achieve the zero relaxation during the transition between Stress and Measurement.

High Resolution Measurements

The high resolution measurement of the XACT-830 is achieved using intelligent hardware and software solutions, accurate measurement equipment and an outstanding temperature control. The crucial advantages of these high resolution measurements are:

- a) the ability to measure at very low levels of stress [this reduces the error made by the extrapolation to normal operating conditions],
- b) early failure detection and
- c) test time reduction.

Data Management and Analysis

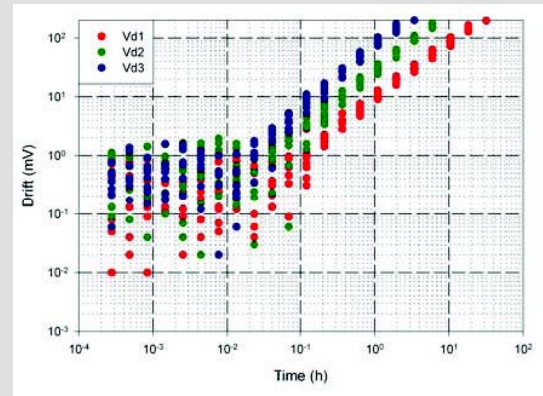
The XACT reliability test systems consist of two computers. The slave computer is invisible to the customer but performs the measurement and keeps the raw data. The master computer is a normal desktop and is used to do the test set-up, monitor the status of the test and to perform the data analysis and report. The system can run without the master computer, so when the test is running, this computer can be used for other purposes.

Files are created for each individual transistor. It contains the time, the property, the temperature, the applied drain and gate voltages, the drain and substrate currents, the threshold voltage. These files can be interpreted by our data analysis software which is installed on the master computer that is delivered together with the test system.

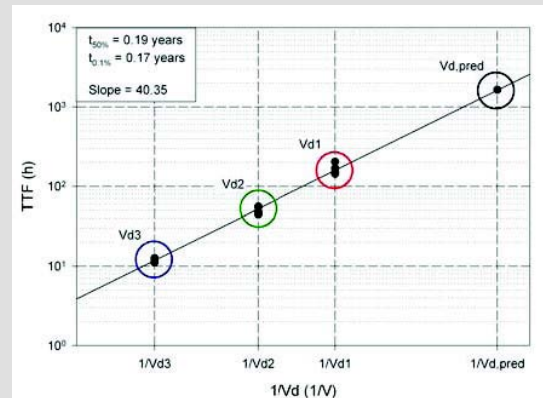
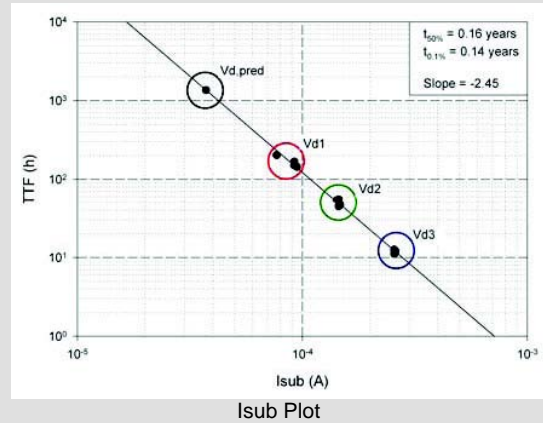
In this software package, HCI reporting is done based on JEDEC 28-1. So the substrate and drain current ration method, the drain source voltage acceleration method and the substrate current method are provided. For NBTI, the gate voltage model can be used. However in all cases, it is easy to insert a new lifetime model and the raw data (degradation curve or time to failure, ttf) can be exported to excel spreadsheet. As an extra feature, the lifetime can be determined with error calculation.

Measurement Service and Consultancy

All XACT Reliability Test Systems are available at our sister company, Chiron Semilab Pte Ltd, to perform in-house measurements and to provide consultancy on the specific application of the customer.



Vt, extrapolated. Typically drift curve of parameter Vt, extrapolated. Repeatability below 5mV



Takeda Plot. All standard lifetime models can be fitted and extrapolated to normal operating conditions and to low percentiles.



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