Model 1164
Reliability Test System

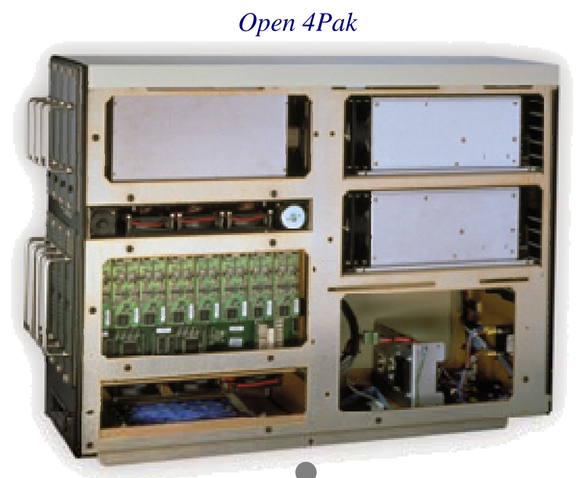
AETRIUM®

Experience, Technology, Solutions

The Model 1164 Reliability Test System's massively parallel architecture can run many tests, at many different temperatures, at the same time. It can be configured for a mix of: Copper/Aluminum Electromigration and Stress Migration, Copper ILD/Barrier BTS, Constant Voltage TDDB and SILC, Multi-Terminal TDDB, MOS Hot Carrier and NBTI, and Bipolar Hot Carrier. Package- and wafer-level testing are both supported. An intuitive Windows XP™ user interface provides experiment control and data analysis capabilities.

Stacked 4Paks

Open 4Pak



Notebook Oven and High-Temperature DUT Board

Wafer-Level Adapter Kit and High-Density Probe Tile

Summary of Features

One System ⇨ Comprehensive Solution

- **Mix and match applications in a single system**
- **Copper and Aluminum Interconnects**
  - Electromigration (EM)
  - Stress Migration (SM)
- **Intra-Level Dielectrics (ILDs), Barrier Layers, and Metal-Insulator-Metal Structures (MIMs)**
  - Bias-Temperature-Stress (BTS)
- **Gate Oxides**
  - Constant Voltage TDDB (CVTDDB)
  - Stress-Induced Leakage Current TDDB (SILC)
  - Multi-Terminal TDDB (MTTDDB)
- **MOSFET Transistor Devices**
  - Hot Carrier Injection (HCI)
  - Vt Stability (VT)
  - Bias-Temperature-Stress (BTS)
  - Negative-Bias Temperature Instability (NBTI)
- **Bipolar Transistor Devices**
  - Hot Carrier Injection (HCI)
- **Package-Level and Wafer-Level**
  - Test packages up to 450°C using Notebook Ovens and long-life DUT Boards
  - Test structures in parallel directly on the wafer
  - Quickly convert any slot position between package- and wafer-level testing
  - Mix package- and wafer-level in same system
- **Statistical Analysis Software**

Notebook Ovens ⇨ Faster Results

- Up to 64 small, independent Notebook Ovens per system test many different temperatures simultaneously
- Independent ovens provide faster test results and better system utilization – start, stop, and reload DUTs at any time without affecting other sample sets

Parallel Measurements ⇨ Better Data

- Zero Relaxation Method algorithm and parallel measurement system nearly eliminate DUT relaxation for NBTI, HCI, SILC, and MTTDDB
- Individual meters per DUT continuously monitor (no scanning) each EM, SM, BTS, TDDB, SILC, and MTTDDB device to closely track degradation and instantly capture failures

Advanced Design ⇨ More Flexibility

- System is easily configured and expanded with stackable, compact 4Paks (up to 16 per system) – each 4Pak includes 4 Application Modules, 4 Notebook Ovens, and 4 DUT Boards and/or WLR Kits
- Independent Notebook Ovens provide easy management of test temperatures and start times, TCRs, and activation energy studies – Notebook Ovens require no external cables or racks
- Distributed microprocessor system supports fast measurement rates and high data throughput
- Integrated ESD protection improves yield
- Software provides flexible experiment setup, generates graphical and tabular data reports, and stores all data in ASCII
- Analysis Software determines fail times, calculates scale/shape parameters, and predicts lifetimes with confidence intervals

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Model 1164 Product Line

4Pak Temperature Chambers & DUT Fixturing

Architecture:	One Oven and one DUT Board (or one Wafer-Level Interface) per Application Module, up to 64 Application Modules and Ovens (or WLR Interfaces) per System
Max. Temperature:	230°C, 250°C, 350°C, or 450°C (select appropriate Oven and DUT Board type)
Package-Level Test:	300- or 600-mil DIPs, up to 28 pins
Wafer-Level Test:	Parallel, multi-site testing on any size wafer

25mA 10V High-Accuracy Electromigration Module

Capacity:	16 Aluminum or Copper Interconnects with Voltage Extrusion Monitors (Vext) and Current Leakage Monitors (Ileak)
Test Algorithms:	EM, SM
Maximum Current:	+25mA per DUT
Maximum Voltage:	10V

80mA 5V Electromigration Module

Capacity:	16 Interconnects with Vext and Ileak
Test Algorithms:	EM, SM
Maximum Current:	±80mA per DUT
Maximum Voltage:	5V

200mA 40V Electromigration Module

Capacity:	16 Interconnects with Vext and Ileak
Test Algorithms:	EM, SM
Maximum Current:	±200mA per DUT
Maximum Voltage:	40V

15V 100mA Advanced Hot Carrier Module

Capacity:	12 MOSFET or BJT Transistors
Test Algorithms:	MOS HCI, NBTI, VT, BTS, Bipolar HCI
Maximum Voltage:	±15V (Channel, Gate, Substrate)
Maximum Current:	100mA per DUT (Channel), 30mA per DUT (Gate, Substrate)

150V 100mA High-Voltage Hot Carrier Module

Capacity:	6 MOSFET or BJT Transistors
Test Algorithms:	MOS HCI, NBTI, VT, BTS, Bipolar HCI
Maximum Voltage:	±150V (Channel, Gate, Substrate)
Maximum Current:	100mA per DUT (Channel), 10mA per DUT (Gate, Substrate)

40V 1mA Standard TDDB Module

Capacity:	64 Gate Oxide, Intra-Level Dielectric (ILD), or Metal-Insulator-Metal (MIM) Structures
Test Algorithms:	CVTDDB, SILC, BTS
Maximum Voltage:	±40V
Maximum Current:	1mA per DUT

150V 10mA High-Voltage TDDB Module

Capacity:	32 Gate Oxide, ILD, or MIM Structures
Test Algorithms:	CVTDDB, SILC, BTS
Maximum Voltage:	±150V
Maximum Current:	10mA per DUT

40V 350mA High-Current TDDB Module

Capacity:	48 Gate Oxide, ILD, or MIM Structures
Test Algorithms:	CVTDDB, SILC, BTS
Maximum Voltage:	±40V
Maximum Current:	350mA per DUT

12V 50mA Multi-Terminal TDDB Module

Capacity:	24 MOSFET Transistors
Test Algorithms:	MTTDDB (SILC, HCI, NBTI)
Maximum Voltage:	±12V (Gate, Drain)
Maximum Current:	50mA per DUT (Gate, Drain)

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