ProChek

PRODUCT BRIEF

Ridgetop Group Inc

ENGINEERING INNOVATION

ProChek-R™ Semiconductor Reliability Characterization System

Industry-standard Integrated Circuit Fabrication Process Reliability Analysis

- Improved lifetime estimates for all CMOS process nodes including 32 nm and below
- Accelerated testing for harsh environmental effects
- Includes test structures for different types of TID radiation effects
- Accelerated testing protocols for NBTI, PBTI, TDDB, HC, EM, SM
- Eliminates the need for expensive test equipment
- Enables acquisition of process-related data that are of unique interest to IC designers
- Easily portable to any process node
- User-programmable and configurable test conditions
- Available on-chip heaters accelerate test processes

Product Description

ProChek-R (user-configurable fabrication Process Reliability Checker) is an innovative system to characterize the intrinsic reliability of deep submicron nanotechnology CMOS processes for microelectronics applications. ProChek-R is designed to provide fast and reliable measurement of degradation effects, especially those common in today's semiconductor fabrication processes. These effects can have a significant adverse impact on the lifetime of chips manufactured at processes at 90 nm, 65 nm, and below.

The ProChek-R method uses a *test coupon* that is fabricated in multiproject wafer (MPW) runs in order to minimize costs and expedite the characterization process. Process reliability characterization is performed using measurement and data collection circuits on a benchtop tester with a test card providing the interface to the test coupon. The benchtop tester is controlled by the host controller, which includes a graphical user interface application on a PC (Figure 1).

Figure 1: ProChek-R system

The benchtop tester and the host controller software are universal and can be used with test coupons for different fabrication runs. Test cards are fabricated to interface the test coupon to the benchtop tester. The test coupon, measuring as small as 1 mm x 1 mm, is standardized and can be ported to different fabrication processes with minimum engineering cost. A single test coupon can contain thousands of devices under test (DUTs), so a statistically valid sample measurement database can be generated extremely quickly.

This innovation eliminates the need for expensive test equipment in fabrication process reliability characterization.

Accelerated stress tests targeting reliability concerns such as negative and positive bias temperature instability (NBTI, PBTI), time-dependent dielectric breakdown (TDDB), hot carrier (HC) damage, electromigration (EM), stress migration (SM), and total ionizing dose (TID) can be performed with ProChek-R.

Control flow and data flow between the four components of ProChek-R is diagrammed in Figure 2.

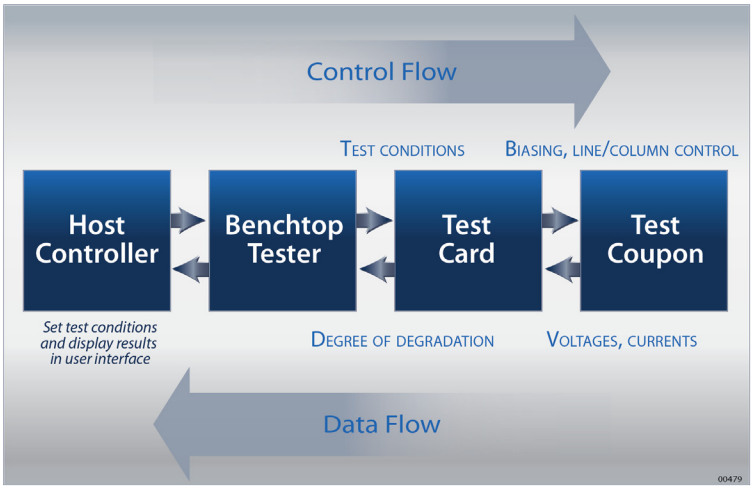

Figure 2: Control flow and data flow between the four components of ProChek-R

The Market

ProChek-R can ensure reliability characterization goals are achieved for each new or existing process. With a variety of process measurement and analysis tools, it provides ample and accurate reliability test results. The ProChek-R solution provides speed, facilitation of testing, and customer support, with low-cost implementation.

Higher Accuracy and Performance

For companies and organizations where electronic reliability and lifetime performance is of paramount concern, characterization of IC manufacturing processes is a must. Rapid capture of data regarding chip wear-out and susceptibility to radiation effects in certain applications is essential, and a prompt and effective response provides a high return on investment. Fabless, foundry, and electronic systems companies all can benefit from closely monitoring fabrication reliability parameters.

Additional Information

The ProChek-Q™ Semiconductor Reliability Characterization System employs the same benchtop test system as ProChek-R and is compatible with this version of ProChek-R. ProChek-Q focuses on deep-submicron process qualification, with mismatch measurement of key parameters including threshold voltage (V_T) shift, turn-on current (I_{ON}), and changes in resistance (ΔR) and capacitance (ΔC). It is possible for a test coupon to contain test structures for both process and reliability characterization.

Ridgetop offers IC integration technical support to assist customers at every step in the process. Our design and support team has extensive experience in CMOS and SiGe bipolar IC design semiconductor process technologies, and practical, results-oriented engineering.

About Ridgetop

Ridgetop Group Inc. is a leader in providing advanced electronic solutions for critical applications. Ridgetop was founded in 2000 with the purpose of introducing revolutionary tools to improve performance of mission-critical electronic systems.

With a strong management team and world-class technical staff, Ridgetop has established a stellar reputation serving its government and commercial customers with effective and practical "best of class" solutions.

Need modified or custom design? Contact Ridgetop at 520-742-3300 to discuss your ideal solution!

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