Ridgetop Group Inc
ENGINEERING INNOVATION

ProChek Plus™

Innovative, Low-cost Qualification and Reliability Characterization System

CERTIFIED QUALITY
• ISO9001:2008
AS9100C
CERTIFICATE No.
1107004
MANAGEMENT SYSTEM

Features and Benefits

- Flexible and dedicated semiconductor qualification and reliability charcterization system.

- Characterizes and quantifies existing and new processes froma quality/ performance perspective.

- Versatile in use -- Can be used in both lab and production environements.

- Cost-effective bench-top instrument accelerating quality and reliability assessments.

- A maximum configuration of 48 channels that can each be physically disconnected from the main connector.

- A variety of plug-in modules support custom configurations and a wide range of applications

Why ProChek Plus

ProChek Plus, belonging to the ProChek Product family, is an innovative, high performing and low-cost platform serving to rapidly and efficiently characterize integrated circuit intrinsic process reliability and device quality. As a configurable, multi-channel, flexible and dedicated semiconductor qualification and reliability characterization system that easily interfaces with a variety of test structures such as single devices, wafer-level test structures, and dedicated test chips, ProChek Plus accelerates the testing of semiconductor devices in volume.

ProChek Plus serves as an applications-oriented tool that can characterize and quantify existing and new processes from a quality and performance perspective by gathering device data such as I/V curves and point measurement data, along with characterizing and quantifying existing and new processes from a reliability

perspective through the evaluation of performance degradation over time in function of operation and stress conditions.

The ProChek Plus platform supports various instrument configurations and can provide up to 48 independently operating SMU channels in a form factor that is 100 times smaller than comparable rack-and-stack equipment.

ProChek Plus supports various application strategies from 'stress all concurrently' -- 'measure individuals sequentially' to 'stress and measure concurrently' approach, thereby recognizing that stress and measurement resources may have different characteristics, but also that a resource may serve both stress and measurement application. Able to work with already existing or dedicated test structures, ProChek Plus supports wafer-level tests or packed test structures and has provisions for add-on (interface board) instruments.

Major degradation effects and accelerated stress	• Negative Bias Temperature Instability (NBTI / Fast-NBTI) • Positive Bias Temperature Instability (PBTI / Fast-PBTI)	• Time-Dependent Dielectric Breakdown (TDDB) • Hot Carrier (HC) Damage • Electromigration (EM) • Stress Migration (SM) • Total Ionizing Dose (TID)
Accelerated data collection	• Collection of data from multiple DUTs simultaneously • DUT degradation is accelerated with electrical and thermal overstress • Statistical analysis of collected data/results	
Combined Effects (RH)	• Radiation effects can be combined with major degradation effects to provide a complex test environment for High Reliability applications.	
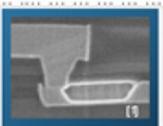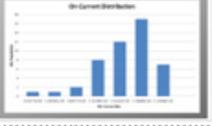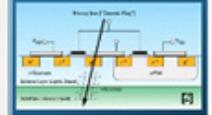
ProChek Plus Structure

The ProChek Plus Platform provides an ultra-low-noise, high-fidelity section and base unit section. The high-fidelity section has 8 plug-in slots, each capable of holding instrument modules that can have up to 4 independently operating channels, providing room for up to 32 instrument or Source-Measurement Units (SMU) channels. The base section holds the system's power management and distribution circuitry, has a plug-in slot for the system's Master Control and Communication Unit (MCCU), and has an additional 4 slots, each capable of holding plug-in units that can have up to 4 independently operating channels providing room for an additional 16 instrument or SMU channels. When fully loaded, the ProChek Plus platform can hold up to 48 independent and concurrently operating SMUs. Each channel can be physically disconnected from the main connector (relay).

ProChek Plus Modules Available

CPU Module (system "Conductor")

4 Channel SMU Module
- Each channel can be configured and operated independently
- Module design supports FVMI - FVMI/FC - FVFCMIMV operation
- 3 selectable current measurement ranges
- 4K local data memory per channel

2 Channel digitizing module
- Each channel combines a slow (10μs sampling) and fast (500ns sampling) voltmeter than run concurrently
- 4K (slow VM)/20K (fast VM) data memory per channel
- Configurable range and input selection for each channel
    - differential/single ended
    - 10V-5V-2V-1V

2 Channel heater control SMU with constant power regulation
- 0-2.5V-150mA

TC Control unit
- 24 bit digital interface - preconfigured I/O direction
- Output level shifters

	Keithley 2600	Keysight B1500	ProChek	ProChek Plus
Dimensions (dm³)	8.72 – 11.39	79.7	0.74	2.79
# of SMUs	2	Up to 10	4 (+2)	Up to 48
Max measurement rate (Mps)	1.9K single 20K sweep	100K – 1M	100K current 2M voltage	100K current 2M voltage
Voltage Measurement Performance (ENOB)	8.7 – 10.7	10.8 – 12.4 (HR) 9.8 – 11 (HS) 8.8 (WGFMU)	14 (@ 2MHz) >16 (@ 100KHz)	14 (@ 2MHz) >16 (@ 100KHz)
Current Measurement Performance (ENOB)	9 – 10.8 (DC) 7.5 – 9 (fast)	10 – 11.7 (HR) 8.6 – 11.3 (HS) 8 (WGFMU)	14 – >16 (typ) 11 – 14 (fast)	14 – >16 (typ) 11 – 14 (fast)

About Ridgetop Group

Since its founding in 2000, Ridgetop has specialized in the development of advanced diagnostic and prognostic methods that are used to improve reliability, reduce downtime, and reduce the mean-time-to-repair (MTTR) of critical systems. Ridgetop also provides software-based development and monitoring tools supporting advanced condition-based maintenance (CBM) strategies.

Need modified or custom design? Contact Ridgetop at +1 520-742-3300 to discuss your ideal solution!

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