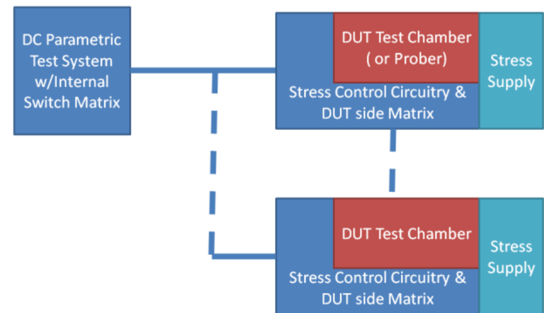
Wide Band Gap (WBG) Reliability Solutions

Reedholm Systems recognizes the unique needs and challenges of stress, test, and measurement of wide band gap devices (WBG). The stress/measurement needs for these devices stretches the limits of conventional parametric measurement tools. Additionally, WBG materials challenges and applications are driving divergent needs from those of traditional Si, therefore Reedholm Systems tailors its measurement instrumentation and long-term reliability stress capabilities specifically for the GaN, SiC, GaN on Si, and other WBG devices & materials.

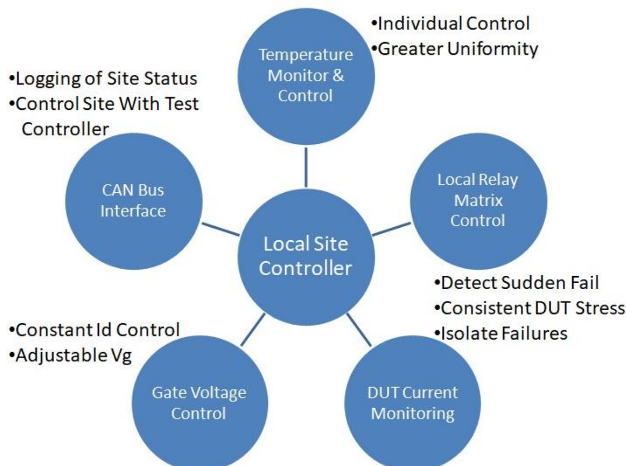
In-Situ Device Characterization

To address the need for statistically significant sample sizes for reliability testing, the WBG systems offer 30 DUT per experiment stress condition and up to 3 simultaneous experiments for a total of up to 90 DUT under stress. Each experiment operates independently of the others and switch in the parametric measurement instrumentation for periodic measurement cycles.



Precision Parametric Measurement Instrumentation & Capabilities

Parameter(s)	Measurement System Capabilities
Static Rds-ON	100V, 400mA Standard, Options for 10kV or 50A (Pulsed)
Dynamic Rds-ON	100V, 400mA Standard, Options for 10kV or 50A (Pulsed)
Switch Speed (T-ON)	uS Speed Parametric Measurements
RF Performance	Integrate Customer Defined Instruments/Tests
Reverse Recovery (Trr)	Precise Timing Resolution of Measurements
I-V Information (Vt, Gm)	Full Parametric Tester Capabilities
Gate Leakage (Ig)	nA Resolution Measurement Across Wide V-range
RF Characterization	Integrate Customer Defined Instrumentation/Tests
Current Collapse	Record and Report Results Over Stress Duration



Local Monitoring & Control

A key to the packaged stress/measurement system is a distributed stress control architecture allowing the user to define control limits, test & measurement temperatures, and provide fully automated and continuous monitoring of each DUT during stress.

- Ability for dynamic HTOL
- Over-current failure isolation
- Constant current Ids with Vg control
- Integration of RF stress capabilities≈
- Continuous data logging

High Voltage (1250V+) & High Current – Stress

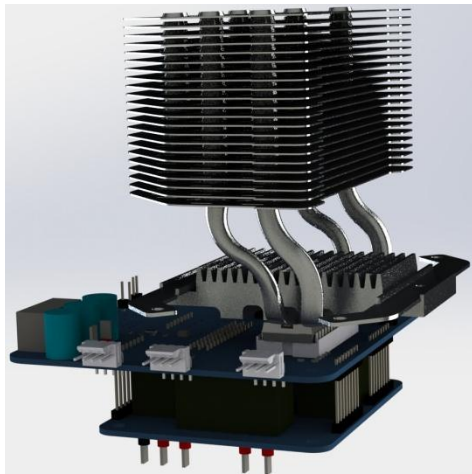
Reedholm Systems offer stress capabilities currently at 0-100V, 0-600V, and 0-1250V with up to 50mA of current per device for blocking mode stress delivery (HTRB).

Different configuration of stress supplies and fixturing delivers higher current compliance per device at lower stress voltages to support higher current stress requirements (HTOL).

Stress	Voltage	Current
HTRB	100V, 600V, 1250V >1250V*	50mA/DUT 10mA/DUT
HTGB	100V	10mA/DUT
HTOL	100V	1.0A/DUT
RF HTOL**	100V DC + RF Carrier Signal	1.0A/DUT

* Higher compliance voltages available based on stress requirements

** Planned development for release 4Q2018/1Q2019



Local Temperature Regulation

For packaged device testing, variation in power dissipation between devices produces variation in junction temperature between devices within a given experiment. Providing thermal monitoring and control for each DUT, gives the ability to independently regulate the temperature of each DUT.

Local, independent control of the temperature and stress interconnect relay matrix allows the user to define any combination of temperature, voltage, current, and measurement options when characterizing a device in-situ.

This design also leads to the ability to deliver higher stress temperatures using materials and design methods to allow higher local device temperatures by localizing the high temp stress at the DUT and not within the entire stress chamber.

High Voltage (10kV) & High Current (50A) - Measurement

The core Reedholm system is well suited for the gamut of parametric test requirements, delivering both power and precision. Reedholm is a pioneer in delivering turn-key systems for die sort and process monitoring. With WBG development products delivering blocking voltages in the 1000's of volts and devices regularly operating at several 10's of Amps of current, measurement instrumentation needs to not only meet but exceed these capabilities to deliver the ability to characterize beyond the product operational range.

Shown is an optional dedicated 10kV voltage source & pulsed 50A current source that can allow either measurement condition to be applied to devices to measure both standard and power devices with a single test system.

For more information about this instrumentation capability, see Reedholm Systems Datasheet DS10058