All-in-One Solution for Acceleration of Wide-Bandgap (WBG) Power Device Characterization in a wide range of operating conditions: up to 1500 A/10 kV and a high temperature of +250 °C

A rapid and effective method is critical in accelerating WBG power devices development and improvement in power efficiency and reliability performance

- Faster time to market to meet growing demand for automotive power devices for Electric Vehicles applications
- Strong requirements and demand in achieving, high-power efficiency, high reliability and high-performance devices
- Accelerating the realization of next generation WBG power devices, based on new advance materials such as SiC, GaN and Ga2O3.

Challenges of WBG power device development

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<th>Challenges</th>
<th>Needs</th>
<th>Problems Using Conventional Instruments</th>
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<td>Increased in device operating range to improve device performance.</td>
<td>High current and high voltage measurements with high accuracy results.</td>
<td>Curve Tracer alone is insufficient for accurate IV measurements due to its resolution limits and the self-heating effect from the wide pulse width</td>
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<td>In addition to the current-voltage (I-V), the capacitance-voltage characteristics (C-V: Ciss, Coss, Crss), gate charge (Qg) and GaN current collapse are critical parameters to ensure the device performance.</td>
<td>Accurate narrow pulse measurements to prevent device self-heating effects.</td>
<td>C-V, Qg and GaN current collapse measurements under high current and high voltage conditions requires other additional measurement equipment.</td>
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<td>Difficulty to evaluate devices safely, under severe temperature conditions, simulating the actual device applications conditions.</td>
<td>Safe operations on high current and high voltage measurements supporting extensive high temperature testing.</td>
<td>Custom-made system may have measurement errors, accuracy and reliability issues.</td>
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<td>Capturing time to market opportunities and R&amp;D efficiency.</td>
<td>Simplification and automation of measurement, data management and data analysis to improve R&amp;D efficiency.</td>
<td>Time consuming in manual process operation of switching and wiring instruments.</td>
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<td>On-wafer measurements with a faster feedback loop and test efficiency improvement.</td>
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<td>Duration to perform measurements and analyzing the data.</td>
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<td>Duration to package and set-up the device for measurements.</td>
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Learn more at: www.keysight.com
B1505A Power Device Analyzer/Curve Tracer solves these challenges and accelerates the power device development cycle

- Precision measurement across a wide range of operating conditions
  - Current and voltage range up to 1500 A/10 kV
  - Min. 10 µs narrow pulse to prevent self-heating effects
  - Sub-pA, µV, µΩ measurements capabilities
  - Oscilloscope view for pulse waveform verification and settings adjustment
  - Support both packaged device measurements and on-wafer measurements

- Advanced measurements beyond IV measurement
  - C-V (Ciss/Coss/Crss) up to 3k VDC bias
  - Gate charge (Qg) up to 3 kV/1500 A
  - GaN current collapse up to 3 kV/20 A with 20 µs switching

- Safety measurement under simulated harsh environments
  - Ensure the safety operation via an integrated interlock test fixture for test conditions up to 1500 A/10 kV
  - Thermal testing capability in the test fixture ranging from -50 °C to +250 °C

- Shorten device development cycle by an intuitive operation, automated test and efficient data analysis
  - EasyEXPERT group+ software supports intuitive measurements, automated test, data management and analysis
  - Real-time knob sweep control capability operation (similar to Curve Tracer operation)
  - Module selector and capacitance selector that enables automatic switching of measurement modules

Summary

- B1505A is an all-in-one solution for power device evaluation that can safely perform I-V/C-V/Qg/GaN current collapse measurements of both packaged and on-wafer devices in a single unit in a wide range of operating conditions (Max 1500 A/10 kV and +250 °C).

- B1505A enables faster power device development cycle, and realizes the development of next generation WBG power devices such as SiC, GaN and Ga2O3 with high efficiency and reliability performance.

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