Tektronix®

Make 3kV C-V Measurements on Power MOSFETs

Complete Solutions for High Voltage (± 3kV) C-V Measurements

The 2600-PCT-4B High Power Measurement System

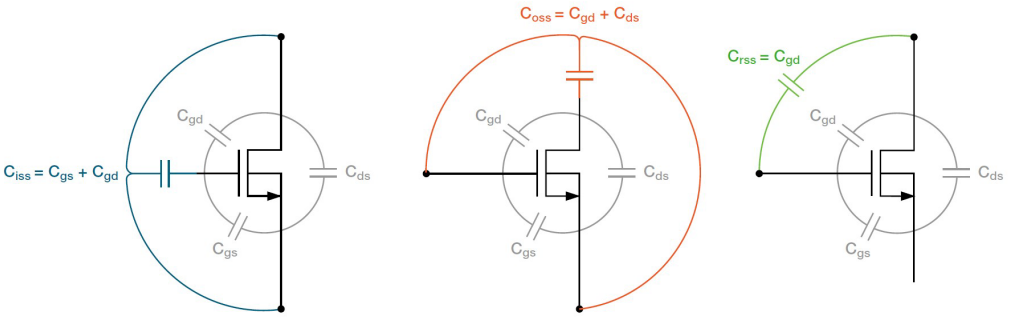
An Integrated C-V Measurement System

If you need to test power MOSFETs consider a Keithley Parametric Curve Tracer (PCT) system solution for making high voltage C-V measurements. Highlights include:

- ± 3kV DC Bias
- 1kHz to 1MHz Test Frequency
- pF to µF Capacitance Range
- Bias Tees and Protection Modules
- ACS-BASIC Software that includes compensation and built-in tests for C_{oss}, C_{iss}, and C_{rss}

Reduce High Voltage C-V Measurement Complexity

The internal capacitance of a power MOSFET affects the switching time and energy loss of the device. Knowing the capacitance of a power MOSFET is important when designing circuitry, so C-V specifications are provided on the device manufacturer's data sheet.



The Component Level Capacitances (C_{oss}, C_{iss}, and C_{rss}) of a Power MOSFET

Complex Test Requirements. Making high voltage C-V measurements can be difficult. Often commercially available LCR meters are used, but because these are typically rated to 30-40V DC bias, they require a high voltage source or Source Measure Unit (SMU). With the high voltage source in the measurement circuity, protection modules are additionally needed for the LCR meter or SMU in the event the device breaks down. Bias tees are also required to combine the AC and DC signals to the device. Finally, software is needed to control all the pieces of equipment in the measurement circuit.

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Modular, Configurable Capacitance Testing

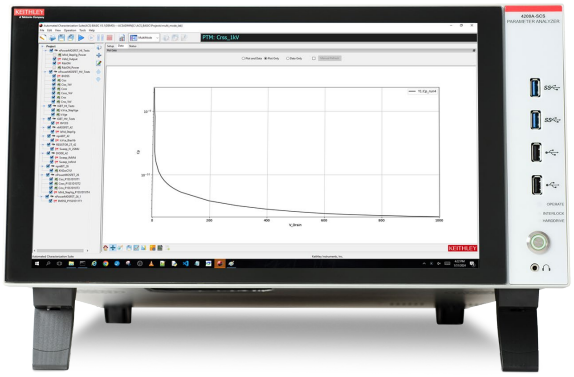
Comprehensive Device-Level Characterization

Keithley Solution. To make these measurements easier, Keithley offers a complete solution for making high voltage (± 3kV) C-V measurements. Depending on your application, Keithley PCT systems include the SMUs, CVU, test fixture, cabling, protection modules, and bias tees. This hardware is controlled using the ACS-BASIC software. A 1kV C-V sweep (C_{oss}) on a power MOSFET is generated using the PCT system with the ACS-BASIC software (below, right).

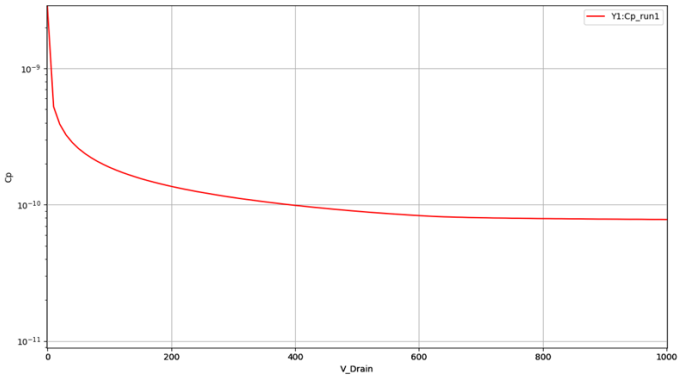
The Model 2600-PCT-4B High Current and High Voltage PCT Curve Tracer System configuration has both 2651A high current and 2657A high voltage SMUs for making high power I-V measurements. The ACS-BASIC software is installed and executed directly on the PCT-CVU Capacitance Meter (below, left). The PCT-CVU along with 2657A SMU are used for making the high voltage C-V measurements.

Equipment List for High Voltage C-V

Model	Description
PCT-CVU	Capacitance-Voltage Unit
2600-PCT-3B	High Voltage Curve Tracer incl.: • 2657A 3kV SMU (Drain terminal) • 2636B 2-Channel Low Current SMU (Gate and Source terminals)
CVU-3KV-KIT	Bias Tees
8010	High Power Test Fixture (includes protection modules)
ACS-BASICFL	ACS Basic Edition Control Software (includes library tests for C_{oss}, C_{iss}, and C_{rss})



PCT-CVU Capacitance Meter with ACS-BASIC Software



A 1kV C-V Sweep (C_{oss}) on a Power MOSFET

PCT System Configuration Selector Guide

Model[1, 2]		Collector / Drain Supply[3]		Step Generator Base/Gate Supply	Auxiliary Supply
		High Voltage Mode	High Current Mode		
Low Power	2600-PCT-1B	200 V/10A	200 V/10A	200 V/10A	N/A
High Current	2600-PCT-2B	200 V/10A	40 V/50A	200 V/10A	200 V/10A
High Voltage	2600-PCT-3B	3 kV/120 mA	200 V/10A	200 V/10A	200 V/10A
High Current and High Voltage	2600-PCT-4B	3 kV/120 mA	40 V/50A	200 V/10A	200 V/10A

[1] Contact your Keithley field applications engineer for custom configurations.
[2] PCT-CVU Capacitance Meter can be added to any configuration.
[3] Add a Model 2651A SMU to increase high current mode to 50A or 100A.

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