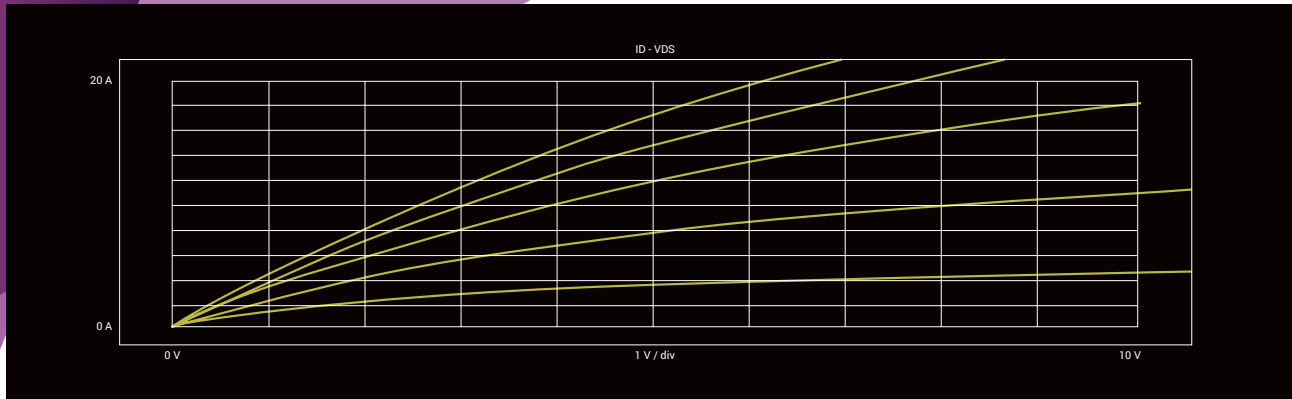


POWER DEVICE CHARACTERISATION AND MODELLING



The demand for power electronic converter solutions at increased efficiency and power density is rising rapidly. Automotive vehicle electrification, more electric aircraft, data centres and wireless power transfer are just some of many example applications driving this trend.

Wide bandgap (WBG) power switching devices such as SiC-MOSFET's and GaN-high electron mobility transistors (HEMT) are used to address these challenges. Their high electron mobility results in very low recovery time during switching and thereby increases switching speed, reduces power losses and reduces cooling requirements. The switching frequency can be increased to reduce the volume and weight of passive components.

The fast switching speed of WBG devices demands device models that cover a much larger frequency range compared to those of silicon based power

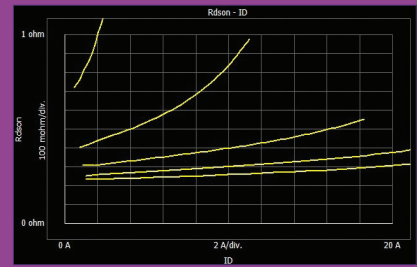
switching devices. Power converter design simulations should accurately reflect switching waveforms, power losses and electro-magnetic interference (EMI) to avoid iterative and costly design cycles.

The Compound Semiconductor Applications Catapult addresses this challenge by supporting industry to create accurate device models. Investment in the latest power device characterisation equipment and modelling software, combined with very close collaboration with manufacturers and Universities for skill development are the key ingredients to achieve this. We offer access to or complete services using:

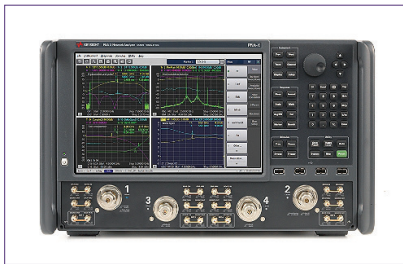
- Power device analyser (to 10kV and 1500A)
- Advanced device modelling software
- Power tester for thermal characterisation

CAPABILITIES RELATED TO POWER DEVICE CHARACTERISATION AND MODELLING

Power device analyser / curve tracer

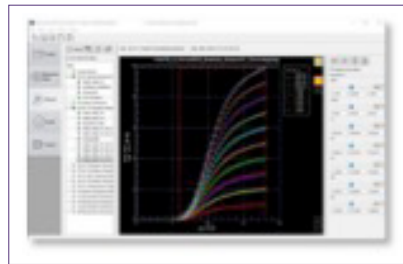


- DC IV tests to 10kV and 1500A
- Fast pulsing capability (10µs)
- µΩ level on-resistance measurement resolution
- Evaluation of gate charge at up to 3kV
- Sub-pA level current measurement capability at high voltage bias
- Off-state capacitance measurements (Ciss, Coss and Crss) with up to 3kV of DC bias
- GaN current collapse / dynamic resistance evaluation
- Breakdown voltage testing
- Fully automated thermal testing from -50°C to +250°C (*)



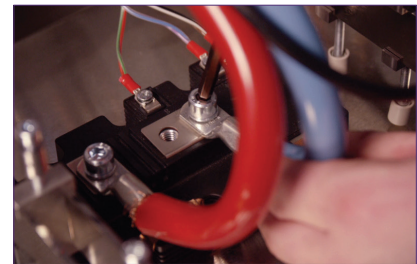
Vector network Analyser

- Zero bias S-parameter extraction to estimate gate resistance and series inductances
- DC bias S-parameters extraction for on-state capacitance fs frequency (*)



Advanced device modelling software

- GaN high electron mobility transistor (HEMT)
- Si/SiC Power metal-oxide-semiconductor field effect transistor (MOSFET)
- Insulated-gate bipolar transistor (IGBT)
- Extraction to SPICE



Power tester

- Thermal characterisation for devices and power modules
- Structure function and RC ladder diagram
- Also supports package development, reliability testing and batch checking

The Catapult aims to generate economic growth by making the UK a global leader in developing and commercialising new applications for compound semiconductors.

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