

# Pulsed Measurement of IV Characteristics & S-Parameters

Keysight Technologies and  
Maury Microwave

## Model devices across their linear and non-linear regions with pulsed measurements

Current-voltage characteristics (IV characteristics) and scattering parameters (S-parameters) are critical in understanding the performance of any active device. Pulsed measurements of IV characteristics and S-parameters involve the application of a pulsed bias voltage to the device-under-test. Pulsed measurements can eliminate heating and trapping effects allowing device modeling to be undertaken under quasi-isothermal operating conditions in both their linear and non-linear operating regions.

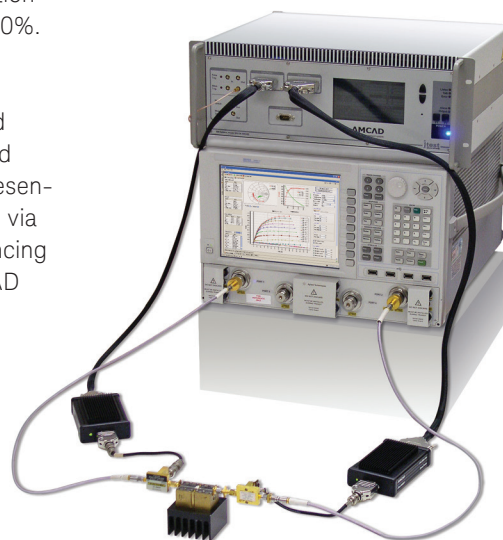
Maury Microwave provides proven technology for pulsed measurements of IV characteristics and S-parameters. For pulsed measurements of S-parameters the technology is used in conjunction with the Keysight Technologies PNA-X microwave network analyzer. A complete solution comprises a Maury pulse controller that includes DC power supplies, external gate and drain pulse heads, Maury's IVCAD software and an Keysight PNA-X for the RF measurements.

Pulse acquisition and measurement is performed via embedded hardware within the gate and drain pulse heads thereby eliminating the requirement for an external oscilloscope. The modular system offers both 250V/10A and 120V/30A pulse generation capabilities with pulse widths down to 200 ns and duty cycles between 0 and 100%. An automatic self-calibration feature makes IV calibration simple and accurate.

For pulsed measurements of IV characteristics and S-parameters, triggering and sequencing are critical. The Keysight PNA-X provides a unique gated narrowband filtering mode that performs asynchronous acquisition thereby reducing pulse desensitization and improving accuracy and dynamic range. Triggering is synchronized via the PNA-X pulse I/O adapter and the pulsed IV controller's trigger input. Sequencing for gate, drain, RF signal and measurement pulse widths, are defined in the IVCAD software suite or as part of the self-programmable API.

With a pulsed IV and S-parameters measurement system from Maury and Keysight you can characterize and model devices across their entire linear and nonlinear operating range providing a better understanding of device technology and more accurate simulations for your product development.

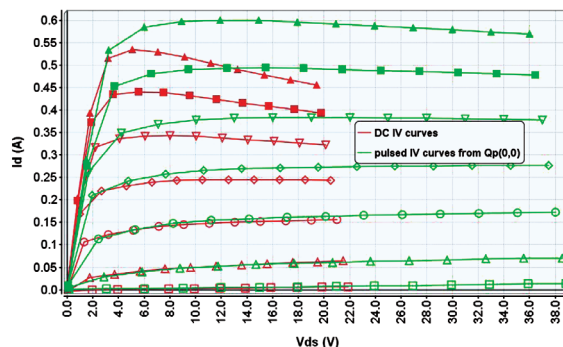
- Pulsed measurement of IV characteristics and S-parameters
- Pulsed measurements can eliminate heating and trapping effects
- Allows active device modeling under quasi-isothermal conditions
- Model devices across their linear and non-linear operating regions
- Uses Keysight PNA-X for pulsed measurement of S-parameters
- Pulsed measurements provide more accurate simulation of active devices



## Pulsed Measurement of IV Characteristics and S-Parameters

### IV Measurements

Standard DC-IV curves plot drain current as a function of drain voltage for various gate voltages, with a set of drain and gate voltages being continuously applied. A DC bias applied to a transistor may result in device self-heating; the longer the device is on and the more power applied to the device, the more self-heating occurs.



By pulsing the bias with sufficiently short pulses and by choosing a sufficiently short duty cycle, the resulting IV curves will represent the transistor characteristics for quasi-isothermal operating conditions. Biasing a device under pulsed conditions will change the device S-parameters; therefore it is essential to properly record S-parameters under the exact application conditions.

To learn how this solution can address your specific needs please contact Keysight's solutions partner, Maury Microwave [www.keysight.com/find/maurymw](http://www.keysight.com/find/maurymw)



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### System Components

#### Keysight Technologies

|        |                                  |
|--------|----------------------------------|
| N524xA | PNA-X microwave network analyzer |
| N1966A | Pulse I/O adapter for PNA-X      |

#### Maury Microwave

|        |                                                                  |
|--------|------------------------------------------------------------------|
| AMBILT | BILT pulsed IV controller and gate pulser (includes DC supplies) |
| AM22x  | BILT drain probe head                                            |
| MT930A | IVCAD base application                                           |
| MT930B | IVCAD visualization suite                                        |
| MT930J | IVCAD pulsed IV curves                                           |
| MT930K | IVCAD pulsed S-parameter                                         |

Maury Microwave has been in business for 50+ years and has become the world's leading manufacturer of laboratory devices and system components, with an emphasis on device characterization and automated tuning systems. [www.maurymw.com](http://www.maurymw.com)

For information on Keysight Technologies' products, applications and services, go to [www.keysight.com](http://www.keysight.com)

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