

# X-Parameter Measurements

Keysight Technologies and  
Maury Microwave

## Reduce design cycles by up to 50% with X-parameter measurements

X-parameters\* are being used increasingly in place of S-parameters in the design of nonlinear, large signal devices and circuits such as complex power amplifiers, including multi-stage and Doherty circuits. Unlike S-parameters, X-parameters contain detailed and useful information including the magnitudes and phases of distortion products generated by the nonlinear component in response to large signal conditions.

Keysight's load impedance X-parameters option on the PNA-X nonlinear vector network analyzer (NVNA), when used with Maury Microwave's tuners and software, allows you to measure and simulate nonlinear component behavior as a function of impedance, input power, bias and frequency – at all load impedances.

This industry-first approach enables engineers to: extend X-parameter design “cascade-ability” to arbitrarily large load mismatches; automatically measure and simulate accurate, linear and nonlinear behavior over the entire Smith chart under multiple load conditions; and model devices and design multi-stage, Doherty or other complex amplifier circuits with the drag-and drop simplicity of Keysight's Advanced Design System (ADS).

The arbitrary load impedance X-parameters option of the PNA-X takes the guesswork out of the typical “trial and error” design approach and eliminates the need to “over design” to safeguard against potential errors.

As a result designers of large signal devices and circuits no longer have to compromise on their simulation models. With this new X-parameter measurement solution from Keysight and Maury you can improve your simulation accuracy, minimize the number of design iterations and reduce your overall design time by up to 50%.

- Use X- instead of S-parameters for large signal, nonlinear devices
- X-parameters allow characterization of large signal devices and circuits
- Keysight PNA-X with Maury tuners and software
- Model & design complex, multi-stage amplifiers
- Simulation models no longer have to be compromised
- Reduce design time by up to 50%



## X-Parameter Measurements

### System Components

#### Keysight Technologies

N524xB	PNA-X network analyzer
N524xB-41x/42x	4 port, dual source
S94510A/11A	Nonlinear component characterization
S94514A	Nonlinear X-parameters
S94520A	Arbitrary load-impedance X-parameters
U9391C, F or G	(2 each required), 26.5, 50 or 67 GHz comb generator
U20xxA or U848xA	USB power sensor (or other Keysight power meter & sensor)

Other options are available; contact your local Keysight sales engineer for more details

Reference documentation publication 5989-8575EN

#### Maury Microwave

Tuner – select from:

MT98x	Automated Impedance Tuner (0.227 MHz to 65 GHz coaxial)
MT930x	IVCAD measurement and modeling device characterization software

Other options are available; contact Maury Sales for more details

\*X-parameters is a trademark and registered trademark of Keysight Technologies in the US, EU, JP, and elsewhere. The X-parameters format and underlying equations are open and documented. For more information, visit <http://www.Keysight.com/find/eesof-x-parameters-info>.

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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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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