

Technology Demonstration

Utilization of the PNA-X for NVNA Measurements

NVNA Application on the PNA-X

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Presentation Outline

- ✓ NVNA capabilities on PNA-X
- ✓ X-parameters
- ✓ Multi-Envelope domain
- ✓ Demo

NVNA Measurements on PNA-X

RF Frequency Nonlinear Measurements:

- Component Characterization (calibrated 'a' and 'b' waves)
- X-parameter extraction for simulation and design (Poly Harmonic Distortion Model)
- Multi-Envelope domain measurements

... the PNA-X provides industry-leading HW performance, accuracy, and configurability to simplify test setups and provide detailed insight into designing nonlinear components.



PNA-X Configuration Benefits

High performance

- Agilent's proprietary harmonic phase reference
- 130 dB dynamic range (85 dB SFDR)
- Two high quality, low harmonic internal sources (better than 60 dBc harmonic performance)
- Pulsed stimulus/response measurements

Speed

- Optimized functions
- High level of integration

PNA-X Configuration Benefits

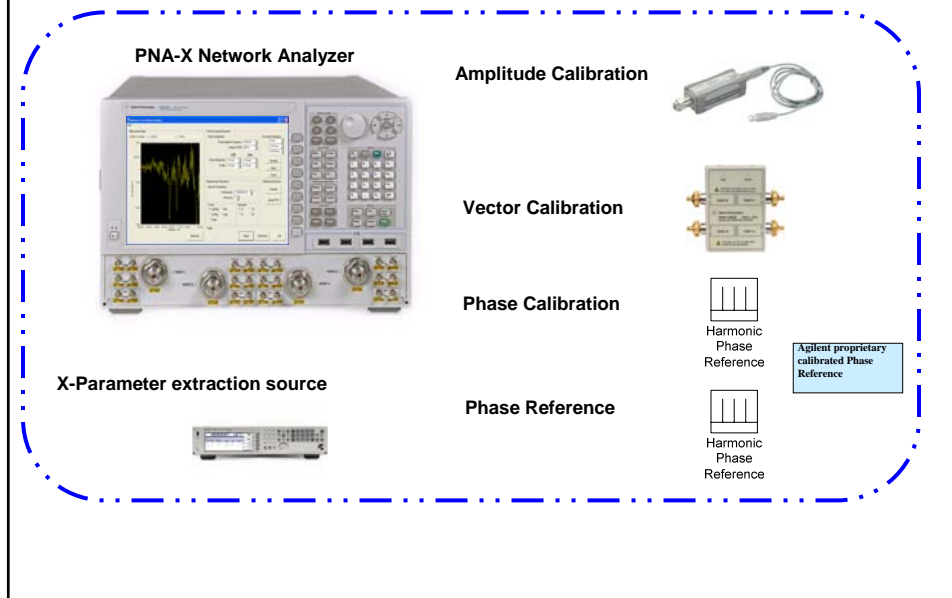
Flexibility

- Internal source path switches & combining network
- Configurable test set & rear panel access loops
- Internal modulators and pulse generators

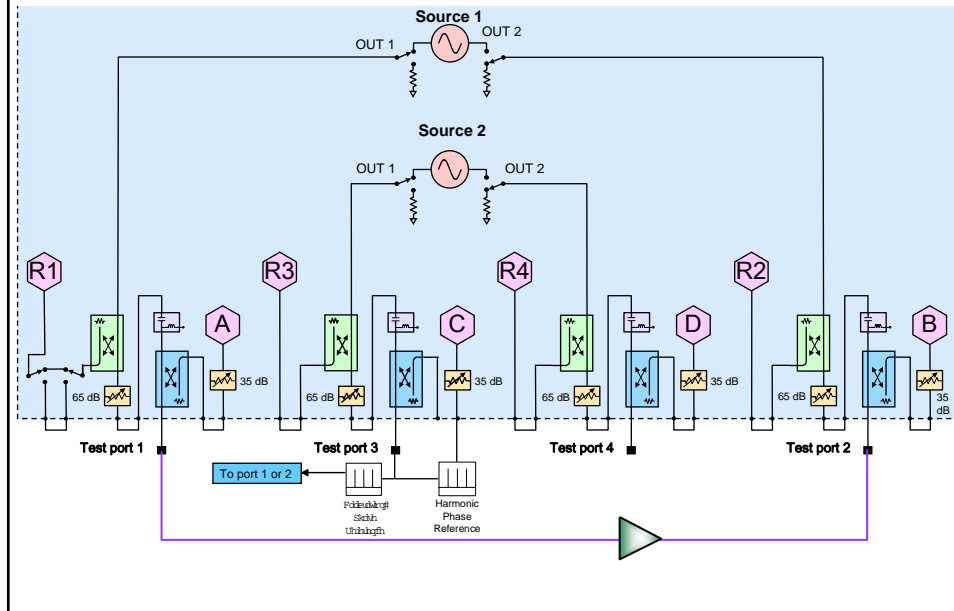
Internal Design Goal of NVNA Application: Ease of use

- Simple user interface and measurement setup
- Convenient three step calibration
- De-embed in real-time

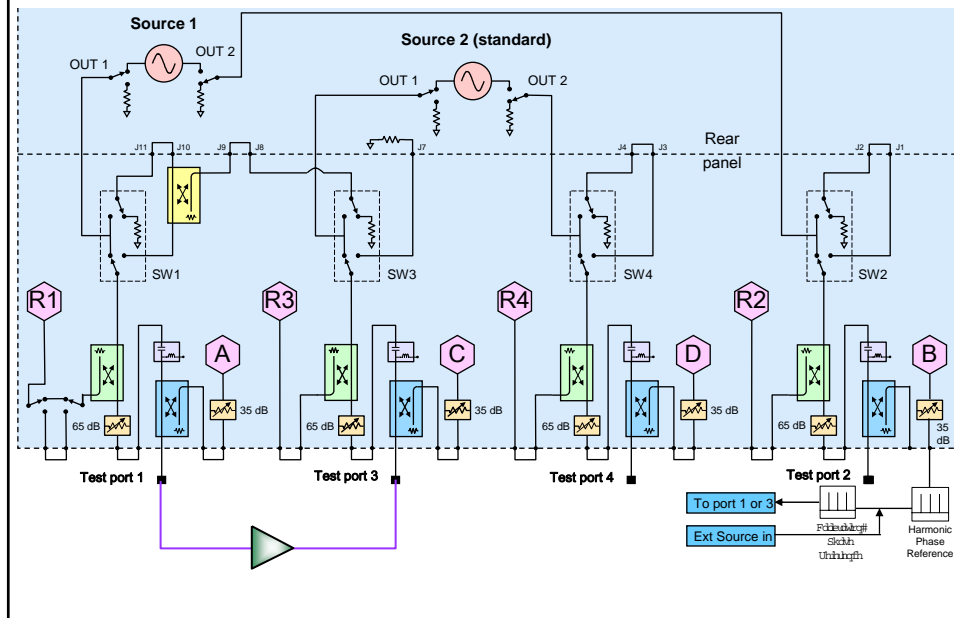
NVNA System Configuration



NVNA for Component Characterization: Internal 2nd Source & Ext Pwr Range

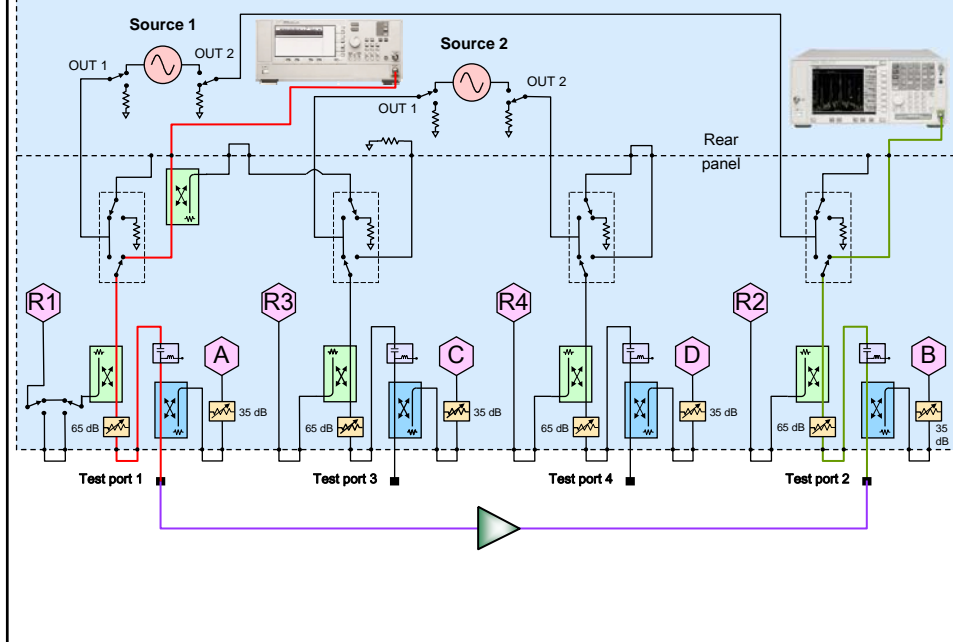


NVNA for X-parameters: External 3rd Source, Ext Pwr Range, Sw & Combiner



4-Port PNA-X, SCMM Mod/Demod Amplifier

Measurements



X-parameters (Coefficients of PHD model)

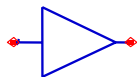
$$B_{e,f} = \sum_{g,h} \left(X_{eg, fh}^S(|A_{11}|) P^{f-h} \cdot A_{g,h} + X_{eg, fh}^T(|A_{11}|) P^{f+h} \cdot A_{g,h}^* \right)$$

Measurement and modeling capabilities with PNA-X HW and simulation SW.

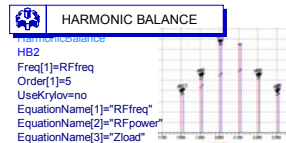
PNA-X:
Measure device X-params



ADS:
Simulate using X-params

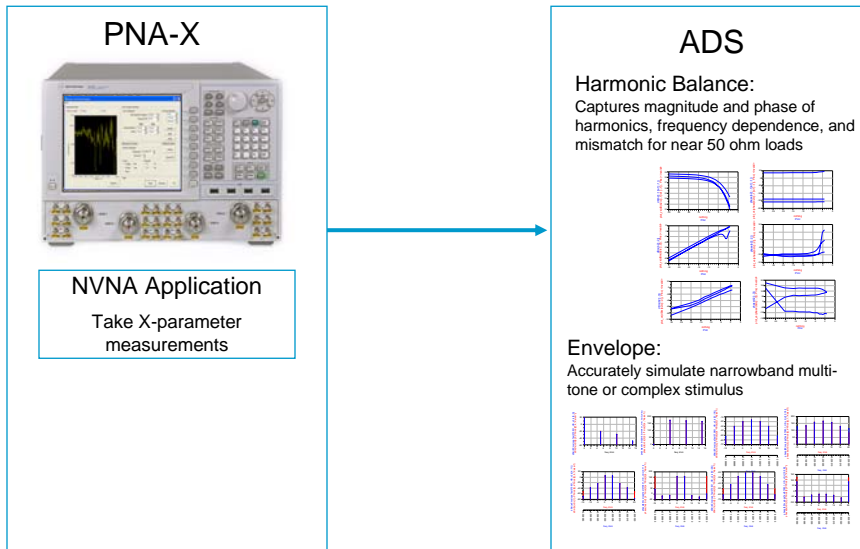


ADS:
Design using X-params

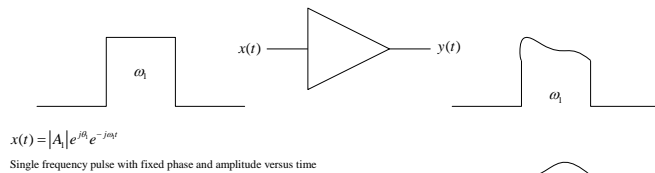


Interoperable Nonlinear Measurement, Simulation and Design

PHD Modeling Data Flow



NVNA Multi-Envelope Domain

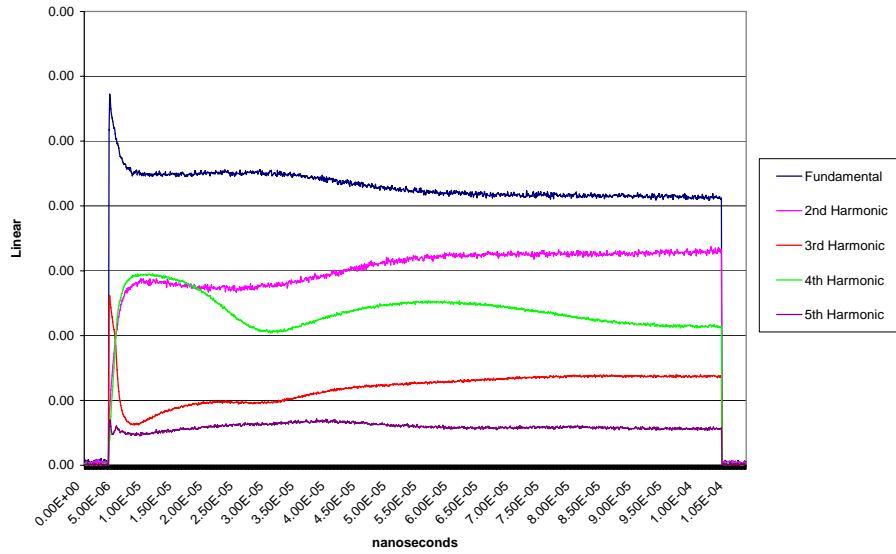


Multi-Envelope Domain

Can measure envelope (like pulse profile) of the fundamental and harmonics with NVNA error correction applied. Use to analyze memory effects in nonlinear devices.

Get vector corrected amplitude and phase of envelope.

NVNA Multi-Envelope Domain Measurements



NVNA Multi-Envelope Domain Measurements

