PNA family B-Model Overview

May 2017

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Keysight Vector Network Analyzer Portfolio

Gain Deeper Confidence

Industry's broadest price/performance choices

PNA-X (N524xA), NVNA
Most advanced & flexible microwave NA

PNA (N522xA)
High-performance microwave NA

PNA-L (N523xA)
Economy microwave NA

PNA Family
Reach for unrivaled excellence
300 kHz to 67 GHz

E5080A
Next-generation ENA

M9485A
Best-in-class RF multiport VNA

E5071C, E5072A
High-performance RF NA

E5061B, E5063A
NA + ZA in one-box
Low-cost RF NA

M937xA
Full two-port single-slot or multiport VNA

ENA Series
Drive down the cost of test
5 Hz to 20 GHz

PXI VNA
Drive down the size of test
300 kHz to 26.5 GHz

PNA-B Series

FieldFox
Carry precision with you
30 kHz to 50 GHz

NEW

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PNA B-model customer slides

B Models Include PNA-X, PNA and PNA-L Series
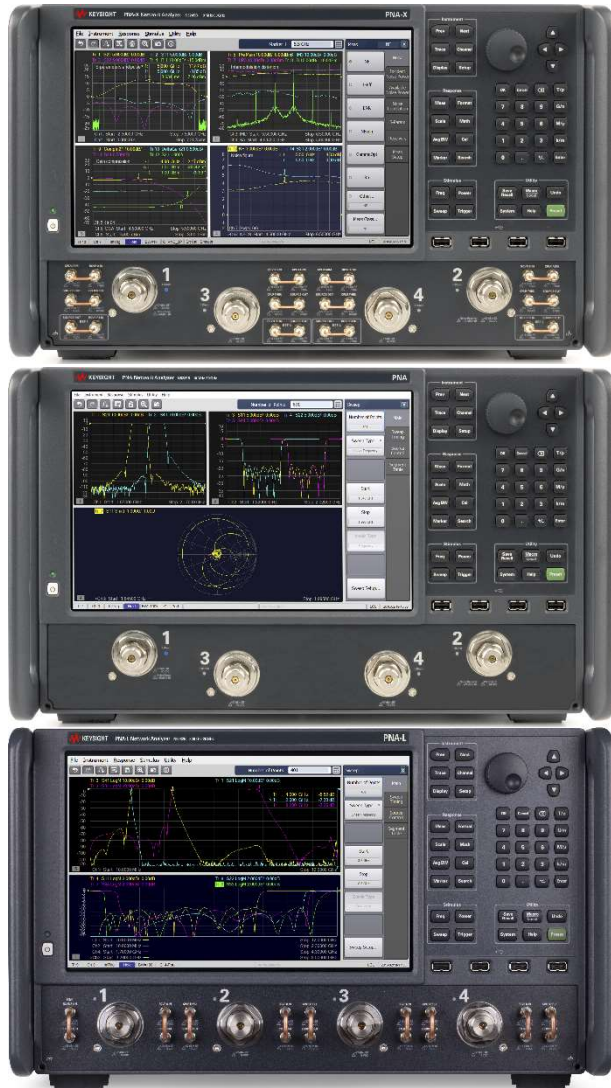
PNA-X Series
N5249B 10 MHz to 8.5 GHz
N5241B 10 MHz to 13.5 GHz
N5242B 10 MHz to 26.5 GHz
N5244B 10 MHz to 43.5 GHz
N5245B 10 MHz to 50 GHz
N5247B 10 MHz to 67 GHz

PNA Series
N5221B 10 MHz to 13.5 GHz
N5222B 10 MHz to 26.5 GHz
N5224B 10 MHz to 43.5 GHz
N5225B 10 MHz to 50 GHz
N5227B 10 MHz to 67 GHz
N5264B Antenna receiver

PNA-L Series
N5239B 300 kHz to 8.5 GHz
N5231B 300 kHz to 13.5 GHz
N5232B 300 kHz to 20 GHz
N5234B 10 MHz to 43.5 GHz
N5235B 10 MHz to 50 GHz

Latest Evolution of Industry's Premier VNA Family

RF PNA
2000

MW PNA
2002

PNA-X
2007

PNA B models
2017

900 Hz - 120 GHz
2017

What's New?

– Dark-gray Keysight color scheme

– Widescreen (12.1") multi-touch display

– New simplified user interface

  • Part of converged VNA software for ENA, PNA, modular

  • Same UI as E5080A ENA

– PNA-X test set configurations now consistent with PNA

– New software-application license structure

  • Former software options now have separate model numbers (e.g. Option 010 $\rightarrow$ S93010A)

  • Can be ordered with instrument or added later

  • Transportable licenses now available – can be moved between instruments as needed

– Lower start frequency (900 Hz) for selected models

User Interface Improvements

- Simplified hard-key and pull-down-menu groupings

- Tabbed softkeys for better organization of items

- Touch and hold screen for right mouse click choices

- Multi-touch scale zooms

- Tools (shortcut icons)

- Sheets (setup tabs)

- More complete status bar
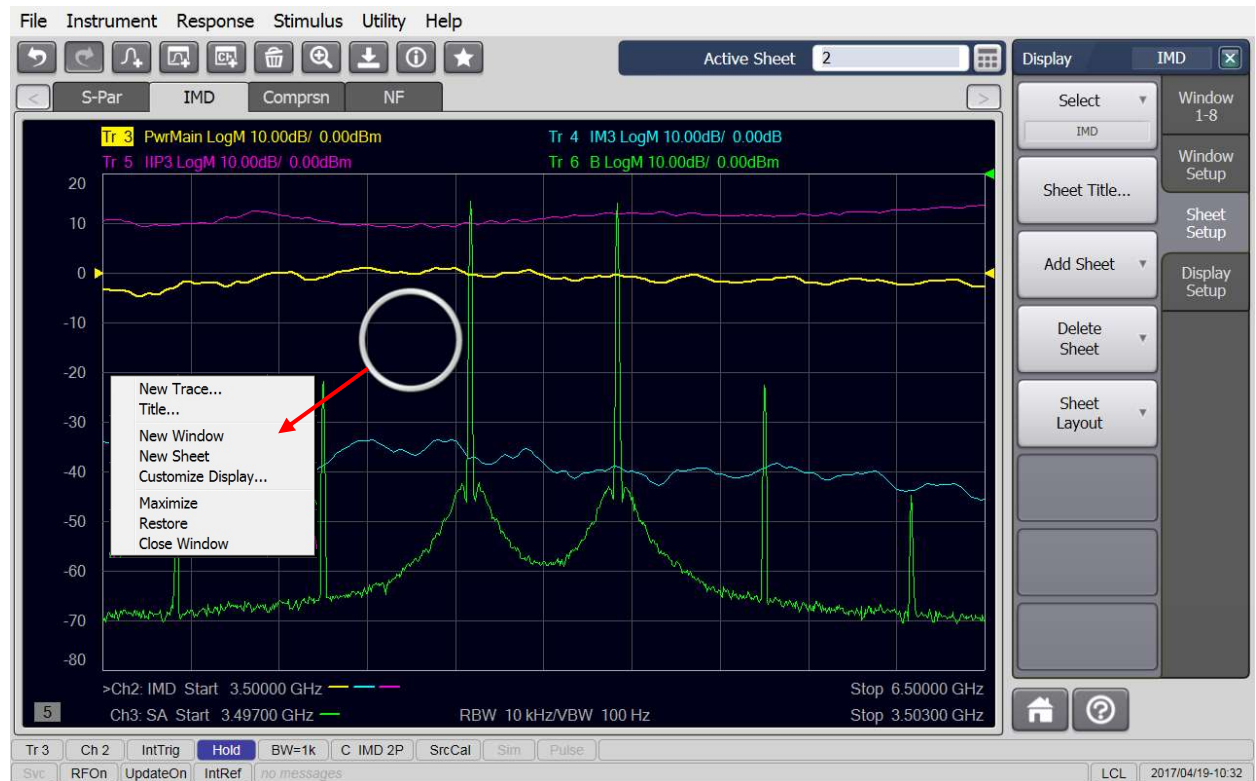
What's The Same?

– Same excellent RF hardware and performance as A models

– Full code compatibility with A models

– Support for all software options/applications

– No significant price changes

SCPI Command Tree

See Also

- Example Programs
- Find commands using a simulated PNA UI
- See list of all SCPI Errors.
- See Calibrating the PNA Using SCPI
- Synchronizing the Analyzer and Controller
- IEEE- 488.2 Common Commands
- Local Lockout

ABORt	Stops all sweeps
+ CALCulate	Click to hide and show CALC branches
CALPod	Controls CalPod units
CONTrol	Interface control, ECal module state control, and Rear-panel connector control.
CSET	Work with a Cal Set without having to select it into that channel.
DISPlay	Display settings
FORMat	Format for data transfer
HCOPy	Hardcopy printing
INITiate	Continuous or manual triggering
LXI	LXI communications
MMEMory	Saves and recalls instrument states
OUTPut	Turns RF power ON and OFF
ROUTe	Controls internal switch to reference receiver. (Opt 81)

PNA B-Model Application Model Structure

Model num	Description	Old option
S93007A	Automatic fixture removal	007
S93010A	Time domain analysis	010
S93015A	Dynamic uncertainty for S-parameters	015
S93118A	Fast CW measurements	118
S93025A	Basic pulsed-RF measurements	025
S93026A	Advanced pulsed-RF measurements	008
S93029A	Noise figure measurements with vector correction	028, 029
S93460A	True-mode stimulus	460
S93551A	N-port measurements	551
S93080A	Frequency-offset measurements	080
S93082A	Scalar mixer/converter measurements	082
S93083A	Vector and scalar mixer/converter measurements	083
S93084A	Embedded-LO capability	084
S93086A	Gain-compression measurements	086
S93087A	Intermodulation distortion measurements	087
S93088A	Source phase control	088
S93089A	Differential and I/Q device measurements	089
S930900A	Spectrum analysis, up to 8.5 GHz	090
S930901A	Spectrum analysis, up to 13.5 GHz	090
S930902A	Spectrum analysis, up to 26.5 GHz	090
S930904A	Spectrum analysis, up to 43.5 GHz	090
S930905A	Spectrum analysis, up to 50 GHz	090
S930907A	Spectrum analysis, up to 67 GHz	090
S930909A	Spectrum analysis, up to 90 GHz	n/a
S93093A	Spectrum analysis, up to 110 GHz	093
S93094A	Spectrum analysis, beyond 110 GHz	094
S93898A	Built-in performance test software	897, 898
NVNA		
S94510A	Nonlinear component characterization	510
S94511A	Nonlinear component characterization, restricted to 50 GHz	511
S94514A	Nonlinear X-parameters	514
S94518A	Nonlinear pulse envelope domain	518
S94520A	Arbitrary load-impedance X-parameters	520
S94521A	Arbitrary load-control X-parameters	521

- Variety of software applications for passive and active DUTs
- Four license types to optimize software operating cost
  - 1FP (fixed, permanent)
  - 1TP (transportable, permanent)
  - 1FY (fixed, 1-year)
  - 1TY (transportable, 1-year)
- 30-day free trial license

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Benefits of New License Types

– **Transportable licenses** (-1**T**P, -1**T**Y)

- 1.3 times the price of a fixed-permanent license

- For applications that are not used 100% of the time, transportable licenses allow multiple instruments to share a common application

- Licenses are managed on a cloud server (via Keysight Software Manager)

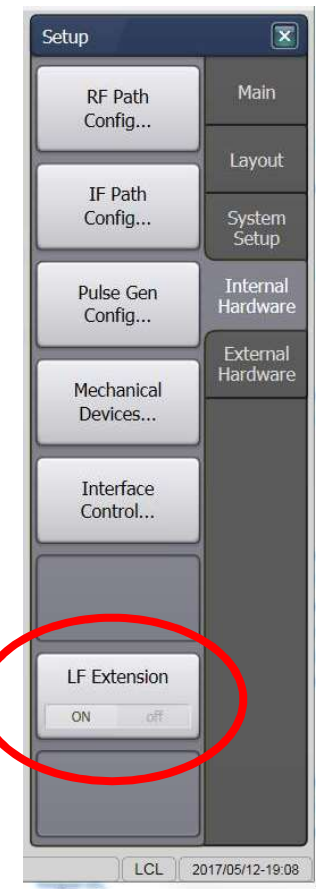- Licenses can be transferred via LAN, flash drive, or entered manually

– **1-year time-based licenses** (-1P**Y**, -1T**Y**)

- 38% of fixed-perpetual license price

- Optimum for short-term projects (< 3 years)

- Allows purchase of apps using operational-expense (op-ex) money instead of capital-expense (cap-ex) money – op-ex approval is often much easier compared to cap-ex budget process
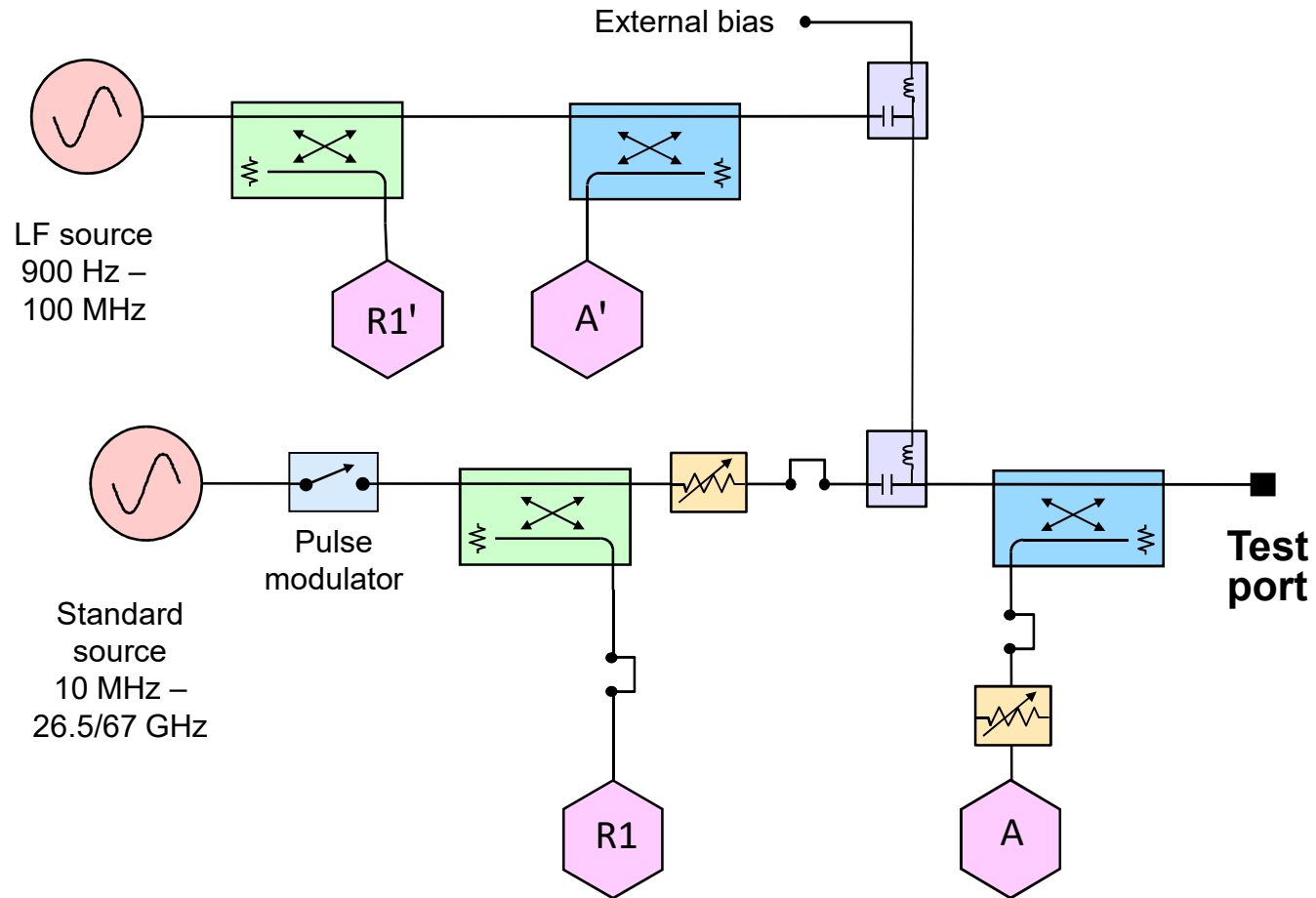

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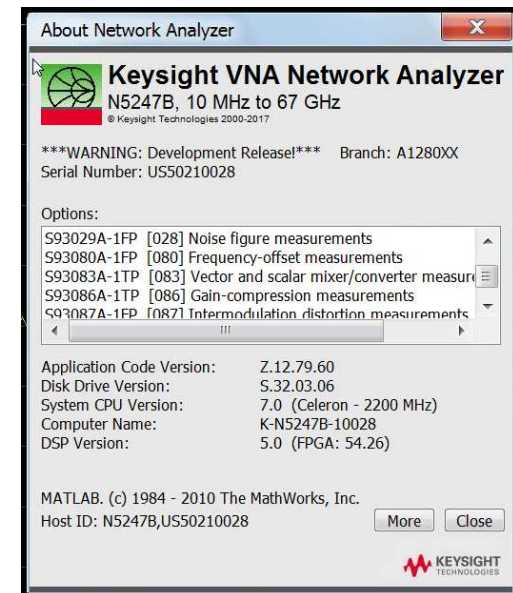
Optional Lower Start Frequency

– Extend S-parameter, gain compression, and SMC (magnitude only) measurements down to 900 Hz (standard stop frequency = 10 MHz)

– Target applications:

  • Time domain and signal integrity

  • Low-IF up/down converters

  • Broadband amplifiers (TIAs for example)

  • Filters

– Works on models compatible with N5290/91A 110/120 GHz millimeter-wave network analyzers

  • 2-port 26.5/67 GHz PNAs (N5222/27B Option 205)

  • 4-port 26.5/67 GHz PNA-Xs (N5242/47B Option 425)

– Not compatible with true-mode stimulus or source-phase control below 10 MHz

– Partial support for pulsed-RF

![Keysight Technologies logo]

Low-Frequency Extension Block Diagram

External bias

LF source
900 Hz –
100 MHz

R1'

A'

Pulse
modulator

Standard
source
10 MHz –
26.5/67 GHz

R1

A

Test
port

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Low-Frequency Measurement Example
## 2 GHz low-pass filter

Upgrade Information

– Minimum upgrade includes new hard drive, front-panel assembly, and outer parts with new color scheme (cover, handles, straps, feet)

– Units older than a couple of years may need additional hardware (e.g. CPU, DSP5, synthesizer assemblies, noise receiver)

– Option H29 (26.5 GHz noise hardware in a 50 GHz PNA-X) must be upgraded to new noise hardware

– Upgrade prices in the range of $12k to $32k, depending on age of unit and amount of required new hardware

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A-Model Support

– A-model discontinuance announced December 1, 2017

– Last order date for A models will be May 31, 2019

– Little or no new features planned for A models

– Major firmware defects will get fixed, but maybe not minor ones with workarounds.
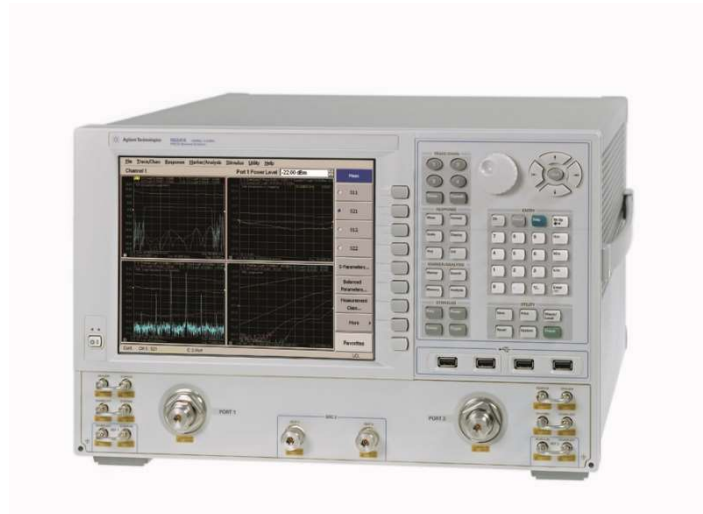
Literature Resources

– Configuration guide: 5992-1465EN

– PNA-X brochure: 5990-4592EN

– PNA/PNA-L brochure: 5990-8290EN

– NA selection guide: 5989-7603EN

Keysight Technologies
PNA Family
Microwave Network Analyzers
(N522x/3x/4xB)

Configuration Guide

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Unlocking Measurement Insights