

# Analyseurs de Réseaux RF



**μWave**  
Micro Ondes  
De 33GHz à 500GHz



**PNA-X**  
Très Hautes Performances  
De 10MHz à 50GHz  
*Mesures Non linéaires*



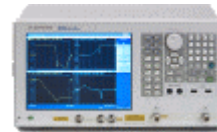
**PNA**  
Hautes Performances  
De 300KHz à 110GHz



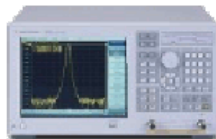
**PNA-L**  
Performances à petit prix  
De 300KHz à 50GHz



**ENA-C**  
Performances moyennes  
De 9KHz à 20GHz



**ENA-LF**  
Basses Fréquences & RF  
De 5Hz à 3GHz



**ENA-L**  
Economique  
De 9KHz à 3GHz



**FieldFox**  
Appareil terrain  
De 2MHz à 6GHz



## Vue par Application

Research and development	FieldFox	ENA-L	ENA LF	ENA	PNA-L	PNA-X	PNA MW	PNA $\mu$ wave
<b>Basic measurements</b>								
S-parameters		•	•	•	•	•	•	•
Transmission and reflection with T/R test set	• <sup>11</sup>	•						
Gain-phase test port with 1 Mohm input			•					
X-parameters						•		
Absolute power	•		• <sup>14</sup>	•	•	•	•	• <sup>1</sup>
Spectrum analyzer function						• <sup>2</sup>		
<b>Non-coaxial devices</b> <sup>3</sup>								
TRL calibration (on-wafer measurement)				•	•	•	•	•
Waveguide measurements				•	•	•	•	•
<b>Non-insertable devices</b> <sup>4</sup>								
Adapter-removal calibration using mechanical calibration			•	•	•	•	•	•
SOLR (unknown thru) using mechanical calibration or ECal				•	•	•	•	•
Different connector types supported by ECal		•	• <sup>6</sup>	•	•	•	•	• <sup>1</sup>

1. Functions up to 67 GHz.
2. Option 087 intermodulation distortion measurements provides spectrum-analyzerlike display for use with IMD measurements.
3. For example, on-wafer, in-fixture, or waveguide applications.
4. A non-insertable device is a device that cannot be inserted in place of a zerolength through. For example, a device that has the same connectors on both ports (type and sex) or different types of connectors on each port (for example, waveguide on one port and coaxial on the another).
5. Time domain gating is not supported.
6. ECal modules do not cover the whole frequency range of the E5061B. Check whether the frequency range of each ECal module meets your measurement needs.
7. For more information, see page 25 of the selection guide.
8. Physical Layer Test System (PLTS) 4.5 only supports E5071C-x4x, x8x.
9. Closed environment, which does not allow access to a Windows desktop operating system.
10. Open environment, which allows access to a Windows desktop operating system and enables you to install software and manage data for easy post-measurement analysis.
11. Includes integrated programming language such as Visual Basic for Applications®, and ability of open Windows environments to install programming languages into analyzers.
12. S11 vector and S21 scalar.
13. 85070E Dielectric Probe Kit only.
14. The source and receiver calibrations are not available. For trace normalization, use Data/Memory math function since the response calibration is not applicable to absolute traces.

Research and development	FieldFox	ENA-L	ENA LF	ENA	PNA-L	PNA-X	PNA MW	PNA $\mu$ wave
<b>Applications</b>								
Gain compression						•		
Intermodulation and harmonic distortion						•		
True mode differential						•		
Nonlinear component characterization						•		
Nonlinear pulse envelope domain						•		
Time-domain mode/gating		• <sup>5</sup>	•	•	•	•	•	•
Frequency-offset mode				•	•	•	•	•
TOI and harmonics					•	•	•	•
Noise figure measurements						•		
Pulsed-RF: wide and narrow pulse width			•	•	•	•	•	•
Frequency conversion application				•		•	•	• <sup>1</sup>
Scalar-calibrated converter measurements				•	•	•	•	• <sup>1</sup>
Antenna	•	•	•	•	•	•	•	
Materials measurement <sup>7</sup>	• <sup>12</sup>			•	•	•	•	•
Signal integrity				• <sup>7</sup>		•	•	•
Automated gain compression						•		
True differential measurements						•		
<b>Programming and connectivity</b>								
Windows-OS		• <sup>8</sup>	• <sup>9</sup>	• <sup>9</sup>	• <sup>9</sup>	• <sup>9</sup>	• <sup>9</sup>	• <sup>9</sup>
LAN interface	•	•	•	•	•	•	•	•
Internal programming capability <sup>11</sup>		•	•	•	•	•	•	•
ADS linkage				•	•	•	•	•
VEE linkage					•	•	•	•
IntuiLink				•	•	•	•	•
LXI compliance			•	•				
Display touch screen		opt	•	•	•	•	•	•
USB for mass storage	•	•	•	•	•	•	•	•



Manufacturing test	ENA-L	ENA LF	ENA	PNA-L	PNA-X	PNA MW	PNA $\mu$ wave
<b>Programming</b> Internal programming capability 1	•	•	•	•	•	•	•
Fast data transfer 2	•	•	•	•	•	•	•
<b>Calibration</b> Adapter-removal calibration 3	•	•	•	•	•	•	•
SOLR (Unknown thru) using mechanical calibration or ECal			•	•	•	•	•
ECal support	•	• <sup>4</sup>	•	•	•	•	• <sup>5</sup>
<b>Measurement and analysis</b>							
Segment sweep 6	•	•	•	•	•	•	•
Pass/fail testing	•	•	•	•	•	•	•
Embedding and de-embedding 7			•	•	•	•	•
Waveform analysis command 8	•	•	•				
<b>Interface</b>							
LAN	•	•	•	•	•	•	•
I/O port	•	•	•	•	•	•	•
Parts handler interface 9	•	•	•	•	•	•	•
VGA output	•	•	•	•	•	•	•

1. Includes integrated programming language such as Visual Basic for Applications, and ability of open Windows environments to install programming languages into analyzers.

Multiport and balanced devices	FieldFox	ENA-L	ENA LF	ENA	PNA-L	PNA-X	PNA	PNA $\mu$ wave
<b>Multiport measurements</b> Built-in 4-port measurement capability				•	•	•		
Multiport measurement capability with external test set 1		•		•	•	•	•	
<b>Multiport calibration</b> Full 4-port calibration				•	•	•	• <sup>2</sup>	
Full N-port calibration					• <sup>2</sup>	• <sup>2</sup>	• <sup>2</sup>	
<b>Balanced measurement</b> Built-in balanced measurement capability				•	•	•		
Balanced measurement capability with external test set 3				•	•	•	•	
Fixture simulation/embedding and de-embedding				•	•	•	•	•
True differential measurements						•		

1. Refer to *Test Solutions for Multiport and Balanced Devices* brochure (literature number 5988-2461EN available on the [www.agilent.com/find/multiport](http://www.agilent.com/find/multiport) Web site) for more details.

2. Available only when used with external test sets and Option 550 or 551.

3. The external test set and software are available with either Option 55x or the Physical Layer Test System (PLTS). For more details on PLTS, refer to the Agilent Physical Layer Test Systems Data Sheet (literature number 5988-5288EN) available on the PLTS Web site: [www.agilent.com/find/plts](http://www.agilent.com/find/plts)

Filter and duplexer measurements	ENA-L	ENA LF	ENA	PNA-L	PNA-X	PNA	PNA $\mu$ wave
<b>Dynamic range</b> Wide dynamic range 1	•	•	•	•	•	•	•
Direct receiver access to obtain widest possible dynamic range				•	•	•	•
<b>Calibration</b> Adapter-removal calibration 3		•	•	•	•	•	•
SOLR (Unknown thru) using mechanical calibration or ECal			•	•	•	•	•
Interpolated calibration	•	•	•	•	•	•	
<b>Measurement and analysis</b> Segment sweep 2	•	•	•	•	•	•	•
Four-parameter display	•	•	•	•	•	•	•
Marker statistics function 3	•	•	•	•	•	•	•
<b>Other functions</b> Time domain mode/gating	• <sup>4</sup>	•	•	•	•	•	•
Balanced measurement capability 5			•	•	•	•	•
Multiport measurement capability 5	• <sup>7</sup>		• <sup>7</sup>	• <sup>7</sup>	•	• <sup>7</sup>	

1. Wide dynamic range is defined as 120 dB or better for RF analyzers and greater than 90 dB for microwave analyzers.

2. Segment sweep includes sweep types that are known as list and fast swept list.

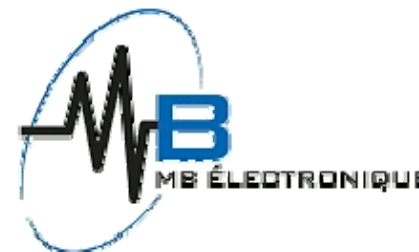
3. Obtains real-time calculations of device characteristics such as maximum/minimum, center frequency, and 3 dB bandwidth.

4. Time gating is not supported.

5. For more details about balanced and multiport tests, see page 19.

6. For 2-port network analyzers, balanced measurement capability requires an external test set and software.

7. An external test set may be required to achieve these functionalities




Amplifier Measurements	FieldFox	ENA-L	ENA LF	ENA	PNA-L	PNA-X	PNA	PNA $\mu$ wave
<b>Basic measurements</b>								
Gain, return loss, isolation	•	•	•	•	•	•	•	•
Compression, AM-PM conversion		•	•	•	•	•	•	•
Automated gain compression						•		
<b>High power measurements</b>								
High output power <sup>1</sup>						•		
Source attenuator		•		•	•	•	•	•
Receiver attenuator			• <sup>2</sup>			•	•	•
Connection loop before reference path						•		
Configurable test set				• <sup>3</sup>	•	•	•	• <sup>4</sup>
<b>Harmonic measurements</b>								
Frequency-offset mode				•	•	•	•	•
Analyzer source harmonics <sup>6</sup>						•		
Receiver attenuator						•	•	•
<b>Intermodulation distortion measurements</b>								
Frequency-offset mode				•	•	•	•	•
Second internal source					•	•		
Internal combining network						•		
Simplified swept-IMD setup						•		
<b>Noise figure</b>						•		
<b>Hot-S22</b>					•	•		
<b>DC inputs for power added efficiency</b>				•		•	•	
<b>Internal DC bias source</b>			•					
<b>Internal bias-tee</b>				•		•	•	•
<b>Nonlinear vector network analyzer applications</b>								
X-parameters						•		
nonlinear component characterization						•		
nonlinear pulse envelop domain						•		


1. High output power is defined as greater than +13 dBm for leveled power output.
2. Only the gain-phase test port has the receiver attenuator.
3. Requires Option 44x, 48x or 4K5 to use external test set mode.
4. Available up to 67 GHz.
5. Harmonic and intermodulation distortion can be measured with integrated spectrum analyzer function.
6. 2nd and 3rd harmonics of the internal source are significantly lower than 20 to 30 dBc.

Mixer measurements	FieldFox	ENA-L	ENA LF	ENA	PNA-L	PNA-X	PNA	PNA $\mu$ wave
<b>Measurement and analysis</b>								
Magnitude measurement <sup>1</sup>				•	•	•	•	• <sup>2</sup>
Phase measurement								
Relative phase					•	•	•	• <sup>2</sup>
Absolute phase				•		•	•	• <sup>2</sup>
3-port measurements <sup>3</sup>				•	•	•	• <sup>4</sup>	
Power sweep				•	•	•	•	• <sup>2</sup>
Embedded LO measurements						•	•	• <sup>2</sup>
Internal dual-source					•	•		
External source control				• <sup>5</sup>	•	•	•	•
<b>Calibration</b> Power meter calibration				•	•	•	•	• <sup>2</sup>
3-port calibration				•	•	•	• <sup>4</sup>	
Scalar mixer calibration				•	•	•	•	• <sup>2</sup>
Vector mixer calibration				•		•	•	• <sup>2</sup>

1. Frequency-offset modes of the ENA and PNA series let the source and receiver operate at different frequencies. Both magnitude and phase measurements can be made.
2. Functions available only on a stand-alone PNA, up to 67 GHz. Requires disconnecting mm-wave controller.
3. For LO return loss and LO to RF/IF leak measurements with single connection.
4. Requires an external test set and 4-port measurement option.
5. Supports one external signal source.



Série	Produits	Max Freq	Maximum Output Power at 10 GHz	Maximum Dynamic Range at 10 GHz	Recommended Application
 PNA-X	N5241A	13.5 GHz	+13 dBm	127 dB	Amplifiers/ Mixers / Converters Antenna Balanced measurements Gain Compression/IMD Noise Figure Pulsed-RF S-parameters X-parameters
	N5242A	26.5 GHz	+13 dBm	127 dB	Amplifiers/ Mixers / Converters Antenna Balanced measurements Gain Compression/IMD Noise Figure Pulsed-RF S-parameters X-parameters
	N5244A	43.5 GHz	+13 dBm	124 dB	Amplifiers/ Mixers / Converters Antenna Balanced measurements Gain Compression/IMD Noise Figure Pulsed-RF S-parameters X-parameters
	N5245A	50 GHz	+13 dBm	124 dB	Amplifiers/ Mixers / Converters Antenna Balanced measurements Gain Compression/IMD Noise Figure Pulsed-RF S-parameters X-parameters
PNA-X Mmwave System	N5250C	110 GHz, extendable to 0.5 THz	-5 dBm	111 dB	Antenna Balanced measurements Materials measurements Pulsed-RF S-parameters

Série	Produits	Max Freq	Maximum Output Power at 10 GHz	Maximum Dynamic Range at 10 GHz	Recommended Application
PNA-X Measurement Receiver	N5264A	26.5 GHz, extendable to 0.5 THz	Not applicable. Instrument is receiver only.	-143 dBm noise floor at 10 Hz IFBW	Antenna
 PNA	E8362C	20 GHz	+3 dBm	123 dB	Amplifiers/ Mixers / Converters Materials measurements Signal Integrity S-parameters
	E8363C	40 GHz	+3 dBm	123 dB	Amplifiers/ Mixers / Converters Materials measurements Signal Integrity S-parameters
	E8364C	50 GHz	+3 dBm	123 dB	Amplifiers/ Mixers / Converters Materials measurements Signal Integrity S-parameters
	E8361C	67 GHz	-2 dBm	114 dB	Amplifiers/ Mixers / Converters Materials measurements Signal Integrity S-parameters
PNA-L	N5230C	6, 13.5, 20, 40, 50 GHz	+4 dBm	111 dB	S-parameters







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Série	Produits	Max Freq	Maximum Output Power at 10 GHz	Maximum Dynamic Range at 10 GHz	Recommended Application
 ENA-C	E5071C	4.5 GHz 6.5 GHz 8.5 GHz 14 GHz 20 GHz	+10 dBm at 1 GHz +7 dBm at 10 GHz	123 dB at 1 GHz 105 dB at 10 GHz	Amplifiers/ Mixers / Converters Balanced measurements Filter test Materials measurements Multiport test S-parameters
 ENA LF	E5061B	3 GHz	+10 dBm at 1 GHz	120 dB at 1 GHz	DC-DC converters/SMPS Low frequency gain-phase (5 Hz~) Passive component test op amps PDNs
 ENA-L	E5061A	1.5 GHz	+10 dBm at 1 GHz	120 dB at 1 GHz	75 Ohms CATV devices Cables Distance-to-fault Passive component test T/R or S-parameters
	E5062A	3 GHz	+10 dBm at 1 GHz	120 dB at 1 GHz	75 Ohms CATV devices Cables Distance-to-fault Passive component test T/R or S-parameters
 FieldFox RF Analyzer	N9912A	4 GHz 6 GHz	+6 dBm at 6 GHz	+72 dB at 2 GHz	75 Ohms CATV devices Distance-to-fault Insertion loss, gain Return loss Spectrum analysis Interference analyzer Vector voltmeter

