# Agilent
E5061B Network Analyzer

100 kHz to 1.5 GHz/3 GHz
5 Hz to 3 GHz

Agilent Technologies

E5061B responds to various measurement needs, from LF to RF

The Agilent E5061B is a member of the industry standard ENA Series network analyzers. The E5061B addresses a broad range of measurement needs of electronic components and circuits from low to high frequencies. The E5061B is the ideal solution for applications in industries such as wireless communications, aerospace and defense, computer, medical, automotive, CATV, plus many more. The E5061B now provides a new standard of frequency-domain device analysis from 5 Hz to 3 GHz.
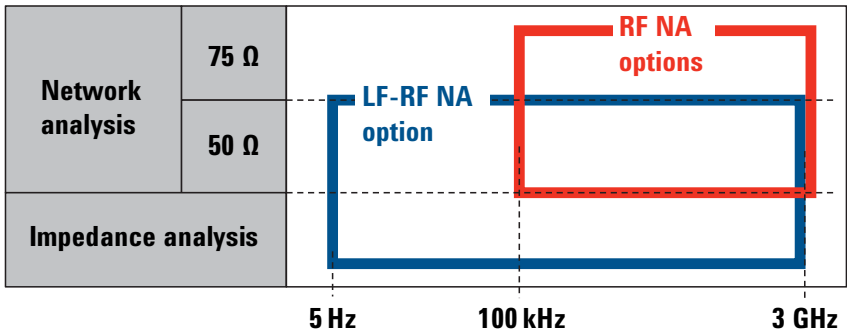
RF NA options
E5061B-115/215/135/235: 50 Ω
E5061B-117/217/137/217: 75 Ω

Economy RF network analyzer that offers solid performance for basic RF network measurements

- **100 kHz to 1.5 GHz/3 GHz**
- **Transmission/Reflection test set and S-parameter test set**
- **50 Ω and 75 Ω system impedance**

LF-RF NA option
E5061B-3L5

General-purpose network analyzer with comprehensive functionality to support network and impedance measurements for electronic devices from LF to RF

- **5 Hz to 3 GHz**
- **50 Ω S-parameter test set**
- **Gain-phase test port (1 MΩ/50 Ω inputs)**
- **DC bias source**
- **Impedance analysis function (Option 005)** [1]

1. Option 005 impedance analysis function is not applicable on the RF NA options E5061B-1x5/2x5/1x7/2x7.

Express ENA

E5061BEP Express ENA is ready for off-the-shelf delivery from our authorized distributors. Preconfigured with popular features, the express configurations deliver the same specifications and functionality as Agilent's build-to-order instruments. For more information on E5061BEP, visit **www.agilent.com/find/express-e5061b.**

Advanced measurement capabilities in a compact box
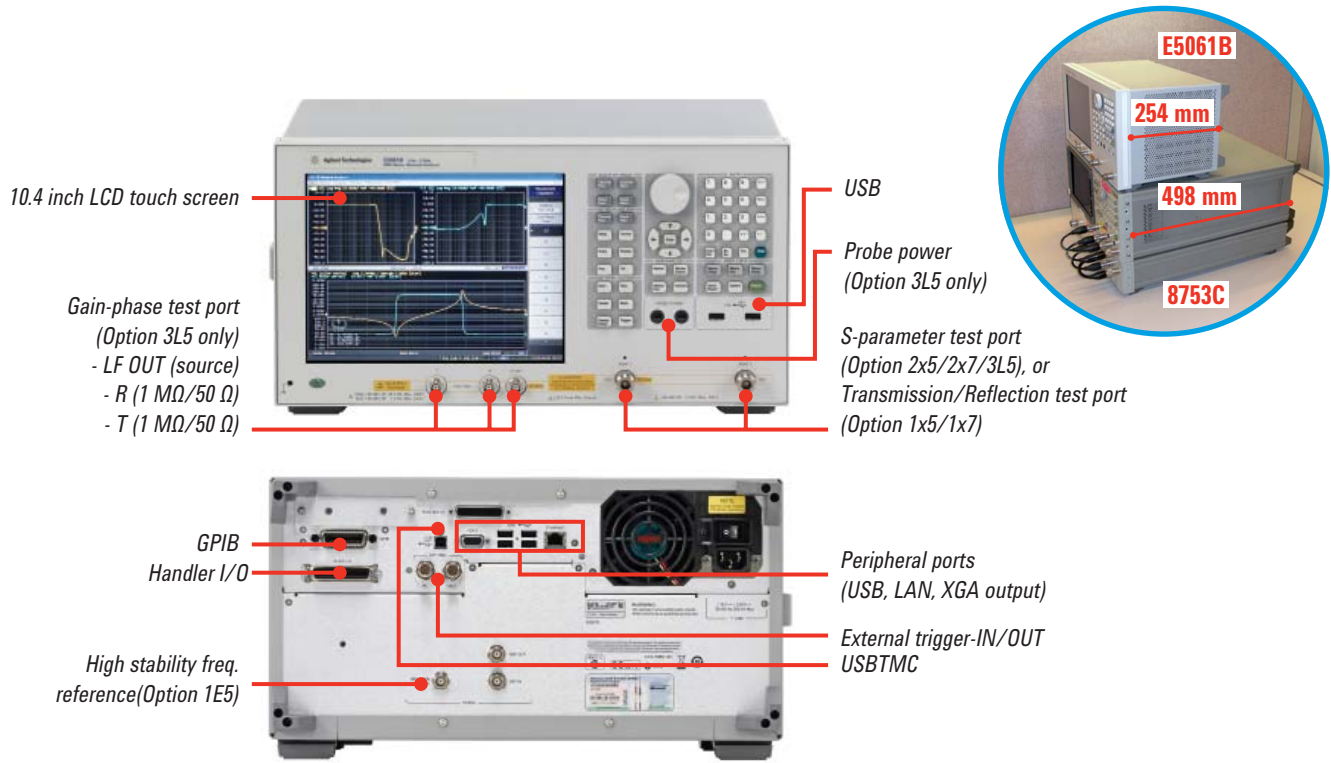
Compact body
(Comparison with 8753C network analyzer)

10.4 inch LCD touch screen

Gain-phase test port
(Option 3L5 only)
- LF OUT (source)
- R (1 MΩ/50 Ω)
- T (1 MΩ/50 Ω)

USB

Probe power
(Option 3L5 only)

S-parameter test port
(Option 2x5/2x7/3L5), or
Transmission/Reflection test port
(Option 1x5/1x7)

GPIB
Handler I/O

Peripheral ports
(USB, LAN, XGA output)

External trigger-IN/OUT
USBTMC

High stability freq.
reference(Option 1E5)

Table 1. E5061B key measurement functions

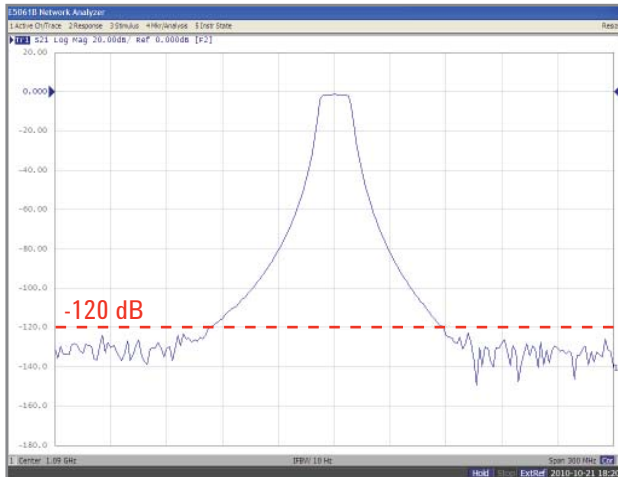|	RF NA options (E5061B-1x5/2x5/1x7/2x7)	LF-RF NA option (E5061B-3L5)
Test frequency range	100 kHz to 1.5 GHz (option 115/215/117/217) 100 kHz to 3 GHz (option 135/235/137/237)	5 Hz to 3 GHz
Source output level	-45 to +10 dBm (at 300 kHz to 1.5/3 GHz) -45 to +5 dBm (at 100 kHz to 300 kHz)	-45 to +10 dBm (at 5 Hz to 3 GHz)
Dynamic range	>120 dB (at 1 MHz to 1.5/3 GHz, IFBW = 10 Hz)	>120 dB (at 1 MHz to 3 GHz, IFBW = 10 Hz)
Trace noise	5 mdBrms (IFBW=3 kHz)	5 mdBrms (IFBW=3 kHz/Auto)
Test port	Transmission/Reflection (option 1x5/1x7), or S-parameter test port (option 2x5/2x7)	S-parameter test port (5 Hz to 3 GHz), plus Gain-phase test port (5 Hz to 30 MHz)
75 Ω test port	Yes (option 1x7/2x7)	No
1 MΩ input	No	Yes (Gain-phase test port, 1 MΩ // 30 pF)
Probe power	No	Yes
DC bias source	No	Yes (0 to ±40 Vdc, max. 100m Adc, sweepable)
Impedance analysis function	No	Yes (option 005)
Frequency stability (CW accuracy)	±7 ppm ±1 mHz (standard), ±1 ppm ±1 mHz (option 1E5)	
Time domain/Fault location analysis	Yes (option 010, with Time gating and Structural Return Loss analysis functions)	
Number of channels/traces	4-channel/4-trace	
Number of point	1601 points	
IFBW	1 Hz to 300 kHz, plus IFBW Auto mode (option 3L5 only)	
Calibration capabilities	Response, 1-port full, 2-port full [1], Enhanced response, Adapter removal, Auto port extension ECal (at >300 kHz with RF 2-port ECal modules) Impedance calibration and fixture compensation (option 3L5 + 005 only)	
Data analysis, data processing	Equation editor, VBA programming, Limit test, Z-conversion	

1.   Not available with E5061B-115/135/117/137.

RF NA options (100 kHz to 1.5/3 GHz)
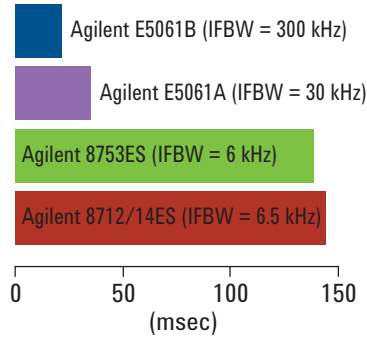## E5061B-115/215/135/235: 50 Ω, E5061B-117/217/137/237: 75 Ω

Solid performance in an enhanced platform

The E5061B RF NA options provide high-performance
1- and 2-port network analysis at an affordable price. The
established RF performance of the E5061/62A has been
integrated into this new digital platform. A wide variety of
test set options allows you to select the best configuration
to suite your test requirements and budget. Enhanced digi-
tal processing capabilities and a smaller footprint improve
the throughput and efficiency for testing RF components,
including cellular BTS filters/antennas, MRI coils, RFIDs,
CATV components, and more.

Transmission/Reflection test set	S-parameter test set
#115 :1.5 GHz, 50 Ω	#215 : 1.5 GHz, 50 Ω
#135 : 3 GHz, 50 Ω	#235 : 3 GHz, 50 Ω
#117 : 1.5 GHz, 75 Ω	#217 : 1.5 GHz, 75 Ω
#137 : 3 GHz, 75 Ω	#237 : 3 GHz, 75 Ω

Wide dynamic range for RF filter measurement
(F0 = 1.09 GHz, source = 10 dBm, IFBW = 10 Hz)

Agilent E5061B (IFBW = 300 kHz)

Agilent E5061A (IFBW = 30 kHz)

Agilent 8753ES (IFBW = 6 kHz)

Agilent 8712/14ES (IFBW = 6.5 kHz)

0   50   100   150

(msec)

Sweep speed comparison (201 points, 2-port cal, max IFBW)

Expanded frequency range

An expanded lower-end frequency range down to 100 kHz
allows you to test components that require measurements
in the 100 kHz range, such as LAN filters and automotive
antennas.

Time domain/Fault location analysis (Option E5061B-010)

The time gating function is available in the time domain/
fault-location analysis function. This enables you to
eliminate mismatch errors caused by test fixtures when
testing CATV cables.
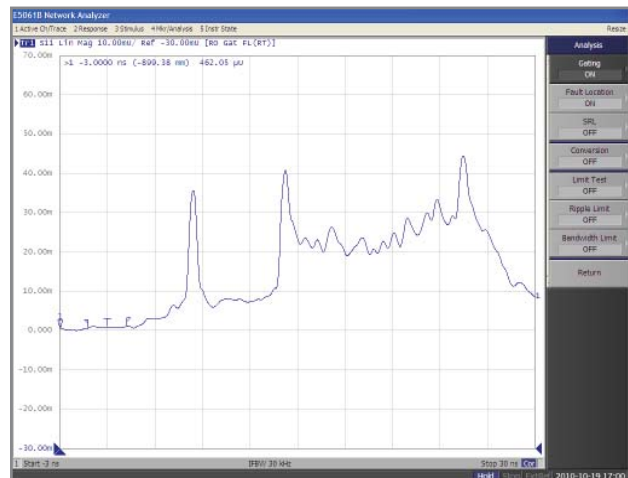
Time domain analysis for cable

LF-RF NA option (5 Hz to 3 GHz)
E5061B-3L5

Comprehensive LF-to-RF network analysis

The E5061B-3L5 LF-RF NA option offers versatile network analysis in the broad frequency range from 5 Hz to 3 GHz. Comprehensive LF network measurement capabilities including built-in 1 MΩ inputs have been seamlessly integrated with the high-performance RF network analyzer. The E5061B-3L5 is the right solution for component and circuit evaluations in the R&D environment.
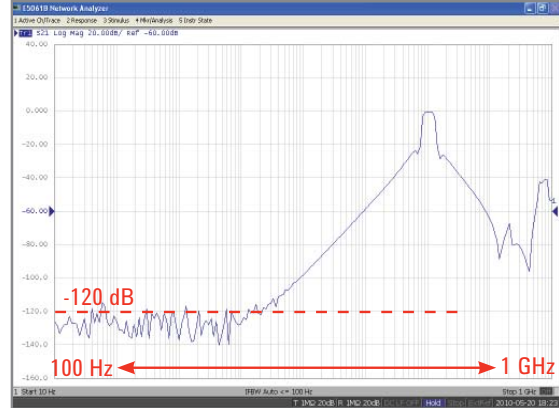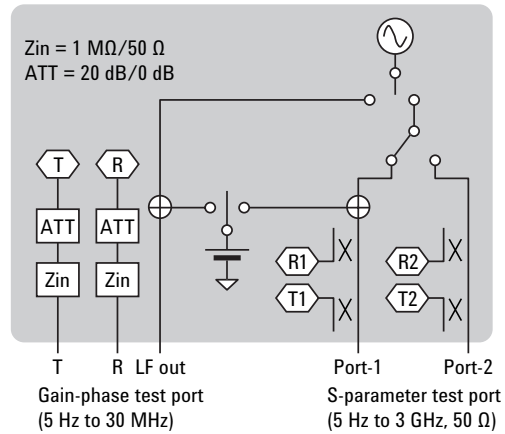
S-parameter test port

The built-in S-parameter test set of the E5061B-3L5 fully covers 5 Hz to 3 GHz with excellent dynamic range performance. This allows you to evaluate a variety of devices from near DC to RF ranges.

Gain-phase test port

The gain-phase test port provides direct receiver access for LF applications from 5 Hz to 30 MHz. The built-in 1 MΩ inputs allow you to easily perform in-circuit probing measurements for amplifiers and DC-DC converter control loops. The receiver ports can accurately measure amplifier's CMRR/PSRR and PDN milliohm impedance by eliminating the measurement errors associated with the ground loop.

DC bias source

The E5061B-3L5 has a built-in DC bias source which internally superimposes the DC voltage up to ±40 Vdc onto the AC source signal at port-1 or LF OUT port. Also, it is possible to provide only the DC voltage from LF OUT port while measuring a DUT at the S-parameter test port.

Zin = 1 MΩ/50 Ω
ATT = 20 dB/0 dB

T   R   LF out   Port-1   Port-2
Gain-phase test port   S-parameter test port
(5 Hz to 30 MHz)   (5 Hz to 3 GHz, 50 Ω)

-120 dB

100 Hz   1 GHz

Wide-band S21 measurement with S-parameter test port
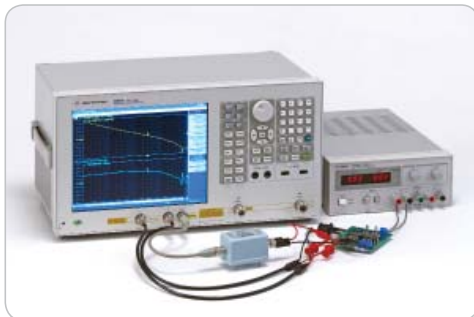
DC-DC converter loop-gain measurement with
gain-phase test port

Loop gain

Phase margin
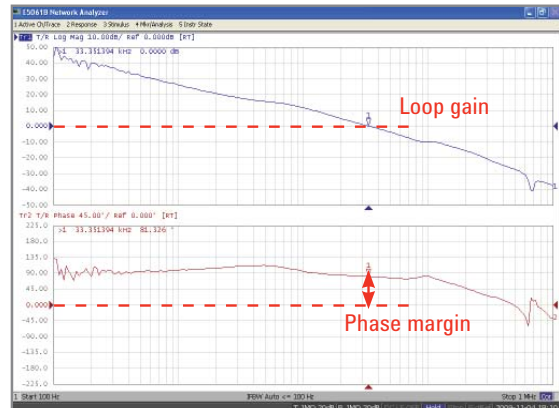
DC-DC loop-gain measurement

5

LF-RF NA option (5 Hz to 3 GHz)
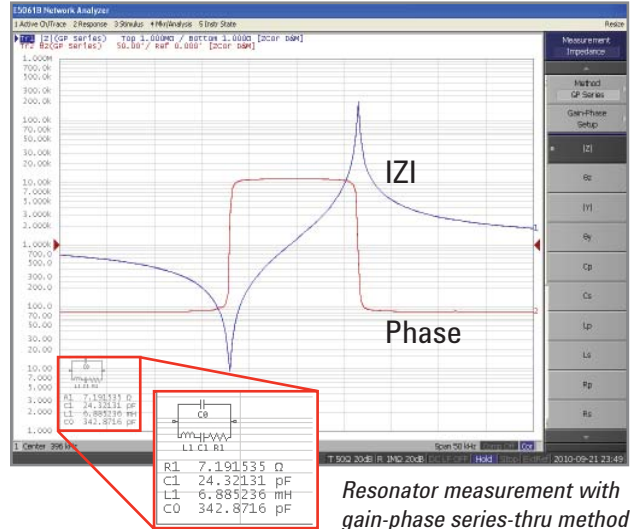## E5061B-3L5 + 005 Impedance analysis option

NA plus ZA in one box

The E5061B-005 provides the impedance analysis (ZA) firmware for the E5061B-3L5 LF-RF network analyzer. This option enables the analyzer to measure impedance parameters of electronic components such as capacitors, inductors, and resonators. The combination of NA and ZA capabilities further enhances the analyzer's versatility as a general R&D tool. Basic ZA functionalities including fixture compensation and equivalent circuit analysis are supported by the firmware. The DC biased impedance measurement is possible with the built-in DC bias source provided by the E5061B-3L5.

Resonator measurement with gain-phase series-thru method

Wide application coverage

The E5061B-005 supports reflection, series-thru, and shunt-thru methods using the S-parameter test port or gain-phase test port. These methods are ideally suitable for low-to-middle, middle-to-high, and very low milliohm impedance ranges. You can evaluate a broad range of components by selecting appropriate measurement methods.

Test fixtures

For the port-1 reflection method and the gain-phase series-thru method, you can use Agilent's 7 mm and 4TP (4-terminal-pair) component test fixtures. The 7 mm fixtures are connected to the port-1 via the 16201A terminal adapter, and the 4TP fixtures are directly connected to the gain-phase test port.
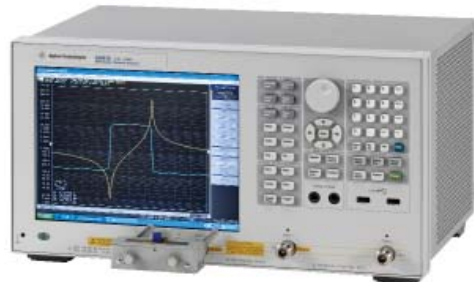

PDN impedance measurement with shunt-thru method (100 Hz to 1 GHz)

Port-1 reflection methodusing 16201A terminal adapter and 16092A 7 mm type fixture

Gain-phase series-thru method using 16047E 4TP type fixture

Ordering information

E5061B network analyzer

Test set options [1]

50 Ω RF NA options

E5061B-115	Transmission/Reflection test set, 100 kHz to 1.5 GHz, 50 Ω system impedance
E5061B 215	S-parameter test set, 100 kHz to 1.5 GHz, 50 Ω system impedance
E5061B-135	Transmission/Reflection test set, 100 kHz to 3 GHz, 50 Ω system impedance
E5061B-235	S-parameter test set, 100 kHz to 3 GHz, 50 Ω system impedance

75 Ω RF NA options

E5061B-117	Transmission/Reflection test set, 100 kHz to 1.5 GHz, 75 Ω system impedance
E5061B-217	S-parameter test set, 100 kHz to 1.5 GHz, 75 Ω system impedance
E5061B-137	Transmission/Reflection test set, 100 kHz to 3 GHz, 75 Ω system impedance
E5061B-237	S-parameter test set, 100 kHz to 3 GHz, 75 Ω system impedance

LF-RF NA option

E5061B-3L5	LF-RF network analyzer with DC bias source, 5 Hz to 3 GHz

Impedance analysis options (for E5061B-3L5)

E5061B-005	Impedance analysis function for LF-RF network analyzer [2]
E5061B-720	Add 50 Ω resistor set [3]

Other options

E5061B-1E5	High stability time base
E5061B-010	Time domain/Fault location analysis
E5061B-020	Standard hard disk drive [4]
E5061B-810	Add keyboard
E5061B-820	Add mouse
E5061B-1CM	Rack mount kit
E5061B-1CN	Front handle kit
E5061B-1CP	Rack mount and front handle kit
E5061B-1A7	ISO 17025 compliant calibration
E5061B-A6J	ANSI Z540 compliant calibration

Accessories

For network analysis

Mechanical calibration kits

85032E/F	Type-N 50 Ω calibration kit
85033E	3.5 mm 50 Ω calibration kit
85036B/E	Type-N 75 Ω calibration kit
85039B	Type-F 75 Ω calibration kit

ECal modules [5]

85092C	Type-N 50 Ω 2-port RF ECal module, 300 kHz to 9 GHz
85093C	3.5 mm 50 Ω 2-port RF ECal module, 300 kHz to 9 GHz
85096C	Type-N 75 Ω 2-port RF Ecal module, 300 kHz to 3 GHz
85099C	Type-F 75 Ω 2-port RF ECal module, 300 kHz to 3 GHz
N4431B	50 Ω 4-port RF ECal module, 9 kHz to 13.5 GHz

Power splitter (for gain-phase test port)

11667L	BNC-type power splitter, DC to 2 GHz

For impedance analysis

Terminal adapter and calibration kit

16201A	7 mm terminal adapter kit
16195B	7 mm calibration kit [6] (open/short/load, and low-loss-C)
85031B	7 mm calibration kit [6] (open/short/load)

7 mm test fixtures

16092A	Test fixture, 500 MHz, for SMD and leaded DUT
16192A	SMD test fixture, 2 GHz
16196A/B/C/D	SMD test fixture, 3 GHz
16197A	SMD test fixture, 3 GHz

4-terminal-pair test fixtures

16047E	Test fixture, for leaded DUT
16034E/G/H	SMD test fixture

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1. *Must choose one of the nine test set options.*

2. *Option 005 is not applicable for the E5061B RF NA options 1x5/2x5/1x7/2x7.*

3. *For calibration at test fixtures. Required for the gain-phase series-thru method.*

4. *Option 020 is the only hard disk option for the E5061B. Must choose this option when ordering the E5061B.*

5. *The ECal modules cannot be used in the low frequency range below 300 kHz or 9 kHz.*

6. *For calibration at the 7 mm connector of the 16201A.*