System configuration summary

This summary lists the main components required to form a basic measurement system. Options or peripherals may be added to provide enhanced measurement and data storage capability.

Full S-parameter measurements

- Agilent PNA Series microwave network analyzers
- Test port cables, 50 ohms
- Calibration kit for applicable connector type

This configuration guide describes standard configurations, options, accessories, upgrade kits and compatible peripherals for the PNA Series microwave network analyzers. This guide should be used with the Agilent PNA Series Microwave Network Analyzers Data Sheet for a complete description of these analyzers.
## Step 1: Select N5230A model number

### Step 2: Choose your frequency range and test set

(Mandatory, choose only one)

<table>
<thead>
<tr>
<th>Description</th>
<th>Ordering number</th>
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<tbody>
<tr>
<td>300 kHz to 6 GHz 2-port standard test set</td>
<td>N52300-020</td>
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<tr>
<td>300 kHz to 6 GHz 2-port configurable test set with extended power range</td>
<td>N52300-025</td>
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<tr>
<td>300 kHz to 13.5 GHz 2-port standard test set</td>
<td>N52300-120</td>
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<td>300 kHz to 13.5 GHz 2-port configurable test set with extended power range</td>
<td>N52300-125</td>
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<td>300 kHz to 13.5 GHz 4-port standard test set</td>
<td>N52300-140</td>
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<tr>
<td>300 kHz to 13.5 GHz 4-port configurable test set with extended power range</td>
<td>N52300-145</td>
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<tr>
<td>300 kHz to 13.5 GHz 4-port configurable test set with extended power range and internal second source (Option 080 recommended)</td>
<td>N52300-146</td>
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<tr>
<td>10 MHz to 20 GHz 2-port standard test set</td>
<td>N52300-220</td>
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<tr>
<td>10 MHz to 20 GHz 2-port configurable test set with extended power range</td>
<td>N52300-225</td>
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<tr>
<td>300 kHz to 20 GHz 4-port standard test set</td>
<td>N52300-240</td>
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<tr>
<td>300 kHz to 20 GHz 4-port configurable test set with extended power range</td>
<td>N52300-245</td>
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<tr>
<td>300 kHz to 20 GHz 4-port configurable test set with extended power range and internal second source (Option 080 recommended)</td>
<td>N52300-246</td>
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<tr>
<td>10 MHz to 40 GHz 2-port standard test set</td>
<td>N52300-420</td>
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<td>10 MHz to 40 GHz 2-port configurable test set with extended power range</td>
<td>N52300-425</td>
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<td>10 MHz to 50 GHz 2-port standard test set</td>
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### Step 3: Choose additional software options (Optional)

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<tr>
<td>Time domain for 13.5, 20, 40 or 50 GHz model</td>
<td>N52300-010</td>
</tr>
<tr>
<td>Frequency-offset measurements</td>
<td>N52300-080</td>
</tr>
<tr>
<td>Scalar-calibrated converter measurements (Option 080 required)</td>
<td>N52300-082</td>
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<tr>
<td>4-port measurement application</td>
<td>N52300-550</td>
</tr>
<tr>
<td>N-port capabilities for 6, 13.5 or 20 GHz model</td>
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<tr>
<td>N-port capabilities for 40 or 50 GHz model</td>
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### Step 4: Choose an electronic or mechanical calibration kit (Optional)

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<td>300 kHz to 9 GHz, 2-port, 3.5 mm</td>
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<td>300 kHz to 18 GHz, 4-port, Type-N</td>
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<tr>
<td>300 kHz to 20 GHz, 4-port, 3.5 mm</td>
<td>N4433A</td>
</tr>
<tr>
<td>300 kHz to 26.5 GHz, 2-port, 3.5 mm</td>
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<tr>
<td>10 MHz to 50 GHz, 2-port, 2.4 mm</td>
<td>N4693A</td>
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*Note: For additional calibration kits refer to page 16*

### Step 5: Accessories (Optional)

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<th>Description</th>
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<tr>
<td>Rack mount kit without handles</td>
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<tr>
<td>Rack mount kit with handles</td>
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<tr>
<td>USB CD R/W drive</td>
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<tr>
<td>USB Hub</td>
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*Note: For additional accessories refer to page 16*

### Step 6: Calibration documentation (Optional)

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<td>Commercial calibration certificate with test data</td>
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<td>ANSI Z540 compliant calibration</td>
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### Step 7: Choose your warranty and service (Optional)

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<tr>
<td>3 year return-to Agilent warranty and service</td>
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</tbody>
</table>

**Documentation**

The PNA Series instruments are equipped with an Online Help system available within the instrument in the following languages: English, Japanese, Chinese, German, Spanish, and French. The PNA Service Guide and Online Help system are available on the Web: [www.na.tm.agilent.com/pna](http://www.na.tm.agilent.com/pna)

**Connector type**

Option 020, 025, 120, 125, 140, 145, 146, 220, 225, 240, 245, 246: 3.5 mm ruggedized male, 50 ohm

Option 420, 425, 520, 525: 2.4 mm ruggedized male, 50 ohm

**Additional product information**

For additional PNA-L (N5230A) product information, refer to the PNA-L brochure available on our Web site: [www.agilent.com/find/pnal](http://www.agilent.com/find/pnal)
PNA-L (N5230A)

This guide is intended to assist you in the ordering process. Additional information and products (such as calibration kits and cables) are described throughout this document.

Test set options

- **Standard test set and power range (Option xx0)**
  The 13.5 and 20 GHz versions are available in 2- or 4-ports.

- **Configurable test set and extended power range (Option xx5)**
  Adds front panel access loops and one or two 60 dB step attenuators as shown in the figures below. This provides the capability to improve instrument sensitivity for measuring low-level signals, to reverse the directional couplers to achieve even more dynamic range or to add components and other peripheral instruments for a variety of measurement applications. The 13.5 and 20 GHz versions are available in 2- or 4-ports.

- **Configurable test set, extended power range and internal second source (Option x46)**
  Available with 4-port models only, this option adds an internal second source, nine front panel access loops and two 60 dB step attenuators as shown in the figure below. This provides an additional signal (fixed or swept) for two-tone third-order-intercept (TOI) and intermodulation testing of amplifiers; or it can be used as a fast swept-LO signal for fixed-IF testing of mixers and converters. In either case, sweep speed is more than twenty times faster than using an external source (Option 080 recommended. Please note, Option 080 is needed in order to have independent control of the two internal sources.).

2-port standard test set

![2-port standard test set diagram](image)

2-port configurable test set and extended power range

![2-port configurable test set and extended power range diagram](image)

4-port standard test set

![4-port standard test set diagram](image)

4-port configurable test set and extended power range

![4-port configurable test set and extended power range diagram](image)

4-port configurable test set, extended power range and internal second source

![4-port configurable test set, extended power range and internal second source diagram](image)
**PNA-L (N5230A)**

**Additional options**

- **Time domain (Option 010)**
  This option enables the PNA Series to view reflection and transmission responses in both time or distance domain. Use time domain to tune filters, gate out the response of fixtures and cables, characterize the impedance of transmission line, and more.

- **Frequency offset (Option 080)**
  This option enables the PNA Series to set the source frequency independently from where the receivers are tuned. This ability is important for two general classes of devices: mixers (and converters) and amplifiers.

- **Scalar-calibrated converter measurements (Option 082)**
  With a simple setup and calibration, this application provides the highest accuracy for conversion-loss (or gain) measurements by combining one-port and power-meter calibrations to remove mismatch errors. Option 080 required.

- **4-port measurement application (Option 550)**
  Enables full 4-port error correction and differential measurements on a 2-port network analyzer with configurable test set (Option x25). External test set required. User installable.

- **N-port capabilities (Option 551)**
  Adds full N-port error correction and measurement capabilities to any PNA-L network analyzer with configurable test set (Option xx5 or x46). External test set required. User installable.

**Certification options**

- **Commercial calibration certification with test data (Option UK6)**
  Complete set of measurements which tests unit to manufacturer’s published specifications. Includes calibration label, calibration certificate, and data report. Conforms to ISO 9001.

- **ISO 17025 compliant calibration (Option 1A7)**
  Complete set of measurements which tests unit to manufacturer’s published specifications. Includes calibration label, ISO 17025 calibration certificate, and data report, measurement uncertainties and guardbands on all customer specifications. Conforms to ISO 17025 and ISO 9001.

- **ANSI Z540 compliant calibration (Option A6J)**
  Complete set of measurements which tests unit to manufacturer’s published specifications. Includes pre- and post-adjustment data with measurement uncertainty information compliant to the ANSI/NCSL Z540 standard.
## PNA-X Network Analyzers N5242A, 10 MHz to 26.5 GHz, 2 or 4 Ports

### Options
To add options to a product, order the corresponding item number.

<table>
<thead>
<tr>
<th>Description</th>
<th>For N5242A</th>
<th>Additional information</th>
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<tbody>
<tr>
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<tr>
<td>Option 200</td>
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<td>Option 224</td>
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<td>Option 400</td>
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<td>N5242A-400</td>
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<tr>
<td>Option 423</td>
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<td><strong>Power configuration</strong></td>
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<td>Option 219</td>
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<td>Option 419</td>
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<td>Option H08</td>
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<td>N5242A-025</td>
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<tr>
<td>Option A6J</td>
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</tr>
</tbody>
</table>

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1. In addition to the list of required PNA-X options, Option 029 requires an N4691B ECal module for use as an impedance tuner, and an Agilent 346 series noise source for calibration.
2. Option 082 is a subset of Option 083, and therefore, they can not be ordered together.
3. When configured as a multiport analyzer with Option 551, the combiner feature of Option 224 or 423 is not available. When configured as a standalone analyzer, the combiner feature is available.
4. Additional hardware required. Please refer to chapter 2 of the Service Guide for required service test equipment.
The PNA-X is an integrated vector network analyzer featuring a built-in S-parameter test set, one or two synthesized sources used for device stimulus, a hard disk drive, USB interfaces, and a 10.4” LCD touch screen display. The N5242A analyzer has 50 ohm, ruggedized 3.5 mm (m) test ports. Included with each instrument is a mouse, keyboard (U.S. style), and a 1-year return-to-Agilent service warranty.

- **N5242A** network analyzer, 10 MHz to 26.5 GHz, 2 or 4 ports

**Test set options**

- **2-port standard test set and power range (Option 200)**
  The standard 2-port test set comes with six front-panel access loops. The loops provide access to the signal path between (a) the source output and the reference receiver, (b) the source output and directional coupler thru arm and (c) the coupled arm of the directional coupler and the port receiver. The standard test set also includes a solid-state internal RF transfer switch in the R1 reference-receiver path.

- **4-port standard test set, power range and an internal second source (Option 400)**
  The standard 4-port test set comes with 12 front-panel access loops and a built-in second source. The loops provide access to the signal path between (a) the source output and the reference receiver, (b) the source output and directional coupler thru arm and (c) the coupled arm of the directional coupler and the port receiver. The internal second source provides an additional signal (fixed or swept) for two-tone third-order-intercept (TOI) and intermodulation testing of amplifiers, or it can be used as a fast swept-LO signal for fixed-IF testing of mixers and converters. With two sources, source 1 is accessible through test ports 1 and 2, and source 2 is accessible through test ports 3 and 4. The standard test set also includes a solid-state internal RF transfer switch in the R1 reference-receiver path. Recommends Option 080.

- **Extended power range and bias-tees (Option 219, 419)**
  Adds to the standard test set one 65 dB source attenuator (settable in 5 dB increments), one 35 dB receiver attenuator (settable in 5 dB increments), and one bias-tee to each test port. Option 219 requires Option 200, and Option 419 requires Option 400.

- **Add an internal second source, a combiner and mechanical switches to 2-port analyzer (Option 224)**
  Available with 2-port model only, this option adds an internal second source, a combiner and mechanical switches. The internal second source provides an additional signal (fixed or swept) for two-tone third-order-intercept (TOI) and intermodulation testing of amplifiers, or it can be used as a fast swept-LO signal for fixed-IF testing of mixers and converters. The mechanical switches provide increased flexibility by having rear panel access to signal paths for advanced applications. Access to the second source is available through two output (SMA) connectors on the front panel. Requires Options 200, 219 and 080.

- **Add an internal combiner and mechanical switches to 4-port analyzer (Option 423)**
  Available with 4-port model only, this option adds a combiner and mechanical switches. The mechanical switches provide increased flexibility by having rear panel access to signal paths for advanced applications. Requires Options 400, 419 and 080.
PNA-X Network Analyzer

2-port standard test set and power range (Option 200)

2-port extended power range and bias-tees (Option 219, requires Option 200)
Add an internal second source, a combiner, and mechanical switches to 2-port analyzer
(Option 224 requires Options 200, 219 and 080)

4-port standard test set, power range, and an internal second source (Option 400, recommends Option 080)
4-port extended power range and bias-tees (Option 419, requires Option 400)

Add an internal combiner and mechanical switches to 4-port analyzer
(Option 423 requires Options 400, 419 and 080)
2-port PNA-X with noise figure hardware (shown with Options 200, 219, 224, and 029).
On 4-port analyzers (Option 419 or 423) with Option 029, ports 1 and 2 are the same as shown here.
Additional options

- **Pulse measurements (Option H08)**
  This option provides software to set up and control pulsed-RF measurements with point-in-pulse and pulse-profile capability. The software sets the coefficient of the PNA-X's digital-IF filters to null out unwanted spectral components, enables the receiver IF gates on the rear panel, controls internal pulse generators (Option 025), internal pulse modulators (Option 021 and/or 022) or external pulse modulators, and optimization for measurement sensitivity. The measurement software can run on the PNA-X or an external computer. A "dll" file containing the IF-filter algorithms is included for automated pulsed-RF testing. The N1966A pulse I/O adapter is recommended if using external pulse generators and/or external pulse modulators.

- **Time domain (Option 010)**
  This option enables the PNA-X to view reflection and transmission responses in time or distance. Use time domain to tune filters, gate out the response of fixtures and cables, characterize the impedance of transmission lines and more.

- **Add IF inputs for antenna and millimeter-wave (Option 020)**
  This option enables external IF inputs on the rear panel of the PNA-X for applications such as antenna and millimeter-wave test.

- **Add pulse modulator to internal first source (Option 021)**
  This option enables the internal pulse modulator on source 1. Control of the modulator can also be done via pin 8 of the Pulse I/O D-sub connector on the rear panel of the PNA-X using an external pulse generator, or by using one of the internal pulse generators (Option 025). The N1966A pulse I/O adapter is recommended if using an external pulse generator. (See diagram below for details of the D-sub connector.)

- **Add pulse modulator to internal second source (Option 022)**
  This option enables the internal pulse modulator on source 2. Control of the modulator can also be done via pin 8 of the Pulse I/O D-sub connector on the rear panel of the PNA-X using an external pulse generator, or by using one of the internal pulse generators (Option 025). The N1966A pulse I/O adapter is recommended if using an external pulse generator. Option 224 or 400 required. (See diagram below for details of the D-sub connector.)

- **Add four internal pulse generators (Option 025)**
  This option enables four internal pulse generators. These pulse generators can be used to control the internal pulse modulators and internal receiver IF gates, and are also available on pins 10 through 13 of the Pulse I/O D-sub connector on the rear panel of the PNA-X to control external modulators and/or gates. The N1966A pulse I/O adapter is recommended if using external pulse modulators. (See diagram below for details of the D-sub connector.)

- **Fully-corrected noise figure measurements (Option 029)**
  This option adds hardware and firmware for high-accuracy noise figure measurements, utilizing Agilent's unique source-correction technique. Using the PNA-X and an Agilent ECal module configured as an impedance tuner, the effects of imperfect system source match are removed, greatly improving the accuracy of the cold-source technique. This approach surpasses the accuracy provided by the Y-factor method. This option requires an N4691B ECal module (m-f recommended) and a 346-series noise source (both must be ordered or supplied separately). During calibration of the analyzer, an additional ECal or mechanical calibration kit is required (also must be ordered or supplied separately). The noise source is only used during calibration of the analyzer. To use the ECal module as a tuner, Option 029 includes a cable (N5242-20137) and 3.5 mm m-f adapter (85052-60013) for use with m-f modules (N4691B-M0F). For use with f-f ECal modules (N4691B-00F), order a 3.5 mm m-m adapter (85052-60014).

- **Frequency offset (Option 080)**
  This option enables the PNA-X to set the source frequency independently from where the receivers are tuned. This ability is important for measuring amplifiers, mixers, and frequency converters.

- **Scalar-calibrated converter measurements (Option 082)**
  With a simple setup and calibration, this application delivers the highest accuracy for conversion-loss (or gain) magnitude measurements by combining one-port and power-meter calibrations to remove mismatch errors. This application provides an intuitive and easy-to-use user interface for setting up mixer and converter measurements, with single or dual conversion stages (up to two local oscillators, LO), along with control of up to two external signal generators for use as LO. External synthesizers supported include the Agilent ESG series and the PSG series of signal source families as well as other SCPI controlled signal generators. Option 082 requires Option 080, and cannot be ordered with Option 083.
PNA-X Network Analyzer

- **Vector- and scalar-calibrated converter measurements (Option 083)**
  This converter measurement is a superset and includes not only the scalar-calibrated converter measurement, but also the vector-mixer calibration (VMC). The advanced and unique VMC delivers exceptional conversion loss amplitude and phase accuracy for mixer and converter measurements. This application provides an intuitive and easy-to-use user interface for setting up mixer and converter measurements, with single or dual conversion stages (up to two LO’s), along with control of up to two external signal generators for use as LO. External synthesizers supported include the Agilent ESG series and the PSG series of signal source families as well as other SCPI controlled signal generators. Option 083 requires Option 080, and cannot be ordered with Option 082.

- **Embedded LO measurements (Option 084)**
  Advanced software tuning that provides absolute group delay of converters with embedded LOs without the need for access to a common reference signal. The measurement result is the same as locking the DUT LO to the reference mixer LO. (Option 080 and 083 required) Requires firmware A.07.50 and above.

- **Gain compression application (Option 086)**
  The Gain Compression Application (GCA) provides input power, output power, gain, and phase at an amplifier’s compression point, over a specified frequency and power range. GCA’s SMART Sweep is very fast and easy-to-use. GCA also includes a guided calibration that corrects for absolute power levels, frequency response, and mismatch errors. Requires firmware A.08.00 and above.

- **N-port capabilities (Option 551)**
  Adds full N-port error correction and measurement capabilities to the PNA-X network analyzer. External test set is required.

- **High-power test set (Option H85)**
  With the standard test set configurations that include source attenuators, the internal bias tees limit the maximum test port power to +30 dBm. Option H85 removes the bias tees between the source attenuators and the test port couplers. This extends the maximum port power that the analyzer can safely handle to +43 dBm. Option H85 requires Option 080, plus Option 224 or 423.

- **Rack mount kit without handles (Option 1CM)**
  Adds a rack mount (5063-9217) and rail kit (E3663AC) for use without handles.

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1. When configured as a multiport analyzer with Option 551, the combiner feature of Option 224 or 423 is not available. When configured as a standalone analyzer, the combiner feature is available.

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**Pulse I/O adapter (N1966A)**

An adapter for connecting between the Pulse I/O connector on the rear panel of the PNA-X and the coaxial inputs and outputs of external pulse generators and external pulse modulators. Coaxial connectors are SMB-male. (See diagram below for details of the Pulse I/O adapter.

The PULSE IN connectors are for controlling the PNA-X’s internal IF gates, which are enabled with Option H08 and used with narrowband detection. The PULSE OUT connectors are from the PNA-X’s four internal pulse generators, which are enabled with Option 025. The PULSE SYNC IN connector is used to synchronize the internal pulse generators with an external timing pulse. The RF PULSE MOD IN connector controls the internal pulse modulator(s) which are enabled with Options 021 and 022.
PNA-X Network Analyzer

**Certification options**

- Commercial calibration certificate with test data (Option UK6)
  Complete set of measurements which tests unit to manufacturer’s published specifications. Includes calibration label, calibration certificate, and data report. Conforms to ISO 9001.

- ISO 17025 compliant calibration (Option 1A7)
  Complete set of measurements which tests unit to manufacturer’s published specifications. Includes calibration label, ISO 17025 calibration certificate, and data report, measurement uncertainties and guardbands on all customer specifications. Conforms to ISO 17025 and ISO 9001.

- ANSI Z540 compliant calibration (Option A6J)
  Complete set of measurements which tests unit to manufacturer’s published specifications. Includes pre- and post-adjustment data with measurement uncertainty information compliant to the ANSI/NCSL Z540 standard.

**Warranty and service**

1 and 3 year warranty and service plans are available at time of instrument purchase. Standard warranty is 1 year.
PNA Network Analyzers\(^1\) E8361A/62B/63B/64B, N5250A

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To add options to a product, order the corresponding item number.

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**Note:** Item numbers may not correspond to product model number. For example, to order the time-domain option on the E8362B, the correct item number to order is E8362A-010.

**Warranty and service**

One, and three year warranty service plans are available at time of instrument purchase. The N5250A 110 GHz system carries a full one-year on-site warranty (where available).

**Calibration**

Three year calibration plans are available at time of instrument purchase.

1. All models are not available in all countries.
2. For more detailed information about the 110 GHz network analyzer system, refer to the Agilent Web site: www.agilent.com/find/pna and download the N5250A Technical Overview, literature number 5988-9620EN.
3. The N5250A 110 GHz system also includes an N5260A millimeter-wave test set controller, 1.0 mm combiner assembly, interconnecting cables, and installation and productivity assistance. See page 14 for more details.
4. UNL* does not include bias-tees. Only includes source attenuators.
5. Up to 67 GHz.
6. Requires firmware A.07.05 and above plus 1.1 GHz CPU board.

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1. All models are not available in all countries.
2. For more detailed information about the 110 GHz network analyzer system, refer to the Agilent Web site: www.agilent.com/find/pna and download the N5250A Technical Overview, literature number 5988-9620EN.
3. The N5250A 110 GHz system also includes an N5260A millimeter-wave test set controller, 1.0 mm combiner assembly, interconnecting cables, and installation and productivity assistance. See page 14 for more details.
4. UNL* does not include bias-tees. Only includes source attenuators.
5. Up to 67 GHz.
6. Requires firmware A.07.05 and above plus 1.1 GHz CPU board.
Agilent PNA Network Analyzers

The microwave PNA Series instruments are integrated vector network analyzers equipped with a built-in S-parameter test set, synthesized source, hard and floppy disk drives, and LCD display. The E8362B analyzer has two 50 ohm, 3.5 mm (m) test ports. The E8363B and E8364B analyzers have two 50 ohm, 2.4 mm (m) test ports. The E8361A analyzer has two 50 ohm, 1.85 mm (m) test ports. Included with each instrument is a mouse, keyboard (U.S.), and a 1-year return-to-Agilent service warranty.

- E8362B network analyzer, 10 MHz to 20 GHz
- E8363B network analyzer, 10 MHz to 40 GHz
- E8364B network analyzer, 10 MHz to 50 GHz
- E8361A network analyzer, 10 MHz to 67 GHz
- N5250A network analyzer system, 10 MHz to 110 GHz

Options

- **Time-domain capability (Option 010)**
  For viewing reflection and transmission responses in time or distance domain.

- **Configurable test set (Option 014)**
  Provides six front panel access loops. Three access loops are for port one and three for port two. The loops provide access to the signal path between (a) the source output and the reference receiver, (b) the source output and directional coupler thru arm and (c) the coupled arm of the directional coupler and the port receiver. This option provides the capability to improve instrument sensitivity for measuring low-level signals, to reverse the directional coupler to achieve even more dynamic range or to add components and other peripheral instruments for a variety of measurement applications. (see PNA Series Microwave Data Sheet literature number 5988-7988EN for a basic block diagram)

- **4-port measurement application (Option 550)**
  Enables full 4-port error correction and differential measurements on a 2-port network analyzer with configurable test set. Option 014 required. External test set required.

- **N-port capabilities (Option 551)**
  Adds full N-port error correction and measurement capabilities to any PNA network analyzer with configurable test set. Option 014 required. External test set required.

- **Extended power range and bias-tees (Option UNL)**
  Adds two 60 dB step attenuators and two bias-tees to the E8362/3/4B. Adds two 50 dB step attenuators and two bias-tees to the E8361A. A step attenuator and bias-tee set is inserted between the source and test port one and another set between the source and test port two. (see PNA Series Microwave Data Sheet literature number 5988-7988EN for a basic block diagram)

- **Frequency offset (Option 080)**
  This option enables the PNA Series microwave network analyzers to set the source frequency independently from where the receivers are tuned. This ability is important for two general classes of devices: mixers (and converters) and amplifiers. Option 080 provides a very basic user interface.

- **Reference receiver switch (Option 081)**
  Option 081 adds a solid-state internal RF transfer switch in the R1 reference-receiver path (see PNA Series Microwave Data Sheet literature number 5988-7988EN for a block diagram). The switch allows the instrument to easily switch between standard S-parameter (non-frequency-offset) measurements and frequency offset measurements such as relative phase or absolute group delay that require an external reference mixer. The user can set the switch manually or remotely, but it is best used with the frequency-converter application (Option 083), where it is controlled automatically during the vector-mixer calibration procedure and subsequent measurements.

- **Scalar-calibrated converter measurements (Option 082)**
  With a simple setup and calibration, this application provides the highest accuracy for conversion-loss (or gain) measurements by combining one-port and power-meter calibrations to remove mismatch errors. Option 080 required.

- **Vector- and scalar-calibrated converter measurements (Option 083)**
  This converter measurement adds an intuitive and easy-to-use user interface, advanced calibration choices that provide exceptional amplitude and phase accuracy, and control of external signal sources for use as local oscillators. Mixer calibration techniques include scalar-mixer calibration and vector-mixer calibration (requires Option 081). Finally, the frequency-converter application supports all of Agilent’s major signal source families.

- **Embedded LO Measurements (Option 084)**
  Advanced software tuning that provides absolute group delay of converters with embedded LOs without the need for access to a common reference signal. The measurement result is the same as locking the DUT LO to the reference mixer LO. (Options 080 and 083 required) Requires firmware A.07.05 and above plus 1.1 GHz CPU board.

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1. The E8361A can be extended to 110 GHz with IF access (Option H11).
2. Up to 67 GHz.
Add receiver attenuators (Option 016)
An attenuator is added between each test port and its corresponding receiver. Two 35 dB step attenuators are added to the E8362/3/4B. Two 50 dB step attenuators are added to the E8361A (see PNA Series Microwave Data Sheet literature number 5988-7988EN for a basic block diagram).

Pulsed-RF measurement capability (Option H08)²
Provides software to set up and control pulsed-RF measurements with point-in-pulse capability. The software sets the coefficient of the PNA's digital-IF filter to null out unwanted spectral components, enables the IF gates provided with IF access (Option H11), and controls selected Agilent pulse generators. It can be run on the PNA or an external computer. A "*.dll" file containing the IF-filter algorithms is included for automated pulsed-RF testing. The pulsed application is configured to work with the Agilent 81110A series pulse generator.

For more detailed information regarding pulsed measurement capabilities with the microwave PNA refer to the Agilent Web site [www.agilent.com/find/pna](http://www.agilent.com/find/pna) and download the PNA Series MW Network Analyzers Configuration Guide for Pulsed Measurements, literature number 5988-9833EN.

IF access (Option H11)
Provides hardware to enable antenna, point-in-pulse, and broadband millimeter-wave measurements to 110 GHz. For each of the MW PNA's measurement receivers, IF gates (enabled with pulsed measurement capability, Option H08) and external IF inputs are added. In addition, access to the PNA's internal RF and LO source is provided for remote mixing applications. For basic antenna measurements, only Option H11 is necessary. Pulsed antenna applications also require the pulsed measurement capability (Option H08). Broadband measurements to 110 GHz, also requires an N5260A millimeter-wave test set controller.

Note: Use external IF access for up to 20 dB more sensitivity when making antenna measurements with a remote mixing configuration. Add Option H08 (Pulsed-RF Measurement Capability) to enable advanced pulsed measurements. Or upgrade to a broadband (10 MHz to 110 GHz) VNA system simply by purchasing an N5260A controller test set with test heads (Option 110, 120, or 130).

High-power test set (Option H85)
This configuration combines options that are often necessary for high power measurements (UNL*¹, 014, 016, 080, 081). The only difference between ordering Option H85 versus a combination of the options listed above is the source attenuator option UNL. Standard UNL includes two source attenuators and two bias-tees. Option H85 includes the two source attenuators, but not the bias-tees, as the bias-tees are the power-limiting factor in the network analyzer test set. The maximum power at the test port is +43 dBm (<20 GHz), and +40 dBm (>20 GHz).

Option 080, frequency-offset mode, is included in Option H85 because it manages the phase-locking internally (instead of depending on the R1 receiver). So if you need to use external components in the path of the R1 receiver, it makes the measurements simpler and more robust.

Rack mount kit without handles (Option 1CM)
Adds a rack mount (5063-9217) and rail kit (E3663AC) for use without handles.

Rack mount kit with handles (Option 1CP)
Adds a rack mount (5063-9237)³ and rail kit (E3663AC) for use with standard supplied handles.

Documentation
PNA Online Help system is available within PNA instruments in the following languages: English, German, Spanish, French, Japanese, and Chinese.

The PNA Service Guide and Online Help are available on the Web: [http://na.tm.agilent.com/pna](http://na.tm.agilent.com/pna)

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1. UNL* does not include bias-tees. Only includes source attenuators.
2. Up to 67 GHz.
3. The 5063-9237 kit assumes you have the standard handles shipped with the instrument. If you do not have handles, order a 5063-9224 kit.
Certification options

☐ Commercial calibration certificate with test data (Option UK6)
Complete set of measurements which tests unit to manufacturer’s published specifications. Includes calibration label, calibration certificate, and data report. Conforms to ISO 9001.

☐ ISO 17025 compliant calibration (Option 1A7)
Complete set of measurements which tests unit to manufacturer’s published specifications. Includes calibration label, ISO 17025 calibration certificate, and data report, measurement uncertainties and guardbands on all customer specifications. Conforms to ISO 17025 and ISO 9001.

☐ ANSI Z540 compliant calibration (Option A6J)
Complete set of measurements which tests unit to manufacturer’s published specifications. Includes pre- and post-adjustment data with measurement uncertainty information compliant to the ANSI/NCSL Z540 standard.

Warranty and service
1 and 3 year warranty and service plans are available at time of instrument purchase. Standard warranty is 1 year.

Calibration
3 year calibration plans are available at time of instrument purchase. Contact your local Agilent sales office for details.

Product services
Agilent product services provide tailored assistance related to a specific need or application. Product services enable you to quickly learn how Agilent instruments operate, their capabilities, and how to apply that knowledge to achieve your specific measurement goals. PNA series services available include:
• Remote scheduled productivity assistance
• 1 Day of start-up assistance
• Daily productivity assistance
• PNA operator training for 8 students at your business site
• PNA operator web classes for 1 student
• Custom services to be qualified by an Agilent technical consultant

E8361A/62B/63B/64B
Configuration Details
Selecting the correct mixer-test configuration:
Most mixer or converter test applications require Options 014, 080, and 082 for conversion loss/gain, or Options 014, 080, 081 and 083 for conversion loss/gain and phase/delay measurements. If you want to create and automate your own custom frequency-offset measurements (for example, intermodulation distortion), you may only need Options 014 and 080. For converters that require input power below -27 dBm, or for devices that have a large amount of LO feedthrough (like an unfiltered mixer), Option UNL, which adds source attenuators, is highly recommended. Besides allowing lower input power levels, these attenuators improve the isolation between the PNA’s internal source and LO leakage signals, helping to prevent source-unleveled errors. For devices that put out signals near or above the receiver’s compression levels (which varies between –3 and +5 dBm, depending on the model and frequency), Option 016 is recommended, which adds receiver attenuators. Finally, Option 010, which adds time-domain analysis, is very useful for gating out unwanted, time-delayed responses which often occur when measuring mixers.
Microwave PNA Network Analyzer

Simplified test set block diagrams

Standard power range

Extended power range and bias-tees (Option UNL)

1. Source attenuator for E8362/3/4B is 60 dB in 10 dB steps.
   Source attenuator for E8361A is 50 dB in 10 dB steps.
Microwave PNA Network Analyzer

Simplified test set block diagrams – continued

Configurable test set (Option 014)

Configurable test set with extended power range and bias-tees (Option UNL and 014)

1. Source attenuator for E8362/3/4B is 60 dB in 10 dB steps.
Source attenuator for E8361A is 50 dB in 10 dB steps.
Microwave PNA Network Analyzer

Simplified test set block diagrams – continued

Fully optioned, active device or mixer/converter test configuration (Options 014, UNL, 016, 080, 081)

1. Source attenuator for E8362/3/4B is 60 dB in 10 dB steps. Source attenuator for E8361A is 50 dB in 10 dB steps.
2. Receiver attenuator for E8362/3/4B is 35 dB in 5 dB steps. Receiver attenuator for E8361A is 50 dB in 10 dB steps.
Microwave PNA Network Analyzer

Simplified test set block diagrams – continued

High-power configuration (Option H85)

Power levels shown on the diagram are damage levels. At a minimum, keep power levels 6 dB below damage level. For optimal performance, keep the power level incident upon the receivers -20 dBm or less. This will keep the receivers out of compression.

1. Source attenuator for E8362/3/4B is 60 dB in 10 dB steps. Source attenuator for E8361A is 50 dB in 10 dB steps.
2. Receiver attenuator for E8362/3/4B is 35 dB in 5 dB steps. Receiver attenuator for E8361A is 50 dB in 10 dB steps.
Microwave PNA Network Analyzer

Simplified test set block diagrams – continued

Fully optioned, pulse-RF, antenna, or mm-wave configuration
(Options 014, UNL, 016, 080, 081, H11)

1. Option H11: IF-gate controls and external-IF inputs are accessed on rear panel. IF gates are enabled with Option H08. External-IF input frequency is 8.33 MHz.
N5250A Configuration Details

**N5250A MM PNA system**, 10 MHz to 110 GHz, includes:

- **E8361A MW PNA** with the following options:
  - Configurable test set – Option 014
  - Extended power range and bias-tees – Option UNL
  - Frequency-offset mode – Option 080
  - Reference channel switch – Option 081
  - IF access – Option H11

**N5260A millimeter-wave test set controller with test heads**

- 67 to 110 GHz test heads
- 1.0 mm combiner assembly
- Interconnecting cables
- Installation and productivity assistance

Additional options available:

- Millimeter-wave modules with bias-tees - N5250A Option 017
- Millimeter-wave modules with bias-tees and port 2 attenuator - N5250A Option 018
- Receiver attenuator – Option 016
- Time-domain capability – Option 010
- Pulsed-RF measurement capability – Option H082
- Scalar-calibrated converter measurements – Option 082
- Frequency converter application – Option 083

Factory integration of the N5250A system integrates the E8361A with Option H11 and the N5260A millimeter-wave controller with test heads. On-site installation is included, and the entire system carries a full one-year, on-site warranty (where available).

**Option Descriptions**

- **Millimeter-wave modules with bias-tees (N5250A Option 017)**
  Adds 67 GHz bias-tees to the combiner assembly between the input to the combiner and the 67 GHz coupler. The bias-tees have tri-axial connectors for force, sense, and ground. Positioning the bias-tees close to the DUT greatly improves stability for on-wafer and in-fixture devices. The bias-tees added for this option have a voltage rating of 40 volts and a maximum of 0.5 amps.

- **Millimeter-wave modules with bias-tees and port 2 attenuator (N5250A Option 018)**
  Adds 67 GHz bias-tees to the combiner assembly between the input to the combiner and the 67 GHz coupler. The bias-tees have tri-axial connectors for force, sense, and ground. Positioning the bias-tees close to the DUT greatly improves stability for on-wafer and in-fixture devices. The bias-tees added for this option have a voltage rating of 40 volts and a maximum of 0.5 amps. Additionally, Option 018 adds a 25 dB micrometer attenuator to the port 2 test head.

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1. For more detailed information regarding the 110 GHz network analyzer system, refer to the Agilent Web site: [www.agilent.com/find/pna](http://www.agilent.com/find/pna) and download the N5250A Technical Overview, literature number 5988-9620EN.

2. Up to 67 GHz.

3. Cascade Microtech is an Agilent Channel Partner.

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**Banded waveguide solution**

In order to assemble a banded waveguide solution, the following components are needed:

- Microwave PNA network analyzer (E8361A or E8362/3/4B) with the following options:
  - IF access - Option H11
  - Configurable test set - Option 014
  - Extended power range and bias-tees - Option UNL
  - Frequency-offset mode - Option 080
  - Reference channel switch - Option 081
  - Millimeter-wave test set controller (N5260A) with no options

- A set of waveguide modules:
  - N5260AW15, 50 to 75 GHz
  - N5260AW12, 60 to 90 GHz
  - N5260AW10, 75 to 110 GHz
  - N5260AW08, 90 to 140 GHz
  - N5260AW06, 110 to 170 GHz
  - N5260AW05, 140 to 220 GHz
  - N5260AW03, 220 to 325 GHz

**NOTE:** To significantly improve system dynamic range above 220 GHz, Agilent strongly recommends adding two external synthesizers such as Agilent’s PSG Series signal generators; one for the RF signal, and one for the LO signal.

For more detailed information, see [PNA Millimeter-wave Technical Overview](http://www.agilent.com/find/pna), literature number 5988-9620EN.

**On-wafer applications**

For on-wafer applications, Cascade Microtech provides complete probing systems using the N5250A. These include both new probing systems and upgrades to existing Cascade Microtech products. Cascade can also provide on-wafer verification and probing system training. Once the N5250A system is verified in coax, Cascade Microtech will verify the system through its wafer probes.
With Option 017, the signal is routed out of the PNA from the front panel jumpers rather than the ports. Without Option 017, the signal is routed from the front panel ports to the combiner assembly, allowing access to the PNA’s internal bias-tees.
Measurement Accessories

A complete list of RF and microwave test accessories is available on our Web site:
www.agilent.com/find/accessories

Accessories are available in these connector types:
50 ohm Type-N, 3.5 mm, 7 mm, 2.4 mm, 2.92 mm, 1.85 mm, 1.0 mm, and waveguide. Test port cables and a calibration kit should be added for a complete measurement system. A verification kit is used to verify corrected system performance.

Cables and adapter sets
Agilent offers cables in the following types:
• single cables in semi-rigid and flexible
• cable sets in semi-rigid and flexible

There are also adapter sets available that protect the test port and convert the port to the desired connector interface. These kits contain:
• one male adapter
• one female adapter

To attain the best mechanical rigidity for device connection, use a single cable and the appropriate special adapter set. To attain the greatest flexibility for device connection, use a cable set.

Calibration kits

Coaxial measurements
Mechanical calibration kits include standards, such as opens, shorts and loads, which are measured by the network analyzer for increased measurement accuracy.

Electronic calibration (ECal) kits replace mechanical calibration standards with one solid-state calibration module that is controlled by the network analyzer via USB, to present many different impedances to the test ports. A full two-port calibration can be performed quickly with a single connection. This technique reduces operator errors and connector wear and abrasion.

Choose a calibration kit for each connector type to be used.

Economy, includes:
• open standards (male and female)
• short standards (male and female)
• fixed-termination standards (male and female)

Standard, includes the devices in the economy kit and adds:
• sliding load standards (male and female) or a series of offset shorts

Precision, includes the devices in the economy kit and adds:
• 50 ohm airline(s) for TRL calibration
• TRL adapters

Waveguide measurements
For waveguide measurements, Agilent offers mechanical calibration kits that include:
• waveguide-to-coax adapters (X, P, K, Q, R, U, V)
• precision waveguide section
• flush short circuit
• fixed terminations
• straight section
### For devices with 1.0 mm connectors

**Mechanical calibration/verification kit**

- 85059A DC to 110 GHz precision calibration/verification kit.
- Includes:
  - 85059-60003 1.00 mm (m) short 2.450 mm
  - 85059-60007 1.00 mm (f) short 2.450 mm
  - 85059-60004 1.00 mm (m) short 3.000 mm
  - 85059-60008 1.00 mm (f) short 3.000 mm
  - 85059-60002 1.00 mm (m) short 1.825 mm
  - 85059-60006 1.00 mm (f) short 1.825 mm
  - 85059-60001 1.00 mm (m) short 1.300 mm
  - 85059-60005 1.00 mm (f) short 1.300 mm
  - 85059-60009 1.00 mm male open
  - 85059-60007 1.00 mm female open
  - 85059-60004 1.00 mm male load
  - 85059-60008 1.00 mm female load
  - 85059-60019 1.00 mm lossy delay line
  - 11920-60001 1.00 mm (m) to 1.00 mm (m) adapter
  - 11920-60002 1.00 mm (f) to 1.00 mm (f) adapter
  - 11920-60003 1.00 mm (m) to 1.00 mm (f) adapter
  - 11500-60001 1.00 mm (f) to 1.00 mm (f) 8.8 cm cable
  - 85059-60016 1.00 mm mismatch thru adapter for verification
  - 85059-60017 1.00 mm matched thru adapter for verification
  - 8710-2079 6 mm, 4 in-lb torque wrench
  - 8710-2156 6 mm open end wrench

### Cables

- 11500I 1.0 mm (f-f) test port cable (8.8 cm)
- 11500J 1.0 mm (m-f) test port cable (16.0 cm)
- 11500K 1.0 mm (m-f) test port cable (20.0 cm)
- 11500L 1.0 mm (m-f) test port cable (24.0 cm)

### Adapter set

- V281C 1.0 mm(f) to V-band waveguide adapter
- V281D 1.0 mm (m) to V-band waveguide adapter
- W281C 1.0 mm (f) to W-band waveguide adapter
- W281D 1.0 mm (m) to W-band waveguide adapter
- 11920A 1.0 mm (m) to 1.00 mm (m) adapter
- 11920B 1.0 mm (f) to 1.00 mm (f) adapter
- 11920C 1.0 mm (m) to 1.00 mm (f) adapter
- 11921A 1.0 mm (m) to 1.85 mm (m) adapter
- 11921B 1.0 mm (f) to 1.85 mm (f) adapter
- 11921C 1.0 mm (m) to 1.85 mm (f) adapter
- 11921D 1.0 mm (f) to 1.85 mm (m) adapter
- 11922A 1.0 mm (m) to 2.4 mm (m) adapter
- 11922B 1.0 mm (f) to 2.4 mm (f) adapter
- 11922C 1.0 mm (m) to 2.4 mm (f) adapter
- 11922D 1.0 mm (f) to 2.4 mm (m) adapter
- 11923A 1.0 mm (f) connector launch assembly

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1. For on-wafer applications, two 11500J/K/L cables are required; one cable for each test port.
2. Special rugged female connector specifically for connecting to the network analyzer test port, but does not mate with a standard male connector.

### For devices with 1.85 mm connectors

**Mechanical calibration kits**

- 85058B standard: DC to 67 GHz.
  - Includes:
    - 85058-60101 1.85 mm (m) short 5.4 mm
    - 85058-60102 1.85 mm (m) short 6.3 mm
    - 85058-60103 1.85 mm (m) short 7.12 mm
    - 85058-60104 1.85 mm (m) short 7.6 mm
    - 85058-60105 1.85 mm (f) short 5.4 mm
    - 85058-60106 1.85 mm (f) short 6.3 mm
    - 85058-60107 1.85 mm (f) short 7.12 mm
    - 85058-60108 1.85 mm (f) short 7.6 mm
    - 85058-60109 1.85 mm male open
    - 85058-60110 1.85 mm female open
    - 85058-60111 1.85 mm male load
    - 85058-60112 1.85 mm female load
    - 85058-60113 1.85 mm (m) to 1.85 mm (m) adapter
    - 85058-60114 1.85 mm (m) to 1.85 mm (f) adapter
    - 85058-60115 1.85 mm (m) to 1.85 mm (f) adapter

- 85058E economy: DC to 67 GHz.
  - Includes:
    - 85058-60101 1.85 mm (m) short 5.4 mm
    - 85058-60105 1.85 mm (f) short 5.4 mm
    - 85058-60109 1.85 mm male open
    - 85058-60110 1.85 mm female open
    - 85058-60123 1.85 mm male load
    - 85058-60124 1.85 mm female load
    - 85058-60113 1.85 mm (m) to 1.85 mm (m) adapter
    - 85058-60114 1.85 mm (m) to 1.85 mm (f) adapter
    - 85058-60115 1.85 mm (m) to 1.85 mm (f) adapter

**Electronic calibration kits**

- N4694A Microwave ECal: 10 MHz to 67 GHz, 2 ports.
  - Includes:
    - Option M0F module with:
      - N4694-60001 1.85 mm (f) to 1.85 mm (m) ECal module
    - Option 00M module with:
      - N4694-60002 1.85 mm (m) to 1.85 mm (m) ECal module
    - Option 00F module with:
      - N4694-60003 1.85 mm (f) to 1.85 mm (f) ECal module
    - Option 00A adds:
      - 85058-60113 1.85 mm (m) to 1.85 mm (m) adapter
      - 85058-60114 1.85 mm (m) to 1.85 mm (f) adapter

**Cables**

- N4697E2 Single, flexible: 1.85 mm (f) to 1.85 mm (f), 96.5 cm, 38 inches
- N4697F2 Set, flexible: One 1.85 mm (f) to 1.85 mm (f) cable, 62.2 cm, 24.5 inches, p/n N4697-60100
  One 1.85 mm (f) to 1.85 mm (m) cable, 62.2 cm, 24.5 inches, p/n N4697-60200
- N4697H2 Single, flexible: 1.85 mm (f) to 1.85 mm (m), 62.2 cm, 24.5 inches
- N4421B-B67 Set of 4, flexible: 1.85 mm (f) to 1.85 mm (f) adapter

**Adapter set**

- 85130H 1.85 mm2 to 1.85 mm
For devices with 2.4 mm connectors

**Mechanical calibration kits**

□ **85056A** standard: DC to 50 GHz.
- Includes:
  - 00901-60003 2.4 mm (m) fixed broadband load
  - 00902-60004 2.4 mm (f) fixed broadband load
  - 00915-60003 2.4 mm (m) sliding load
  - 00915-60004 2.4 mm (f) sliding load
  - 85056-60005 2.4 mm (m) to 2.4 mm (m) adapter
  - 85056-60006 2.4 mm (f) to 2.4 mm (f) adapter
  - 85056-60007 2.4 mm (m) to 2.4 mm (f) adapter
  - 85056-60020 2.4 mm (m) short
  - 85056-60021 2.4 mm (f) short
  - 85056-60022 2.4 mm (m) open
  - 85056-60023 2.4 mm (f) open

□ **85056D** economy: DC to 50 GHz.
- Includes:
  - 00901-60003 2.4 mm (m) fixed broadband load
  - 00902-60004 2.4 mm (f) fixed broadband load
  - 85056-60005 2.4 mm (m) to 2.4 mm (m) adapter
  - 85056-60006 2.4 mm (f) to 2.4 mm (f) adapter
  - 85056-60007 2.4 mm (m) to 2.4 mm (f) adapter
  - 85056-60020 2.4 mm (m) short
  - 85056-60021 2.4 mm (f) short
  - 85056-60022 2.4 mm (m) open
  - 85056-60023 2.4 mm (f) open

**Electronic calibration kits**

□ **N4693A** Microwave ECal: 10 MHz to 50 GHz, 2 ports.
- Includes:
  - Option M0F module with:
    - N4693-60001 2.4 mm (f) to 2.4 mm (m) ECal module
  - Option 00M module with:
    - N4693-60002 2.4 mm (m) to 2.4 mm (m) ECal module
  - Option 00F module with:
    - N4693-60003 2.4 mm (f) to 2.4 mm (f) ECal module
  - Option 00A adds:
    - 85056-60005 2.4 mm (m) to 2.4 mm (m) adapter
    - 85056-60007 2.4 mm (m) to 2.4 mm (f) adapter

**Cables**

□ **85133C1** single, semi-rigid: 2.4 mm (f) to PSC-2.4 mm (f), 81 cm, 32 inches
□ **85133D1** set, semi-rigid:
  - One 2.4 mm (f) to 2.4 mm (m), 53 cm, 21 inches, p/n 85133-60001
  - One 2.4 mm (f) to 2.4 mm (f), 53 cm, 21 inches, p/n 85133-60002
□ **85133E1** single, flexible: 2.4 mm (f) to PSC-2.4 mm (f), 97 cm, 38 inches
□ **85133F1** set, flexible:
  - One 2.4 mm (f) to 2.4 mm (f), 63 cm, 25 inches, p/n 85133-60016
  - One 2.4 mm (f) to 2.4 mm (m), 63 cm, 25 inches, p/n 85133-60017

1. Special rugged female connector specifically for connecting to the network analyzer test port, but does not mate with a standard male connector.

□ **85133G1** Single, semi-rigid: 2.4 mm (f) to 2.4 mm (m), 53 cm, 21 inches
□ **85133H1** Single, flexible: 2.4 mm (f) to 2.4 mm (m), 63 cm, 25 inches
□ **N4421A-B20** Set of 4, flexible: 2.4 mm (f) to 2.4 mm (m), 91.4 cm, 36 inches

**Adapter set**

□ **85130G** 2.4 mm to 2.4 mm

For devices with K connectors (2.92 mm)

**Mechanical calibration kits**

□ **85056K** 2.92/2.4 economy: DC to 40/50 GHz.
- Includes:
  - 00901-60003 2.4 mm (m) fixed broadband load
  - 00902-60004 2.4 mm (f) fixed broadband load
  - 00915-60003 2.4 mm (m) sliding load (Option 001)
  - 00915-60004 2.4 mm (f) sliding load (Option 001)
  - 11904-60001 2.4 mm (m) to 2.92 mm (m) adapter
  - 11904-60002 2.4 mm (f) to 2.92 mm (f) adapter
  - 11904-60003 2.4 mm (m) to 2.92 mm (f) adapter
  - 11904-60004 2.4 mm (f) to 2.92 mm (m) adapter
  - 85056-60005 2.4 mm (m) to 2.4 mm (m) adapter
  - 85056-60006 2.4 mm (f) to 2.4 mm (f) adapter
  - 85056-60007 2.4 mm (m) to 2.4 mm (f) adapter
  - 85056-60020 2.4 mm (m) short
  - 85056-60021 2.4 mm (f) short
  - 85056-60022 2.4 mm (m) open
  - 85056-60023 2.4 mm (f) open

**Electronic calibration kits**

□ **N4692A** Microwave ECal: 10 MHz to 40 GHz, 2 ports.
- Includes:
  - Option M0F module with:
    - N4692-60001 2.92 mm (f) to 2.92 mm (m) ECal module
  - Option 00M module with:
    - N4692-60002 2.92 mm (m) to 2.92 mm (m) ECal module
  - Option 00F module with:
    - N4692-60003 2.92 mm (f) to 2.92 mm (f) ECal module
  - Option 00A adds:
    - N4692-60021 2.92 mm (m) to 2.92 mm (m) adapter
    - N4692-60022 2.92 mm (f) to 2.92 mm (f) adapter

**Cables**

□ **85133C1** single, semi-rigid: 2.4 mm (f) to PSC-2.4 mm (f), 81 cm, 32 inches
□ **85133D1** set, semi-rigid:
  - One 2.4 mm (f) to 2.4 mm (m), 53 cm, 21 inches, p/n 85133-60001
  - One 2.4 mm (f) to 2.4 mm (f), 53 cm, 21 inches, p/n 85133-60002
□ **85133E1** single, flexible: 2.4 mm (f) to PSC-2.4 mm (f), 97 cm, 38 inches
□ **85133F1** set, flexible:
  - One 2.4 mm (f) to 2.4 mm (f), 63 cm, 25 inches, p/n 85133-60016
  - One 2.4 mm (f) to 2.4 mm (m), 63 cm, 25 inches, p/n 85133-60017
For devices with 3.5 mm or SMA connectors

Mechanical calibration kits

- **85052B** standard: DC to 26.5 GHz.
  - Includes:
    - 00902-60003 3.5 mm (m) fixed load
    - 00902-60004 3.5 mm (f) fixed load
    - 00911-60019 3.5 mm (m) sliding load
    - 00911-60020 3.5 mm (f) sliding load
    - 85052-60006 3.5 mm (m) short
    - 85052-60007 3.5 mm (f) short
    - 85052-60012 3.5 mm (f) to 3.5 mm (f) adapter
    - 85052-60013 3.5 mm (f) to 3.5 mm (m) adapter
    - 85052-60014 3.5 mm (m) to 3.5 mm (m) adapter

- **85052C** precision TRL: DC to 26.5 GHz.
  - Includes:
    - 00902-60003 3.5 mm (m) fixed load
    - 00902-60004 3.5 mm (f) fixed load
    - 85052-60006 3.5 mm (m) short
    - 85052-60007 3.5 mm (f) short
    - 85052-60012 3.5 mm (f) to 3.5 mm (f) adapter
    - 85052-60013 3.5 mm (f) to 3.5 mm (m) adapter
    - 85052-60014 3.5 mm (m) to 3.5 mm (m) adapter

- **85052D** economy: DC to 26.5 GHz.
  - Includes:
    - 00902-60003 3.5 mm (m) fixed load
    - 00902-60004 3.5 mm (f) fixed load
    - 85052-60006 3.5 mm (m) short
    - 85052-60007 3.5 mm (f) short
    - 85052-60012 3.5 mm (f) to 3.5 mm (f) adapter
    - 85052-60013 3.5 mm (f) to 3.5 mm (m) adapter
    - 85052-60014 3.5 mm (m) to 3.5 mm (m) adapter

Electronic calibration kits

- **85093C** RF ECal: 300 kHz to 9 GHz, 2 ports
  - Standard module includes
    - Option M0F with:
      - 85093-60008 3.5 mm (f) to 3.5 mm (m) ECal module
    - Option 00F module with:
      - 85093-60010 3.5 mm (f) to 3.5 mm (f) ECal module
    - Option 00M module with:
      - 85093-60009 3.5 mm (m) to 3.5 mm (m) ECal module
    - Option 00A adds:
      - 85052-60012 3.5 mm (m) to 3.5 mm (m) adapter
      - 85052-60014 3.5 mm (f) to 3.5 mm (f) adapter

85093C-xxx mixed-connector options:

<table>
<thead>
<tr>
<th>Type</th>
<th>Port A option</th>
<th>Port B option</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(f)</td>
<td>(m)</td>
</tr>
<tr>
<td>3.5 mm</td>
<td>101</td>
<td>102</td>
</tr>
</tbody>
</table>

- **N4431B** Microwave ECal: 300 kHz to 13.5 GHz, 4 ports.
  - Includes:
    - Option 010 module with:
      - N4431-60006 4 x 3.5 mm (f) ECal module

N4431B-xxx mixed-connector options:

<table>
<thead>
<tr>
<th>Connector type</th>
<th>Port A option</th>
<th>Port B option</th>
<th>Port C option</th>
<th>Port D option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type (f)</td>
<td>(m)</td>
<td>(f)</td>
<td>(m)</td>
<td>(m)</td>
</tr>
<tr>
<td>3.5 mm</td>
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<td>201</td>
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<td>401</td>
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<tr>
<td>3.5 mm</td>
<td>102</td>
<td>202</td>
<td>302</td>
<td>402</td>
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<tr>
<td>Type-N 50 ohm</td>
<td>103</td>
<td>203</td>
<td>303</td>
<td>403</td>
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<tr>
<td>Type-N 50 ohm</td>
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<td>204</td>
<td>304</td>
<td>404</td>
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<td>7-16 (f)</td>
<td>105</td>
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<td>305</td>
<td>405</td>
</tr>
<tr>
<td>7-16 (m)</td>
<td>106</td>
<td>206</td>
<td>306</td>
<td>406</td>
</tr>
</tbody>
</table>

- **N4433A** Microwave ECal: 300 kHz to 20 GHz, 4 ports.
  - Includes:
    - Option 010 module with:
      - N4433-60003 4 x 3.5 mm (f) ECal module

N4433A-xxx mixed-connector options:

<table>
<thead>
<tr>
<th>Connector type</th>
<th>Port A option</th>
<th>Port B option</th>
<th>Port C option</th>
<th>Port D option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type (f)</td>
<td>(m)</td>
<td>(f)</td>
<td>(m)</td>
<td>(m)</td>
</tr>
<tr>
<td>3.5 mm</td>
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<td>201</td>
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<td>401</td>
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<tr>
<td>3.5 mm</td>
<td>102</td>
<td>202</td>
<td>302</td>
<td>402</td>
</tr>
</tbody>
</table>

- **N4691B** Microwave ECal: 300 kHz to 26.5 GHz, 2 ports.
  - Includes:
    - Option M0F module with:
      - N4691-60001 3.5 mm (f) to 3.5 mm (m) ECal module
    - Option 00M module with:
      - N4691-60002 3.5 mm (m) to 3.5 mm (m) ECal module
    - Option 00F module with:
      - N4691-60003 3.5 mm (f) to 3.5 mm (f) ECal module
    - Option 00A adds:
      - 85052-60012 3.5 mm (m) to 3.5 mm (m) adapter
      - 85052-60014 3.5 mm (f) to 3.5 mm (f) adapter
**Cables**

- **85131C** single, semi-rigid: 3.5 mm (f) to PSC-3.5 mm (f), 81 cm, 32 inches
- **85131D** set, semi-rigid:
  - One 3.5 mm (f) to 3.5 mm (m), 53 cm, 21 inches, p/n 85131-60009
  - One 3.5 mm (f) to PSC-3.5 mm (f), 53 cm, 21 inches, p/n 85131-60010
- **85131E** single, flexible: 3.5 mm (f) to PSC-3.5 mm (f), 96.5 cm, 38 inches
- **85131F** set, flexible:
  - One 3.5 mm (f) to 3.5 mm (m), 62.2 cm, 24.5 inches, p/n 85131-60012
  - One 3.5 mm (f) to PSC-3.5 mm (f), 62.2 cm, 24.5 inches, p/n 85131-60013
- **85131G** single, semi-rigid: 3.5 mm (f) to 3.5 mm (m), 53 cm, 21 inches
- **85131H** single, flexible: 3.5 mm (f) to 3.5 mm (m), 62.2 cm, 24.5 inches
- **85134C** single, semi-rigid: PSC-3.5 mm (f) to 2.4 mm (f), 81 cm, 32 inches
- **85134D** set, semi-rigid:
  - One 2.4 mm (f) to PSC-3.5 mm (f), 53 cm, 21 inches, p/n 85134-60002
  - One 2.4 mm (f) to PSC-3.5 mm (m), 53 cm, 21 inches, p/n 85134-60001
- **85134E** single, flexible: PSC-3.5 mm (f) to 2.4 mm (f), 96 cm, 38 inches
- **85134F** set, flexible:
  - One 2.4 mm (f) to PSC-3.5 mm (f), 53 cm, 21 inches, p/n 85134-60004
  - One 2.4 mm (f) to PSC-3.5 mm (m), 53 cm, 21 inches, p/n 85134-60003
- **85134G** single, semi-rigid: 2.4 mm (f) to PSC-3.5 mm (m), 53 cm, 21 inches
- **85134H** single, flexible: 2.4 mm (f) to PSC-3.5 mm (m), 53 cm, 21 inches
- **N4419A-B20** set of 4, flexible: 3.5 mm (m) to 3.5 mm (f), 91.4 cm, 36 inches
- **Z5623A-B20** set of 4, flexible: 3.5 mm (m) to 3.5 mm (m), 91.4 cm, 36 inches (phase-matched)

**Adapter sets**

- **85130C** 3.5 mm¹ to Type-N
- **85130D** 3.5 mm¹ to 3.5 mm
- **85130F** 2.4 mm¹ to 3.5 mm

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1. Special rugged female connector specifically for connecting to the network analyzer test port, but does not mate with a standard male connector.
2. For use with E8362A or B.
For devices with Type-N connectors

**Mechanical calibration kits**

- 85054B standard: DC to 18 GHz.
  - Includes:
    - 00909-60011 Type-N (m) fixed lowband load
    - 00909-60012 Type-N (f) fixed lowband load
    - 85054-60025 Type-N (m) short
    - 85054-60026 Type-N (f) short
    - 85046-60027 Type-N (m) open
    - 85054-60028 Type-N (f) open
    - 85054-60031 Type-N (f) to 7mm adapter
    - 85054-60032 Type-N (m) to 7mm adapter
    - 85054-60037 Type-N (f) to Type-N (f) adapter
    - 85054-60038 Type-N (m) to Type-N (m) adapter
    - 85054-80009 Type-N (m) sliding load
    - 85054-60050 Type-N (f) connector gage
    - 85054-60052 Type-N (f) gage master
    - 85054-60051 Type-N (m) connector gage
    - 85054-60053 Type-N (m) gage master

- 85054D economy: DC to 18 GHz.
  - Includes:
    - 85054-60025 Type-N (m) short
    - 85054-60026 Type-N (f) short
    - 85054-60027 Type-N (m) open
    - 85054-60028 Type-N (f) open
    - 85054-60031 Type-N (f) to 7mm adapter
    - 85054-60032 Type-N (m) to 7mm adapter
    - 85054-60037 Type-N (f) to Type-N (f) adapter
    - 85054-60038 Type-N (m) to Type-N (m) adapter
    - 85054-60046 Type-N (m) fixed load
    - 85054-60047 Type-N (f) fixed load

**Electronic calibration kits**

- N4431B Microwave ECAl: 300 kHz to 13.5 GHz, 4 ports.
  - Includes:
    - Option 020 module with:
      - N4431-60007 4 x Type-N (f) ECAl module

  **N4431B-xxx mixed-connector options:**

<table>
<thead>
<tr>
<th>Connector type</th>
<th>Port A option</th>
<th>Port B option</th>
<th>Port C option</th>
<th>Port D option</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5 mm (f)</td>
<td>101</td>
<td>201</td>
<td>301</td>
<td>401</td>
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<tr>
<td>3.5 mm (m)</td>
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<td>402</td>
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<tr>
<td>Type-N 50 ohm (f)</td>
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<td>7-16 (m)</td>
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<td>406</td>
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</tbody>
</table>

- N4432A Microwave ECAl: 300 kHz to 18 GHz, 4 ports.
  - Includes:
    - Option 020 module with:
      - N4432-60003 4 x Type-N (f) ECAl module

  **N4432A-xxx mixed-connector options:**

<table>
<thead>
<tr>
<th>Connector type</th>
<th>Port A option</th>
<th>Port B option</th>
<th>Port C option</th>
<th>Port D option</th>
</tr>
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<tbody>
<tr>
<td>3.5 mm (f)</td>
<td>101</td>
<td>201</td>
<td>301</td>
<td>401</td>
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<tr>
<td>3.5 mm (m)</td>
<td>102</td>
<td>202</td>
<td>302</td>
<td>402</td>
</tr>
<tr>
<td>Type-N 50 ohm (f)</td>
<td>103</td>
<td>203</td>
<td>303</td>
<td>403</td>
</tr>
<tr>
<td>Type-N 50 ohm (m)</td>
<td>104</td>
<td>204</td>
<td>304</td>
<td>404</td>
</tr>
</tbody>
</table>

- N4690B Microwave ECAl: 300 kHz to 18 GHz, 2 ports.
  - Includes:
    - Option M0F module with:
      - N4690-60001 Type-N (f) to Type-N (m) ECAl module
    - Option 00M module with:
      - N4690-60002 Type-N (m) to Type-N (m) ECAl module
    - Option 00F module with:
      - N4690-60003 Type-N (f) to Type-N (f) ECAl module
    - Option 00A adds:
      - 85054-60037 Type-N (f) to Type-N (f) adapter
      - 85054-60038 Type-N (m) to Type-N (m) adapter

**Cables**

1. Use the test port cables recommended for devices with 7 mm connectors, and 7 mm to Type-N adapters that are from the 85054B/D Type-N calibration kit (see 7 mm connector section).

2. Special rugged female connector specifically for connecting to the network analyzer test port, but does not mate with a standard male connector.

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1. Limits ECAl module high frequency to 7.5 GHz.
2. Special rugged female connector specifically for connecting to the network analyzer test port, but does not mate with a standard male connector.
For devices with 7 mm connectors

**Mechanical calibration kits**

- **85050B** standard: DC to 18 GHz.
  - Includes:
    - 00909-60008 7 mm coax termination
    - 85050-60007 7 mm fixed broadband load
    - 85050-80007 7 mm short
    - 85050-80010 7 mm open
    - 85050-80011 7 mm sliding load

- **85050C** precision TRL: DC to 18 GHz.
  - Includes:
    - 00909-60008 7 mm coax termination
    - 85050-60003 7 mm to 7 mm airline
    - 85050-60005 7 mm to 7 mm TRL adapter
    - 85050-60006 7 mm fixed broadband load
    - 85050-80008 7 mm short
    - 85050-80009 7 mm short collet
    - 85050-80010 7 mm open

- **85050D** economy: DC to 18 GHz.
  - Includes:
    - 85050-60006 7 mm fixed broadband load
    - 85050-80007 7 mm short
    - 85050-80010 7 mm open

**Electronic calibration kits**

- **N4696B** Microwave ECal: 300 kHz to 18 GHz, 2 ports, 7mm to 7mm Microwave module

**Cables**

- **85132C** single, semi-rigid: 7 mm to 3.5 mm (f), 81 cm, 32 inches
- **85132D** set, semi-rigid: two 3.5 mm (f) to 7 mm cables, 53 cm each, 21 inches each, p/n 85132-60003
- **85132E** single, flexible: 7 mm to 3.5 mm (f), 97.2 cm, 38.25 inches
- **85132F** set, flexible: two 3.5 mm (f) to 7 mm cables, 62.9 cm each, 24.75 inches each, p/n 85132-60004
- **85135C** single, semi-rigid: 7 mm to 2.4 mm (f), 81 cm, 32 inches
- **85135D** set, semi-rigid: two 2.4 mm (f) to 7 mm cables, 53 cm each, 21 inches each, p/n 85135-60001
- **85135E** single, flexible: 7 mm to 2.4 mm (f), 96 cm, 38 inches
- **85135F** set, flexible: two 2.4 mm (f) to 7 mm cables, 53 cm each, 21 inches each, p/n 85135-60002

**Adapter sets**

- **85130E** 2.4 mm to 7 mm

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1. Special rugged female connector specifically for connecting to the network analyzer test port, but does not mate with a standard male connector.
2. For use with E8362A or B.

For devices with waveguide

**Mechanical calibration kits**

- **X Band**
  - **X11644A** standard, WR-90: 8.2 to 12.4 GHz.
    - Includes:
      - 00896-60008 X-band standard section
      - 00910-60003 X-band termination
      - 11644-20018 X-band short
      - 11644-20021 X-band shim
    - **85132F** cable set (set, flexible 7 mm to 3.5 mm, 62.9 cm each, 24.75 inches each²)
    - **85135F** cable set (set, flexible, 7 mm to 2.4 mm, 53 cm each, 21 inches each)
    - **X281C** adapter (included in calibration kit):
      - WR-90 to 7 mm

- **P Band**
  - **P11644A** standard, WR-62: 12.4 to 18 GHz.
    - Includes:
      - 00896-60007 P-band standard section
      - 00910-60002 P-band termination
      - 11644-20017 P-band short
      - 11644-20020 P-band shim
    - **85132F** cable set (set, flexible, 7 mm to 3.5 mm, 62.9 cm each, 24.75 inches each²)
    - **85135F** cable set (set, flexible, 7 mm to 2.4 mm, 53 cm each, 21 inches each)
    - **P281C** adapter (included in calibration kit):
      - WR-62 to 7 mm

- **K Band**
  - **K11644A** standard, WR-42: 18 to 26.5 GHz.
    - Includes:
      - 00896-60006 K-band standard section
      - 00910-60001 K-band termination
      - 11644-20016 K-band short
      - 11644-20019 K-band shim
    - **85134F** cable set (set, flexible, 3.5 mm to 2.4 mm, 53 cm each, 21 inches each)
    - **K281C** adapter (included in calibration kit):
      - WR-42 to 3.5 mm (f)

**Option 012** WR-42 to 3.5 mm (m)
R Band

□ R11644A standard, WR-28; 26.5 to 40 GHz.
   Includes:
   00814-20028 R-band termination
   11644-20005 R-band short
   11644-20003 R-band shim
   11644-60001 R-band 10 cm straight waveguide
   11644-60016 R-band 5 cm straight waveguide
   □ 85133F cable set (set, flexible, 2.4 mm, 53 cm each, 21 inches each)
   □ R281A adapter (2.4 mm (f) to WR-28 waveguide adapter)
   □ R281B adapter (2.4 mm (m) to WR-28 waveguide adapter)

Q Band

□ Q11644A standard, WR-22: 33 to 50 GHz.
   Includes:
   11644-60005 Q-band termination
   11644-20004 Q-band short
   11644-20001 Q-band shim
   11644-60002 Q-band 10 cm straight waveguide
   11644-60017 O-band 5 cm straight waveguide
   □ 85133F cable set (set, flexible, 2.4 mm, 53 cm each, 21 inches each)
   □ Q281A adapter (2.4 mm (f) to WR-22 waveguide adapter)
   □ Q281B adapter (2.4 mm (m) to WR-22 waveguide adapter)

U Band

□ U11644A standard, WR-19: 40 to 60 GHz.
   Includes:
   11644-60006 U-band termination
   11644-20004 U-band short
   11644-20002 U-band shim
   11644-60003 U-band 10 cm straight waveguide
   11644-60018 U-band 5 cm straight waveguide

V Band

□ V11644A standard, WR-15: 50 to 75 GHz.
   Includes:
   11644-60025 V-band termination
   11644-20015 V-band short
   11644-20013 V-band shim
   11644-60012 V-band standard section

Verification kits

All Agilent verification kits include:
- precision Z0 airline or match thru
- mismatched airline or mismatch thru
- fixed attenuators
- traceable measured data and uncertainties

□ 85053B 300 kHz to 26.5 GHz 3.5 mm kit
   Includes attenuators, airline and mismatch airline with data on a 3.5-inch disk for use in confirming accuracy enhanced system measurement performance, traceable to national standards. Test procedure is provided in the service manual.

□ 85055A 300 kHz to 18 GHz Type-N kit
   Includes attenuators, airline and mismatch airline with data on a 3.5-inch disk for use in confirming accuracy enhanced system measurement performance, traceable to national standards. Test procedure is provided in the service manual.

□ 85057B 45 MHz to 50 GHz 2.4 mm kit
   Includes attenuators, airline and mismatch airline with data on a 3.5-inch disk for use in confirming accuracy enhanced system measurement performance, traceable to national standards. Test procedure is provided in the service manual.

□ 85058V 45 MHz to 67 GHz 1.85 mm kit
   Includes attenuators, match thru and mismatch thru with data on a 3.5-inch disk for use in confirming accuracy enhanced system measurement performance, traceable to national standards. Test procedure is provided in the service manual.
General Accessories

USB

□ N4688A CD-ROM drive
Provides an external read/write CD-ROM drive with a USB cable.

□ N4689A USB hub
Provides a USB hub for connecting additional USB peripherals.

Hard drive

□ N980A spare hard drive
For use with 500 MHz Pentium III CPU board
Recommended for use in secure environments.

□ N981A spare hard drive
For use with 1.1 GHz Pentium M CPU board
Recommended for use in secure environments.

Probe

□ 85024A high-frequency probe
Provides high-impedance in-circuit test capability from 300 kHz to 3 GHz.

Power meters and sensors

Recommended for self support, adjustments and performance tests to verify proper instrument operation.

□ U2000A USB power sensor, 10 MHz to 18 GHz
□ U2001A USB power sensor, 10 MHz to 6 GHz
□ U2002A USB power sensor, 50 MHz to 24 GHz
□ U2004A USB power sensor, 10 kHz to 6 GHz
□ E4418B single-channel power meter
□ E4419B dual-channel power meter
□ 8481B power sensor, 10 MHz to 18 GHz, Type-N (m), 25 W
□ 8481A power sensor, 10 MHz to 18 GHz, Type-N (m), 100 mW
□ 8485A power sensor, 50 MHz to 26.5 GHz, APC-3.5 mm (m), 100 mW
□ 8487A power sensor, 50 MHz to 50 GHz, 2.4 mm, 300 mW
□ 8487D power sensor, 50 MHz to 50 GHz, 2.4 mm, 100 mW
□ R8486A power sensor, 26 GHz to 40 GHz, waveguide flange UG-599/U, 100 mW
□ Q8486A power sensor, 33 GHz to 50 GHz, waveguide flange UG-383/U, 100 mW
□ UB846A power sensor, 50 GHz to 75 GHz, waveguide flange UG-385/U, 200 mW avg
□ E4412A CW power sensor, 10 MHz to 18 GHz, Type-N (m), 200 mW
□ E4413A CW power sensor, 50 MHz to 26.5 GHz, 3.5 mm, 200 mW

Amplifiers

□ 83006A power amplifier, 10 MHz to 26.5 GHz, 20 dB gain, power out: +18 dBm to 10 GHz or +16 dBm to 20 GHz or +14 dBm to 26.5 GHz
□ 83017A power amplifier, 50 MHz to 26.5 GHz, 25 dB gain, power out: +20 dBm to 20 GHz or +15 dBm to 26.5 GHz
□ 83018A power amplifier, 2 to 26.5 GHz, 27 dB gain to 20 GHz or 23 dB to 26.5 GHz, power out: +24 dBm to 20 GHz or +21 dBm to 26.5 GHz
□ 83020A power amplifier, 2 to 26.5 GHz, 30 dB gain to 20 GHz or 27 dB to 26.5 GHz, power out: +30 dBm to 20 GHz or +26 dBm to 26.5 GHz
□ 83050A power amplifier, 2 to 50 GHz, 23 dB gain, power out: +20 dBm to 40 GHz or +17 dBm to 50 GHz
□ 83051A power amplifier, 45 MHz to 50 GHz, 23 dB gain power out: +12 dBm to 45 GHz or +10 dBm to 50 GHz

Couplers

□ 87300B coaxial coupler, 1 to 20 GHz, SMA (f), 10 dB coupling
□ 87300C coaxial coupler, 1 to 26.5 GHz, 3.5 mm (f), 10 dB coupling
□ 87301B coaxial coupler, 10 to 46 GHz, 2.92 mm (f), 10 dB coupling
□ 87301D coaxial coupler, 1 to 40 GHz, 2.4 mm (f) or optional 2.92 mm (f), 13 dB coupling
□ 87301E coaxial coupler, 2 to 50 GHz, 2.4 mm (f), 10 dB coupling
□ 87310B 90° coaxial coupler, 1 to 18 GHz, SMA (f), 3 dB coupling

Equipment rack accessories

□ E3663AC Rail kit
□ 5063-9217 Rack mount kit, for use without handles
□ 5063-9205 Front handle kit
□ 5063-9224 Rack mount kit with handles
□ 5063-9237 Rack mount kit, for use with standard supplied handles (included with Option 1CP)

1. The 500 MHz CPU board has one USB port oriented vertically and a single GPIB port. The 1.1 GHz CPU board has four USB ports and two GPIB ports. For more information on this subject, refer to na.tm.agilent.com/pna/hdnumbers.html.

2. For the latest guide to power meters and power sensors, refer to the Agilent web site: www.agilent.com/find/powermeters

3. Front handles and Option 1CP (rack mount with handles) are not available for the N5242A.
Applications

Material measurements

☐ 85070E High-Temperature Dielectric Probe Kit
The 85070E enables measurements of the dielectric properties of materials quickly and conveniently. Measurements made with this probe are nondestructive and require no sample preparation. The dielectric probe is well suited for measurements of liquid, semisolid and flat solid materials. Measurement results can be viewed in a variety of formats (\(\varepsilon^\prime\), \(\varepsilon^\prime\prime\), \(\mu^\prime\), \(\mu^\prime\prime\), tan \(\delta\) or Cole-Cole \(\mu\)). The supplied software can be run in the PNA analyzer or on a PC.

☐ 85071E Materials Measurement Software
The 85071E materials measurement software calculates the permittivity and permeability of material samples placed in a coaxial airline or a rectangular waveguide. The measurement technique works well for solid materials that can be machined to fit precisely inside a transmission line. Measurement results can be viewed in a variety of formats (\(\varepsilon^\prime\), \(\varepsilon^\prime\prime\), \(\mu^\prime\), \(\mu^\prime\prime\), tan \(\delta\) or Cole-Cole \(\mu\)). The software can be run in the PNA analyzer or on a PC.

Pulsed measurements\(^1\)

The pulsed RF measurement capability (Option H08) and IF access (Option H11), are recommended for pulsed measurements with the PNA Series.

Pulse/pattern generators
Recommended to provide pulse signals and timing to the pulsed S-parameter test set and MW PNA
☐ 81104A Pulse/pattern generator, 80 MHz, single-/dual-channel with one or two Agilent 81105A output modules.
☐ 81110A Pulse/pattern generator, 165 MHz, single-/dual-channel with one or two Agilent 81111A output modules.

Note: Each pulse/pattern generator must be ordered with its associated output modules depending on the measurement configuration.

Pulsed S-Parameter test sets
☐ Z5623AH81 Pulsed S-parameter test set, 2 to 20 GHz
Includes a pin-diode switch to modulate the analyzer’s internal source, an amplifier, and directional coupler to provide a pulsed reference to the analyzer.

☐ Z5623AH83 Pulsed S-parameter test set, 2 to 20 GHz
Includes two pin switches for bi-directional (forward and reverse) pulsed-RF stimulus, and two directional couplers for the reference channels. It does not include internal amplifiers, but has front panel access loops for switching in external amplifiers to boost port power in both directions.

☐ Z5623AH84 Pulsed S-parameter test set, 2 to 40 GHz
Includes two pin switches for bi-directional (forward and reverse) pulsed-RF stimulus, and two directional couplers for the reference channels. It does not include internal amplifiers, but has front panel access loops for switching in external amplifiers to boost port power in both directions.

☐ Z5623AH86 Pulsed S-parameter test set, 2 to 40 GHz
Includes one pin switch to modulate the analyzer’s internal source in the forward direction, and one directional coupler for the reference channel. It does not include internal amplifiers, but has front panel access loops for switching in an external amplifier to boost port power.

☐ Z5623AH87 Pulsed S-parameter test set, 1 to 50 GHz
Includes two pin switches for bi-directional (forward and reverse) pulsed-RF stimulus. It does not include internal amplifiers, but has front panel access loops for switching in external amplifiers to boost port power in both directions.

☐ Z5623AH89 Pulsed S-parameter test set, 10 MHz to 5 GHz
Includes one pin switch to modulate the analyzer’s internal source in the forward direction. This test set has no internal amplifier, no reference channel variable attenuator, and no GPIB control (manual control only).

☐ Z5623AH90 Pulsed S-parameter test set, 1 to 50 GHz
Same as Z5623AH87, but adds 50 GHz couplers to the front panel to allow DUT connection on the test set instead of using the PNA test ports.

Note: Pulse biasing can be achieved with or without the use of a pulsed S-parameter test set. A proper pulse-bias driver must be used. Contact your local Agilent Sales Representative for additional pulsed S-parameter test set configurations and details.

Peripherals

The following peripherals may be used with the Microwave PNA Series. Other peripherals not listed here may also be compatible with these instruments.

Monitors
VGA-compatible monitor

Printers
USB, LAN, parallel or serial printers with Microsoft® Windows® printer driver

Interface cables
Choose the appropriate cables to connect each peripheral to the network analyzer.
☐ 10833A GPIB cable, 1.0 m (3.3 ft)
☐ 10833B GPIB cable, 2.0 m (6.6 ft)
☐ 10833D GPIB cable, 0.5 m (1.6 ft)
☐ 82357B GPIB to USB interface

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1. For more details regarding pulsed measurement configurations with the PNA Series, refer to Agilent’s Web site (www.agilent.com/find/pna) to download a copy of the Microwave PNA Series Network Analyzer Configuration Guide for Pulsed Measurements, literature number 5988-9833EN.
Upgrade Kits
Upgrade kits for the PNA Series
E8362B, E8363B, E8364B, E8361A, N5250A

Upgrade kits are available to add options after initial purchase. To order an upgrade kit for the PNA series, order the analyzer’s model number followed by a “U”, then indicate the option to be added (for example, E8362BU-010). The serial number of the instrument to be retrofitted is required as part of the order.

- **Time-domain (Option 010)**
  User installable.

- **Configurable test set (Option 014)**
  Provides six front-panel RF access loops.
  Includes installation at an Agilent service center.

- **Receiver attenuators (Option 016)**
  Includes installation at an Agilent service center.

- **Extended memory (Option 022)**
  Applies only to E8362B/63B/64B/61A with 256 MB of RAM.
  Includes installation at an Agilent service center.

- **Frequency range upgrade to an E8363B (40 GHz) PNA (Option 040/041)**
  Available only for the E8362A/B. Includes installation at an Agilent service center.

- **Frequency range upgrade to an E8364B (50 GHz) PNA (Option 050/051)**
  Available only for the E8362A/B and E8363A/B. Includes installation at an Agilent service center.

- **Frequency range upgrade to an E8361A (67 GHz) PNA (Option 067/068)**
  Available only for the E8363B and E8364B. Includes installation at an Agilent service center.

- **Frequency-offset (Option 080)**
  Includes installation at an Agilent service center.

- **External reference switch (Option 081)**
  Includes installation at an Agilent service center.

- **Scalar-calibrated converter measurements (Option 082)**
  User installable. Option 080 required.

- **Frequency converter measurement application (Option 083)**
  User installable. Option 080 and 081 required.

- **Embedded LO Measurements (Option 084)**
  Advanced software tuning that provides absolute group delay of converters with embedded LOs without the need for access to a common reference signal. The measurement result is the same as locking the DUT LO to the reference mixer LO. (Options 080 and 083 required) Requires firmware A.07.05 and above plus 1.1 GHz CPU board.

- **4-Port measurement application (Option 550)**
  Enables full 4-port error correction and differential measurements. Option 014 and external test set required. User installable.

- **N-port capabilities (Option 551)**
  Adds full N-port error correction and measurement capabilities. Option 014 and external test set required. User installable.

- **Extended power range (Option UNL)**
  Adds a step attenuator and a bias-tee between source and each test port. Includes installation at an Agilent service center.

- **Pulsed-RF measurement capability (Option H08)**
  Provides software to set up and control pulsed-RF measurements using narrowband detection, with point-in-pulse and pulse-profile capability. User installable.

- **IF access (Option H11)**
  Provides hardware for antenna, point-in-pulse, and millimeter-wave measurements. Adds rear-panel RF and LO outputs, external IF inputs, and IF gates (gates enabled with Option H08). Includes installation at an Agilent service center.

- **High-power test set (Option H85)**
  Removes bias tees for higher test port power-handling capability. Options UNL, 014, 016, 080, and 081 are required. Includes installation at an Agilent Service Center.

- **Upgrade to C model (Option 221 or Option 241)**
  Provides new front panel, new hard drive with latest firmware and new GUI. Option 221 is available for the E8361A, E8362/3/4B, and N5230A 2-port instruments. Option 241 is available for N5230A 4-port instruments.

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1. Please contact Agilent for ordering this upgrade.
2. Some older PNAs may also require the purchase of a new CPU board.
3. For N5250A upgrades, order E8361AU options.
Upgrade kits for the PNA-L Series
N5230A

Upgrade kits are available to add options after initial purchase. To order an upgrade kit for the PNA-L series, order the analyzer’s model number followed by a “U”, then indicate the option to be added (example: N5230AU-010). The serial number of the instrument to be retrofitted is required as part of the order.

- **Time-domain upgrade kit (Option 010)**
  - The serial number of the instrument to be retrofitted must be specified when ordering this kit. User installable.
- **Frequency-offset upgrade kit (Option 080)**
  - The serial number of the instrument to be retrofitted must be specified when ordering this kit. User installable.
- **Scalar-calibrated converter measurements (Option 082)**
  - User installable. Option 080 required.
- **4-port measurement application (Option 550)**
  - Enables full 4-port error correction and differential measurements on a 2-port network analyzer with configurable test set (Option x25). External test set required. User installable.
- **N-port capabilities (Option 551)**
  - Adds full N-port error correction and measurement capabilities to PNA-L with configurable test set (Option xx5 or x46). External test set required. User installable.
- **6 or 13.5 GHz configurable test set & extended power range upgrade kit (Option 901)**
  - Applicable to 6 or 13.5 GHz PNA-L (N52300-020, N52300-120). Upgrade to configurable test set and extended power range. Includes installation at an Agilent service center.
- **20 GHz 2-port configurable test set & extended power range upgrade kit (Option 921)**
  - Applicable to 20 GHz PNA-L (N52300-220 with serial prefix MY4500A and below). Upgrade to configurable test set and extended power range. Includes installation at an Agilent service center.
- **20 GHz 2-port configurable test set & extended power range upgrade kit (Option 922)**
  - Applicable to 20 GHz PNA-L (N52300-220 with serial prefix MY4640A and above). Upgrade to configurable test set and extended power range. Includes installation at an Agilent service center.
- **13.5 or 20 GHz 4-port configurable test set & extended power range upgrade kit (Option 926)**
  - Applicable to 13.5 or 20 GHz PNA-L (N52300-130, N52300-240). Upgrade to configurable test set and extended power range. Includes installation at an Agilent service center.
- **13.5 GHz 4-port configurable test set, extended power range & internal second source upgrade kit (Option 928)**
  - Applicable to 13.5 GHz 4-port PNA-L (N52300-135). Upgrade to configurable test set, extended power range and internal second source. Includes installation at an Agilent service center. (Option 080 recommended. Please note, Option 080 is needed in order to have independent control of the two internal sources.)
- **20 GHz 4-port configurable test set, extended power range & internal second source upgrade kit (Option 927)**
  - Applicable to 20 GHz 4-port PNA-L (N52300-245). Upgrade to configurable test set, extended power range and internal second source. Includes installation at an Agilent service center. Option 080 recommended.
- **40 or 50 GHz configurable test set & extended power range upgrade kit (Option 941)**
  - Applicable to 40 or 50 GHz PNA-L (N52300-420, N52300-520). Upgrade to configurable test set and extended power range. Includes installation at an Agilent service center.
- **Frequency range upgrade from 6 to 13.5 GHz (Option 960)**
  - Applicable to the 6 GHz PNA-L (N52300-020, N52300-025). Includes installation at an Agilent service center.
- **Frequency range upgrade from 13.5 to 20 GHz (Option 966)**
  - Applicable to the 13.5 GHz 4-port PNA-L (N52300-130, N52300-140, N52300-145, N52300-146). Includes installation at an Agilent service center.
- **Frequency range upgrade from 20 to 40 GHz (Option 971)**
  - Applicable to the 20 GHz PNA-L (N52300-220). Includes installation at an Agilent service center.
- **Frequency range upgrade from 20 to 40 GHz (Option 973)**
  - Applicable to the 20 GHz PNA-L (N52300-220 with serial prefix MY4500A and below). Includes installation at an Agilent service center.
- **Frequency range upgrade from 40 to 50 GHz (Option 990)**
  - Applicable to the 40 GHz PNA-L (N52300-420, N52300-425). Includes installation at an Agilent service center.

For additional upgrade paths, contact your Agilent field office.

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PNA-L upgrade path examples.
Upgrade kits are available to add options after initial purchase. To order an upgrade kit for the PNA-X, order the analyzer’s model number followed by a “U”, then indicate the option to be added (example: N5242AU-010). The model and serial numbers of the instrument to be retrofitted are required as part of the order.

- **Pulse measurements** (Option H08)
  User installable.
- **Time-domain** (Option 010)
  User installable.
- **Add IF inputs for antenna and millimeter-wave** (Option O20)
  User installable.
- **Add pulse modulator to internal 1st source** (Option O21)
  User installable.
- **Add pulse modulator to internal 2nd source** (Option O22)
  User installable. Option 224 or 400 required.
- **Add four internal pulse generators** (Option O25)
  User installable.
- **Frequency offset** (Option O80)
  User installable.
- **Scalar-calibrated converter measurements** (Option O82)
  User installable. Option O80 required, and can not be ordered with Option O83.
- **Frequency converter measurements** (Option O83)
  User installable. Option O80 required, and can not be ordered with Option O82.
- **Embedded LO measurements** (Option O84)
  User installable. Options O80 and O83 required. Requires firmware A.07.50 and above.
- **Gain compression application** (Option O86)
  User installable. Requires firmware A.08.00 and above.
- **N-port capabilities** (Option 551)
  User installable.
- **Perpetual license for built-in performance test software for Agilent inclusive calibration** (Option 897)
  User installable. Additional hardware required.
- **Perpetual license for built-in performance test software for standards compliant calibration** (Option 898)
  User installable. Additional hardware required.
- **2 ports, extended power range and bias-tees** (Option 921)
  Applicable to 2-port model only (N5242A-200). This upgrade adds one 65 dB source attenuator, one 35 dB receiver attenuator, and one bias-tee to each test port. Includes installation at an Agilent service center. Option 200 required.

- **2 ports, add an internal 2nd source, a combiner & mechanical switches** (Option 922)
  Applicable to 2-port models only (N5242A-200, N5242A-219). This upgrade adds an internal second source, a combiner and mechanical switches. Access to the second source is available through two output (SMA) connectors on the front panel. Includes installation at an Agilent service center. Options 200, 219 and 080 required.
- **Fully corrected noise figure measurements, 2-port** (Option 924)
  Adds fully-corrected noise figure measurements to 2-port analyzer. Includes installation at an Agilent Service Center. Option 219 or 224 required.
- **4 ports, extended power range and bias-tees** (Option 926)
  Applicable to 4-port model only (N5242A-400). This upgrade adds one 65 dB source attenuator, one 35 dB receiver attenuator, and one bias-tee to each test port. Includes installation at an Agilent service center. Option 400 required.
- **4 ports, add an internal combiner & mechanical switches** (Option 927)
  Applicable to 4-port models only (N5242A-400, N5242A-419). This upgrade adds a combiner and mechanical switches. Includes installation at an Agilent service center. Options 400, 419 and 080 required.
- **Fully corrected noise figure measurements, 4-port** (Option 929)
  Adds fully-corrected noise figure measurements to 4-port analyzer. Includes installation at an Agilent Service Center. Option 419 or 423 required.

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**N5242A PNA-X upgrade path**

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Key Web Resources

Visit our Web sites for additional product information and literature:
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America

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<tr>
<th>Country</th>
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<tbody>
<tr>
<td>Canada</td>
<td>(877) 894-4414</td>
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<tr>
<td>Latin America</td>
<td>305 269 7500</td>
</tr>
<tr>
<td>United States</td>
<td>(800) 829-4444</td>
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Asia Pacific

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<td>Hong Kong</td>
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<td>Japan</td>
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Europe & Middle East

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<td>Israel</td>
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<td>Sweden</td>
<td>0200-88 22 55</td>
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<td>Switzerland</td>
<td>0800 80 63 53</td>
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<td>United Kingdom</td>
<td>44 (0) 118 9276201</td>
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