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# Agilent 8720E Family Network Analyzers

## Configuration Guide

**8719ET, 50 MHz to 13.5 GHz**  
**8720ET, 50 MHz to 20 GHz**  
**8722ET, 50 MHz to 40 GHz**  
**8719ES, 50 MHz to 13.5 GHz**  
**8720ES, 50 MHz to 20 GHz**  
**8722ES, 50 MHz to 40 GHz**

The Agilent Technologies 8720E family of microwave network analyzers integrates a microwave source, tuned-receiver, and transmission/reflection or S-parameter test set into a single, cost-effective instrument. To complete a microwave measurement system, select the desired network analyzer options, test port cables, and calibration kits. Also, additional measurement accessories may be selected.

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# Transmission/Reflection Network Analyzers

**8719ET** vector network analyzer,  
50 MHz to 13.5 GHz

**8720ET** vector network analyzer,  
50 MHz to 20 GHz

**8722ET** vector network analyzer,  
50 MHz to 40 GHz

Included with a standard network analyzer is a manual set which includes an installation and quick start guide, user's guide, reference guide, programmer's guide, example programs CD-ROM, and a CD-ROM containing the manual set. A bandpass filter test device (P/N 0955-0446) and a 3-year return-to-Agilent service warranty are also included.

## Transmission/reflection analyzer options

Any combination of the following options may be ordered with an ET model analyzer.

**004** step attenuator: adds a 55-dB step attenuator to increase the source output power range.

**010** time-domain capability: allows time-domain measurements.

**1D5** high-stability frequency reference: replaces standard frequency reference with a higher stability unit.

# S-parameter Network Analyzers

**8719ES** vector network analyzer,  
50 MHz to 13.5 GHz

**8720ES** vector network analyzer,  
50 MHz to 20 GHz

**8722ES** vector network analyzer,  
50 MHz to 40 GHz

Included with a standard network analyzer is a manual set which includes an installation and quick start guide, user's guide, reference guide, programmer's guide, example programs CD-ROM, and a CD-ROM containing the manual set. A bandpass filter test device (P/N 0955-0446) and a 3-year return-to-Agilent service warranty are also included.

# Network Analyzer Options

## S-parameter analyzer options

Some ES options cannot be ordered with other options. See option compatibility table below.

- 007** mechanical transfer switch: replaces the solid-state transfer switch with a mechanical transfer switch. Increases test port power and dynamic range by 5 dB.
- 010** time-domain capability: allows time-domain measurements.
- 012** direct sampler access: configures the test set with direct access to A and B sampler receiver inputs. Operates as a standard instrument with the jumpers installed.
- 085** high-power S-parameter test set modification: deletes bias tees and adds a mechanical transfer switch and internal attenuators. Allows insertion of an amplifier before the transfer switch and insertion of isolators in the measurement configuration. Includes direct sampler access (Option 012).
- 089** frequency offset mode: modifies the test set and firmware. Provides mixer measurement capability, allowing a receiver frequency offset from the source.
- 1D5** high-stability frequency reference: replaces standard frequency reference with a higher stability unit.
- 400** adds fourth sampler and TRL calibration firmware: replaces the transfer switch with a solid-state switch/splitter.

The following options apply to both ET and ES models:

## Hardware options

- 1CM** adds rack mount flange kit for use without handles
- 1CP** adds rack mount flange kit for use with handles<sup>1</sup>

## Information options

- 0B0** deletes manual set
- 0B1** adds extra manual set
- 0BW** adds service guide, part number 08720-90397

The following language options provide a translated user's guide:

- ABF** French manual, part number 5967-8509
- ABJ** Japanese manual, part number 5967-8503

## Service options

- W01** converts three year return-to-Agilent service warranty to one year on-site service warranty.<sup>2</sup>
- W32** adds three years of return-to-Agilent calibration.
- W34** adds three years of return-to-Agilent standards-compliant calibration.
- W52** adds five years of return-to-Agilent calibration.
- W54** adds five years of return-to-Agilent standards-compliant calibration.

## Certification options

- UK6** commercial calibration certification with test data
- 1BN** mil standard 45662A calibration certification
- 1BP** mil standard 45662A calibration certification with test data

## S-Parameter Network Analyzer Option Compatibility

Option	Option 1D5	Option 007	Option 010	Option 012	Option 085	Option 089	Option 400
<b>1D5</b> High-stability frequency reference	—	Yes	Yes	Yes	Yes	Yes	Yes
<b>007</b> Mechanical transfer switch	Yes	—	Yes	Yes	No <sup>4</sup>	Yes	No <sup>3</sup>
<b>010</b> Time domain	Yes	Yes	—	Yes	Yes	Yes	Yes
<b>012</b> Direct sampler access	Yes	Yes	Yes	—	No <sup>5</sup>	Yes	Yes
<b>085</b> High-power test	Yes	No <sup>4</sup>	Yes	No <sup>3</sup>	—	Yes	No <sup>3,4</sup>
<b>089</b> Frequency offset mode	Yes	Yes	Yes	Yes	Yes	—	Yes
<b>400</b> Four-sampler test set	Yes	No <sup>3</sup>	Yes	Yes	No <sup>3,4</sup>	Yes	—

1. The 8720E family of network analyzers is supplied with handles.  
 2. Only where on-site service is available.  
 3. Option 400 uses solid-state switch splitter in place of transfer switch.  
 4. Option 085 requires and includes a mechanical transfer switch.  
 5. Option 085 includes direct sampler access (Option 012).

# Measurement Accessories

Accessories are available in these connector types: 7 mm, K-connector (2.92 mm), Type-N, 3.5 mm (SMA-compatible), 2.4 mm coaxial, 7-16, WR-90 (X Band), WR-62 (P Band), WR-42 (K Band), WR-28 (R Band)

For a complete list of Agilent's coaxial and waveguide accessories, ask your Agilent sales representative for the RF & Microwave Test Accessories Catalog (literature number 5968-4314E).

## Calibration kits

### Coaxial measurements

For coaxial measurements, Agilent offers two types of calibration kits:

**Economy**, includes:

- open standards (male and female)
- short standards (male and female)
- fixed-termination standards (male and female)
- in-series adapters

**Standard**, includes the devices in the economy kit and adds:

- sliding loads
- connector gages

**Precision**, includes the devices in the economy kit and adds:

- 50 ohm airline for TRL calibration
- TRL adapters
- connector tools

### Waveguide measurements

For waveguide measurements, Agilent offers calibration kits that include:

- waveguide-to-coax adapters (X, P, K)
- precision waveguide section
- flush short circuit
- fixed terminations
- straight section

### Electronic calibration

Agilent also offers electronic calibration systems.

These systems require an Agilent 85097A interface kit and electronic calibration kit.

The calibration kit includes:

- highband ECal module
- torque wrench
- optional adapters
- optional lowband ECal module

## Verification kits

All Agilent verification kits include:

- precision  $Z_0$  airline
- mismatched airline
- fixed attenuators
- traceable measured data and uncertainties

## Cables and adapter sets

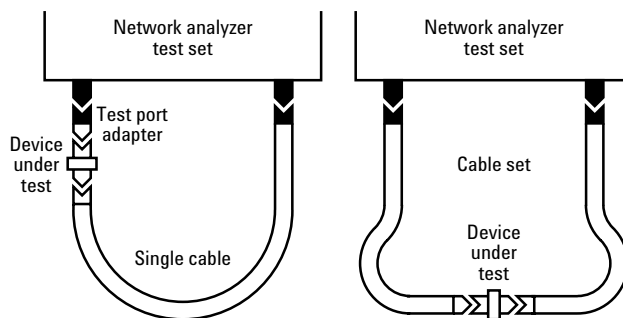
Agilent offers cables in the following types:

- single cables in semi-rigid and flexible
- cable set 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.



## For devices with 3.5 mm or SMA connectors

### Calibration kits

**85052B** standard: 0.045 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  
85052-60008 3.5 mm (m) open  
85052-60009 3.5 mm (f) open  
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

**Option K11** PSC-3.5 slotless female center contact repair kit

**85052C** precision TRL: 0.045 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  
85052-60008 3.5 mm (m) open  
85052-60009 3.5 mm (f) open  
85052-60032 3.5 mm (f) to 3.5 mm (f) adapter  
85052-60033 3.5 mm (m) to 3.5 mm (m) adapter  
85052-60034 3.5 mm (f) to 3.5 mm (m) adapter  
85052-60035 3.5 mm short TRL line  
85052-60036 3.5 mm long TRL line

**85052D** economy: 0.045 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  
85052-60008 3.5 mm (m) open  
85052-60009 3.5 mm (f) open  
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

**85033D** economy: DC to 6 GHz. Includes:

1250-1746 3.5 mm (f) to 7 mm adapter  
1250-1747 3.5 mm (m) to 7 mm adapter  
85033-60009 3.5 mm (m) load  
85033-60010 3.5 mm (f) load  
85033-60011 3.5 mm (m) open  
85033-60012 3.5 mm (f) open  
85033-60013 3.5 mm (m) short  
85033-60014 3.5 mm (f) short

**Option 001** deletes 3.5 mm to 7 mm adapters

### Electronic calibration kits

**85093B** RF ECal:<sup>2</sup> 30 kHz to 9 GHz. Includes:

85093-60005 3.5 mm (f) to 3.5 mm (m) RF ECal module

**Option 00M** substitutes:

85093-60006 3.5 mm (m) to 3.5 mm (m) RF ECal module

**Option 00F** substitutes:

85093-60007 3.5 mm (f) to 3.5 mm (f) RF ECal module

**Option 00A** adds:

85052-60012 3.5 mm (f) to 3.5 mm (f) adapter

85052-60014 3.5 mm (m) to 3.5 mm (m) adapter

**85062B** MW ECal:<sup>2</sup> 1 GHz to 26.5 GHz. Includes:

85062-60002 3.5 mm (f) to 3.5 mm (m) MW ECal module

**Option 00M** substitutes:

85062-60004 3.5 mm (m) to 3.5 mm (m) MW ECal module

**Option 00F** substitutes:

85062-60006 3.5 mm (f) to 3.5 mm (f) MW ECal module

**Option 001** adds:

a 30 kHz to 9 GHz RF ECal module

85093-60005 3.5 mm (f) to 3.5 mm (m) RF ECal module

**Option 00A** adds:

85052-60012 3.5 mm (f) to 3.5 mm (f) adapter

85052-60014 3.5 mm (m) to 3.5 mm (m) adapter

### Verification kits

**85053B** 0.045 to 26.5 GHz

**Option 1BP** MIL-STD 45662A calibration certificate with test data

### Cables for either 8719ET/ES or 8720ET/ES

**85131C** single, semi-rigid: 3.5 mm to 3.5 mm, 81 cm, 32 inches

**85131D** set, semi-rigid: 3.5 mm to 3.5 mm, 53 cm each, 21 inches

**85131E** single, flexible: 3.5 mm to 3.5 mm, 96 cm, 38 inches

**85131F** set, flexible: 3.5 mm to 3.5 mm, 53 cm each, 21 inches

### Cables for the 8722ET/ES

**85134C** single, semi-rigid: 3.5 mm to 2.4 mm, 81 cm, 32 inches

**85134D** set, semi-rigid: 3.5 mm to 2.4 mm, 53 cm each, 21 inches

**85134E** single, flexible: 3.5 mm to 2.4 mm, 96 cm, 38 inches

**85134F** set, flexible: 3.5 mm to 2.4 mm, 53 cm each, 21 inches

### Adapter sets

**85130D** 8719/8720 only: 3.5 mm<sup>3</sup> to 3.5 mm

**85130F** 8722 only: 2.4 mm<sup>3</sup> to 3.5 mm

1. Kit includes open and short circuits, fixed broadband loads, precision short airlines, TRL adapters, and 3.5 mm connector tools.  
2. Requires an Agilent 85097A interface kit.  
3. Special rugged female connector specifically for connecting to the network analyzer test port, but does not mate with a standard male connector.

# Measurement Accessories, continued

## For devices with 7 mm connectors

### Calibration kits

**85050B** standard: 0.045 to 18 GHz. Includes:

00909-60008 7 mm coax termination  
85050-60006 7 mm fixed broadband load  
85050-80007 7 mm short  
85050-80010 7 mm open  
85050-80011 7 mm sliding load

**85050C**<sup>1</sup> precision TRL: 0.045 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  
85050-80007 pin collet assembly  
85050-80008 7 mm short  
85050-80009 7 mm short collet  
85050-80010 7 mm open

**85050D** economy: 0.045 to 18 GHz. Includes:

85050-60006 7 mm fixed broadband load  
85050-80007 7 mm short  
85050-80010 7 mm open

**85031B** economy: 30 kHz to 6 GHz. Includes:

00909-60008 7 mm coax termination  
85050-60001 7 mm open/short

### Electronic calibration kits

**85091B RF ECal**:<sup>2</sup> 30 kHz to 9 GHz. Includes:

85091-60003 7 mm to 7 mm RF ECal module

**85060B MW ECal**:<sup>2</sup> 1 GHz to 18 GHz. Includes:

85060-60002 7 mm to 7 mm MW ECal module

**Option 001**: adds a 30 kHz to 9 GHz RF ECal module

85091-60003 7 mm to 7 mm RF ECal module

### Verification kit

**85051B** 8719/8720 only: 0.045 to 18 GHz

**Option 1BP** MIL-STD 45662A calibration certificate with test data

### Cables for either 8719ET/ES or 8720ET/ES

**85132C** single, semi-rigid: 7 mm to 3.5 mm, 81 cm, 32 inches

**85132D** set, semi-rigid: 7 mm to 3.5 mm, 53 cm each, 21 inches

**85132E** single, flexible: 7 mm to 3.5 mm, 96 cm, 38 inches

**85132F** set, flexible: 7 mm to 3.5 mm, 53 cm each, 21 inches

### Cables for the 8722ET/ES

**85135C** single, semi-rigid: 7 mm to 2.4 mm, 81 cm, 32 inches

**85135D** set, semi-rigid: 7 mm to 2.4 mm, 53 cm each, 21 inches

**85135E** single, flexible: 7 mm to 2.4 mm, 96 cm, 38 inches

**85135F** set, flexible: 7 mm to 2.4 mm, 53 cm each, 21 inches

### Adapter sets

**85130B** 8719/20 only: 3.5 mm<sup>3</sup> to 7 mm

**85130E** 8722 only: 2.4 mm<sup>3</sup> to 7 mm

## For devices with Type-N connectors

### Calibration kits

**85054B** standard: 0.045 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  
85054-60027 Type-N (m) open  
85054-60028 Type-N (f) open

85054-60031 Type-N (f) to 7 mm adapter

85054-60032 Type-N (m) to 7 mm adapter

85054-60037 Type-N (f) to Type-N (f) adapter

85054-60038 Type-N (m) to Type-N (m) adapter

85054-80010 Type-N (f) sliding load

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

**Option K11** PSC-N slotless contact repair kit

**85054D** economy: 0.045 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 7 mm adapter

85054-60032 Type-N (m) to 7 mm 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

**85092B RF ECal**:<sup>2</sup> 30 kHz to 9 GHz. Includes:

85092-60005 Type-N (f) to Type-N (m) RF ECal module

**Option 00M** substitutes:

85092-60006 Type-N (m) to Type-N (m) RF ECal module

**Option 00F** substitutes:

85092-60007 Type-N (f) to Type-N (f) RF 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

**85064B MW ECal**:<sup>2</sup> 1 GHz to 18 GHz. Includes:

85064-60002 Type-N (f) to Type-N (m) MW ECal module

**Option 00M** substitutes:

85064-60004 Type-N (m) to Type-N (m) MW ECal module

**Option 00F** substitutes:

85064-60006 Type-N (f) to Type-N (f) MW ECal module

**Option 001**: adds a 30 kHz to 9 GHz RF ECal module

85092-60005 Type-N (f) to Type-N (m) RF 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

1. Kit includes open and short circuits, fixed loads, precision short airline, 7 mm connector tools, and gauges.

2. Requires an Agilent 85097A interface kit.

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



### Verification kit

**85055A** 8719/8720 only: 0.045 to 18 GHz

**Option 1BP** MIL-STD 45662A calibration certificate with test data

### Cables

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).

### Adapter set

**85130C** 8719/8720 only: 3.5 mm<sup>1</sup> to Type-N

## For devices with 2.4 mm connectors

### Calibration kits

**85056A** standard: 0.045 to 50 GHz. Includes:

00901-60003 2.4 mm (m) fixed broadband load  
00901-60004 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: 0.045 to 50 GHz. Includes:

00901-60003 2.4 mm (m) fixed broadband load  
00901-60004 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

### Verification kit

**85057B** 8722 only: 0.045 to 50 GHz

**Option 1BP** MIL-STD 45662A calibration certificate with test data

### Cables for the 8722ET/ES

**85133C** single, semi-rigid: 2.4 mm, 81 cm, 32 inches

**85133D** set, semi-rigid: 2.4 mm, 53 cm each, 21 inches

**85133E** single, flexible: 2.4 mm, 81 cm, 32 inches

**85133F** set, flexible: 2.4 mm, 53 cm each, 21 inches

### Adapter set

**85130G** 8722 only: 2.4 mm<sup>1</sup> to 2.4 mm

## For devices with K connectors (2.92 mm)

### Calibration kit

**85056K**<sup>2</sup> economy, 2.92/2.4 mm: 0.045 to 40 GHz.

Includes:

00901-60003 2.4 mm (m) fixed broadband load  
00901-60004 2.4 mm (f) fixed broadband load  
00915-60003 2.4 mm (m) sliding load  
00915-60004 2.4 mm (f) sliding load  
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

**Option 001** adds 2.4 mm sliding loads and gages

### Cables<sup>3</sup>

**85133C** single, semi-rigid: 2.4 mm, 81 cm, 32 inches

**85133D** set, semi-rigid: 2.4 mm, 53 cm each, 21 inches

**85133E** single, flexible: 2.4 mm, 81 cm, 32 inches

**85133F** set, flexible: 2.4 mm, 53 cm each, 21 inches

### Adapters

**11904A** 2.4 mm (m) to K (m)

**11904B** 2.4 mm (f) to K (f)

**11904C** 2.4 mm (m) to K (f)

**11904D** 2.4 mm (f) to K (m)

**11904S** 2.4 mm to K adapter set

## For devices with 7-16 connectors

### Calibration kits

**85038A** standard: 30 kHz to 7.5 GHz. Includes:

85038-80002 7-16 (f) open  
85038-80003 7-16 (m) open  
85038-80004 7-16 (f) short  
85038-80005 7-16 (m) short  
85038-80006 7-16 (f) fixed load  
85038-80007 7-16 (m) fixed load  
8710-2175 torque wrench  
8710-2174 open-end wrench

**85038F** economy: 30 kHz to 7.5 GHz. Includes:

85038-80002 7-16 (f) open  
85038-80004 7-16 (f) short  
85038-80006 7-16 (f) fixed load  
11906-80016 7-16 (f) to 7-16 (f) adapter

1. Special rugged female connector specifically for connecting to the network analyzer test port, but does not mate with a standard male connector.  
2. This kit can be used to calibrate in the 2.4 mm interface, as well as measure in the 2.92 mm (K connector).  
3. 2.4 mm to K type adapters are required in addition to these cables.

# Measurement Accessories, continued

**85038M** economy: 30 kHz to 7.5 GHz. Includes:  
85038-80003 7-16 (m) open  
85038-80005 7-16 (m) short  
85038-80007 7-16 (m) fixed load  
11906-80015 7-16 (m) to 7-16 (m) adapter

## Electronic calibration kit

**85098B** RF ECal:<sup>1</sup> 30 kHz to 7.5 GHz. Includes:  
85098-60005 7-16 (m) to 7-16 (f) RF ECal module  
**Option 00F** substitutes:  
85098-60007 7-16 (f) to 7-16 (f) RF ECal module  
**Option 00M** substitutes:  
85098-60006 7-16 (m) to 7-16 (m) RF ECal module  
**Option 00A** adds:  
11906-80015 7-16 (m) to 7-16 (m) adapter  
11906-80016 7-16 (f) to 7-16 (f) adapter

## Cables

Use the test port cables recommended for devices with 7 mm, 3.5 mm, or Type-N connectors and use the appropriate 11906 series adapter kit.

## Adapter kits

**11906A** 7-16 to 7-16. Includes:  
11906-80015 7-16 (m) to 7-16 (m) adapter  
11906-80016 7-16 (f) to 7-16 (f) adapter  
11906-80017 7-16 (m) to 7-16 (f) adapter (two included)  
**11906B** 7-16 to Type-N. Includes:  
11906-80007 Type-N (m) to 7-16 (m) adapter  
11906-80008 Type-N (f) to 7-16 (f) adapter  
11906-80009 Type-N (f) to 7-16 (m) adapter  
11906-80010 Type-N (m) to 7-16 (f) adapter  
**11906C** 7-16 to 7-mm. Includes:  
11906-80012 7-mm to 7-16 (m) adapter (two included)  
11906-80013 7-mm to 7-16 (f) adapter (two included)  
**11906D** 7-16 to 3.5-mm. Includes:  
11906-80002 3.5-mm (m) to 7-16 (m) adapter  
11906-80005 3.5-mm (m) to 7-16 (f) adapter  
11906-80004 3.5-mm (f) to 7-16 (m) adapter  
11906-80003 3.5-mm (f) to 7-16 (f) adapter

## For devices with waveguide

### X Band

**X11644A** calibration kit (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 (open)  
X281C waveguide to 7 mm coax adapter  
**8719/8720: 85132F** cable set (set, flexible, 7 mm to 3.5 mm, 53 cm each, 21 inches)  
**8722: 85135F** cable set (set, flexible, 7 mm to 2.4 mm, 53 cm each, 21 inches)  
**X281C** adapter (included in calibration kit):  
WR-90 to 7 mm

### P Band

**P11644A** calibration kit (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 (open)  
P281C waveguide to 7 mm coax adapter  
**8719/8720: 85132F** cable set (flexible, 7 mm to 3.5 mm, 53 cm each, 21 inches)  
**8722: 85135F** cable set (flexible, 7 mm to 2.4 mm, 53 cm each, 21 inches)  
**P281C** adapter (included in calibration kit):  
WR-62 to 7 mm

### K Band

**K11644A** calibration kit (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 (open)  
K281C waveguide to 3.5 mm (f) coax adapter  
**8719/8720: 85131F** cable set (set, flexible, 3.5 mm to 3.5 mm, 53 cm each, 21 inches)  
**8722: 85134F** cable set (set, flexible, 3.5 mm to 2.4 mm, 53 cm each, 21 inches)  
**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** calibration kit (standard, WR-28, 26.5 to 40 GHz). Includes:  
00914-60028 R-band termination  
11644-20005 R-band short  
11644-20003 R-band shim (open)  
11644-60001 R-band 10 cm straight waveguide  
11644-60016 R-band 5 cm straight waveguide  
**8722: 85133F** cable set (set, flexible, 2.4 mm, 53 cm each, 21 inches)  
**R281A** adapter (2.4 mm (f) to WR-28 waveguide adapter)  
**R281B** adapter (2.4 mm (m) to WR-28 waveguide adapter)

1. Requires an Agilent 85097A ECal interface kit.



# Test Configuration Accessories

## Power meters<sup>1</sup>

**E4418B** EPM series, single channel

**E4419B** EPM series, dual channel

## Power sensors

**8481B** 10 MHz to 18 GHz, Type-N (m), 25 watt

**8482B** 100 kHz to 4.2 GHz, Type-N (m), 25 watt

**8485A** 50 MHz to 26.5 GHz, APC-3.5 mm (m), 100 mW

**8481A** 10 MHz to 18 GHz, Type-N (m), 100 mW

**8482A** 100 kHz to 4.2 GHz, Type-N (m), 100 mW

**8483A** 100 kHz to 2 GHz, Type-N (m), 75 ohm, 100 mW

**R8486A** 26 GHz to 40 GHz, waveguide flange UG-599/U, 100 mW

**8487A** 50 MHz to 50 GHz, 2.4 mm (m), 100 mW

## Power amplifiers<sup>2</sup>

**83006A** 0.01 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** 0.05 to 26.5 GHz, 25 dB gain, power out:

+20 dBm to 20 GHz or +15 dBm to 26.5 GHz

**83018A** 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** 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** 2 to 50 GHz, 23 dB gain, power out:

+20 dBm to 40 GHz or +17 dBm to 50 GHz

**83051A** pre-amplifier, 0.045 to 50 GHz, 23 dB gain,

power out: +12 dBm to 45 GHz or +10 dBm to 50 GHz

## Couplers

**87300B** coaxial: 1 to 20 GHz, SMA (f), 10 dB coupling

**87300C** coaxial: 1 to 26.5 GHz, 3.5 mm (f), 10 dB coupling

**87301D** coaxial: 1 to 40 GHz, 2.4 mm (f) or optional

2.92 mm (f), 13 dB coupling

**87310B** 90° coaxial: 1 to 18 GHz, SMA (f), 3 dB

coupling

**87301E** coaxial: 2 to 50 GHz, 2.4 mm (f), 10 dB

coupling

## Test fixtures

For TRL/LRM and TOSL calibration standards, microstrip adapters, and test fixtures, Agilent recommends ICM<sup>3</sup> adjustable test fixture mainframe series TF-3000, which is compatible with the ICM TRL-3000 series calibration kits.

## Bias supplies<sup>4</sup>

**6626A** precision DC power supply; 2 A, 50 V maximum

**6629A** quad-out precision GPIB DC power supply

**4142B** modular DC source/monitor; 10 A, 200 V maximum

## Bias networks<sup>5</sup>

**11590B** 100 MHz to 12.4 GHz, Type-N, 0.5 A and 100 V maximum bias

**Option 001** 100 MHz to 18 GHz, 7 mm, 0.5 A and 100 V maximum bias

**11612A** 45 MHz to 26.5 GHz, 3.5 mm (f), 0.5 A and 40 V maximum bias

**Option 001** 2 A maximum bias

**11612B** 45 MHz to 50 GHz, 2.4 mm (f), 0.5 A maximum bias

## System software

**85070C** high-temperature dielectric probe kit.

Includes the dielectric probe, software on 3.5 inch disk, cables, port/cable adapters, switch, short circuit, mounting bracket, adapters, 50-ohm termination, stand, vials, and stoppers. Measures complex permittivity of materials. Standard software version runs on PC with Windows<sup>®</sup> 95, 98, or NT 4.0.

**85071C** materials measurement software.

Measures complex permeability and permittivity of materials in a transmission line environment. Software runs on a PC with Windows<sup>®</sup> 95, 98, or NT 4.0.

**85190A** IC-CAP modeling suite<sup>6</sup>

Design Software, Advanced Design System series (ADS) and Series IV<sup>6</sup> connector repair kits

## Application support

Agilent 50629E productivity assistance; provides one hour of on-site consulting and assistance delivered by an application engineer. Hourly charges apply from portal to portal to cover travel costs.

1. A power meter with the appropriate Agilent 8480 series power sensor is required for use with the power meter calibration feature.
2. RF connectors: 3.5 mm (f) on RF input and output; BNC (f) detector out. 2.4 mm (f) on RF input and output for 85050A, 83051A.
3. Inter-Continental Microwave, 1515 Wyatt Drive, Santa Clara, CA 95054-1524, Telephone: (408) 727-1596 Fax: (408) 727-0105
4. For internally biasing with the 8719ES/8720ES/8722ES.
5. For supplying DC bias externally from test sets. Internal bias networks have a current limit of 0.5 A.
6. Consult with an Agilent systems application engineer. The product you order will depend on the test environment.

## Peripheral Accessories

### Printers

For a current list of compatible printers, consult our printer-compatibility guide on the World Wide Web at [www.agilent.com/find/pcg](http://www.agilent.com/find/pcg)

### Interface cables

**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.)

### Keyboard

A keyboard with mini-DIN cable can be connected to the Agilent 8720E family of network analyzers interface to form a remote front panel and to provide a quicker, more convenient way to enter titles, labels, and file names.

### Equipment racks

**5063-9223** rack mount flange kit, for use with handles; includes handles<sup>1</sup>

**5063-9236** rack mount kit, for use with handles; does not include handles. May be ordered as Option 1CP.

**5063-9216** rack mount kit, for use without handles. May be ordered as Option 1CM.

**1181B** system testmobile, 3 ft. tall (see literature number 5091-1233E)

**1540-1695** operating case

**9211-2657** transit case

### Computers

Any computer configured with a GPIB interface card and software drivers

### Monitors

Any VGA-compatible monitor

## Literature and Manuals

### Literature

Agilent 8720E family overview, literature number 5968-5161E

Agilent 8720E family data sheet, literature number 5968-5163E

For more information about the Agilent 8720E family, visit our Web site at [www.agilent.com/find/8720](http://www.agilent.com/find/8720)

### Manuals

One manual set is included with each network analyzer. Additional manual sets and service manuals may be ordered as options when a network analyzer is purchased, or separately using the part numbers. For on-line manuals, visit our Web site at [www.agilent.com/find/manuals](http://www.agilent.com/find/manuals)

**8719/20/22 ET/ES** manual set, part number 08720-90390. Includes:

**Installation and Quick Start Guide**, 08720-90391

**User's Guide**, 08720-90392

**Reference Guide**, 08720-90393

**Programmer's Guide**, 08753-90475

**CD-ROM**, 08720-90418; includes all documents in the manual set

**8719/20/22 ET/ES** service guide, part number 08720-90397. Includes service guide on CD-ROM, part number 08720-90419.

# Upgrades

## Network analyzer upgrade kits

Options may be added to an Agilent 8720E series network analyzer after initial purchase by ordering the instrument's model number followed by a "U" to indicate an upgrade, and specifying one or more of the following upgrade options. Some options are available only for certain models, as noted in the description. Refer to the option compatibility matrix on page 3 to determine if a desired option is compatible with existing options in an ES-model network analyzer.

- 004** adds 55-dB step attenuator to an ET model analyzer for extended output power range. Includes installation at an Agilent service center.
- 007** adds mechanical S-parameter transfer switch to an ES model analyzer, replacing the standard solid-state switch. Includes installation at an Agilent service center.
- 010** adds time domain capability. Includes installation at an Agilent service center.
- 012** modifies S-parameter test set in an ES model analyzer for direct sampler access. Front panel jumpers also allow standard instrument operation. Includes installation at an Agilent service center.
- 020** for 8719ET or 8719ES only. Adds 20 GHz operation. Includes installation at an Agilent service center.
- 040** for 8719ET/ES and 8720ET/ES only. Adds 40 GHz operation. Includes installation at the Agilent factory.
- 085** modifies S-parameter test set in an ES model analyzer for high power measurement capability and provides direct sampler access. Includes installation at the Agilent factory.
- 089** modifies S-parameter test set and firmware in an ES model analyzer for frequency offset mixer test capability. Includes installation at an Agilent service center.
- 1D5** adds high stability frequency reference. Includes installation at an Agilent service center.
- 400** adds fourth sampler and TRL calibration firmware to an ES model analyzer. Includes installation at the Agilent factory.

Agilent 8719D, 8720D, and 8722D analyzers can be upgraded to have their firmware include the new features introduced in the ES models with one of the following upgrades.

### **8719DU, 8720DU, or 8722DU** upgrade kit

**Option 000** performance upgrade kit for an 8719D, 8720D, or 8722D with firmware revision below 7.0. Adds new CPU board and firmware, which offers measurement and data-transfer speed improvements and the latest firmware. Includes installation at an Agilent service center.

**Option 099** firmware upgrade for an 8719D, 8720D, or 8722D with firmware revision above 7.0.

This firmware upgrade can be installed by the user. The firmware is also available for download from Agilent's website. Go to [www.agilent.com/find/8720](http://www.agilent.com/find/8720)

# Application and Product Notes

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	<b>Pub. Number</b>
<i>Basics of Measuring the Dielectric Properties of Materials, Application note 1217-1</i>	5091-3300E
<i>Understanding the Fundamental Principles of Vector Network Analysis, Application note 1287-1</i>	5965-7707E
<i>Exploring the Architectures of Network Analyzers, Application note 1287-2</i>	5965-7708E
<i>Applying Error Correction to Network Analyzer Measurements, Application note 1287-3</i>	5965-7709E
<i>Network Analyzer Measurements: Filter and Amplifier Examples, Application note 1287-4</i>	5965-7710E
<i>Improving Throughput in Network Analyzer Applications, Application note 1287-5</i>	5966-3317E
<i>Using a Network Analyzer to Characterize High-Power Components, Application note 1287-6</i>	5966-3319E
<i>Improving Network Analyzer Measurements of Frequency-Translating Devices, Application note 1287-7</i>	5966-3318E
<i>Simplified Filter Tuning Using Time-Domain Analysis, Application note 1287-8</i>	5968-5328E
<i>In-Fixture Measurements Using Vector Network Analyzers, Application note 1287-9</i>	5968-5329E
<i>8 Hints for Making Better Network Analyzer Measurements, Application note 1291-1</i>	5965-8166E
<i>Specifying Calibration Standards for the Agilent 8510 Network Analyzer, Product note 8510-5A</i>	5956-4352
<i>Applying TRL Cal to Non-Coaxial Measurements, Product note 8510-8A</i>	5091-3645E
<i>Testing Amplifiers and Active Devices with the Agilent 8720C, Product note 8720-1</i>	5091-1942E
<i>In-Fixture Measurements with the Agilent 8720C, Product note 8720-2</i>	5091-1943E

## Agilent Technologies' Test and Measurement Support, Services, and Assistance

Agilent Technologies aims to maximize the value you receive, while minimizing your risk and problems. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully. Every instrument and system we sell has a global warranty. Two concepts underlie Agilent's overall support policy: "Our Promise" and "Your Advantage."

### Our Promise

Our Promise means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you receive your new Agilent equipment, we can help verify that it works properly and help with initial product operation.

### Your Advantage

Your Advantage means that Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contracting with us for calibration, extra-cost upgrades, out-of-warranty repairs, and onsite education and training, as well as design, system integration, project management, and other professional engineering services. Experienced Agilent engineers and technicians worldwide can help you maximize your productivity, optimize the return on investment of your Agilent instruments and systems, and obtain dependable measurement accuracy for the life of those products.

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Contacts revised: 09/26/05

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[www.agilent.com/find/contactus](http://www.agilent.com/find/contactus)

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