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**Agilent Technologies**

## HP Precision LCR Meter Family

HP 4284A 20Hz-1 MHz LCR Meter  
HP 4285A 75 kHz-30 MHz LCR Meter  
HP 4286A 1 MHz-1 GHz RF LCR Meter  
HP 42841A 20Adc Bias Current Source  
HP 42851A Precision Q Adapter

**New Standards For Precise  
Component, Semiconductor and  
Material Measurements**

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### Awareness Brochure

**Expanded LCR Meter Performance to 1 GHz!**



#### **HP Precision LCR Meter Family**

The HP Precision LCR Meter Family combines exceptional impedance measurement capabilities with advanced features to satisfy your performance needs from 20 Hz to 1 GHz

## HP Precision LCR Meter Family Frequency Range

|          | LF   | HF    | RF    |
|----------|------|-------|-------|
| HP 4284A | 20Hz | 1MHz  |       |
| HP 4285A |      | 75kHz | 30MHz |
| HP 4286A |      | 1MHz  | 1GHz  |

## HP 4284A/85A Features



### Utilize State-of-the-Art Measurement Technologies

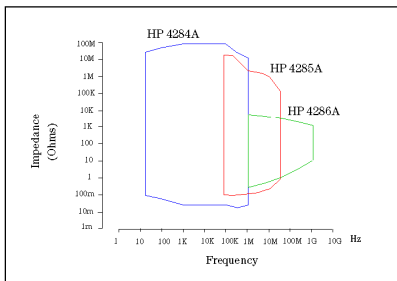
- Basic Accuracy:
  - 0.05% HP 4284A
  - 0.1% HP 4285A
- Constant V or I Test Signal Level
- 20 Vrms Level Option (HP 4284A Opt. 001)
- 40 Vdc DC Bias (Option. 001)
- 40 Adc with HP 42841A

### Move Your Process Toward Error-Free Operation

- Instrument Setup State Storage
- Instrument Memory Cards
- Comparator Functions
- Powerful Compensation

### Simplify Your System Development

- HP-IB, Handler I/F (Option. 201/202), Scanner I/F (Option. 301)
- Test Port Extension



Impedance Range (10% Accuracy)

## Wide Application of HP 4284/85A

- Power Inductor Characterization
- Precise Ceramic Capacitor Measurements
- Semiconductor C-V Evaluation
- Dielectric Material Properties

### Key Specifications<sup>1</sup>

#### HP 4284A Precision LCR Meter

|                   |  |
|-------------------|--|
| Test Frequency    | 20Hz-1MHz, over 8600 selectable points <sup>2</sup>  |
| Impedance Range   | 0.01m-99.9M $\Omega$   |
| Basic Accuracy    | Z: 0.05%<br>D: 0.0005  |
| Test Signal Level |  |
| Standard          | V: 5m-2Vrms<br>(V: 10m-1Vrms) <sup>3</sup><br>I: 50 $\mu$ -20mArms<br>(I: 100 $\mu$ -10mArms) <sup>3</sup>     |
| Opt. 001          | V: 5m-20Vrms<br>(V: 10m-10Vrms) <sup>3</sup><br>I: 50 $\mu$ -200mArms<br>(I: 100 $\mu$ -100mArms) <sup>3</sup> |
| DC Bias           |  |
| Standard          | 1.5V, 2V   |
| Opt. 001          | $\pm$ 40V with 0.1% accuracy   |
| Meas. Time        | 40m sec/ 190m sec/<br>830m sec @ 1kHz  |

- 1 Refer to HP 4284A specification sheet (PN5963-5390E) for more detailed information.
- 2 Frequency Point distribution based on geometric progression series
- 3 Constant Test Signal Level Range

### Key Specifications<sup>1</sup>

#### HP 4285A Precision LCR Meter

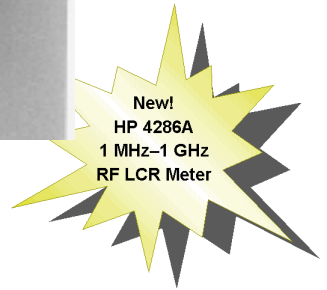
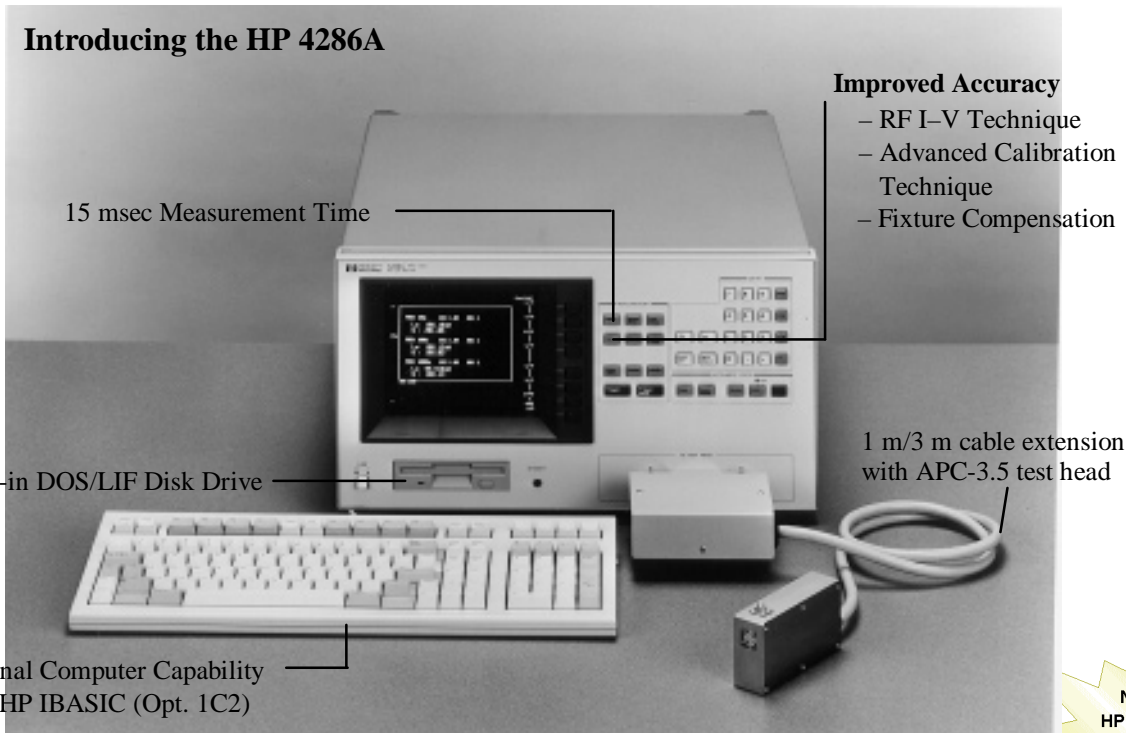
|                   |  |
|-------------------|--|
| Test Frequency    | 75kHz-30MHz with 100Hz resolution  |
| Impedance Range   | 0.01m-99.9M $\Omega$   |
| Basic Accuracy    | Z: 0.1%<br>D: 0.001  |
| Test Signal Level |  |
| Standard          | V: 5m-2Vrms<br>(V: 10m-1Vrms) <sup>2</sup><br>I: 50 $\mu$ -20mArms<br>(I: 100 $\mu$ -10mArms) <sup>2</sup> |
| DC Bias (Opt.001) | $\pm$ 40V with 0.1% accuracy   |
| Meas. Time        | 30m sec/ 65m sec/<br>200m sec  |

- 1 Refer to HP 4285A Specification Sheet (P/N 5963-5395E) for more detailed information.
- 2 Constant Test Signal Level Range

#### HP 4285A with Opt. 002 and HP 42851A

|                   |                |
|-------------------|----------------|
| Meas. Function    | Q-L/C          |
| Q range           | 5.00-999.99    |
| Basic Accuracy    | 5%             |
| Test Signal Level | $\leq$ 1.0Vrms |
| Auto Tuning Time  | 200m sec-1 sec |

## Satisfying Your Performance Needs HP 4286A RF LCR Meter



### HP 4286A Features New Precise Impedance Measurement Technique

- Basic Accuracy of 1% and wide impedance range with RF I-V technique
- Improved Q accuracy
- Advanced Compensation function
- APC-7 Fixtures

### Easy System Integration

- HP-IB, Handler I/F
- HP-IBASIC Option (1C2)
- 1 m/3 m Selectable extension cable

### High Throughput with Reliable Test

- Fast Measurement (15m sec)
- Binning/Limit Test Functions
- Contact Check For Inductor Testing
- 10 point List Sweep Function

### Wide Application of HP 4286A

- RF inductors
- SMD Components
- RF Amplifiers
- Hybrid ICs
- Impedance Matching of RF Circuits

### Key Specifications<sup>1</sup>

#### HP 4286A RF LCR Meter

|                   |                                   |
|-------------------|-----------------------------------|
| Test Frequency    | 1 MHz-1GHz with 10 kHz resolution |
| Impedance Range   | 200m-3k $\Omega$                  |
| Basic Accuracy    | Z: 1 %<br>D: 0.01                 |
| Test Signal Level |                                   |
| 1 m Cable:        | V: 10m-1Vrms<br>I: 0.2m-20m Arms  |
| 3m Cable:         |                                   |
| 1M-500MHz         | V: 10m-1Vrms<br>I: 0.2m-20mArms   |
| 500 M-1 GHz       | V: 10m-0.5Vrms<br>I: 0.2m-10mArms |
| Meas. Time        | 15msec                            |

<sup>1</sup> Refer to HP 4286A Specification Sheet (P/N 5963-5394E) for more detailed information.

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## Best Choice For LF/HF Testing

### Precise Ceramic Capacitor Measurements

1 kHz and 1 MHz are the primary testing frequencies for ceramic materials and capacitors. The HP 4284A can test at these frequencies while maintaining an excellent accuracy and 6 digits of resolution.



Ceramic Capacitor Evaluation

### Semiconductor Testing

The HP 4284A and HP 4285A allow you to evaluate the C-V characteristics of semiconductors at multiple frequencies. Small ac test signal levels and an accurate DC Bias can be applied so that you can evaluate the C-V characteristics.

### Dielectric Evaluation

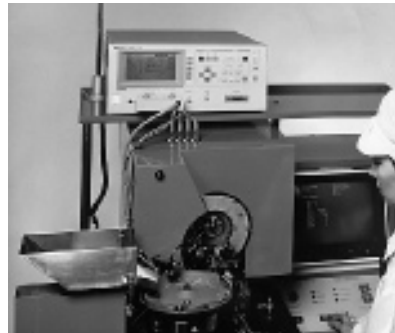
The HP 4284A and HP 4285A provides the accuracy, resolution, high test signal and bias levels required for material measurements. Using the HP 16451B Dielectric Test Fixture provides you with accurate dielectric and dissipation factor (loss tangent) measurements.

## Make Production Test Easier

The HP 4284A and HP 4285A reduce testing costs by providing accurate high throughput test platform. The built-in comparator, cable compensation and I/O interfaces permit system integration. Operation setup errors can be reduced by storing and recalling instrument states from memory cards or internal memory.

### Power Supply's Components Performance Evaluation

Designing advanced switching power supplies require the use of inductors and transformers that operate in high frequencies. For low frequencies, the HP 4284A, the HP 42841A and the HP 42842A/B all combine to form a 40 Adc bias test system. For high frequencies, use the HP 4285A, the HP 42841A, and the HP 42842C to achieve up to 10 Adc biasing measurements at 30 MHz.



Production Testing

### Direct Q measurements with the HP 42851A Precision Q Adapter

The HP 4285A and HP 42851A provide you with excellent Q accuracy at the resonant frequency. Tuning Operation, calculation of the measured values, and compensation are fully automated, thus improving measurement efficiency and reliability.



High Current Bias For Inductor Testing Under Load



HP 4285A with HP 42851A

## High Accuracy with wide Impedance Range

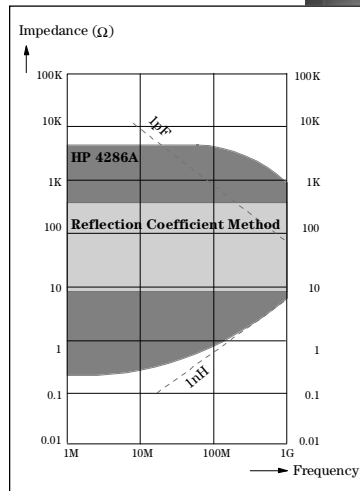
The HP 4286A RF LCR Meter offers accurate and reliable measurements. This will allow you to evaluate your components and improve circuit design. The HP 4286A employs a RF I-V measurement technique, as opposed to the reflection measurement technique, yielding an accurate impedance measurement that extends way beyond 50Ω.

## Precise RF Inductor Measurements

The expanding wireless communication market is rapidly increasing the use of RF inductors. The HP 4286A provides you with an accurate impedance measurement capability for RF inductors, especially for nH values. Q measurement accuracy has been improved due to HP's advanced calibration technique ; typical Q accuracy is 6% @ 100 MHz (Q=100). You can reduce the design uncertainty by measuring your devices true impedance values at operating conditions.

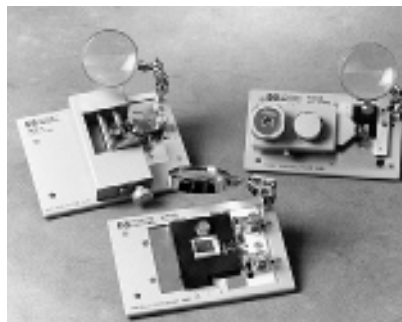
## Ease-of-Use

The HP 4286A can be easily used by pressing the front panel keys. By adding to the HP-IBASIC



**Impedance range (10% accuracy) comparison between HP 4286A versus reflections coefficient method**

Option (1C2), the HP 4286A allows you to customize measurement, test sequences, process control, and perform data analysis. A number of new APC-7 SMD test fixtures can be connected with the HP 4286A; you don't need to build your own fixture.



**HP 4286A Applicable Fixtures**

| SMD Fixture Specifications | HP 15191A      | HP 15192A      | HP 15193A      |
|----------------------------|----------------|----------------|----------------|
| Operating Frequency        | dc to 2 GHz    | dc to 2 GHz    | dc to 2 GHz    |
| Operating Temperature      | -55° to +85° C | -55° to +85° C | -55° to +85° C |
| DUT Size (length in mm)    | 2.0 to 12.0    | 1.0 to 28.8    | 0.5 to 3.2     |
| DUT connection             |                |                |                |



## RF Inductor for Testing

## Simplified Handler Integration

The HP 4286A is designed to test RF components in a production line. The 1m/3m selectable test head cable can be easily connected closely to the handler DUT (device under test) contacts without additional error. The built-in comparator function, a HP-IB interface and a Handler interface are available for integration with a component handler.

## Reliable and High Throughput Testing in Production Line

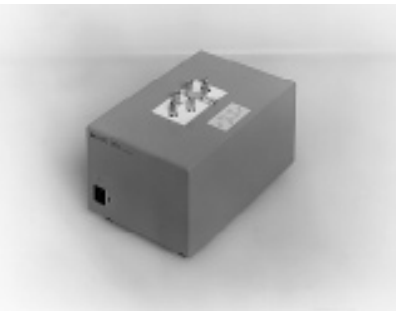
The HP 4286A allows you to reduce test time and improve testing efficiency and reliability. The measurement time is 15 milliseconds. Using the working standard set option (004) with the calibration/compensation functions minimizes the fixture parasitic residuals, allowing you to test the actual component characteristics.



**HP 42841A Bias Current Source**



**HP 42842A/B/C Bias Current Test Fixture**



**HP 42851A Precision Q Adapter**

The HP 42841A is used with either the HP 4284A or HP 4285A for high DC current bias measurements.

*Bias Current Output*

Up to 20 Adc maximum, 0.01 Adc steps

*Current Accuracy*

±1% to 1A, ±2% to 5A, ±3% to 20A

*Output Voltage*

38 Vdc maximum

*Frequency Range*

HP 4284A: 20 Hz to 1 MHz  
HP 4285A: Up to 30 Hz to when combined with the HP 42842C Bias Current Fixture.

*Test Signal Voltage*

0.5 Vrms to 2 Vrms

*Basic Impedance Accuracy*

HP 4284A: 2% for <1 kHz, 1% for 1 kHz to 1 MHz

HP 4285A:  $\sqrt{fm\%}$  + HP 4285A accuracy (fm=test frequency in MHz)

*Interface*

Custom, directly controllable by the HP 4284A/4285A with Option 002.

The HP 42842A/B/C are fixtures designed to interface from the HP 42841A Bias Current Source to inductive DUTs.

**Basic Impedance Accuracy**

Refer to HP 42841A specifications

*HP 42842A:* Up to 20 Adc maximum, used only with the HP 4284A

*HP 42842B:* Up to 40 Adc maximum, used only with the HP 4284A

*Component Dimensions*

(Maximum)

80 mm (W) x 80 mm (H) x 80 mm (D)

*HP 42842C*

Up to 10 Adc maximum, used only with the HP 4285A. Option 001 adds the SMD Test Fixture.

*Component Dimensions*

(Maximum)

60 mm (W) x 50 mm (H) x 60 mm (D)

The HP 42851A is used with the HP 4285A/Option 002 to perform automatic resonant Q factor measurements.

*Measurement Function*

Q (Quality factor), L (Inductance), C (Capacitance)

*Q Measurement Range*

5.00 to 999.99

*Basic Q Accuracy*

5%

*Test Signal Level*

≤1.0 Vrms

*Automatic Tuning Time*

200 ms to 1s

*Interface*

Custom, directly controllable by the HP 4285A with Option 002.

*Weight*

4.1 kg

*Dimensions*

180 mm (W) x 166 mm (H) x 290 mm (D)

*Option 001*

SMD Test Fixture

**HP 42843A Bias Current Cable**

This cable is used with the HP 4284A for configurations greater than 20 Adc. Refer to the configuration table in the Ordering Information section.

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## Ordering Information

### HP 4284A 20 Hz–1 MHz Precision LCR Meter

*Furnished Accessories:* Operation Manual, Memory Card, and Power Cable. (No test fixture is supplied with the HP 4284A.)

#### Options

- 001** Power Amplifier/40V DC Bias<sup>1</sup>
- 002** Bias Current Interface<sup>1,2</sup>
- 006** 2m/4m Cable Length Operation
- 008** Add Japanese Operation Manual
- 009** Delete Operation Manual
- 109** Delete HP-IB Interface
- 201** General Purpose Handler Interface<sup>2,3</sup>
- 202** Specific Handler Interface<sup>2,3</sup>
- 301** Scanner Compensation<sup>2</sup>
- 910** Extra Operation Manual
- UK6** Commercial Cal. Certificate with Test Data

- 1 Option 001 and 002 do not operate simultaneously.
- 2 A maximum of 2 (3 with Opt. 109) of the following may be installed at one time: Options 002, 201, 202, 301
- 3 Select either Option 201 or 202

### HP 4285A 75 kHz–30 MHz Precision LCR Meter

*Furnished Accessories:* Operation Manual, Memory Card, and Power Cable. (No test fixture is supplied with the HP 4285A.)

#### Options

- 001** 40V DC Bias<sup>1</sup>
- 002** Accessory Control Interface<sup>1,2</sup>
- 008** Add Japanese Operation Manual
- 009** Delete Operation Manual
- 109** Delete HP-IB Interface
- 201** General Purpose Handler Interface<sup>2,3</sup>
- 202** Specific Handler Interface<sup>2,3</sup>
- 301** Scanner Compensation<sup>2</sup>

- 910** Extra Operation Manual
- 915** Add Service Manual
- UK6** Commercial Cal. Certificate with Test Data

- 1 Option 001 and 002 do not operate simultaneously.
- 2 A maximum of 2 (3 with Opt. 109) of the following may be installed at one time: Options 002, 201, 202, 301
- 3 Select either Option 201 or 202

### Cabinet Options (HP 4284A/ HP 4285A)

#### Options

- 907** Handle kit
- 908** Rack Mount kit
- 909** Rack Flange and Handle kit

### HP 42851A Precision Q Adapter

#### Options

- 001** SMD Test Fixture
- 008** Add Japanese Operation Manual
- 009** Delete Operation Manual
- 910** Extra Operation Manual
- 915** Add Service Manual

### Bias Current Accessories

- HP 42841A Bias current Source
- HP 42842A 20 Adc Bias Current Test Fixture
- HP 42842B 40 Adc Bias current Test Fixture
- HP 42842C (10 Adc @30 MHz) Bias Current Test Fixture

#### Option

- 001** SMD Test Fixture HP 42843A Bias Current Cable

### Test fixtures for HP 4284A/ HP 4285A

- HP 16034E Test Fixture (SMD component)
- HP 16047A Test Fixture (Axial/Radial)
- HP 16047C Test Fixture (Axial/Radial)
- HP 16047D Test Fixture (Axial/Radial)

- HP 16048A Test Leads (0.94 m/BNC)
- HP 16048B Test Leads (0.94 m/SMC)
- HP 16048C Test Leads (1m/Alligator Clip)
- HP 16048D Test Leads (1.89 m/BNC)
- HP 16048E Test Leads (3.8m/BNC)
- HP 16065A External Voltage Bias Fixture
- HP 16334A Test Fixture (Tweezer contacts)
- HP 16451B Dielectric Test Fixture

### Other Accessories for HP 4284A/HP 4285A

- HP 10503A 50Ω cable, BNC(m)-BNC(m), 122 cm, UG-88C/U
- HP 16270A Memory Card Set (10 ea.)
- HP 16380A Standard Capacitor Set (1, 10, 100, 1000 pF)
- HP 16380C Standard Capacitor Set (10, 100, 1000 nF)
- HP 41200A Four-Terminal Pair Resistor Set (Open, Short, 100Ω)

The resistor set is needed for HP 4285A Cable length compensation of 1 and 2 m.

*Note:* HP printers capable of the following are usable with HP 4284A/4285A.

- 1. HP-IB Interface
- 2. Listen Only mode

### Instrument Configurations

#### 0–10 Adc Bias configuration (HP 4285A only)

- HP 4285A with Opt. 002, 1 ea.
- HP 42841A Bias Current Source, 1 ea.
- HP 42842C Bias Test Fixture, 1 ea. Opt. 001 adds SMD test fixture
- HP 16048A Test Leads, 1 ea.

### 0–20 Adc Bias configuration (HP 4284A only)

- HP 4284A with Opt. 002, 1 ea.
- HP 42841A Bias current Source, 1 ea.
- HP 42842A or HP 42842B Bias Test Fixture, 1 ea.

### 0–40 Adc Bias7 Configuration (HP 4284A only)

- HP 4284A with Opt. 002, 1 ea.
- HP 42841A Bias Current Source, 2 ea.
- HP 42842B Bias Test Fixture, 1 ea.
- HP 42843A Bias Test Fixture, 1 ea.
- HP 16048A Test Leads, 1 ea.

### Direct Q Measurement configuration (HP 4285A Only)

- HP 4285A with Opt. 002, 1 ea.
- HP 42851A Q Adapter, 1 ea.  
Opt. 001 adds SMD test fixture
- HP 10503A BNC-BNC Cable, 2 ea.
- HP 16048A Test Leads, 1 ea.

### HP 4286A 1 MHz–1GHz RF LCR Meter

*Furnished Accessories:* Right angle test head (1m)<sup>1</sup>, APC<sup>3</sup>. 5-to-APC7 adapter, Test Fixture Stand, HP 16195A APC-7 Calibration Kit<sup>2</sup>, Operation Manual, Floppy Disk, and Power Cable. (No test fixture is supplied with the HP 4286A.)

#### Options

- 021** Add straight angle test head (1 m)<sup>1</sup>
- 022** Add straight angle test head (3 m)<sup>1</sup>
- 031** Delete right angle test head (1 m)<sup>1</sup>
- 032** Add right angle test head (3 m)<sup>1</sup>
- 001** Delete HP 16195A Calibration Kit
- 002** Delete Test Fixture Stand
- 004** Add Working Standard Set<sup>3</sup>
- 1C2** Add HP-IBASIC, Keyboard, Cable
- 1CM** Rack Flange Kit (P/N 5062-3979)

**1CN** Front Handle Kit (P/N 5062-3991)

**1CP** Handle/Rack Kit (P/N 5062-3985)

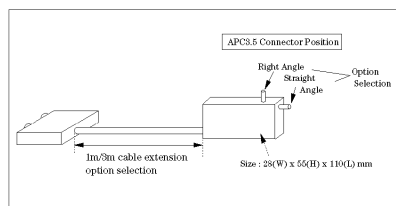
**0B0** Delete Operation Manual

**0B1** Add Operation Manual

**0BW** Add Service Manual

**ABA** English Localization

**UK6** Commercial Cal. Certificate with Test Data



Test Head Options

#### Note

1. Refer to the following figure when test head options is selected
2. The HP 16195A is used to calibrate the HP 4286A at the APC-7 calibration plane by using the APC3.5-APC7 adapter. It consists of OPEN, SHORT, LOAD, and LOW-LOSS CAPACITOR.
3. This is used to calibration the HP 4286A at the handler DUT contacts. It consists of Shorting bars, and 51.0Ω Clip Resistors. (SMD size: 1.0 x 0.5 mm, 1.6 x 0.8 mm, 2.0x1.2 mm, 3.2 x 1.6 mm)

#### Accessories for HP 4286A

- HP 16190A Performance Test Kit
- HP 16191A Side Electrode SMD Fixture
- HP 16192A Parallel Electrode SMD Fixture
- HP 16193A Small Side Electrode SMD Fixture
- HP 16194A High Temperature Test Fixture
- HP 16195A APC-7 Calibration Kit
- HP 16092A Test Fixture (≤ 500 MHz)
- HP 16093A Binding Post Fixture (≤ 250 MHz)
- HP 16093B Binding Post Fixture (≤ 125 MHz)
- HP 16094A Probe Test Fixture (≤ 125 MHz)

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1 800 452 4844

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5150 Spectrum Way  
Mississauga, Ontario  
L4W 5G1  
(905) 206 4725

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European Marketing Centre  
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Printed in U.S.A. 4/96  
**5963-5391E**