# Agilent
# 4284A/4285A
# Precision LCR Meter Family

20 Hz to 1 MHz
75 kHz to 30 MHz

Technical Overview


A new standard
for precise component,
semiconductor and
material measurements

Agilent Technologies

## *Agilent precision LCR meter family*

### Utilize state-of-the art measurement technologies

- 6-digits of resolution at any range
- Basic accuracies of 0.05% (Agilent 4284A) and 0.1% (Agilent 4285A)
- 20 impedance parameters to access and measure
- Constant V or I test signal level
- 20 Vrms test signal level (Agilent 4284A)

### Move your process toward error-free operation

- Instrument setup state storage
- Comparator functions
- Selectable frequency error corrections
- Open, short and load corrections remove parasitics

## *Key specifications*

### Agilent 4284A precision LCR meter

| | |
|---|---|
| **Test frequency** | 20 Hz to 1 MHz over 8610 selectable frequencies |
| **Measurement range**[1] | |
| | \|Z\|, R, X :0.01 mΩ to 99.9999 MΩ |
| | \|Y\|, G,B :0.01 nS to 99.9999 S |
| | C :0.01 fF to 9.99999 F |
| | L :0.01 nH to 99.9999 kH |
| | D :0.000001 to 9.99999 |
| | Q :0.01 to 99999.9 |
| **Basic accuracy** | \|Z\| , C and L:0.05% D:0.0005 |
| **Test signal level range** | |
| Voltage | 5 mVrms to 2 Vrms |
| Current | 50 µArms to 20 mArms |
| **Constant test signal level range** | |
| Voltage | 10 mVrms to 1 Vrms |
| Current | 100 µArms to 10 mArms |
| **Measurement time**[2] | 39 ms/190 ms/830 ms at 1 kHz |

### 4284A with Option 4284A-001

| | |
|---|---|
| **Test signal level range** | |
| Voltage | 5 mVrms to 20 Vrms |
| Current | 50 µArms to 200 mArms |
| **Constant test signal level range** | |
| Voltage | 10 mVrms to 10 Vrms |
| Current | 100 µArms to 100 mArms |
| **Internal DC bias** | ± (1 mV ~ 40 V), ≤ 100 mA, 0.1% accuracy |

### 4284A with Option 4284A-002 and 42841A

| | |
|---|---|
| **DC current bias** | 0.01 A to 20 A (with 42841A and 42842A)<br>0.02 A to 40 A (with 42841A x 2 ea., 42842B and 42843A) |

1. Refer to specifications for complete accuracy.
2. Supplimental information only.

## *Satisfying your performance needs*

### Adapt instrument configurations to fit your test needs

- Internal voltage biasing up to ±40 Vdc[3]
- High current biasing up to 40 A dc[3] (Agilent 4284A)
- Wide range of frequencies, 20 Hz to 30 MHz
- BIN'ing and comparator functions for handlers
- SMD, axial and radial test fixtures[3]

### Simplify your system development and integration

- Programming language compatible with IEEE 488.2
- Test port extensions: maximum 4 m for 4284A[3] and 2 m for 4285A
- Identical operation for the entire family of products
- Scanner, handler and GPIB interfaces[3]

## *Key specifications*

### Agilent 4285A precision LCR meter

| | |
|---|---|
| **Test frequency** | 75 kHz to 30 MHz with 100 Hz resolution |
| **Measurement range**[1] | |
| | \|Z\|, R, X :0.01 m Ω to 99.9999 MΩ |
| | \|Y\|, G,B :0.01 nS to 99.9999 S |
| | C :0.01 fF to 999.999 μF |
| | L :0.001 nH to 99.9999 H |
| | D :0.000001 to 9.99999 |
| | Q :0.01 to 99999.9 |
| **Basic accuracy** | \|Z\|, C and L:0.1% D:0.001 |
| **Test signal level range** | |
| Voltage | 5 mVrms to 2 Vrms |
| Current | 200 μArms to 20 mArms |
| **Constant test signal level range** | |
| Voltage | 10 mVrms to 1 Vrms |
| Current | 100 μArms to 20 mArms |
| **Measurement time**[2] | 30 ms/65 ms/200 ms |

### 4285A with Option 4285A-001

| | |
|---|---|
| **Internal DC bias** | ± (1 mV ~ 40 V), ≤ 100 mA, 0.1% accuracy |

### 4285A with Option 4285A-002, 42841A, and 42842C

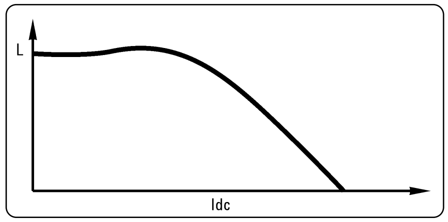
| | |
|---|---|
| **DC current bias** | 0.01 A to 10 A |

1. Refer to specifications for complete accuracy.
2. Supplimental information only.
3. The options, the accessories, or the test fixtures are needed.

# *Versatile component measurements*

## Characterize inductive devices

- Sweep high current conditions
- Identify device properties precisely
- Test to RF frequencies



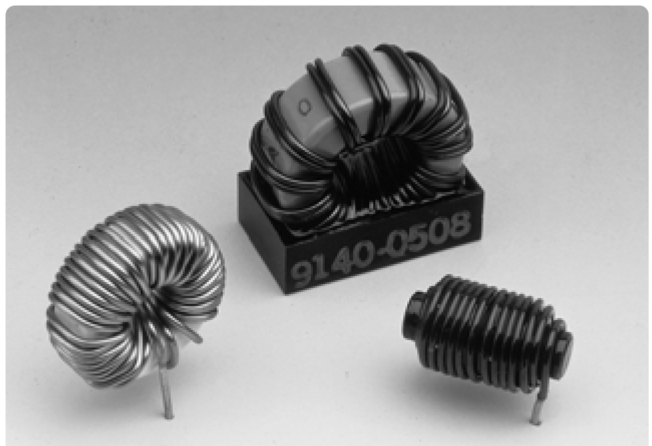

***Inductance rolloff due to high dc current bias***

## Low frequency measurements: Agilent 4284A

Inductive devices can now be accurately characterized from 20 Hz to 1 MHz with a dc bias current up to 40 A[1] dc.

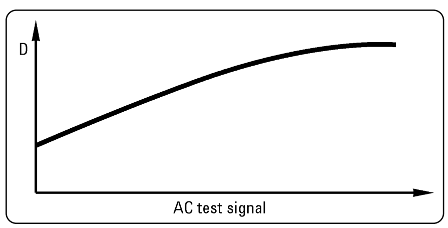
## High frequency measurements: Agilent 4285A

The Agilent 4285A's wide 75 kHz to 30 MHz range allow you to test RF inductors with improved accuracy and 0.001 nH resolution. Magnetic heads, ferrite-cores, and power inductors that need to be tested at a specified current signal level can be easily tested with the Agilent 4285A.




## Precise ceramic capacitor measurements

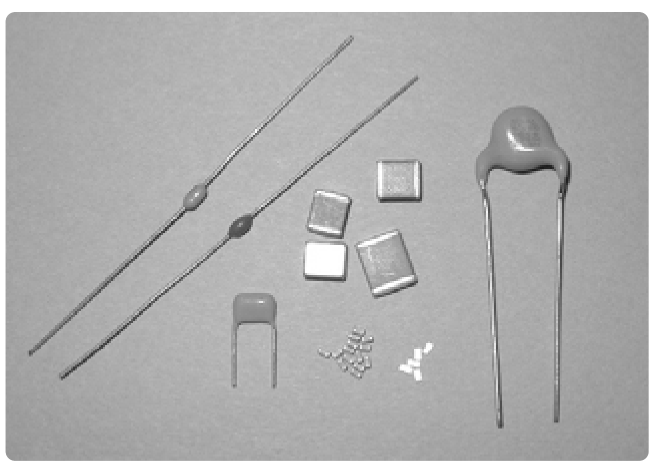
- Test at 1 kHz and 1 MHz
- Resolve measurements to low values
- Maintain constant signal levels




***Dissipation factor rise due to high ac signal***

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

1 MHz accuracies of capacitance (0.05%) and dissipation factor (0.0005) are essential for characterizing DUTs with low dissipation factors. Dissipation factors can change as a function of the applied test signal level to the DUT. For reliable and consistent measurements, the Agilent 4284A can maintain a constant voltage test signal level.

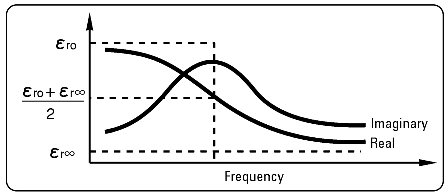


1. Need Option 4284A-001

# *Adaptable parameter testing*

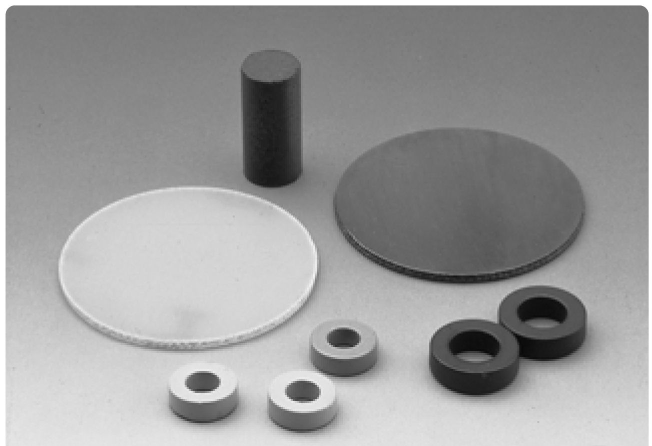
## Discover new material properties

- High accuracy and precise measurements
- Wide frequency ranges
- High test signal levels
- Agilent 16451B dielectric test fixture




***A material's characteristics versus frequency***

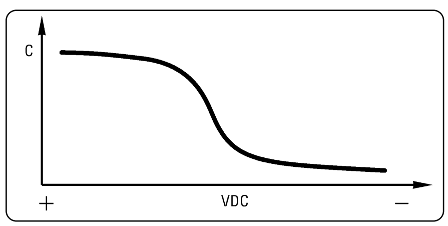
The Agilent precision LCR meter family provides the accuracy, resolution, high test signal and bias levels[1] required for material measurements. Using the Agilent 16451B dielectric test fixture provides you with accurate permittivity and dissipation factor measurements.



The ability to output a constant test signal level permits repeatable and accurate magnetic/dielectric measurements. Both the Agilent 4284A and Agilent 4285A offer variable voltage and current test signal level control.

## Semiconductor testing

- Extend the test cable to the DUT
- Detect small parameter changes
- Rapidly acquire data
- Test at multiple frequencies

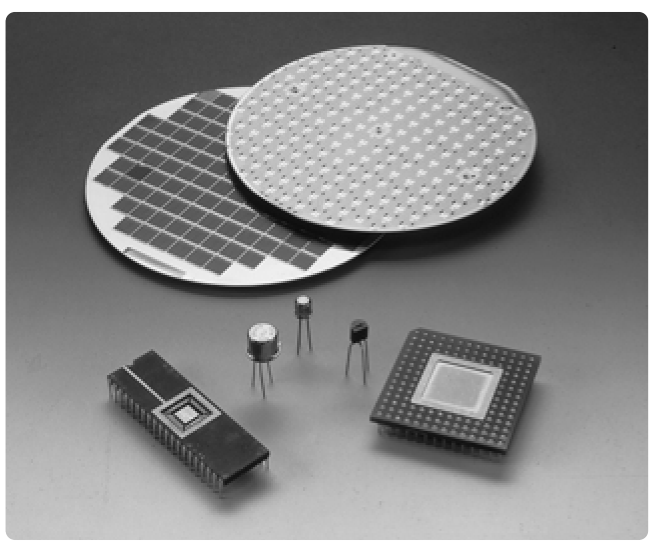



***C-V characteristics sample—MOS diode***

Both instruments allow you to extend the front panel measurement port through test cables, switches, and probers directly to the DUT. The 6-digits of resolution give you the ability to sense and identify changes not normally seen by conventional LCR meters.

The accuracies of the Agilent 4284A at key test frequencies up to 1 MHz permit complete DUT evaluation for either production or laboratory needs.

For high speed device testing at frequencies above 1 MHz, the best solution is the Agilent 4285A.



1. Need Option 4284A/4285A-001

## *One LCR meter family for your product's life cycle*

***Research and development***

### Research tomorrow's electronic components now

- **Increase measurement confidence**
  The basic accuracies are:
  Agilent 4284A 0.05% and Agilent 4285A 0.1%.
- **Detect 1 ppm changes**
  The 6-digits of resolution permit you to measure differences in materials not detectable before.
- **Fit the instrument to your test needs**
  For low frequency applications the Agilent 4284A is the ideal tool. For testing at RF frequencies the Agilent 4285A is the best solution.

***Production test***

### Reduce production test factors

- **Increase test throughput**
  The precision LCR meter family reduces testing costs by providing accurate high throughput testing.
- **Interface easily to handlers**
  Built-in comparator, cable compensation[1], and interfaces[2] permit system integration.
- **Minimize operator error**
  Instrument state storage minimizes costly setup errors.

***Material design***

### Design and test new materials

- **Material test fixtures**
  For accurate permittivity and dissipation factor measurements of solid dielectric materials, the 16451B dielectric test fixture is provided. The 16452A liquid test fixture is provided for the permittivity measurements of liquids with minimal conductivity.
- **Sample program**
  By using the sample program in the operation manual of 16451B, complex permittivity can be calculated rather easily and instantly. In addition, with the use of a spreadsheet soft ware, the frequency response of permittivity can be displayed in a graph.

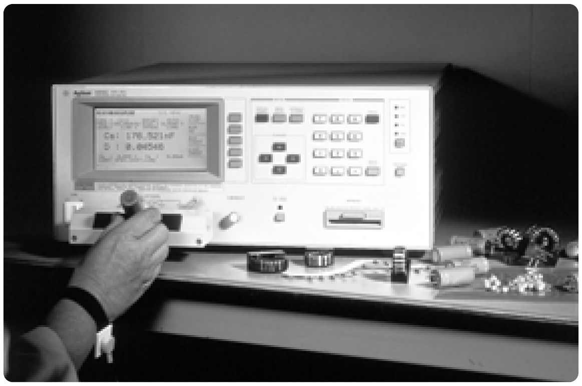
***Quality assurance***

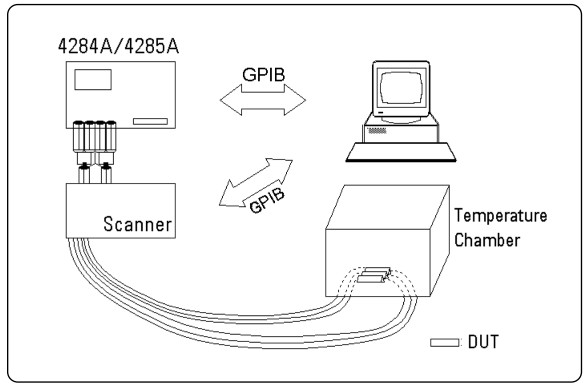
### Automated quality assurance

- **Reduce your system development time**
  The Agilent 4284A and Agilent 4285A are designed to be used as elements in systems. This means GPIB, programming, and the ability to interface with scanners[3].
- **Painlessly integrate the system**
  GPIB and a scanner[3] interface allow the instruments to easily integrate into system configurations.
- **Leverage your programming experience**
  Learning to program one instrument automatically means you learn both.

1. For 4284A, need Option 4284A-006
2. Choose the combination from Option 4284A/4285A-201, 4284A/4285A-202, or 4284A/4285A-301
3. Need Option 4284A/4285A-301

## *Comprehensive incoming inspection*






### Satisfying difficulties and requirements of impedance measurements during incoming inspection

Many types of measurements requiring a variety of measurement conditions have to be carried out during incoming inspection. However, as measurement instruments cannot perform all of the measurements required, substitute measurements are made. On the other hand, purchasing all the necessary equipment would substantially increase capital costs.

By employing the precision LCR meter family, a wide frequency range is covered (20 Hz to 1 MHz for 4284A and 75 kHz to 30 MHz for 4285A) and various test signal levels can be set (20 Vrms/200 mArms for 4284A Option 4284A-001 and 2 Vrms/20 mArms for 4285A). In addition, the ALC function allows measurements of constant-voltage and constant-current signals, and the added capability of Option 4284A/4285A-001 enables up to ±40 V of dc bias to be applied to the DUT. As a result of these features, a variety of measurement conditions can be carried out.

Furthermore, the precision LCR meter family achieves high accuracy measurements (basic |Z| measurement accuracy: 0.05% for 4284A and 0.1% for 4285A), permitting the characteristics of inductors and capacitors to be evaluated with excellent reliability. Also, built-in compensation functions reduce the influence of test fixtures to a minimum, further raising the reliability.

### Built-in functionalities for efficient measurements

In order to save time and facilitate the efficiency of measurement routines, the precision LCR meter family has the following features. The memory card[1] allows the measurement conditions to be preset for various components with different measurement needs. The comparator function can be set to sort into a maximum of 10 BINs, enabling many components to be handled during inspection. The Option 4284A/4285A-301 scanner interface solves the problem of having discrepancies in measurement values for different channels of the switching matrix by allowing channel compensation for up to 128 channels.

1. Need Option 4284A/4285A-004

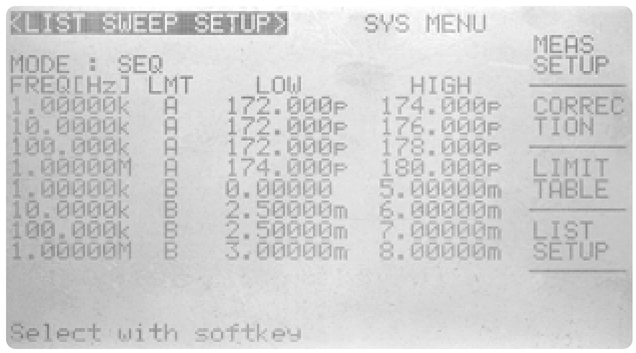
# *User friendly linterface*

## Simple front panel operation

- Clearly view the display
- See all instrument settings
- Interactive softkeys for simple control

Directly view all instrument settings and measurement results on the large LCD display. This simplifies operation and improves operator efficiency by minimizing readout error.

The softkeys simplify front panel operation by allowing the user to easily change instrument states by moving the LCD cursor with cursor keys. The softkeys will automatically change to reflect the cursor's position. This minimizes the number of menus and key strokes.


**Customized test frequencies**

## Non-volatile memory

- Eliminate costly setup errors
- Increase user productivity
- Archive tests

The instruments contain two types of user accessible memory; internal and external (memory cards)[1]. The memory can easily be used to store measurement setups. Later, a setup can be loaded back into the instrument. This reduces test setup errors and increases the user's productivity.

The memory can store 10 different instrument states, complete with correction data and system configuration. Entire setups including limit information can now be stored and loaded using either the internal memory or the memory card[1]. The memory card[1] system is completely electronic and is based on EEPROM.

**Inserting the memory card**[1]

1. Need Option 4284A/4285A-004

# *Testing with the proper tools*

## Measure the components' performance in your power supply

- Test your components under load conditions
- Bias inductive devices with high currents
- Satisfy your needs with the right instrument

Designing advanced switching power supplies require the use of inductors and transformers that operate in the RF regions.

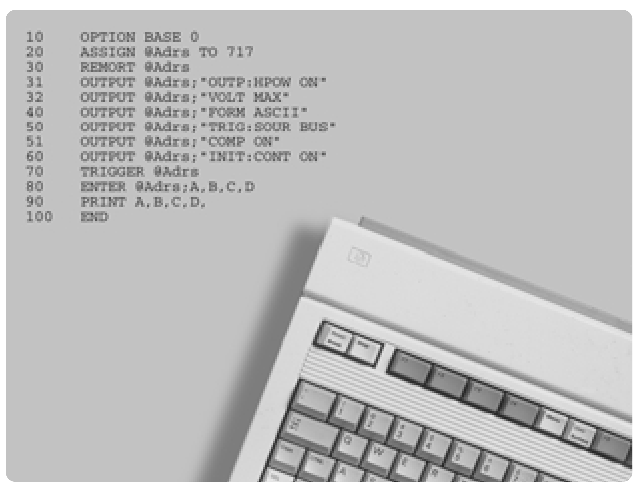
For low frequencies, the Agilent 4284A[1] precision LCR meter with the Agilent 42841A bias current source, and the 42842A/B bias current test fixtures all combine to form a 40 A dc test system.

Where a high frequency measurement is required, use an Agilent 4285A[2], an Agilent 42842C bias current test fixture, and an Agilent 42841A bias current source to achieve up to 10 A dc biasing with measurements at 30 MHz.

**High current bias for inductor testing under load conditions**

# *Reduce system development time*

The 4284A and 4285A employ a programming language, which is compatible with the IEEE 488.2. Since the command names are similar to the measurement functions, the time spent for creating and debugging programs can be largely minimized. The operation manual lists several key sample programs, allowing the user to efficiently create a program for their measurement system.




**Code generation made easy**

1. Need Option 4284A-002
2. Need Option 4285A-002

## Specifications

All specifications are common to the Agilent 4284A and Agilent 4285A unless otherwise noted.

## Measurement functions

**Measurement parameters**

|Z| (impedance), |Y| (admittance), $\theta$ (phase), R (resistance), X (reactance), G (conductance), B (susceptance), L (inductance), C (capacitance), Q (quality factor), D (dissipation factor), ESR (equivalent series resistance) and Rp (parallel resistance).

20 parameter combinations are available

| | |
|---|---|
| **Equivalent circuit modes:** | Series and parallel |
| **Mathematical functions:** | Deviation and percent deviation |
| **Trigger:** | Internal, external and manual |
| **Delay time:** | 0 to 60.000 s in 1 ms steps |
| **Measurement terminals:** | Four-Terminal Pair |
| **Test cable lengths:** | |
| Agilent 4284A-standard: | 0 and 1 meter |
| Option 4284A-006: | adds 2 and 4 meter extension |
| Agilent 4285A-standard: | 0.1 and 2 meters |
| **Integration time:** | Short, medium and long |

## Test signal

| | |
|---|---|
| **Test frequency:** | |
| Agilent 4284A: | 20 Hz to 1 MHz, 8610 selectable frequencies |
| Agilent 4285A: | 75 kHz to 30 MHz, 100 Hz steps |
| **Frequency accuracy:** | ±0.01% |
| **Output impedance:** | |
| Agilent 4284A: standard: | 100 Ω ±3% |
| Option 4284A-001: | 100 Ω ±6% |
| Agilent 4285A: | (25 + 0.5 $f_m$) Ω ±10% @ 1 MHz, ±30% @ 30 MHz, $f_m$ = test frequency in MHz |
| **AC test signal modes:** | |
| Normal: | Programs selected voltage or current at the measurement terminals when they are opened or shorted, respectively. |
| Constant: | Maintains selected voltage or current at the device under test independent of changes in the device’s impedance. |

**AC test signal**

Agilent 4284A: standard

| | | *Range* | *Accuracy* |
|---|---|---|---|
| *Normal* | V | 5 m Vrms to 2 Vrms | ±(10% + 1 mVrms) |
| | I | 50 µArms to 20 mArms | ±(10% + 10 µArms) |
| *Constant* | V | 10 m Vrms to 1 Vrms | ±(6% + 1 mVrms) |
| | I | 100 µArms to 10 mArms | ±(6% + 10 µArms) |

Agilent 4284A with Option 4284A-001

| | | *Range* | *Accuracy* |
|---|---|---|---|
| *Normal* | V | 5 m Vrms to 20 Vrms | ±(10% + 1 mVrms) |
| | I | 50 µArms to 200 mArms | ±(10% + 10 µArms) |
| *Constant* | V | 10 m Vrms to 10 Vrms | ±(10% + 1 mVrms) |
| | I | 100 µArms to 100 mArms | ±(10% + 10 µArms) |

*Specifications continued on page 11*

Agilent 4285A: standard

| | | Range | Accuracy |
|---|---|---|---|
| *Normal* | V | 5 m Vrms to 2 Vrms | ±(8% + 0.4 fm% + 1 mVrms) |
| | I | 200 µArms to 20 mArms | ±(8% + 1 fm% 40 µArms) |
| *Constant* | V | 10 m Vrms to 1 Vrms | ±(6% + 0.2 fm%+ 1 mVrms) |
| | I | 100 µArms to 20 mArms | ±(6% + 0.2 fm%+ 40 µArms) |

fm: test frequency in MHz

**DC bias:**

Standard: 0 V, 1.5 V and 2 V (Agilent 4284A only)

With
Option 4284A/4285A-001: 0 V to ±40 V Rear panel DC bias monitor, BNC connector

| *Range* | *Resolution* | *Accuracy* |
|---|---|---|
| ±(0.000 to 4.000) V | 1 mV | ±(0.1% to 1 mV)[1] |
| ±(4.002 to 8.000) V | 2 mV | ±(0.1% to 2 mV)[1] |
| ±(8.005 to 20.000) V | 5 mV | ±(0.1% to 5 mV)[1] |
| ±(20.01 to 40.00) V | 10 mV | ±(0.1% to 10 mV)[1] |

## Measurement range

| *Parameter* | *Range* |
|---|---|
| \|Z\|, R, X: | 0.01 mΩ to 99.9999 MΩ |
| \|Y\|, G, B: | 0.01 nS to 99.9999 S |
| C: | 4284A: 0.01 fF to 9.99999 F |
| | 4285A: 0.01 fF to 999.999 µF |
| L: | 4284A: 0.01 nH to 99.9999 kH |
| | 4285A: 0.001 nH to 99.9999 H |
| D: | 0.000001 to 9.99999 |
| Q: | 0.01 to 99999.9 |
| $\theta$: | -180.000° to 180.000° |
| Δ% | -999.999% to 999.999% |

## Display

LCD Dot-matrix type display. Capable of displaying: measured values, control settings, comparator limits and decisions, list sweep tables, self test messages and annunciations.

## Correction function

Open/short: Eliminates measurement errors due to stray parasitic impedance in the test fixture.

Load: Improves measurement accuracy by using a calibrated device as a reference.

## List sweep function

A maximum of ten frequencies or test levels can be programmed. Single or sequential testing can be performed. When Option 4284A/4285A-001 is installed, dc bias sweep can also be performed.

1. Refer to measurement accuracy.

*Specifications continued on page 12*

## Comparator function

Ten bin sorting for the primary measurement parameter, IN/OUT for the secondary measurement parameter.

| | |
|---|---|
| Bin count: | 0 to 999999 |
| List sweep comparator: | HIGH/IN/LOW decision output for each point in the list sweep table. |

## Other functions

| | |
|---|---|
| **Store/load:** | Ten instrument setups can be stored/loaded from the internal non-volatile memory. Ten additional setups can also be stored/loaded from each memory card[1]. |
| **GPIB:** | All instrument control settings, measured values, comparator limits, list sweep tables, and self test results. |
| **Memory:** | Memory buffer can store a maximum of 128 measurement results and output the date over GPIB, ASCII and 64 bit binary data formats. |

## Options

| | |
|---|---|
| **Option 4284A/4285A-001:** | Power amplifier/dc bias<br>This option cannot be operated simultaneously with Option 4284A/4285A-002. |
| Agilent 4284A: | Increases the AC test signal to 20 Vrms/0.2 Arms. Extends bias range to variable ±40 Vdc. Rear panel BNC for dc voltage monitor. |
| Agilent 4285A: | Adds variable ±40 Vdc. Rear panel BNC for dc voltage monitor and current monitor. |
| **Option 4284A/4285A-002:** | Accessory control interface/bias current<br>Interface allows the Agilent precision LCR meter to control the Agilent 42841A bias current source.<br>This option cannot be operated simultaneously with Option 4284A/4285A-001. |
| **Option 4284A-006:** | 2 m/4 m cable length operation (4284A only)<br>Increases test cable length capability. Adds 2 and 4 meter operation. |
| **Option 4284A/4285A-201:** | Handler interface<br>This is a general purpose comparator/handler interface. Nine-sets of HIGH/LOW limits can be input allowing 10-bin sorting for L, C, or IZI. The handler interface enables systemization with an automatic component sorting machine. All signals are optically isolated. |
| **Option 4284A/4285A-202**: | Handler interface |
| **Option 4284A/4285A-301:** | Scanner interface<br>Open/short/load correction data for multiple channels is stored in non-volatile memory, a maximum of 128 for the Agilent 4284A and 90 for the Agilent 4285A. Three frequencies can be corrected on the Agilent 4284A while seven frequencies can be corrected on the Agilent 4285A. |

1. Need Option 4284A/4285A-004

*Specifications continued on page 13*

## Specifications
*Continued from page 12*

## General

| | |
|---|---|
| **Power requirements** | 100 V/120 V/220 V ±10%, 240 V +5%/-10%, 47 Hz to 66 Hz. |
| **Power consumption** | 200 VA |
| **Operating temperature and humidity** | 0 °C to 55 °C, < 95% RH at 40 °C |
| **Size** | 426(W) x 177(H) x 498(D) mm |
| **Weight** | Agilent 4284A: 15kg (33lb.) Agilent 4285A: 16kg (35.2lb.) |

## Supplemental performance characteristics (Not guaranteed)

**Agilent 4284A**

Stability: Medium integration and constant operating temperature of 23 °C ±5 °C.

|Z|, |Y|, L, C, R < 0.01%/day D < 0.0001/day

Temperature coefficient: Medium integration and 23 °C ±5 °C.

**Agilent 4285A**

Stability: Long integration and constant operating temperature of 23 °C ±5 °C.

| | *≤ 1 MHz* | *30 MHz* |
|---|---|---|
| \|X\|, \|Y\|, L, C, R | 0.01 %/day | < 0.05 %/day |
| D | 0.0001/day | < 0.0005/day |

Temperature coefficient: Long integration, test signal voltage ≥ 20 mVrms and 23 °C ±5 °C.

| | *≤ 1 MHz* | *30 MHz* |
|---|---|---|
| \|X\|, \|Y\|, L, C, R | 0.004%/°C | <0.05%/°C |
| D | 0.00004/°C | <0.0005/°C |

**Settling time**

Frequency

| | |
|---|---|
| 4284A | < 70 ms; $f_m \geq 1$ kHz<br>< 120 ms; 100 Hz $\leq f_m <$ 1 kHz<br>< 160 ms; $f_m <$ 100 Hz |
| 4285A | < 50 ms |
| **Test signal** | < 120 ms (4284A) < 100 ms (4285A) |
| **Range** | < 50 ms/range shift; $f_m \geq 1$ kHz |
| **Input protection** | Internal circuit protection, when a charged capacitor is connected to the unknown terminals. The maximum capacitor voltage is:<br>$V_{max} = \sqrt{1/C}$ (v) where: $V_{max} \leq 200$ V<br>C is in Farads |

*Specifications continued on page 14*

| | |
|---|---|
| **Measurement time** | Time interval from a trigger command to the EOM (end of measurement) signal output at the handler interface port. |

Agilent 4284A setting time

| *Integrated time* | *100 Hz* | *1 kHz* | *10 kHz* | *1 MHz* |
|---|---|---|---|---|
| Short | 270 ms | 40 ms | 30 ms | 30 ms |
| Medium | 400 ms | 190 ms | 180 ms | 180 ms |
| Long | 1040 ms | 830 ms | 820 ms | 820 ms |

Agilent 4285A setting time

| *Integrated time* | *75 kHz ~ 30 MHz* |
|---|---|
| Short | 30 ms |
| Medium | 65 ms |
| Long | 200 ms |

| | |
|---|---|
| **Option 4284A/4285A-001:** | DC bias current output: 100 mA max |

## Measurement accuracy (Agilent 4284A only)

**The following conditions must be met:**

1. Warm up time: ≥ 30 minutes
2. Ambient temperature: 23 °C ±5 °C
3. Test signal voltage: 0.3 Vrms to 1 Vrms
4. Test cable length: 0 m
5. Open and short corrections have been performed
6. D ≤ 0.1 for C, L, X and B measurements
   Q ≤ 0.1 for R and G measurements

See operation manual for additional conditions.

Accuracies are relative to calibrated standards. Absolute accuracies are given as: (Agilent 4284A's relative accuracy +calibration uncertainty of standards).

## Accuracy equations

**|Z|, |Y|, L, C, R, X, G and B accuracies are given as:**

$\pm[A + (K_a + K_b + K_c) \times 100]$ (% of reading)

where:

1. A is basic accuracy as shown in figure 1
2. $K_a$ and $K_b$ are impedance proportional factors given in Table 2.
   The $K_a$ term is negligible for impedance above 500 Ω.
   The $K_b$ term is negligible for impedances below 500 Ω.
3. $K_c$ is the calibration interpolation factor given in Table 1.

**D accuracy is given as:**

$\pm[A_e/100]$ (absolute D value)

where:

1. $A_e = [A + (K_a + K_b + K_c) \times 100]$

**Q accuracy is given as (when $Q_x \times D_e < 1$):**

$\pm[(Q_x^2 \times D_e)/(1 \mp (Q_x \times D_e)]$ (absolute Q value)

where:

1. $Q_x$ is the measured Q value
2. $D_e$ is the D accuracy

*Specifications continued on page 15*

## *Specifications*
*Continued from page 14*

**$\theta$ accuracy is given as:**

$\pm[(180/\pi) \times (A_e/100)]$ (absolute degrees)

where: 1. $A_e = [A + (K_a+K_b+K_c) \times 100]$

**Additional error due to temperature:**

Multiply the measurement accuracy by the following temperature factors.

| Temp°C | 0 | | 8 | | 18 | | 28 | | 38 | | 55 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Factor | | X 4 | | X 2 | | X 1 | | X 2 | | X 4 | |

**Example C and D accuracy calculation**

*Measurement conditions:*

Frequency: 1 kHz
Capacitance value: 100 nF
Test signal level: 1 Vrms
Integration time: Medium

*Calculation:*

Step 1: Use Figure 1 to determine A and $Z_m$.
a. Find the frequency along the X-axis.
b. Find the capacitance value along a diagonal.
c. Note the intersection of the values from steps a and b. Interpolation may be necessary.
d. Each shaded area has two values for A; the upper number is for medium and long integrations, the lower number is for short integration. A = 0.05%. Find $Z_m$ by extrapolating horizontally to the Y-axis (impedance axis). $Z_m = 1590\ \Omega$

Step 2: Use Tables 1 and 2 to find $K_a$, $K_b$ and $K_c$.
a. Use the equations in Table 2 to find $K_a$ and $K_b$.

$K_a = (1 \times 10^{-3}/1590)(1+(200/1000)) = 7.5 \times 10^{-7}$

$K_b = (1590(1 \times 10^{-9})(1 + 70/1000)) = 1.67 \times 10^{-6}$

b. Use Table 1 to find $K_c$ for the given frequency.

$K_c = 0$

Step 3: Calculate C and D accuracy.

$C = 0.05 + (7.5 \times 10^{-7} + 1.67 \times 10^{-6} + 0) \times 100\% = 0.05\%$

$D = 0.05/100 = 0.0005$

**Table 1. $K_c$ : Calibration interpolation factor**

| *Frequency* | $K_c$ |
|---|---|
| Direct correction frequencies | 0 |
| All other frequencies | 0.0003 |

Note: Direct calibration frequencies are 20, 25, 30, 40, 50, 60, 80, 100, 120, 150, 200Hz. Sequence repeats for each decade up to 1 MHz. 48 frequencies total.

*Specifications continued on page 16*

# *Specifications*

*Continued from page 15*

**Table 2. $K_a$ and $K_b$: Impedance proportional factors**

| Integ time | Frequency | Ka | Kb |
|---|---|---|---|
| Medium and Long | fm < 100Hz | $\left(\frac{1\times10^{-3}}{\vert\vert Zm\vert}\right)\left(1+\frac{200}{Vs}\right)\left(1+\sqrt{\frac{100}{fm}}\right)$ | $\left(\vert Zm\vert\right)\left(1\times10^{-9}\right)\left(1+\frac{70}{Vs}\right)\left(1+\sqrt{\frac{100}{fm}}\right)$ |
| | 100Hz ≦ fm ≦ 100kHz | $\left(\frac{1\times10^{-3}}{\vert Zm\vert}\right)\left(1+\frac{200}{Vs}\right)$ | $\left(\vert Zm\vert\right)\left(1\times10^{-9}\right)\left(1+\frac{70}{Vs}\right)$ |
| | 100kHz < fm ≦ 300kHz | $\left(\frac{1\times10^{-3}}{\vert Zm\vert}\right)\left(2+\frac{200}{Vs}\right)$ | $\left(\vert Zm\vert\right)\left(3\times10^{-9}\right)\left(1+\frac{70}{Vs}\right)$ |
| | 300kHz < fm ≦ 1MHz | $\left(\frac{1\times10^{-3}}{\vert Zm\vert}\right)\left(3+\frac{200}{Vs}+\frac{Vs^2}{10^8}\right)$ | $\left(\vert Zm\vert\right)\left(10\times10^{-9}\right)\left(1+\frac{70}{Vs}\right)$ |
| Short | fm < 100Hz | $\left(\frac{2.5\times10^{-3}}{\vert Zm\vert}\right)\left(1+\frac{400}{Vs}\right)\left(1+\sqrt{\frac{100}{fm}}\right)$ | $\left(\vert Zm\vert\right)\left(2\times10^{-9}\right)\left(1+\frac{100}{Vs}\right)\left(1+\sqrt{\frac{100}{fm}}\right)$ |
| | 100Hz ≦ fm ≦ 100kHz | $\left(\frac{2.5\times10^{-3}}{\vert Zm\vert}\right)\left(1+\frac{400}{Vs}\right)$ | $\left(\vert Zm\vert\right)\left(2\times10^{-9}\right)\left(1+\frac{100}{Vs}\right)$ |
| | 100kHz < fm ≦ 300kHz | $\left(\frac{2.5\times10^{-3}}{\vert Zm\vert}\right)\left(2+\frac{400}{Vs}\right)$ | $\left(\vert Zm\vert\right)\left(6\times10^{-9}\right)\left(1+\frac{100}{Vs}\right)$ |
| | 300kHz < fm ≦ 1MHz | $\left(\frac{2.5\times10^{-3}}{\vert Zm\vert}\right)\left(3+\frac{400}{Vs}+\frac{Vs^2}{10^8}\right)$ | $\left(\vert Zm\vert\right)\left(20\times10^{-9}\right)\left(1+\frac{100}{Vs}\right)$ |

Notes: 1. $f_m$ is the test frequency in (Hz)
2. $\vert Zm \vert$ is the device's impedance
3. Vs is the test signal level in (mVrms)

*Specifications continued on page 17*

*Continued from page 16*

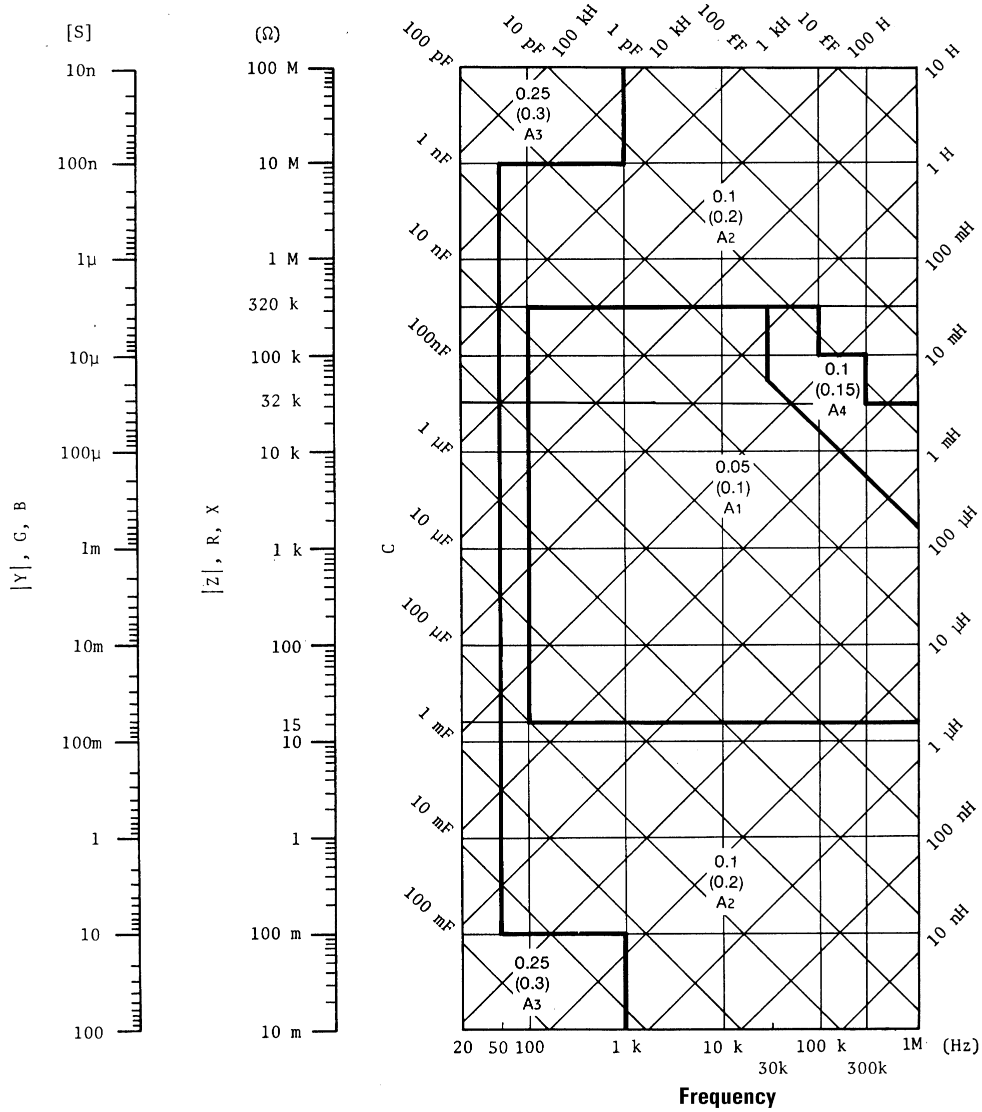



**Figure 1. Baseline accuracy facto (4284A)**
**(For additional accuracy information refer to the impedance accuracy equation on page 14.)**

Notes:
1. Test signal level: 0.3 Vrms to 1 Vrms
2. Upper number, medium and long integration
3. Lower number, short integration

*Specifications continued on page 18*

## *Specifications*

*Continued from page 17*

## Additional specifications (Agilent 4284A only)

When measured value < 10 mΩ, |Z|, R, and X accuracy, which is described on page 14, is given as following equation.

**|Z|, R, and X accuracy:**
• ±[(*Ka* + *Kc*) x 100] (%)

Where
• Ka = Impedance proportional factor (refer to Table 2)
• Kc = Calibration interpolation factor (refer to Table 1)

## Measurement accuracy (Agilent 4285A only)

**Accuracy is specified for the following conditions:**

1. Warm up time: ≥ 30 minutes
2. Ambient temperature: 23 °C ±5 °C
3. Test signal level voltage: 0.2 Vrms to 1 Vrms
4. Test cable correction completed
5. Open and short corrections have been completed
6. D ≤ 0.1 for C, L, X and B measurements
   Q ≤ 0.1 for R and G measurements
7. For test frequencies above 10 MHz and DUT impedance ≥ 5 kΩ, the test signal level must be between 0.5 Vrms and 1 Vrms

These accuracies are absolute and include the calibration uncertainties of standards. Refer to the operation manual for additional setup conditions.

## Accuracy equations

**|Z|, |Y|, L, C, R, X, G and B accuracies are given as:**

$\pm(A_n + B)$ (% of reading)

where:
1. $A_n$ is the accuracy equation as specified by Figure 2 and Table 3. $A_n$ ranges from $A_1$ to $A_8$.
2. B is the test cable length factor in Table 5.

**D accuracy is given as:**

$\pm[A_e/100]$ (absolute D value)

Note: $A_e = (A_n + B)$

**Q accuracy is given as:**

$\pm[(Q_x^2 \times D_e)/(1 \mp (Q_x \times D_e)]$ (absolute Q value)

Note: Specification valid only when $Q_x D_e < 1$. $Q_x$ is the measured value of Q. $D_e$ is the computed D accuracy.



*Specifications continued on page 19*

# Specifications

*Continued from page 19*

**Table 3. Accuracy equations**

**Medium/short integration period**

$$A_1 = N_1\% + \left[\left(\frac{f}{30}\right)^2 \cdot 3\%\right] + \frac{100}{|Zm|}\left[0.02\% + \left(\frac{f}{30}\right) \cdot 0.1\%\right]$$

$$A_2 = N_2\% + \left[\left(\frac{f}{30}\right)^2 \cdot 3\%\right] + \frac{|Zm|}{25}\left[0.02\% + \left(\frac{f}{30}\right) \cdot 0.05\%\right]$$

$$A_3 = N_3\% + \left[\left(\frac{f}{5}\right)^2 \cdot 0.1\%\right] + \frac{|Zm|}{250}\left[0.02\% + \left(\frac{f}{30}\right) \cdot 0.05\%\right]$$

$$A_4 = 0.3\% + \left[\left(\frac{f}{30}\right)^2 \cdot 3\%\right] + \frac{|Zm|}{500}\left[0.05\% + \left(\frac{f}{30}\right) \cdot 0.1\%\right]$$

$$A_5 = 0.18\% + \left[\left(\frac{|Zm|}{5k}\right) \cdot 0.04\%\right]$$

$$A_6 = 0.18\% + \left[\left(\frac{f}{30}\right)^2 \cdot 3\%\right] + \frac{|Zm|}{2.5k}\left[0.02\% + \left(\frac{f}{10}\right) \cdot 0.03\%\right]$$

$$A_7 = 0.5\% + \left[\left(\frac{f}{30}\right)^2 \cdot 3\%\right] + \frac{|Zm|}{2.5k}\left[\left(\frac{f}{30}\right) \cdot 0.2\%\right]$$

$$A_8 = 0.18\% + \left[\left(\frac{|Zm|}{50k}\right) \cdot 0.06\%\right]$$

**Long integration period**

$$A_1 = N_1\% + \left[\left(\frac{f}{30}\right)^2 \cdot 3\%\right] + \frac{50}{|Zm|}\left[0.02\% + \left(\frac{f}{30}\right) \cdot 0.1\%\right]$$

$$A_2 = N_2\% + \left[\left(\frac{f}{30}\right)^2 \cdot 3\%\right] + \frac{|Zm|}{50}\left[0.02\% + \left(\frac{f}{30}\right) \cdot 0.05\%\right]$$

$$A_3 = N_3\% + \left[\left(\frac{f}{5}\right)^2 \cdot 0.1\%\right] + \frac{|Zm|}{500}\left[0.02\% + \left(\frac{f}{30}\right) \cdot 0.05\%\right]$$

$$A_4 = 0.3\% + \left[\left(\frac{f}{30}\right)^2 \cdot 3\%\right] + \frac{|Zm|}{500}\left[0.05\% + \left(\frac{f}{30}\right) \cdot 0.1\%\right]$$

$$A_5 = 0.18\% + \left[\left(\frac{|Zm|}{5k}\right) \cdot 0.02\%\right]$$

$$A_6 = 0.18\% + \left[\left(\frac{f}{30}\right)^2 \cdot 3\%\right] + \frac{|Zm|}{5k}\left[0.02\% + \left(\frac{f}{10}\right) \cdot 0.03\%\right]$$

$$A_7 = 0.5\% + \left[\left(\frac{f}{30}\right)^2 \cdot 3\%\right] + \frac{|Zm|}{5k}\left[\left(\frac{f}{30}\right) \cdot 0.2\%\right]$$

$$A_8 = 0.18\% + \left[\left(\frac{|Zm|}{50k}\right) \cdot 0.03\%\right]$$

f: Measured frequency (MHz)

**Values of $N_1$, $N_2$, and $N_3$, are in the following table:**

| Frequency (f) | $N_1$、$N_2$ | $N_3$ |
|---|---|---|
| 75kHz≦ f ≦200kHz | 0.15 | 0.15 |
| 200kHz< f ≦3MHz | 0.08 | 0.08 |
| 3MHz< f ≦5MHz | 0.15 | 0.15 |
| 5MHz< f ≦30MHz | 0.3 | |

*Specifications continued on page 20*

## *Specifications*

*Continued from page 19*

**$\theta$ accuracy is given as:**

$\pm[(180/\pi) \times (A_e/100)]$ (absolute degrees)

Note: 1. $A_e = (A_n + B)$

**Additional error due to temperature:**

Multiply the measurement accuracy by the following temperature factors.

| Temp°C | 0 | 8 | 18 | 28 | 38 | 48 | 55 |
|---|---|---|---|---|---|---|---|
| Factor | X 3 | X 2 | X 1 | X 2 | X 3 | X 4 | |

**Example L and Q accuracy calculation**

*Measurement conditions:*

| | | | |
|---|---|---|---|
| Frequency: | 500 kHz | L value measured: | 2 mH |
| Test signal level: | 1 Vrms | Integration time: | Long |
| Cable length: | 0 meters | Q value measured (Qx): | 200 |

*Calculation:*

Step 1: Use Figure 2 to determine $A_n$ and $Z_m$.
- a. Find the frequency along the X-axis.
- b. Find the inductance value along a diagonal.
- c. Note the intersection of steps a and b.
  In this case $A_n = A_5$. Refer to the equations in Table 3.
- d. Note that in step c $Z_m$ is 6.3 kΩ.

Step 2: Use Tables 3 and 4 to determine $A_n$ and B.
- a. $A_n$ is equation $A_5$ for long integration times:
  $0.18\% + [(|Z_m|/5\text{ k}) \times 0.02\%]$
- b. $A_5$ yields a value of 0.21%
- c. Table 4 indicates that B has a value of 0.
  (@ cable length = 0 m)
- d. L accuracy is $\pm(A_n + B) = 0.21\%$
- e. Determine D accuracy ($D_e$): $(A_n + B)/100 = 0.0021$
- f. Q accuracy: ($\Delta Q$)
  $\pm[(Q_x^2 \times D_e)/(1 \mp (Q_x \times D_e)]$
- g. $\Delta Q$ yields a value of –57 to 133, Actual Q: 143 to 333
  $N_1$, $N_2$ and $N_3$ are in Table 3.

**Table 4. Cable length correction**

| *Test cable length* | *B (%)* |
|---|---|
| 0 meter | 0 |
| 1 meter (16048A) | $f_m/15$ |
| 2 meter (16048D) | $f_m/15$ |

($f_m$ : test frequency in MHz)

*Specifications continued on page 21*

*Continued from page 20*

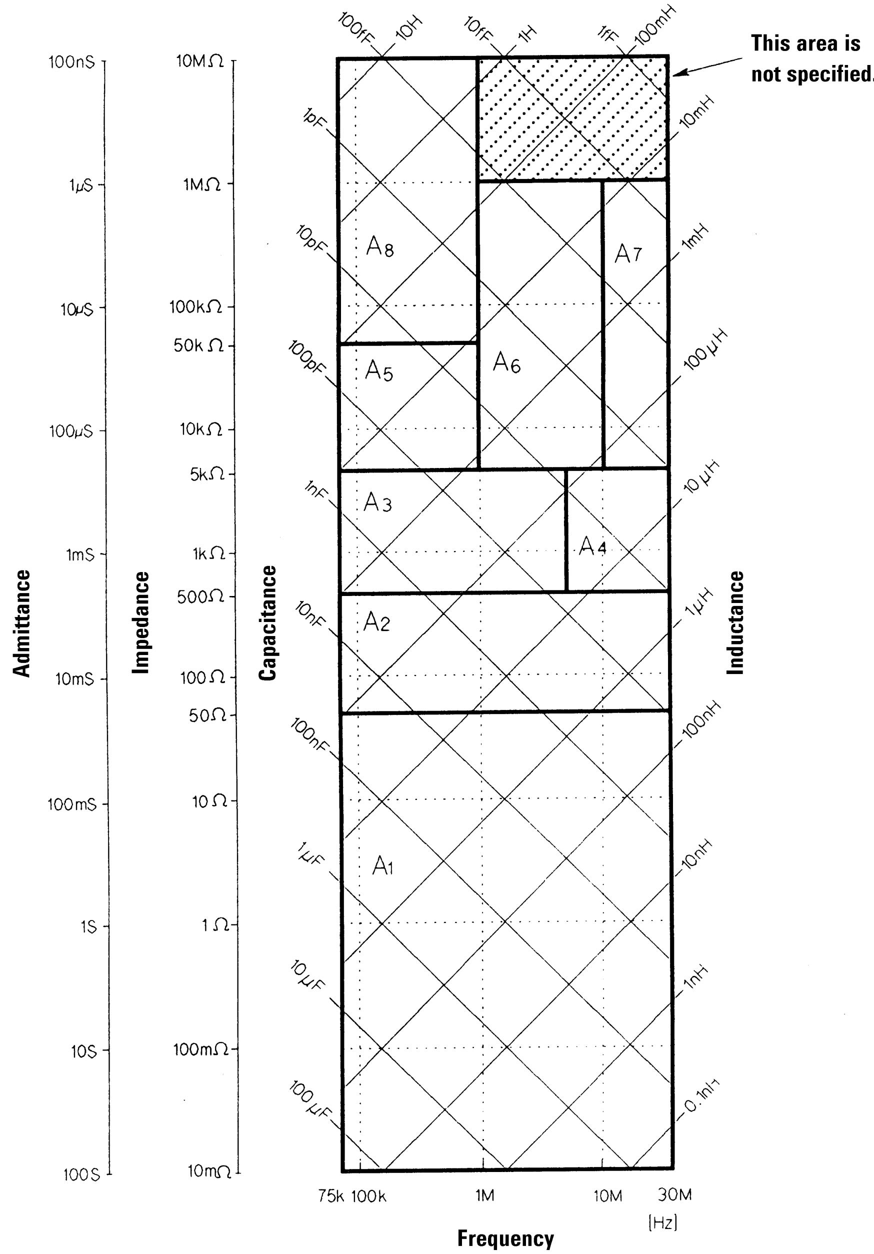



**Figure 2. Accuracy equation ($A_n$) frequency and impedance range (4285A)**

Note: For additional accuracy information, refer to the impedance accuracy equation on page 18. The symbol in parenthesis ($A_n$) represents accuracy equations in Tables 3 and 4. (Measurements outside Figure 2 are permitted but accuracies are not specified.)

## *Accessories*

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

**Agilent 42841A bias current source**

| | |
|---|---|
| **Bias current output:** | Up to 20 Adc maximum, 0.01 Adc steps |
| **Current accuracy:** | ±1% to 1A, ±2% to 5A, ±3% to 20 A |
| **Output voltage:** | 38 Vdc maximum (for more details see page 23) |
| **Frequency range:** | Agilent 4284A: 20 Hz to 1 MHz |
| **Agilent 4285A:** | Up to 30 MHz when combined with the Agilent 42842C bias current fixture. |
| **Test signal voltage:** | 0.5 Vrms to 2 Vrms |

**Basic measurement accuracy:**

| | |
|---|---|
| Agilent 4284A: | 2% for < 1 kHz, 1% for 1 kHz to 1 MHz |
| Agilent 4285A: | $\sqrt{f_m}$% + Agilent 4285A accuracy ($f_m$ = test frequency in MHz) |
| **Interface:** | Custom, directly controllable by the Agilent 4284A/4285A with Option 4284A/4285A-002 |

The Agilent 42842A/B/C are fixtures designed to interface from the Agilent 42841A bias current source to inductive DUT's.

**Agilent 42842A/B/C bias current test fixture**

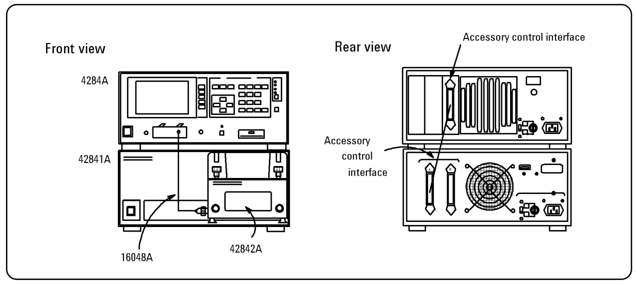
| | |
|---|---|
| **Agilent 42842A:** | Up to 20 Adc maximum, used only with the Agilent 4284A |
| **Agilent 42842B:** | Up to 40 Adc maximum, used only with the Agilent 4284A |

**Basic impedance accuracy:**
Refer to Agilent 42841A specifications

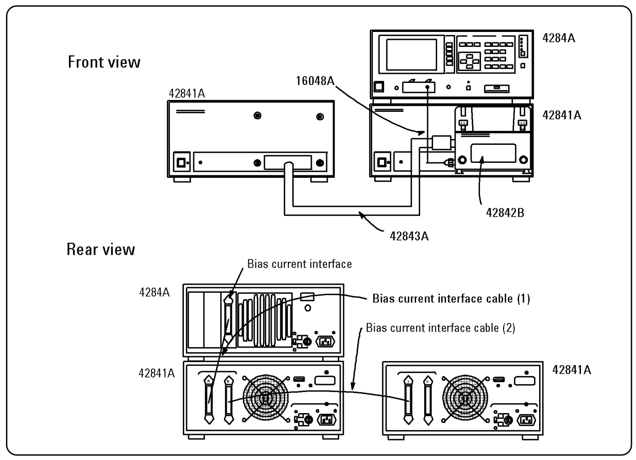
**Component dimensions (maximum):**
80 mm (W) x 80 mm (H) x 80 mm (D)

| | |
|---|---|
| **Agilent 42842C:** | Up to 10 Adc maximum, used only with the Agilent 4285A. Option 42842C-001 adds the SMD test fixture. |

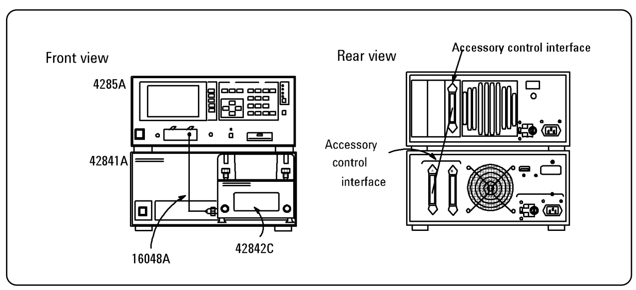
**Component dimensions (maximum):**
60 mm (W) x 50 mm (H) x 60mm (D)




**20A measurement system**



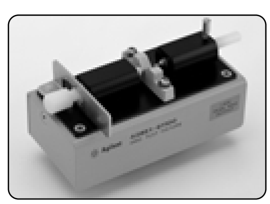

**40A measurement system**




**Bias current system configuration for 42842C**

**Agilent 42843A bias current cable**

This cable is used with the Agilent 4284A for configurations greater than 20 Adc. Refer to the configuration table in the ordering information section.



**Agilent 42851-61100 SMD test fixture**

This is the SMD test fixture, which is furnished with 42842C when Option 42842C-001 is ordered.

| | |
|---|---|
| **Frequency:** | ≤ 30 MHz |
| **Maximum DC bias voltage:** | ±40 V |
| **Maximum DC bias current:** | ±2 A |

# *Supplemental characteristics data for the 42841A*

## Impedance measurement accuracy and applicable measurement range:

The figure to the right shows the inductance measurement accuracy of the 42841A measurement system configured for 40 A. The inductance measurement accuracy represents the tolerance of additional errors to the 4284A's measurement accuracy and is applicable at the 42842A/B's measurement terminals when all of the following conditions are satisfied:

(1) 4284A integration mode: long

(2) Test signal voltage level: 1 Vrms

(3) Test cable: 16048A

(4) Short compensation has been performed

(5) Surrounding temperature: 5 °C to 45 °C

(6) DUT's dissipation factor D < 1

The entire system's measurement error is given as 4284A accuracy + 42841A accuracy (see figure) + additional error due to temperature (see table).
For more information see the operational manual of 42841A.

## Bias current settling time:

The typical time required for the bias current to reach 99% of setting from 0 A is given as:

Bias current ≤ 1 A: 1 s + I bias + 0.6 s

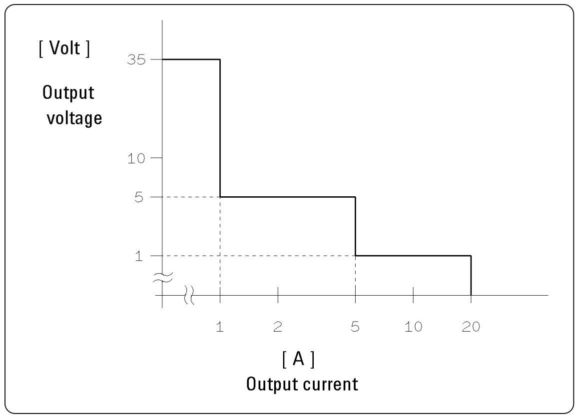
Bias current ≤ 5 A: 0.2 s + I bias + 0.6 s

Bias current > 5 A: 0.1 s + I bias + 0.6 s

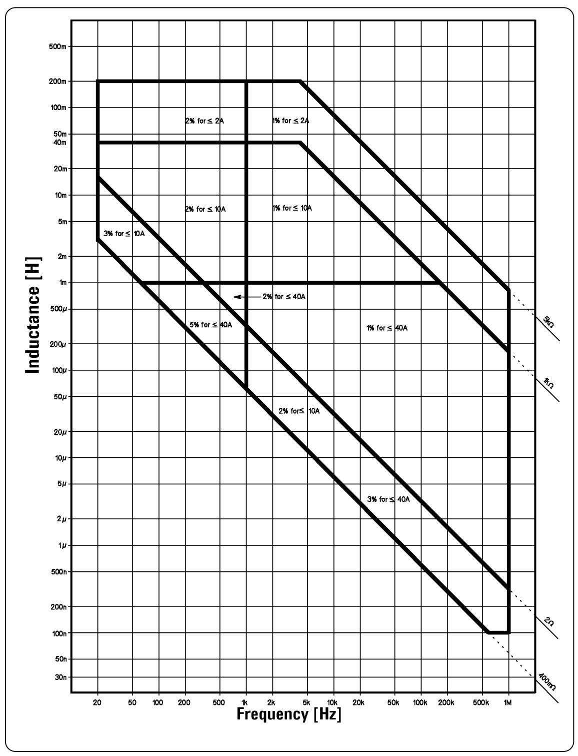
where I bias is bias current setting in amperes.

| Temp (°C) | | 5 | 8 | 18 | 28 | 38 | 45 |
|---|---|---|---|---|---|---|---|
| Additional Error | Ibias≤10[A] | 3.0% | 1.5% | 0% | 1.5% | 3.0% | |
| | Ibias≤40[A] | 4.0% | 2.0% | 0% | 2.0% | 4.0% | |

**Temperature induced error of 42841A (40A configuration)**

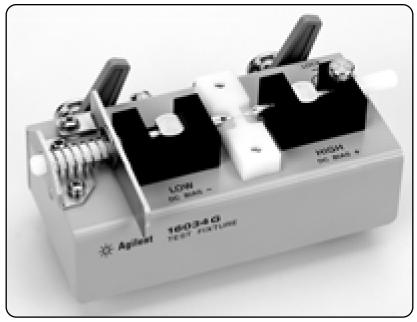



**Output voltage characteristics**

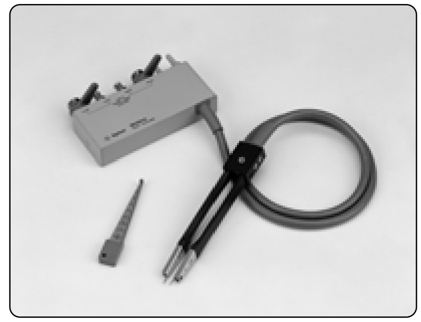



**Inductance measurement accuracy of 42841A (40A configuration)**

# *Test fixtures*



Agilent 16034G



Agilent 16334A

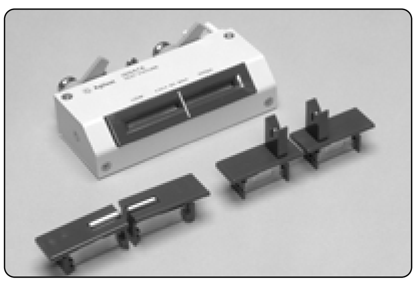
## Surface mount device fixture

**Agilent 16034G/H test fixtures**

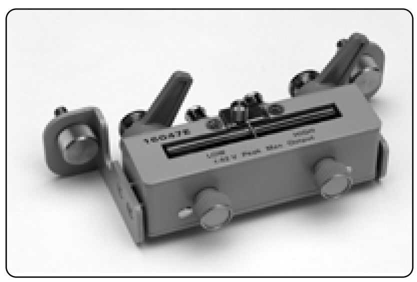
| | |
|---|---|
| Frequency: | ≤ 110 MHz |
| Maximum DC bias voltage: | ±40 V |

**Agilent 16334A test fixture**

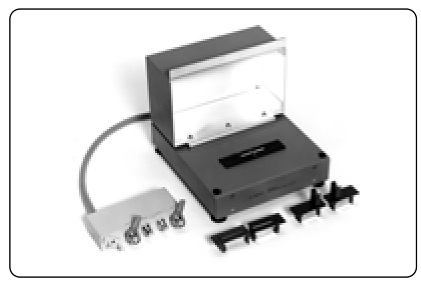
| | |
|---|---|
| Frequency: | ≤ 15 MHz |
| Cable length: | 1 meter |
| Maximum DC bias voltage: | ±40 V |



Agilent 16047A



Agilent 16047E



Agilent 16065A

## Radial and Axial lead fixtures

**Agilent 16047A/D test fixture**

| | |
|---|---|
| Frequency: | ≤ 13 MHz (A)<br>≤ 40 MHz (D) |
| Maximum DC bias voltage: | ±35 V (A)<br>±40 V (D) |

**Agilent 16047E test fixture**

| | |
|---|---|
| Frequency: | ≤ 110 MHz |
| Maximum DC bias voltage: | ±40 V |

**Agilent 16065A external voltage bias fixture**

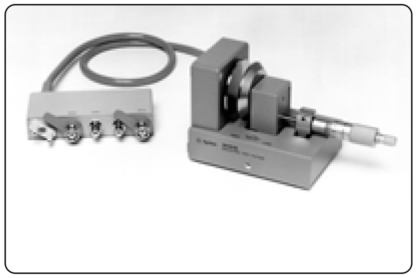
| | |
|---|---|
| Frequency: | 50 Hz to 2 MHz |
| Maximum external DC bias voltage: | ±200 V |
| Maximum AC voltage: | ±7 V |

Blocking capacitor of 5.6 µF is connected in series with the Hc terminal.

*Test fixtures continued on page 25*

# *Test fixtures*

*Continued from page 24*



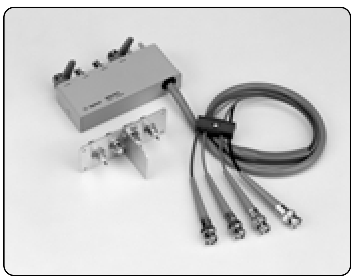
**Agilent 16451B**

## Dielectic material test fixture

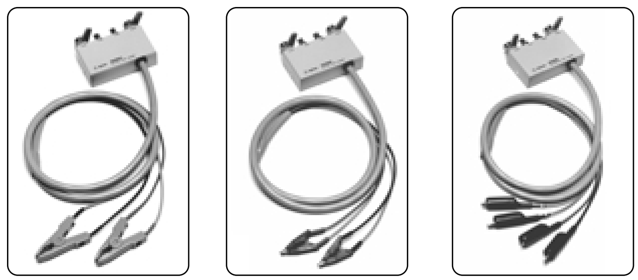
**Agilent 16451B dielectric test fixture**

| | |
|---|---|
| Frequency: | ≤ 30 MHz |
| Function: | Dielectric constant and dissipation factor |

Please refer to the *Accessories Selection Guide for Impedance Measurements* (part number 5965-4792E) for the measurement accuracy and measurement methods.



**Agilent 16048A**



**16089A/B/C Kelvin clips**

## Cable test leads and Kelvin clips

**Agilent 16048A/B/D/E test leads**

| | |
|---|---|
| Connector type: | BNC (A/D/E)<br>SMC (B) |
| Cable Length: | |
| 16048A: | 0.94 m |
| 16048B: | 1 m |
| 16048D: | 1.89 m |
| 16048E: | 3.8 m |
| Frequency: | ≤ 30 MHz (A/B/D)<br>≤ 1 MHz (E) |
| Maximum DC bias voltage: | ±40 V |

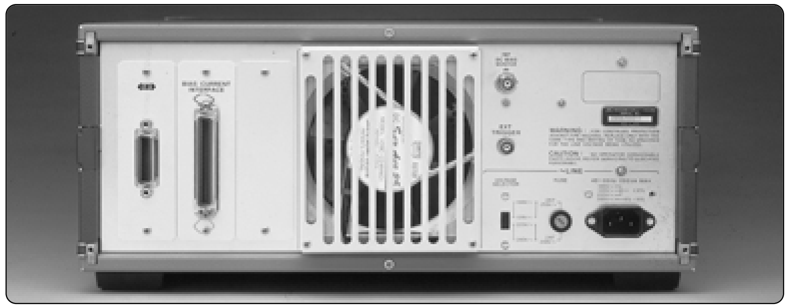
**16089A/B/C/D/E Kelvin clips**

| | |
|---|---|
| Clip type: | Kelvin (A/B/C/E)<br>Alligator (D) |
| Cable length: | 0.94 m (A/B/C/D)<br>1.3m (E) |
| Frequency: | ≤ 100 kHz |
| Maximum DC bias voltage: | ±40 V |

## *Ordering information*

## Agilent 4284A 20 Hz to 1 MHz precision LCR meter

Note: No test fixture is supplied with the Agilent 4284A.
Furnished accessories: Operation manual (04284-90000), power cable.



**Options:**

| | |
|---|---|
| Option 4284A-001: | Power amplifier/40V dc bias (see note 1) |
| Option 4284A-002: | Bias current interface (see note 1, 2) |
| Option 4284A-004: | Memory card |
| Option 4284A-006: | 2 m/4 m cable length operation |
| Option 4284A-008: | Add Japanese operation manual |
| Option 4284A-009: | No operation manual |
| Option 4284A-201: | General purpose handler interface (see note 2, 3) |
| Option 4284A-202: | Specific handler interface (see note 2, 3) |
| Option 4284A-301: | Scanner interface (see note 2) |
| Option 4284A-910: | Extra operation manual |

Note 1: Options 4284A-001 and 4284A-002 do not operate simultaneously.
Note 2: A maximum of 2 of the following may be installed at one time:
Options 4284A-002, 4284A-201, 4284A-202, 4284A-303.
Note 3: Select either Option 4284A-201 or 4284A-202.

## Agilent 4285A 75 kHz to 30 MHz precision LCR meter

Note: No test fixture is supplied with the Agilent 4285A.
Furnished accessories: Operation manual (04285-90000), power cable.

**Options:**

| | |
|---|---|
| Option 4285A-001: | 40V dc bias (see note 1) |
| Option 4285A-002: | Accessory control interface (see note 1, 2) |
| Option 4285A-004: | Memory card |
| Option 4285A-008: | Add Japanese operation manual |
| Option 4285A-009: | No operation manual |
| Option 4285A-201: | General purpose handler interface (see note 2, 3) |
| Option 4285A-202: | Specific handler interface (see note 2, 3) |
| Option 4285A-301: | Scanner interface (see note 2) |
| Option 4285A-910: | Extra operation manual |
| Option 4285A-915: | Add service manual |

Note 1: Options 4285A-001 and 4285A-002 do not operate simultaneously.
Note 2: A maximum of 2 of the following may be installed at one time:
Options 4285A-002, 4285A-201, 4285A-202, 4285A-301.
Note 3: Select either Option 4285A-201 or 4285A-202.

*Specifications continued on page 27*

## *Ordering information*

*Continued from page 26*

**Cabinet options (Agilent 4284A and Agilent 4285A)**

| | |
|---|---|
| Option 4284A/4285A-907: | Front handle kit |
| Option 4284A/4285A-908: | Rack mount kit |
| Option 4284A/4285A-909: | Rack flange and handle kit |

**Bias current accessories:**

Agilent 42841A bias current source
Agilent 42842A 20 Adc bias current test fixture
Agilent 42842B 40 Adc bias current test fixture

Refer to the *Accessories Selection Guide for Impedance Measurements* (part number 5965-4792E) for details.

Agilent 42842C (10 Adc @ 30 MHz) bias current test fixture
Option 4282C-001: surface mount device (SMD) test fixture (42851-61000)
Agilent 42843A bias current cable

**Test fixtures:**

Agilent 16034E test fixture (SMD)
Agilent 16034G test fixture (0603mm/0201inch -sized SMD)
Agilent 16034H test fixture (Array-type SMD)
Agilent 16044A test fixture (SMD, Kelvin contact)
Agilent 16047A test fixture (Axial and radial)
Agilent 16047D test fixture (Axial and radial)
Agilent 16047E test fixture (Axial and radial)
Agilent 16048A test leads (0.94 meters/BNC)
Agilent 16048B test leads (0.94 meters/SMC)
Agilent 16048D test leads (1.89 meters/BNC)
Agilent 16048E test leads (3.8 meters/BNC))
Agilent 16065A external voltage bias fixture
Agilent 16334A test fixture (Tweezer contacts)
Agilent 16451B dielectric test fixture
Agilent 16452A liquid test fixture

**Other accessories:**

Agilent 16270A memory card set (Contains 10 memory cards)
Agilent 16380A standard capacitor set (1, 10, 100, 1000 pF)
Agilent 16380C standard capacitor set (10, 100, 1000 nF)
42030A Four-Terminal Pair standard resistor set (1 mΩ to 100 kΩ)
42090A open termination
42091A short termination

**1.Dc bias current measurement configurations:**

0-10 Amps dc bias configuration (Agilent 4285A only)
Agilent 4285A with Option 4285A-002, 1 ea.
Agilent 42841A bias current source, 1 ea.
Agilent 42842C bias test fixture, 1 ea.
Option 42842C-001 adds SMD test fixture
Agilent 16048A test fixture, 1 ea.

**0-20 Amps dc bias configuration (Agilent 4284A only)**

Agilent 4284A with Option 4284A-002, 1 ea.
Agilent 42841A bias current source, 1 ea.
Agilent 42842A bias test fixture, 1 ea.
Agilent 16048A test leads, 1 ea.

**0-40 Amps dc bias configuration (Agilent 4284A only)**

Agilent 4284A with Option 4284A-002, 1 ea.
Agilent 42841A bias current source, 2 ea.
Agilent 42842B bias test fixture, 1 ea.
Agilent 42843A bias current cable, 1 ea.
Agilent 16048A test leads, 1 ea.



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