Documentation Map

- **User’s Guide** ➔ This book
  
  Is a handy reference to help you to get started using your 4263B, basic measurements and commonly used features are explained.

- **Operation Manual** (Furnished with the 4263B.)
  
  Provides information on initial inspection, how to operate the 4263B, in-depth reference information, general information, and maintenance information.

**In User’s Guide.**

- Chapter 1, Preparation for Use
  
  For initial turn ON of the 4263B

- Chapter 2, Operating the 4263B
  
  Basic Measurement operation
    
    Getting acquired with the 4263B: for beginners
    
    Handy reference for measurement task: for all users

- Chapter 3, Measurement Example
  
  Measurement examples for typical 4263B applications
    
    Capacitor measurement
    
    Inductor measurement
    
    Transformer measurement

In the **User’s Guide**, information on the following subjects is not discussed:

- Initial Inspection
- GPIB Remote Control
- Handler Interface

- Maintenance
- Specification
- Error Messages

For detailed information on these subjects, refer to the **Operation Manual**.
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Preparation for Use

In This Chapter

First you must set the 4263B to match the available power LINE voltage, before turning the 4263B ON.

If the 4263B’s power LINE voltage and frequency are properly set and ready to use, you can skip this chapter.

Power Requirements

The 4263B’s power source requirements are as follows:

- **LINE Voltage**: 100 / 120 / 220 / 240 V ac (±10%)
- **LINE Frequency**: 47 to 66 Hz
- **Power Consumption**: 45 VA maximum

To Set Power LINE Voltage

1. Confirm that the power cable is disconnected.
2. Slide the LINE Voltage selector on the rear panel to match the ac LINE voltage which will be used (see Table 1-1).
Table 1-1. Line Voltage Selection

<table>
<thead>
<tr>
<th>Voltage Selector</th>
<th>Line Voltage</th>
<th>Required Fuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) 115 V</td>
<td>100 / 120 V</td>
<td>T 0.5 A 250 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Agilent part number 2110-0202)</td>
</tr>
<tr>
<td>(b) 230 V</td>
<td>220 / 240 V</td>
<td>T 0.25 A 250 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Agilent part number 2110-0201)</td>
</tr>
</tbody>
</table>
To Set Power LINE Frequency

Note  In this manual, the BLUE shift key is expressed as 🔄, the top of the key is not labeled “blue”.

1. Connect the power cable to the power cord receptacle on the rear panel.
2. Push the LINE switch in and the 4263B will emit a beep when it turns ON, and the self tests will be performed. (If any message is displayed, see “Error Messages” at the back of Operation manual.) The 4263B will be ready for operation after a message like the following is displayed.

3. Press 🔄 Config. The following configuration menu is displayed.

4. Press 🔄 until Line blinks, then press Enter.

A blinking item means that it is currently selected.
5. If the setting does not match the ac line frequency, press 🔄 to toggle the setting between 50 Hz and 60 Hz.
6. Press Enter to set the line frequency.
7. Exit the configuration menu by selecting Exit.

**Note**

The power line frequency setting is stored and is not changed after reset or power-off. Once you set it, you do not need to set the line frequency again as long as the same power line frequency is being used.
Operating the 4263B

In This Chapter

Basic operation of the 4263B is explained.
Resetting 4263B to its Default Settings

1. Press [reset] to select the reset menu.

   ![Image showing reset menu settings]

   - **Cp:** +12.345nF
   - **D:** +0.0001
   - **System Reset:** No
   - **FREQ:** 1kHz
   - **LVL:** 1000mV

2. Select Yes using [reset] or [reset], and press [enter].

The 4263B will be reset to its default settings. For more information about the default settings, see "Default Settings" later in this chapter.

Connecting Test Fixture

Connect the test fixture to the UNKNOWN terminals as follows:

![Image showing test fixture connection]

**Figure 2-1. Connecting a Test Fixture**

See information on available test fixtures, "Accessories Available" later in this chapter.
Setting the Cable Length

The cable length correction function cancels the phase shift error caused by the cable length. When using the Agilent test leads, perform the cable length correction as follows:

1. Press \( \text{Cable} \). Cable lengths 0 m, 1 m, 2 m, and 4 m will be displayed.

   ![Cable Length Display]

   The blinking cable length is the current setting.

2. Select the desired cable length using \( \text{Cable} \) or \( \text{Cable} \). To determine which length you should select, see “Accessories Available” later in this chapter.

3. Press \( \text{Enter} \).

Selecting the Measurement Parameter

1. Press \( \text{Meas} \). The primary measurement parameters are displayed.

   ![Measurement Parameters]

2. Select the desired primary parameter using \( \text{Meas} \) or \( \text{Meas} \), and press \( \text{Enter} \).

3. Then the secondary parameters are displayed in the same manner as above.

   The secondary parameters which can be selected differ depending on the primary parameter. Refer to “Measurement Parameters” later in this chapter.

4. Select the desired secondary parameter using \( \text{Meas} \) or \( \text{Meas} \), and press \( \text{Enter} \).
Setting the Test Signal Frequency

Press \( \text{Freq} \). The test signal frequency selection menu is displayed.

Select the desired frequency using \( \text{F} \) or \( \text{D} \), and press \( \text{Enter} \).

You can also select the test signal frequency by pressing \( \text{Freq} \) until the desired frequency is displayed.

Note that the 10 kHz and 20 kHz (Option 002 only) test frequency are not available when the cable length setting is 4 m, and the 100 kHz test frequency is not available when the cable length setting is 2 m or 4 m.

Setting the Test Signal Level

1. Press \( \text{Set} \). The test signal level selection menu is displayed.

2. Enter the desired value using the numeric keys and the engineering key \( \text{E} \). For example, to set the level to 245 mV, press \( \text{Cont Chk} \: 2 \quad \text{Open} \: 4 \quad \text{Short} \: 5 \) (or press \( \text{Reset} \: 4 \quad \text{Cont Chk} \: 2 \)).

You can also set the value using \( \text{Conv} \) or \( \text{Div} \).

3. Press \( \text{Enter} \) to set the test signal level.
Setting the DC Bias Source Voltage

1. Press [Bias Set]. The DC bias setting menu is displayed.

   ![Image of DC bias settings](image)

   - C: +12.345nF
   - D: +0.0001
   - DC Bias: 0V, 1.5V, 2.0V
   - Ext
   - FREQ: 1kHz
   - LVL: 1000mV

2. Select the desired DC bias voltage value using [ or ] and press [Enter].

Now the DC bias source is selected. For how to apply the DC bias voltage, see “Applying the DC Bias”, later in this chapter.

Selecting the Measurement Time Mode

1. Press [Average Time] to select the measurement time mode (Short, Med or Long). The Meas Time annunciator (▼) displays the measurement time setting.

Setting the Averaging Rate

1. Press [Average].

   ![Image of averaging settings](image)

   - C: +12.345nF
   - D: +0.0001
   - FREQ: 1kHz
   - LVL: 1000mV

2. Enter the averaging rate using the numeric keys. You can enter integer values from 1 to 256. Also, you can increase or decrease the value using [ or ].

3. Press [Enter] to set the value and to exit.
Selecting the Measurement Range

**Auto Range mode**
—Automatically Selecting the Optimum Measurement Range

Press \[ \text{Auto Range} \]. The 4263B's range mode is changed from “Hold” to “Auto”, or from “Auto” to “Hold”. When the Hold Range annunciator(\(\downarrow\)) is OFF, the 4263B is set to the auto range mode.

![Auto Range mode diagram]

**Hold Range mode—Selecting the Measurement Range of Your Choice**

1. Press \[ \text{Hold Range} \].

2. Press \[ \text{Hold Range} \] or \[ \text{Hold Range} \] until the desired range is displayed. Or, input the impedance value to be measured using the numeric keys and the engineering key \(10^\text{x}\). The 4263B will select the optimum measurement range setting.

3. Press \[ \text{Enter} \]. to set the measurement range.

The available ranges are 0.1 Ω, 1 Ω, 10 Ω, 100 Ω, 1 kΩ, 10 kΩ, 100 kΩ, and 1 MΩ. To determine which measurement range you should select, see “Measurement Range Setting” later in this chapter.
Selecting the Trigger Mode

Press until the **Trigger** annunciator (▼) points to the desired trigger mode (Int, Man or Ext).

To trigger a measurement in each mode, see “Making a Measurement” later in this chapter.

Setting the Trigger Delay Time

1. Press 

2. Enter the desired trigger delay time using the numeric keys. (For example, to set 0.5 sec, press 0 5.) You can set the trigger delay time from 0.000 sec to 9.999 sec.

3. Press .
Performing the OPEN Correction
—Canceling the stray admittance in parallel with the DUT

1. Confirm that the test fixture is connected to the UNKNOWN terminals without a DUT connected.

2. Press [ ] 4 . The OPEN correction menu is displayed.

   ▶  

After a while, the 4263B completes OPEN correction with the message Open Correction Complete, and returns to the measurement state.

If “Out Of Limit”, a WARNING message, is displayed, the OPEN admittance is so high that it would be unsuitable for OPEN correction data. This is only a WARNING, the OPEN correction data will still be used. However, you must verify the test fixture connection to the UNKNOWN terminals and the procedure used to perform the OPEN correction.

- Verify that the test fixture is correctly connected to the UNKNOWN terminal.
- Verify that nothing is connected to the test fixture’s test electrode.

Perform OPEN correction again after verifying the above items.
Performing the SHORT Correction
—Canceling the residual impedance in series with the DUT

1. Configure the test electrodes in a SHORT configuration by connecting the High and Low electrodes to each other or by connecting a shorting bar to the test fixture.

2. Press \[\text{Shift} 5\]. The SHORT correction menu is displayed.

   \[
   \begin{array}{ccc}
   \text{Cp: } +12.345nF & \text{D: } +0.0001 \\
   \text{ShortMeas} & \text{MeasVal} & \text{Exit} \\
   \end{array}
   \]

   \[
   \begin{array}{ccc}
   \text{FREQ : } 1kHz & \text{LVL : } 1000mV \\
   \end{array}
   \]

3. Press \[\text{Meas} \] or \[\text{Select} \] until ShortMeas blinks, and press \[\text{Select} \]. SHORT correction is performed. During that time, the following message is displayed.

   \[
   \begin{array}{ccc}
   \text{Cp: } +12.345nF & \text{D: } +0.0001 \\
   \text{Short Correction} \\
   \end{array}
   \]

   \[
   \begin{array}{ccc}
   \text{FREQ : } 1kHz & \text{LVL : } 1000mV \\
   \end{array}
   \]

After a while, the 4263B completes SHORT correction with the message Short Correction Complete, and returns to the measurement state.

If “Out Of Limit”, a WARNING message, is displayed, the SHORT impedance is so high that it would be unsuitable for SHORT correction data. This is only a WARNING, the SHORT correction data will still be used. However, you must verify the test fixture connection to the UNKNOWN terminals and the procedure used to perform the SHORT correction.

- Verify that the test fixture is correctly connected to the UNKNOWN terminal.
- Verify that the test fixture’s test electrodes are correctly shorted.
- Perform SHORT correction again after verifying the above items.
Using the Comparator Function

Setting the Limit Values

1. Press \textit{Sec Low} to set the lower limit of the primary parameter, and \textit{Sec High} to set the higher limit. Press \textit{Int Low} to set the lower limit of the secondary parameter, and \textit{Int High} to set the higher limit.

For example, the following menu is displayed when \textit{Int High} is pressed.

\texttt{Cp: +12.345nF D: +0.0001}

\texttt{FREQ : 1kHz}

\texttt{LvL : 1000mV}

2. Enter the value using the numeric keys, then press \textit{Entry} to set the value. You can set the value from $-999.99 \times 10^{14}$ to $999.99 \times 10^{14}$.

Starting the Sort

3. Press \textit{Comptr On}. The \textit{Comptr On} annunciator(\textit{\downarrow}) turns ON, and the comparator function is turned ON.

The sorting results are HIGH, IN, and LOW.

Where,

\begin{itemize}
  \item \textbf{HIGH} greater than the higher limit
  \item \textbf{IN} between the higher and lower limits
  \item \textbf{LOW} less than the lower limit
\end{itemize}

The 4263B shows the comparison results using the display, beeper, printer, and 16064B LED Display/Trigger Box.

- For result output to the display, see “Selecting the Display Mode” later in this chapter.
- For result output to the beeper, see “Selecting the Beep Mode” later in this chapter.
- For result output to the printer, see “Setting the Printer—Printing the measurement data” later in this chapter.
- For result output to the 16064B, see “Accessories Available” later in this chapter.
Using the Contact Check Function
—Monitoring the connection of test electrodes and DUT

Press [Cont Chk], and the Cont Chk annunciator (▼) turns ON.

When the contact check result is Fail, the 4263B displays N.C. (No-Contact).

Using the Deviation Measurement Function

Setting the Deviation Reference Values

1. Press [Δ Ref (Ent)].

Press [Δ] or [Δ] until ΔRefEnt blinks, and press [Enter].

2. You can now input the primary parameter's reference value. Enter the reference value with the numeric keys, and press [Enter] to set the value.

3. Then the 4263B displays the menu for setting the secondary parameter's reference value. Enter the reference value with the numeric keys, and press [Enter] to set the value.
Selecting the Deviation Mode

4. The primary parameter's mode can be set by selecting Pri and pressing Enter.

<table>
<thead>
<tr>
<th>Cp: +12.345nF</th>
<th>D: +0.0001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>( \Delta \text{ABS} )</td>
</tr>
<tr>
<td>FREQ : 1kHz</td>
<td>LVL : 1000mV</td>
</tr>
</tbody>
</table>

\( \Delta \text{ABS} \) \quad \text{Measured value} - \text{Reference}

\( \Delta \% \) \quad \frac{\text{Measured value} - \text{Reference}}{\text{Reference}} \times 100\%

Off \quad \text{Turning the deviation mode OFF.}

Select the deviation measurement mode with \( \triangleright \) or \( \triangleright \), and press Enter.

5. The secondary parameter's mode can be set by selecting Sec and pressing Enter in the same manner as the primary. Select the desired mode with \( \triangleright \) or \( \triangleright \), and press Enter.
Selecting the Display Mode

Press  or  to select Data, Cmprtr, Digit or Off, and press Enter.

- The Measurement Display mode (Data) shows the measurement data:

```
Cp: +12.345nF  D: +0.0001  FREQ : 1kHz
LVL : 1000mV
```

- The Comparison Display mode (Cmprtr) shows the comparison results:

```
Cp: LOW  D: IN
FREQ : 1kHz
LVL : 1000mV
```

- When Digit is selected, the following menu is displayed, allowing you to set the number of digits displayed for the measured value:

```
Cp: +12.345nF  D: +0.0001
Digit : 3 4 5
Vmon : +80.00mV
Imon : +1.00mA
```

- When Off is selected, the 4263B will not display the measurement results (Display OFF mode).
Using the Level Monitor Function

1. Press \[ \text{[Menu]} \] \[ \text{Set} \], and the following menu is displayed.

\[
\begin{array}{|c|c|c|c|}
\hline
\text{Cp: } +12.345\text{nF} & \text{D: } +0.0001 & \text{FREQ: } 1\text{kHz} \\
\text{Off} & \text{Imon} & \text{Vmon} & \text{Both} \\
\text{LVL: } 1000\text{mV} \\
\hline
\end{array}
\]

2. Select \text{Off}, \text{Imon}, \text{Vmon} or \text{Both} using \[ \text{[Menu]} \] \[ \text{Set} \] .

- When \text{Imon} is selected, the 4263B will monitor the actual signal current flowing through the DUT.
- When \text{Vmon} is selected, the 4263B will monitor the actual signal voltage across the DUT.
- When \text{Both} is selected, the 4263B will monitor both current and voltage.
- When \text{Off} is selected, the level monitor function is turned OFF.

3. Press \[ \text{Enter} \] .

You can see the level monitor values on the LCD display by pressing \[ \text{[Set]} \] several times;

\[
\begin{array}{|c|c|c|}
\hline
\text{Cp: } +12.345\text{nF} & \text{D: } +0.0001 & \text{Vmon: } +80.00\text{mV} \\
\text{Imon: } +1.00\text{mA} \\
\hline
\end{array}
\]
Selecting the Beep Mode

To change the beeper mode for the comparator result reporting:

1. Press \[ \text{Shift} \].

\[
\begin{array}{cccccc}
\text{Cp} &: +12.345\text{nF} & \text{D} &: +0.0001 \\
\text{Beep} &: \text{Line} & \text{Svc} & \text{Test} & \text{Exit} & \text{Freq} &: 1\text{kHz} \\
\text{Lvl} &: 1000\text{mV}
\end{array}
\]

2. Select Beep using \[ \text{Shift} \] or \[ \text{Shift} \], and press \[ \text{Enter} \].

\[
\begin{array}{cccccc}
\text{Cp} &: +12.345\text{nF} & \text{D} &: +0.0001 \\
\text{Beep} &: \text{Off} & \text{Fail} & \text{Pass} & \text{Freq} &: 1\text{kHz} \\
\text{Lvl} &: 1000\text{mV}
\end{array}
\]

3. Select the beep mode using \[ \text{Shift} \] or \[ \text{Shift} \], and press \[ \text{Enter} \].

4. Select Exit using \[ \text{Shift} \] or \[ \text{Shift} \], and press \[ \text{Enter} \].

Setting the Printer—Printing the measurement data

1. Use an GPIB compatible printer, set to the Listen Always mode.
2. Connect the printer to the 4263B’s GPIB port on the rear panel.
3. Turn the printer ON.
4. Set the 4263B to talk only mode (Set the 4263B’s GPIB address to 31).
   a. Press \[ \text{Addr} \] \[ \text{Addr} \] \[ \text{Gpib} \] \[ \text{Addr} \] \[ \text{Addr} \] \[ \text{Enter} \]. Or press \[ \text{Addr} \] or \[ \text{Addr} \] to change the value.

\[
\begin{array}{cccccc}
\text{Cp} &: +12.345\text{nF} & \text{D} &: +0.0001 \\
\text{Gpib Adr} &= 31 & \text{Freq} &: 1\text{kHz} \\
\text{Lvl} &: 1000\text{mV}
\end{array}
\]

b. Press \[ \text{Enter} \]. The Talk Only annunciator(\(\checkmark\)) turns ON, and the printer begins printing the measurement data.
When you want to disable printing, change the GPIB address to an address other than 31 (for example, 17, which is the default setting).

Connecting the DUT

Connect the DUT to the test electrodes.

Figure 2-3. Connecting the DUT
Applying the DC Bias

Press the DC Bias button to apply the DC bias. The DC Bias ON/OFF indicator is ON.

(Press the DC Bias button again to turn OFF the DC bias. The DC Bias ON/OFF indicator is OFF.)

Making a Measurement

- In the internal trigger mode—The 4263B makes continuous free-running measurements.
- In the manual trigger mode—Press the trigger button when you want to trigger a measurement.
- In the external trigger mode—Connect the external trigger source to the EXT TRIGGER terminal on the 4263B’s rear panel, and apply a TTL level trigger signal to trigger a measurement. (For details, see Operation Manual.) Note that it must be set to the external trigger mode to trigger from an external handler or the 16064B LED Display/Trigger Box.

Verification of Current Settings

Press the Display Setting button.

The display on the right side of the LCD changes, and each time the Display Setting button is pressed, the next current setting is displayed.

1. Test signal frequency and Test signal level
2. DC bias setting and Averaging rate
3. Trigger delay time and Cable length
4. Comparator limits for primary parameter
5. Comparator limits for secondary parameter
6. Level monitor value
If You Have a Problem

If any of the problems listed below occur, follow the instructions described.

- If you find yourself lost when operating the 4263B, you can get back on track by:
  
  To return to the measurement mode, press several times.

  To return to the default settings, press Reset. (If the reset not accepted, confirm that
  the Key Lock annunciator is turned ON. See next.)

- If the 4263B does not accept key input:

  - Check whether or not the Key Lock annunciator is ON. If so,
    
    - Press . The Key Lock annunciator turns OFF and the front-panel keys are
      unlocked.

  - Check that the 16064B LED display/trigger box is connected to the 4263B and it is set to
    lock out the keys. If so, unlock the keys from the 16064B.

- If the 4263B does not display measurement results:

  The display mode is set to the Display OFF mode.

  1. If the 4263B is in the key lockout mode, cancel the key lockout mode. (See previous
     description.)
  2. Press to change the display mode to a mode other than Display OFF.

- If ------ or OVL is displayed:

  The measurement result is out of the measurable range. Check the DUT and make sure the
  measurement range is properly set.
Reference

Default Settings

- Frequency : 1 kHz
- Test voltage level : 1 Vrms
- DC Bias : OFF
- DC Bias source : 0 V
- Deviation measurement : OFF
- Measurement parameter : Cp-D
- Measurement range : Auto
- Measurement time : MEDIum
- Averaging rate : 1
- Trigger mode : Internal
- Trigger delay : 0 ms
- Comparator : OFF
- Contact check : OFF
- Display mode : Measurement mode
- Beep mode : FAIL mode
- Cable length : 0 m
- Display digits : 5
- Level monitor : OFF
- OPEN/SHORT correction data is cleared

Measurement Parameters

<table>
<thead>
<tr>
<th>Primary Parameter</th>
<th>Secondary Parameters Which May Be Selected For This Primary Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z</td>
<td>$\theta$</td>
</tr>
<tr>
<td>Y</td>
<td>$\theta$</td>
</tr>
<tr>
<td>R</td>
<td>$X$</td>
</tr>
<tr>
<td>G</td>
<td>$B$</td>
</tr>
<tr>
<td>Cp</td>
<td>D Q G Rp</td>
</tr>
<tr>
<td>Cs</td>
<td>D Q Rs</td>
</tr>
<tr>
<td>Lp</td>
<td>D Q G Rp Rdc</td>
</tr>
<tr>
<td>Ls</td>
<td>D Q Rs Rdc</td>
</tr>
<tr>
<td>L2</td>
<td>N 1/N M R2</td>
</tr>
<tr>
<td>Z : impedance (absolute value)</td>
<td>Y : admittance (absolute value)</td>
</tr>
<tr>
<td>$\theta$ : phase angle</td>
<td>R : resistance</td>
</tr>
<tr>
<td>Ls : equivalent series inductance</td>
<td>Lp : equivalent parallel inductance</td>
</tr>
<tr>
<td>Cs : equivalent series capacitance</td>
<td>Cp : equivalent parallel capacitance</td>
</tr>
<tr>
<td>Q : quality factor</td>
<td>D : dissipation Factor</td>
</tr>
<tr>
<td>G : conductance</td>
<td>X : reactance</td>
</tr>
<tr>
<td>B : susceptance</td>
<td>Rp : equivalent parallel resistance</td>
</tr>
<tr>
<td>Rs : equivalent series resistance</td>
<td>Rdc : dc resistance</td>
</tr>
<tr>
<td>N : turns ratio of transformer</td>
<td>M : mutual inductance</td>
</tr>
<tr>
<td>L2 : inductance</td>
<td>R2 : dc resistance</td>
</tr>
</tbody>
</table>

1 This parameter is measured using the transformer measurement configuration (two-terminal measurement configuration).
Note

Primary parameter L2 and secondary parameters Rdc, N, M, and R2 can only be used with Option 001 (N / M / DCR measurement function addition). These parameters are not displayed on the menu if the 4263B is not equipped with Option 001.

To measure the primary parameter L2, the transformer measurement configuration is required. So use the 16060A Transformer Test Fixture.

Accessories Available

16064B LED Display/Trigger Box

The 16064B LED Display/Trigger Box triggers a measurement when its trigger key is pressed, and displays the contact check and comparison results using LEDs. It allows you to manually operate the comparator function of the 4263B.

Connect to the Handler Interface connector on the rear panel.

Test Fixtures and Test Leads

For measurement versatility, various types of test fixtures and test leads are available for the 4263B. In this section, main test fixtures and test leads are described using figures. When using these test fixtures and test leads, set the 4263B to the corresponding cable length of the test fixture or test leads being used.
Set the cable length to 0 m

HP 16060A Transformer Test Fixture

Set the cable length to 1 m

HP 16065C External Bias Adapter

Set the cable length to 0 m

HP 16085B Terminal Adapter (4TP to APC 7)

Set the cable length to 1 m

HP 16334A Test Fixture (Tweezer)

Set the cable length to 1 m

HP 16089A Kelvin Clip Leads
Large clip, 1 m length

HP 16089B Kelvin Clip Leads
Medium clip, 1 m length

HP 16089C Kelvin IC Clip Leads
IC Package clip, 1 m length

HP 16089D Alligator Clip Leads
Four clips, 1 m length
Accessories List

16034E  Test Fixture (For SMD or Chip type DUT)
16047A  Test Fixture (For Axial or Radial DUT)
16047B  Test Fixture (For Axial or Radial DUT)
16047C  HF Test Fixture (For Axial or Radial DUT)
16047D  Test Fixture (For Axial or Radial DUT)
16048A  Test Leads (1 m, BNC)
16048B  Test Leads (1 m, SMC)
16048D  Test Leads (2 m, BNC)
16048E  Test Leads (4 m, BNC)
16060A  Transformer Test Fixture
16065A  External Bias Test Fixture
16065C  External Bias Adapter
16085B  Terminal Adapter: Converts 4 terminal pair connector to APC7 connector.
16089A  Kelvin Clip Leads (1 m, two large clips)
16089B  Kelvin Clip Leads (1 m, two medium clips)
16089C  Kelvin Clip Leads (1 m, two IC clips)
16089D  Alligator Clip Leads (1 m, four medium clips)
16089E  Kelvin Clip Leads (1 m, two large clips)
16092A  RF Spring Clip: Axial Radial and SMD
16093A  RF Two-Terminal Binding Post
16093B  RF Three-Terminal Binding Post
16094A  RF Probe Tip/Adapter
16095A  LF Probe Adapter
16191A  Side Electrode SMD Test Fixture
16192A  Parallel Electrode SMD Test Fixture
16193A  Small Side Electrode SMD Test Fixture
16194A  Wide Temperature SMD Test Fixture
16314A  50MHz/4-Terminal 100Hz-10MHz
16334A  Test Fixture (For SMD or Chip type DUT)
16451B  Dielectric Test Fixture
16452A  Magnetic Test Fixture
16664B  LED Display/Trigger Box (with GO/NO-GO display and trigger button)

1 16085B adapter required.
2 Cables adapted to APC7 on each end required.
3 Don’t connect ground/lead to 4263B.

Note  There is some possibility that available accessories are changed. Refer to latest accessories catalogue about the latest information.
Measurement Range Setting

<table>
<thead>
<tr>
<th>Range Setting</th>
<th>Optimum Measurement Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 Ω&lt;sup&gt;1&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>1 Ω</td>
<td>100 mΩ &lt;</td>
</tr>
<tr>
<td>10 Ω</td>
<td>1 Ω &lt;</td>
</tr>
<tr>
<td>100 Ω</td>
<td>10 Ω &lt;</td>
</tr>
<tr>
<td>1 kΩ</td>
<td>1 kΩ ≤</td>
</tr>
<tr>
<td>10 kΩ</td>
<td>10 kΩ ≤</td>
</tr>
<tr>
<td>100 kΩ&lt;sup&gt;2&lt;/sup&gt;</td>
<td>100 kΩ ≤</td>
</tr>
<tr>
<td>1 MΩ&lt;sup&gt;2&lt;/sup&gt;</td>
<td>1 MΩ ≤</td>
</tr>
</tbody>
</table>

<sup>1</sup>This range is available when the test level setting is higher than 315 mV.

<sup>2</sup>This range is not available for the 100 kHz test frequency setting.

---

Other Topics

For details on these functions, see the *Operation Manual*.

- Initial Inspection — Chapter 1 of the *Operation Manual*
- Load correction — Chapter 1, Chapter 3 and Chapter 7 of the *Operation Manual*
- Key Lock Function — Chapter 2 and Chapter 3 of the *Operation Manual*
- GPIB — Chapter 4 and Chapter 5 of the *Operation Manual*
- Handler Interface — Chapter 3, Chapter 6, and Appendix B of the *Operation Manual*
- Save / Recall — Chapter 2 and Chapter 3 of the *Operation Manual*
- Backup Function — Chapter 3 of the *Operation Manual*
- Specification — Chapter 8 of the *Operation Manual*
- Maintenance — Chapter 9 of the *Operation Manual*
- Error Messages — “Error Messages” in back of the *Operation Manual*
Measurement Examples

In This Chapter
This chapter provides the typical measurement examples
Electrolytic Capacitor Measurement—For High Capacitance

The 4263B’s measurement accuracy and wide measurement range are the right tools to make precise measurements of electrolytic capacitor parameters.

Electrolytic capacitors are generally high capacitance, so their impedance is low. The 4263B has the 100 mΩ measurement range, and keeps its high measurement accuracy when measuring low impedance. For example, the 4263B measures an aluminum electrolytic capacitor, 22,000 µF, at the test frequency of 120 Hz, with about 0.5 % accuracy. You can try this measurement using the following procedure.

DUT

Aluminum electrolytic capacitor (22,000 µF ± 20 %)

Requirements

Test Fixture : 16089B Kelvin Clip Leads

Measurement Setup

<table>
<thead>
<tr>
<th>Measurement parameter</th>
<th>: Cs-D&lt;sup&gt;1&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test frequency</td>
<td>120 Hz</td>
</tr>
<tr>
<td>Test signal level</td>
<td>1 Vrms&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

1 For high capacitance measurement, equivalent series parameter Cs-D is commonly used.

2 Even though LVL: 1 Vrms is set, less than 0.5 Vrms which is maximum applicable voltage for testing electrolytic capacitors in accordance to JIS standard, will be applied to the Aluminum electrolytic capacitor under test.

Measurement Procedure

1. Reset the 4263B.
   a. Press 
   b. Press 
      until Yes blinks, and press .

   ![Shift](image)
2. Connect test fixture to the UNKNOWN terminals as follows.

![Diagram of test fixture connection]

3. Set the cable length to 1 m.
   a. Press [cable 3].

![Measurement Settings screen]

b. Select 1m using [ or ] and press [Enter].

4. Set measurement parameter to Cs-D.
   a. Press [Mode], and the following menu is displayed.

![Measurement Settings screen]

b. Select Cs using [ or ] and press [Enter].

c. Select D using [ or ] and press [Enter].
5. Set the test frequency to 120 Hz.
   Press \[ \text{Clip} \quad \text{Freq} \].
   Press \[ \text{C} \quad \text{C} \] to set the frequency to 120 Hz, and press \[ \text{Enter} \].

6. Perform the OPEN correction.
   a. Separate the test lead clips (Nothing must be connected to the test lead clips).
   b. Press \[ \text{Blue} \quad 4 \] and the following menu is displayed.

   \[ \begin{array}{ccc}
   \text{Cs:} & +12.345 \text{nF} & \text{D:} & +0.0001 \\
   \text{OpenMeas} & \text{MeasVal} & \text{Exit} & \text{FREQ:} & 120 \text{Hz} \\
   \text{LVL:} & 1000 \text{mV} \\
   \end{array} \]

   c. Select \text{OpenMeas} using \[ \text{C} \quad \text{C} \], and press \[ \text{Enter} \].

   \[ \begin{array}{ccc}
   \text{Cs:} & +12.345 \text{nF} & \text{D:} & +0.0001 \\
   \text{Open Correction} & \text{FREQ:} & 120 \text{Hz} \\
   \text{LVL:} & 1000 \text{mV} \\
   \end{array} \]

   After a while, the OPEN correction is completed. (If Out Of Limit is displayed, see “Performing the OPEN Correction —Canceling the stray admittance in parallel with the DUT” in Chapter 2.)

7. Perform the SHORT correction.
   a. Short the electrodes of the test fixture as shown in the following figure.
b. Press \[ \text{blue} \quad 5 \text{ } \text{Shift} \], and the following menu is displayed.

\[
\begin{align*}
\text{Cs: } &+12.345\text{nF} & D: &+0.0001 & \text{FREQ: } &120\text{Hz} \\
&\text{ShortMeas} & \text{MeasVal} & \text{Exit} & LVL: &1000\text{mV}
\end{align*}
\]

\[
\begin{align*}
\text{Cs: } &+12.345\text{nF} & D: &+0.0001 & \text{FREQ: } &120\text{Hz} \\
&\text{Short Correction} & \text{Exit} & \text{LVL: } &1000\text{mV}
\end{align*}
\]

After a while, the SHORT correction is completed. (If Out Of Limit is displayed, see “Performing the SHORT Correction — Canceling the residual impedance in series with the DUT” in Chapter 2.)

8. Connect the DUT to the test fixture, and the measurement result will be displayed.

\[
\begin{align*}
\text{Cs: } &+21.719\text{mF} & D: &+0.1640 & \text{FREQ: } &120\text{Hz} \\
& \text{LVL: } &1000\text{mV}
\end{align*}
\]

For More Information

- To apply the DC bias — See “Setting the DC Bias Source Voltage” in Chapter 2.
- To print out the measurement result — See “Setting the Printer—Printing the measurement data” in Chapter 2
Inductor Measurement—Versatile measurement parameters

The 4263B offers many kinds of measurement parameters for LCR measurement. In addition to these parameters, Option 001 adds ability to make turns ratio (N), mutual inductance (M), DC resistance (DCR) measurements.

This example shows a basic measurement for an inductor, and its DCR. You can measure both inductance and DCR without resetting the measurement configuration.

DUT

Coil (220 μH ± 5% @ 100kHz)

Requirements

Test Fixture: 16047A

Test Fixture

16047A

Measurement Setup

Measurement parameter: Lp-Q and Lp-Rdc
Test frequency: 100 kHz
Test signal level: 100 mVRms

Measurement Procedure

1. Reset the 4263B.
   a. Press and .

   ![Shift](image1)

   - Cp: +12.345nF D: +0.0001
   - System Reset: No
   - FREQ: 1kHz
   - LVL: 1000mV

   b. Press until Yes blinks, and press Enter .

2. Connect the test fixture to the UNKNOWN terminals.
3. Select measurement parameter Lp-Q.
   a. Press \( \text{Menu} \) and the following menu is displayed.

   \[
   \begin{array}{cccccccc}
   \text{Cp:} & +12.345 \text{nF} & \text{D:} & +0.0001 & \text{FREQ:} & 1 \text{kHz} \\
   \text{Z Y R G Cp Cs Lp Ls L2} & \text{LVL:} & 1000 \text{mV} \\
   \end{array}
   \]

   b. Select Lp using \( \text{or } \text{or } \) and press \( \text{Enter} \).

   \[
   \begin{array}{cccccccc}
   \text{Cp:} & +12.345 \text{nF} & \text{D:} & +0.0001 & \text{FREQ:} & 1 \text{kHz} \\
   \text{D Q G Rp Rdc} & \text{LVL:} & 1000 \text{mV} \\
   \end{array}
   \]

   c. Select Q using \( \text{or } \text{or } \) and press \( \text{Enter} \).

4. Set the test signal frequency to 100 kHz.
   Press \( \text{Freq} \).

   Set the frequency to 100 kHz using \( \text{or } \text{or } \) and press \( \text{Enter} \).
5. Set the test signal level to 100 mV.
   Press \text{Gas Setup} \text{Level}.

   Set the level to 100 mV using the numeric keys or \text{0} \text{0} \text{0} \text{0}, and press \text{Enter}.

6. Perform the OPEN correction.
   a. Remove any device inserted in the test electrodes to create an OPEN condition (Nothing should be connected to the test electrodes).
   b. Press \text{Open} \text{4}, and the following menu is displayed.

   ![Open Correction Menu]

   c. Select \text{OpenMeas} using \text{0} \text{0} \text{0} \text{0}, and press \text{Enter}.

   ![Open Correction Result]

   After a while, the OPEN correction is completed. (If Out Of Limit is displayed, see “Performing the OPEN Correction —Canceling the stray admittance in parallel with the DUT” in Chapter 2.)

7. Perform the SHORT correction.
   a. Insert the shorting plate to the test fixture as shown in the following figure:

   ![Shorting Plate Diagram]
b. Press \( \text{Shift} \) \( \text{5} \), and the following menu is displayed.

```
Lp: +12.345 \mu \text{H}   Q: + 10.0  FREQ : 100kHz
ShortMeas  MeasVal  Exit
LVL : 100mV
```

After a while, the SHORT correction is completed. (If Out Of Limit is displayed, see “Performing the SHORT Correction — Canceling the residual impedance in series with the DUT” in Chapter 2.)

8. Connect the DUT to the test fixture and the measurement result will be displayed.

```
Lp: +216.55 \mu \text{H}   Q: + 18.6  FREQ : 100kHz
LVL : 100mV
```

**Note**  
Step 9 is for an 4263B with Option 001 only.

9. Change the measurement parameter to Lp-Rdc.
   a. Press \( \text{Menu} \) and the following menu is displayed.

```
Lp: +216.55 \mu \text{H}   Q: + 18.6  FREQ : 100kHz
Z  Y  R  G  Cp  Cs  Lp  Ls  L2  
LVL : 100mV
```

b. Press \( \text{Enter} \) to select Lp.
c. Select Rd<sub>c</sub> using \[\text{[1]}\] or \[\text{[2]}\], and press \[\text{[Enter]}\]. The measurement result will be displayed.

\[
\begin{array}{|c|c|c|}
\hline
\text{Lp: +216.55 } & \text{Rdc: +7.0986 } & \text{FREQ: 100kHz} \\
\text{ } & \text{Ω} & \\
\text{LVL: 100mV} & \\
\hline
\end{array}
\]

**For More Information**

- To select other measurement parameters — See “Selecting the Measurement Parameter” in Chapter 2.
- To print out the measurement result — See “Setting the Printer—Printing the measurement data” in Chapter 2
Transformer Measurement (Option 001 Only)

With the 4263B’s ability to measure turns ratio (N), mutual inductance (M), and DC resistance (DCR), transformer-parameter calculations are no longer time-consuming tasks. Moreover, the 16060A Transformer Test Fixture makes it easy to setup transformer measurement configurations.

The following example shows how easy it is to measure turns ratio (N), mutual inductance (M), and dc resistance (DCR) measurement of transformer.

**DUT**

Transformer (1 : 8)

**Requirements**

Test Fixture: 16060A Transformer Test Fixture

**Measurement Setup**

- Measurement: L2-N and L2-R2 parameter
- Test frequency: 100 kHz
- Test signal Level: 100 mVrms

**Measurement Procedure**

1. Reset the 4263B.
   a. Press \[ \text{Reset} \] .
      
   b. Press \[ \text{Enter} \] until Yes blinks, and press \[ \text{Enter} \] .

   ![Measurement Settings]

   - Cp: +12.345nF
   - D: +0.0001
   - FREQ: 1kHz
   - LVL: 1000mV

   ![Measurement Settings]
2. Connect the test fixture to the UNKNOWN terminals.

3. Set the measurement parameter to L2-N.
   a. Press A Mode and the following is displayed.

   ![Measurement Display](image)

   Cp: +12.345nF  D: +0.0001  FREQ: 1kHz  Z Y R G Cp Cs Lp Ls L2 LVL: 1000mV

   b. Select L2 using or , and press .

   ![Measurement Display](image)

   Cp: +12.345nF  D: +0.0001  FREQ: 1kHz  N 1/N M R2 LVL: 1000mV

   c. Select N using or , and press .

4. Set the test frequency to 100 kHz.
   Press .

   Set the frequency to 100 kHz using , , and press .

5. Set the test signal level to 100 mVrms.
   Press .

   Set the level to 100 mV using the numeric keys or , , and press .

3.12 Measurement Examples
6. Perform the OPEN correction.
   a. Short the red clips together and short the black clips together, then separate the shorted red and black sets of clips from each other. (See the following figure.)

   ![Diagram of shorting and separating clips]

   b. Press \( \text{blue} \quad \text{Open} \quad 4 \), and the following menu is displayed.

   ![Menu showing L2: -- H N: -- Measure L2: 100mV, FREQ: 100kHz]

   c. Select \( \text{OpenMeas} \) using \( \text{cursor arrows} \) or \( \text{cursor down} \), and press \( \text{Enter} \).

   ![Menu showing L2: -- H N: -- Measure L2: 100mV, FREQ: 100kHz]

   After a while, the OPEN correction is completed. (If OUT OF LIMIT is displayed, see “Performing the OPEN Correction—Canceling the stray admittance in parallel with the DUT” in Chapter 2.)

**Note**

Do not use the SHORT correction function of the 4263B when the L2-N, L2-1/N, L2-M, or L2-R2 measurement parameters are selected.
7. Connect the DUT to the test fixture and the measurement result will be displayed.

![Diagram of A:B Switch](image)

<table>
<thead>
<tr>
<th>L2: + 15.88mH</th>
<th>N: -8.7508</th>
<th>FREQ: 100kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>LVL: 100mV</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Set the switch to the opposite position if the 4263B displays OVDL as the measured value of N. The 4263B cannot measure a value of N less than 0.9, and OVDL means that the measurement result is out of range.

The leading sign of N indicates the polarity of transformer as follows:

![Diagram of Polarity](image)

(a) N will be a plus value.
(b) N will be a minus value.

For More Information

- To select other parameters — You can measure L2-M (mutual inductance) and L2-R2 (dc resistance) without changing the measurement configuration. To change the measurement parameter, see “Selecting the Measurement Parameter” in Chapter 2.
- To print out the measurement result — See “Setting the Printer—Printing the measurement data” in Chapter 2