

# HIOKI

## 3255 DIGITAL HiTESTER

### Instruction Manual

October 2000 Edition 1 Printed in Japan  
3255A981-00 00-10-H

#### Introduction

Thank you for purchasing the Hioki Model 3255 DIGITAL HiTESTER. To obtain maximum performance from the instrument, please read this manual first, and keep it handy for future reference.

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#### Initial Inspection

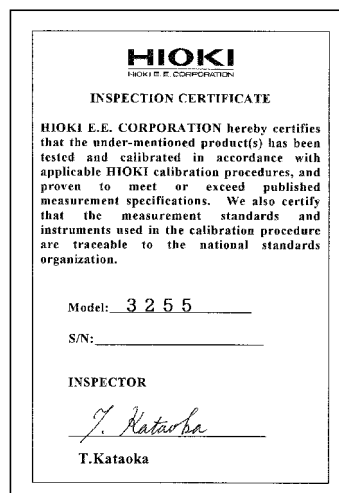
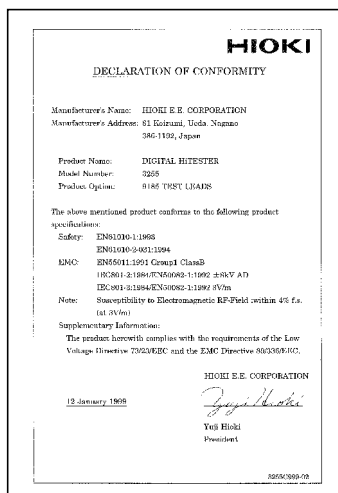
When you receive the instrument, inspect it carefully to ensure that no damage occurred during shipping. If damage is evident, or if it fails to operate according to the specifications, contact your dealer or Hioki representative.

#### Preliminary Checks

Before using the instrument, make sure that the insulation on the test leads is undamaged and that no bare conductors are improperly exposed. Using the instrument in such conditions could cause an electric shock. Replace the test leads with the specified Hioki Model 9185.

#### Maintenance and Service

- To clean the instrument, wipe it gently with a soft cloth moistened with water or mild detergent. Never use solvents such as benzene, alcohol, acetone, ether, ketones, thinner or gasoline, as they can deform and discolor the case.
- If the instrument seems to be malfunctioning, confirm that the batteries are not discharged or the test leads broken before contacting your dealer or Hioki representative.



## Specifications

Accuracy Chart (23±5°C, 80% RH or less, non-condensating)

DC Voltage function (≐.V / mV)				
Range	Accuracy	Input Impedance	Remarks	
320.0 mV	±0.5%rdg.±4 dgt.	Approx. 10 MΩ	Response time: Approx. 2 sec	
3.200 V	±0.5%rdg.±4 dgt.	Approx. 11 MΩ		
32.00 V	±1.3%rdg.±4 dgt.	Approx. 10 MΩ		
320.0 V	±1.3%rdg.±4 dgt.	Approx. 10 MΩ		
600 V	±1.3%rdg.±4 dgt.	Approx. 10 MΩ		
AC Voltage function (∩.V / mV)				
Range	Accuracy	Input Impedance	Remarks	
320.0 mV	±2.0%rdg.±8 dgt.	Approx. 10 MΩ	Measurement Frequency Range: 50 Hz to 500 Hz Response time: Approx. 2 sec	
3.200 V	±2.0%rdg.±8 dgt.	Approx. 11 MΩ		
32.00 V	±2.0%rdg.±8 dgt.	Approx. 10 MΩ		
320.0 V	±2.0%rdg.±8 dgt.	Approx. 10 MΩ		
600 V	±2.0%rdg.±8 dgt.	Approx. 10 MΩ		
Resistance Measurement function (Ω)				
Range	Accuracy	Open Terminal Voltage	Full Scale	Response time
320.0	±1.5%rdg.±6 dgt.	1.7 V or less	3149	Approx. 3 sec
3.200 k	±1.5%rdg.±4 dgt.	0.45 V or less	3239	Approx. 3 sec
32.00 k	±1.5%rdg.±4 dgt.	0.45 V or less	3249	Approx. 3 sec
320.0 k	±1.5%rdg.±4 dgt.	0.45 V or less	3249	Approx. 3 sec
3.200 M	±1.5%rdg.±4 dgt.	0.45 V or less	3249	Approx. 5 sec
32.00 M	±10.0%rdg.±4 dgt.	0.45 V or less	3249	Approx. 20 sec
Continuity Check function (≡)				
Accuracy		Open Terminal Voltage	Threshold level	Response time
±2.5%rdg. ±6 dgt.		1.7 V or less	250 Ω or less	Approx. 0.2 sec
Diode Check function (→)				
Accuracy		Open Terminal Voltage	Measurement Current	Response time
±5.0%rdg. ±4 dgt.		1.7 V or less	1.0 mA or less	Approx. 2 sec

Response Time: Transition time from the lowest range to the measurement range, plus display settling time.

Overload protection is 600 V AC/DC rms (sine wave) or 10<sup>7</sup> V · Hz for all functions and ranges.

#### General

Measurement Method	Dual integration
Display Type	TN type LCD, 1/3 duty, dynamic drive, 12-mm character height, Max. 3249 counts (600 counts only in 600 V range)
Display Elements	Polarity indicator: "-" sign (automatic) Overflow indicator: "OF" or "-OF" Other indicators: units, functions
Range Switching	Auto/Manual Range (single range for mV, continuity and diode check)
Function Selector	Rotary selector
Input Terminals	+ and COM terminals (2 terminals)
Sampling Rate	2.5 times/sec
Size & Weight	70W x 145H x 31D mm (2.76" x 5.71" x 1.22") (without protrusions), 200 g (7.1 oz.) (within battery)
Accessories	9185 TEST LEADS, 9371 CARRYING CASE, Instruction Manual

#### Electrical Characteristics

Power Supply	Rated supply voltage: 1.5 V DC x 2, R03 manganese x 2
Maximum rated working Voltage	600 V DC/AC rms (sine wave) or 10 <sup>7</sup> V·Hz (for 1 min.), for all functions
Dielectric Strength	Input terminals to case: 5.55 kVrms (50/60-Hz sine wave for one minute)
Noise Suppression	NMRR: DC -40 dB or better (50/60 Hz) CMRR: DC -100 dB or better (50/60 Hz) AC -60 dB or better (50/60 Hz)
Rated Power	5.0 mW typ. (DC Voltage function, from two 1.5 V batteries) 6.0 mW typ. (AC Voltage function, from two 1.5 V batteries) 0.15 mW typ. (Auto Power Saving, from two 1.5 V batteries)
Maximum Rated Power	6.0 mVA
Battery Status Indicator	<input checked="" type="checkbox"/> indicates low battery (< 1.2 V ± 0.1 V)
Continuous Operating Time	Approx. 400 hours (DC Voltage function) Approx. 250 hours (AC Voltage function)

#### Environmental Conditions

Operating Temperature & Humidity	0 to 40°C (32 to 104°F) at 80% RH or less (non-condensating)
Storage Temperature & Humidity	-20 to 60°C (-4 to 140°F) at 70% RH or less (non-condensating)
Temperature Characteristic	(Measurement accuracy) × 0.1/°C
Operating Environment	Indoors, <2000 m (6562 feet) ASL
Dust and Water Protection	Equivalent to JIS Protection Type Class 4 (however, instrument operation is not guaranteed when wet)
Electromagnetic Radiation Susceptibility	4% f.s. or less at 3 V/m electromagnetic radiation

#### Standards Conformance

Safety	EN61010-1:1993 Pollution Degree 2, Overvoltage Category III (Anticipated Transient Overvoltage: 6000 V), EN61010-2-031:1994
EMC	EN55011:1991, EN50082-1:1992

## Safety

Follow these precautions to ensure safe operation and to obtain the full benefits of the various functions.

### ⚠ DANGER

This device is designed to conform to IEC 61010 Safety Standards, and has been thoroughly tested for safety prior to shipment. However, mishandling during use could result in injury or death, as well as damage to the instrument. Be certain that you understand the instructions and precautions in the manual before use. We disclaim any responsibility for accidents or injuries not resulting directly from product defects.

#### Overvoltage Categories (CAT)

This device conforms to the safety requirements for CAT III measurement instruments. To ensure safe operation of measurement instruments, IEC 60664 establishes safety standards for various electrical environments, categorized as CAT I to CAT IV, and called overvoltage categories. These are defined as follows.

**CAT I:** Secondary electrical circuits connected to an AC electrical outlet through a transformer or similar device.

**CAT II:** Primary electrical circuits in equipment connected to an AC electrical outlet by a power cord (portable tools, household appliances, etc.)

**CAT III:** Primary electrical circuits of heavy equipment (fixed installations) connected directly to the distribution panel, and feeders from the distribution panel to outlets.

**CAT IV:** The circuit from the service drop to the service entrance, and to the power meter and primary overcurrent protection device (distribution panel).

Higher-numbered categories correspond to electrical environments with greater momentary energy, so a measurement instrument designed for CAT III environments can withstand greater momentary energy than one designed for CAT II. Using a measurement instrument in an environment designated with a higher-numbered category than that for which the instrument is rated could result in a severe accident, and must be carefully avoided.

This manual contains information and warnings essential for safe operation of the instrument and for maintaining it in safe operating condition. Before using the instrument, be sure to carefully read the following safety notes.

#### Safety symbols

	In the manual, the  symbol indicates particularly important information that the user should read before using the instrument.
	The  symbol on the instrument indicates that the user should refer to a corresponding topic in the manual (marked with the  symbol) before using the relevant function.
	Indicates a device that is protected by double or supplemental insulation.
	Indicates direct current (DC).
	Indicates alternating current (AC).
	Indicates both DC and AC.
	Indicates a protective ground terminal.

The following symbols in this manual indicate the relative importance of cautions and warnings.

	Indicates that incorrect operation presents an extreme hazard that could result in serious injury or death to the user.
	Indicates that incorrect operation presents a significant hazard that could result in serious injury or death to the user.
	Indicates that incorrect operation presents a possibility of injury to the user or damage to the instrument.
	Advisory items related to performance or correct operation of the equipment.

## Usage Notes

### ⚠ WARNING

- To avoid electric shock, do not allow the instrument to get wet, and do not use it when your hands are wet.
- Do not use the instrument where it may be exposed to corrosive or combustible gases. The instrument may be damaged or cause an explosion.

### ⚠ CAUTION

- Although this instrument is designed to resist ingress of dust and water, it is not entirely or water- or dust-proof, so to avoid shock or damage, do not use it in a wet or dusty environment.
- This instrument is designed for indoor use, and operates reliably from 0 to 40°C.
- Do not store or use the instrument where it could be exposed to direct sunlight, high temperature or humidity, or condensation. Under such conditions, the instrument may be damaged and insulation may deteriorate so that it no longer meets specifications.
- Do not use the instrument near a device that generates a strong electromagnetic field or electrostatic charge, as these may cause erroneous measurements.
- To avoid damage to the instrument, protect it from vibration and shock during transport or handling. Be especially careful to avoid dropping.
- If the protective functions of the instrument are damaged, either remove it from service or mark it clearly so that others do not use it inadvertently.
- Adjustments and repairs should be made only by technically qualified personnel.

#### NOTE

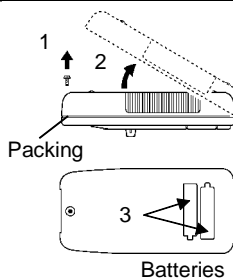
- Accurate measurement may be impossible in the presence of strong magnetic fields such as near transformers and high-current conductors or in the presence of strong electromagnetic fields such as near radio transmitters.
- To avoid battery depletion, turn the function selector OFF after use (the Auto Power Save feature consumes a small amount of current).
- The indicator appears when battery voltage becomes low. Replace the batteries as soon as possible.
- To avoid corrosion from battery leakage, remove the batteries from the instrument if it is to be stored for a long time (several months or more).

## Replacing the Batteries

### ⚠ WARNING

- To avoid electric shock when replacing the batteries, first disconnect the test leads from any measurement object.
- Before using the instrument after replacing the batteries, replace the cover and screw.
- Do not mix old and new batteries, or different battery types. Also, be careful to observe battery polarity during installation. Otherwise, poor performance or damage from battery leakage could result.
- To avoid the possibility of explosion, do not short circuit, disassemble or incinerate batteries.
- Handle and dispose of batteries in accordance with local regulations.

- Place the instrument back-side up, and remove the Philips screw affixing the rear cover.
- Remove the rear cover.
- Replace both batteries.
- Replace the rear cover back to keep the dustproof and waterproof devices good condition, attach the packing corentry without fail.
- Replace the screw to affix the rear cover.



## Replacing the Fuse

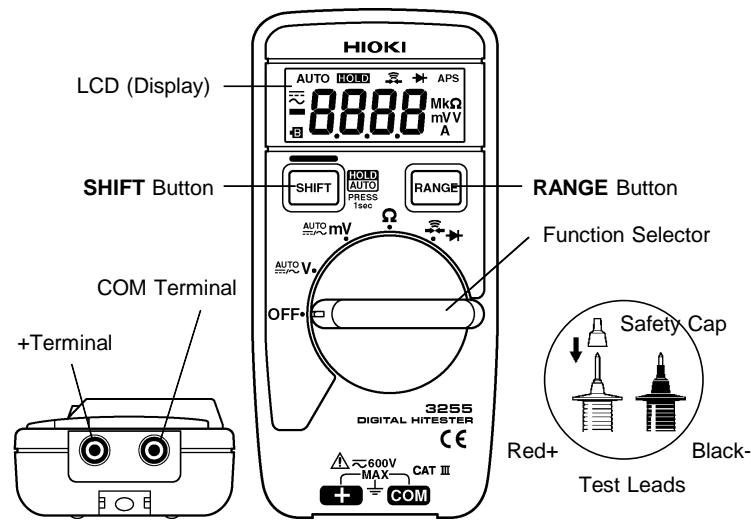
### ⚠ CAUTION

If the fuse blows, do not attempt to replace it or repair the instrument: contact your dealer or Hioki representative. To determine if the fuse has blown, check whether the beeper sounds when the test leads are shorted during a continuity check.

#### Fuse Protection Circuitry

A 10 Ω protective resistor and 1 A safety fuse (600 V AC, 100 kA cut-off capacity) are installed in series with the positive terminal of the instrument to prevent short-circuit accidents during voltage measurement of power line circuits. If a short occurs in the instrument circuitry, current flow is limited by the protective resistance until the safety fuse opens. The protective resistance limits the short-circuit current, minimizing arcing at the tip of the test probe and providing safer operation.

## Parts Names and Functions



Function Selector	<b>V</b> (AUTO/≡/~), <b>mV</b> (AUTO/≡/~): Auto Voltage/DC/AC <b>Ω</b> : Resistance <b>☞</b> : Continuity/Diode Check <b>OFF</b> : Power Off
<b>SHIFT</b> Button	<ul style="list-style-type: none"> <li>For the Voltage (<b>V</b>, <b>mV</b>) function: switches between Auto Voltage, AC and DC</li> <li>Switches between Continuity and Diode Check functions</li> <li>Starts and cancels the Auto-Hold function (refer to the Auto-Hold function description)</li> <li>Cancels the Auto Power Save function (refer to "Auto Power Save")</li> </ul>
<b>RANGE</b> Button	<ul style="list-style-type: none"> <li>Selects between Manual and Autoranging switching (refer to "Autoranging Function")</li> <li>Selects the range during Manual Range operation</li> </ul>
LCD (Display)	<ul style="list-style-type: none"> <li>.</li> <li>≡</li> <li>~</li> <li>☞</li> <li>☞</li> <li>AUTO</li> <li>APS</li> <li>B</li> <li>mV, V</li> <li>Ω, kΩ, MΩ</li> <li>HOLD</li> </ul>
+Terminal	This instrument is a two-terminal design, so test lead connections do not need to be changed when changing functions. Connect the RED lead here.
COM Terminal	This is the common terminal for all functions. Connect the BLACK lead here.
Safety Cap	The safety cap minimizes the amount of exposed metal at the probe tip, but the probe can also be used without the cap.

## Other Functions

### Auto Voltage Function

- This function automatically selects the voltage range according to the voltage being measured, and automatically selects DC or AC voltage measurement.
- Setting the function selector to **V** or **mV** enables the Auto Voltage function (the **AUTO** indicator appears blinking).
- When the **V** function is selected, measurement of DC voltage (≡) begins. Automatic switching from DC to AC occurs at a preset threshold in the range of two to ten volts (at 50 Hz) AC. If the measured AC voltage exceeds this threshold, the instrument switches to AC Voltage function. If the measured AC voltage drops below about 1 V on the display, the instrument switches back to DC Voltage function. The actual voltage level at which the AC voltage function switches to DC is frequency dependent, and is approximately equal to [frequency/5] volts, or less.
- When the **mV** function is selected, measurement of DC voltage (≡) begins. Automatic switching from DC to AC occurs at a preset threshold in the

range of two to ten volts (at 50 Hz) AC. If the measured AC voltage exceeds this threshold, the instrument switches to AC Voltage function. If the measured AC voltage drops below about 10 mV on the display, the instrument switches back to DC Voltage function. The actual voltage level at which the AC Voltage function switches to DC is frequency dependent, and is approximately equal to [frequency/5+20] volts, or less.

- Disabling the Auto Voltage Function  
Press **SHIFT** to enable manual AC/DC switching.  
Press **RANGE** to enable manual range selection (AC or DC is displayed when the button is pressed).

### NOTE

In the Auto-Voltage function, AC measurement is automatically selected when an input waveform exceeds the +/- threshold in both polarities. Therefore the auto-voltage switching function may not work properly when measuring an AC voltage with significant DC offset. The AC/DC detection process occurs when measurement starts, so if the input changes from AC to DC during measurement, the DC Voltage function may not be selected automatically.

### Autoranging Function

- The Autoranging function automatically selects the optimum measurement range.
- The **AUTO** indicator appears during Autoranging.
- The range automatically switches up when the display shows 2800 to 3249 counts or more, and down when the display shows 269 counts or less. (3.2 kΩ range: 259 counts)
- The Autoranging function is not available in the millivolt (**mV**) range, or in the Continuity or Diode Check functions.
- Disabling Autoranging  
Press **RANGE** to switch to Manual Ranging (the **AUTO** indicator disappears)  
The measurement range can then be selected by the **RANGE** button.
- Enabling Autoranging  
Hold **RANGE** for 1 seconds.

### Auto-Hold Function

- This function displays and holds either the maximum voltage or minimum resistance measurement.
- Hold the **SHIFT** button for one second to enable Auto-Hold (a beep sounds and the **HOLD** indicator appears).
- To cancel Auto-Hold:  
Hold the **SHIFT** button again for one second (a beep sounds and **HOLD** indicator disappears).
- When measuring voltage, the display remains unchanged as long as the measured value is within the dead zone (the indicator blinks).
- When the measured voltage reaches or exceeds the dead zone, the new value is displayed and a beep sounds, after which the display remains unchanged until another measured value exceeds the displayed value (the **HOLD** indicator appears).
- When measuring resistance, the display remains unchanged as long as the measured value is "OF" [overflow] (the **HOLD** indicator blinks).
- When a measurable resistance is present, the value is displayed and a beep sounds, after which the display remains unchanged until another measured value is less than the displayed value (the **HOLD** indicator lights).

### Auto Power Save Function

- This function activates the power save state 30 minutes after the last operation. In the power save state, the LCD is blanked, but power is not completely turned off.
- Auto Power Save is automatically enabled when the instrument is turned on (the **APS** indicator appears).
- Exiting the Power Save State  
Either turn the Function selector, or press **SHIFT** or **RANGE**.  
All selections are reset when exiting the Power Save State, so stored data is invalid. For long-term operation, disable Auto Power Save beforehand.
- Disabling Auto Power Saving  
Hold the **SHIFT** button down while turning the instrument on, and keep holding it (for about two seconds) until a beep sounds.  
The **APS** indicator is not displayed, and Auto Power Saving is disabled until the instrument is turned off.

## Measurement Procedure

### Measurement Procedure

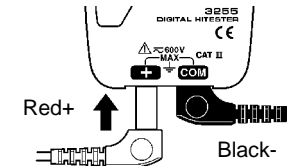
#### ⚠ DANGER

Observe the following precautions to avoid electric shock.

- Always verify the appropriate setting of the function selector before connecting the test leads.
- Disconnect the test leads from the measurement object before switching the function selector.

### Preparation for Measurement

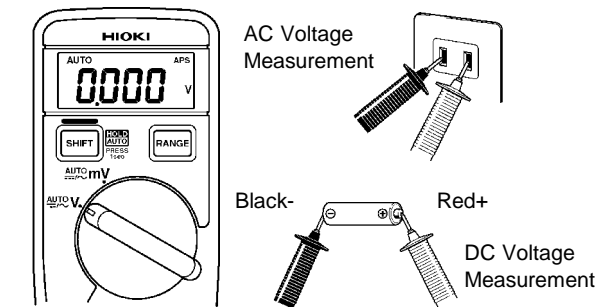
- The safety caps are attached to the test leads. Remove these caps before connecting in the unit.
- Firmly connect the RED test lead to the + terminal, and the BLACK test lead to the COM terminal.



## Voltage Measurement (V)

#### ⚠ DANGER

- The maximum rated voltage is 600 V DC/AC rms (sine wave), or 10<sup>7</sup> V · Hz. Attempting to measure voltage in excess of the maximum rated voltage could destroy the instrument and injure or kill the user.
- Do not connect the test leads while voltage is present: a short circuit could result and cause injury. Pay careful attention when making measurements.
- For safety, test lead connections must always be made at the secondary side of a circuit breaker.
- The maximum rated voltage between input terminals and ground is 600 V AC/DC rms (sine wave). Attempting to measure voltages exceeding 600 V with respect to ground could damage the instrument and injure the user.

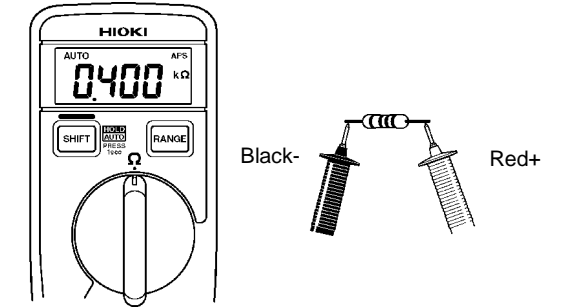


- Set the function selector to **V** or **mV** (if **AUTO** is blinking, the Auto Voltage function will select AC or DC automatically).
- Connect the test leads to the measurement object, and read the display.
  - To select between Auto Voltage, AC and DC volts, press the **SHIFT** button.
  - Press the **RANGE** button to select the range manually.
  - Hold **RANGE** for one seconds to re-enable Autoranging (**AUTO** appears).

## Resistance Measurement (Ω)

#### ⚠ DANGER

- Never apply voltage to the test leads when the Resistance function is selected. Doing so could damage the instrument and injure the user.
- To avoid electric shock, remove power from the circuit under test before measuring.

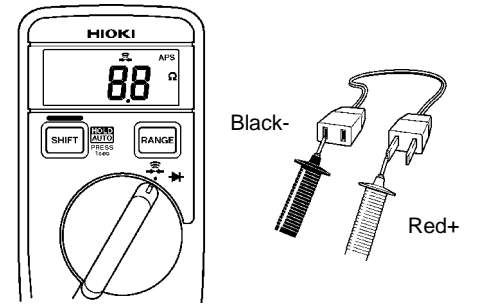


- Set the function selector to Ω.
- Connect the test leads to the object to be measured, and read the display. Press the **RANGE** button to select the range manually.  
To re-enable Autoranging, hold **RANGE** for one seconds.

## Continuity Checking (☞)

#### ⚠ DANGER

- Never apply voltage to the test leads when the Continuity Check function is selected. Doing so could damage the instrument and injure the user.
- To avoid electric shock, remove power from the circuit under test before measuring.

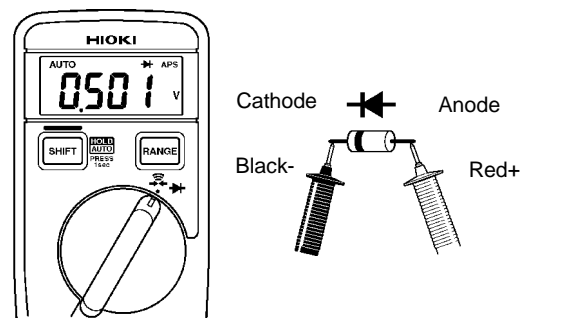


- Set the function selector to ☞ (the ☞, Ω indicator appear).
- Connect the test leads to the object to be measured. Resistance is displayed when checking continuity (320 Ω range).
- When the circuit is closed (250 Ω or less), the ☞ indicator appears and a beep sounds.

## Diode Checking (☞)

#### ⚠ DANGER

- Never apply voltage to the test leads when the Diode Check function is selected. Doing so could damage the instrument and injure the user.
- To avoid electric shock, remove power from the circuit under test before measuring.



- Set the function selector to ☞ and press the **SHIFT** button (the ☞ indicator appears).
- Connect the red test lead to the diode's anode, and the black test lead to the cathode.
  - The display shows forward voltage (0.4 to 0.7 V) for a normal diode. In the opposite polarity, the open-terminal voltage (1.7 V or less) is displayed.
  - The display shows about 0 V if the diode is shorted, and the open-terminal voltage in both directions (3.2 V range) if the diode is open.