HIOKI

1117 X-Y BOARD HiTESTER

Automatic Testing Equipment

Dual-Sided Bare Board Test Equipment

IVH Resistance Measurement

Inner Via Hole

Test Speed Enhanced by Simultaneous Four-Arm, Dual-Sided Action

Maximum Measurement Speed of 0.015 s/step

The 1117 X-Y BOARD HiTESTER is capable of simultaneous four-arm dual-sided testing, two arms in front and two arms in back. This fixtureless high-speed bare board tester uses a four-terminal resistance measurement function to measure very small resistances with IVH or through holes. It includes both a conductivity detection method and a capacitance measurement method for a range of applications from large general-purpose bare boards to high-density, very fine boards such as BGA, CSP, and MCM. It can also be used to test build-up boards.

CERTIFIED JQA ENVIRONMENTAL MANAGEMENT SYSTEM

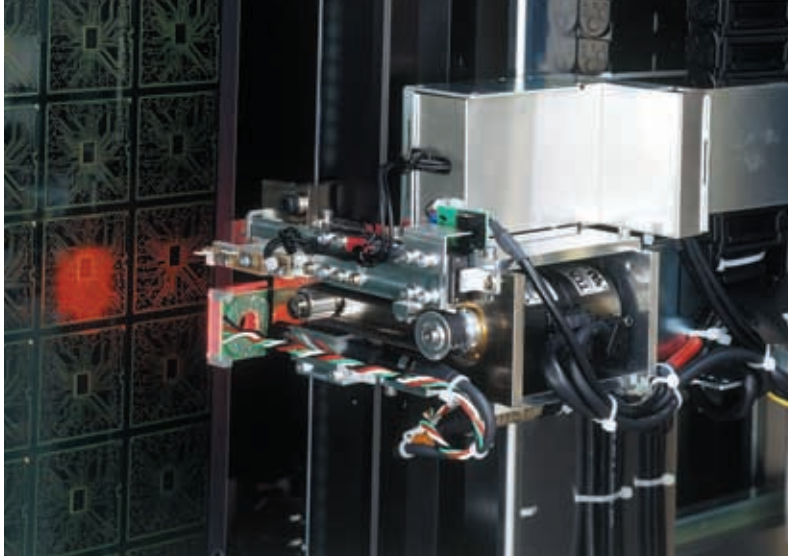
ISO14001
JQA-E-90091

INTERNET HIOKI Website

http://www.hioki.co.jp/

HIOKI company overview, new products, environmental considerations and other information are available on our website.

A Wide Range of Test Capabilities -- With High Speed and High Precision



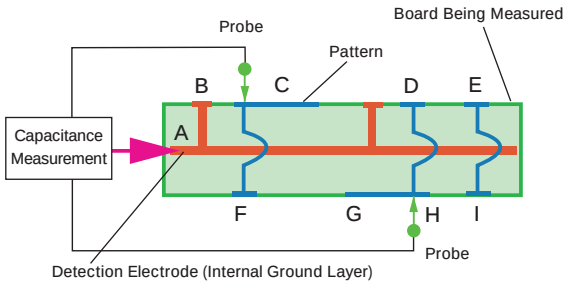
The conductivity detection and capacitance measurement methods provide all the features required for dual-sided testing in a wide range of testing capabilities. The 1117 can not only detect build-up board broken connections with IVH, but it can also measure resistance values, making it possible to detect defects such as cracks that are not visible to the eye.

- Detection of short circuits and broken connections with the capacitance measurement method.
- Detection of short circuits and broken connections with the conductivity detection method.
- Detection of short circuits and broken connections with combined capacitance-resistance measurement method. (Patent No. 1736393)
- Resistance measurement with IVH (Inner Via Holes) or through holes.
- Pattern resistance measurement
- Detection of single pads on IC's.
- Measurement of insulation between nets.
- Detection of high resistance short circuits by capacitance measurement.
- L, C, R, and D measurements.

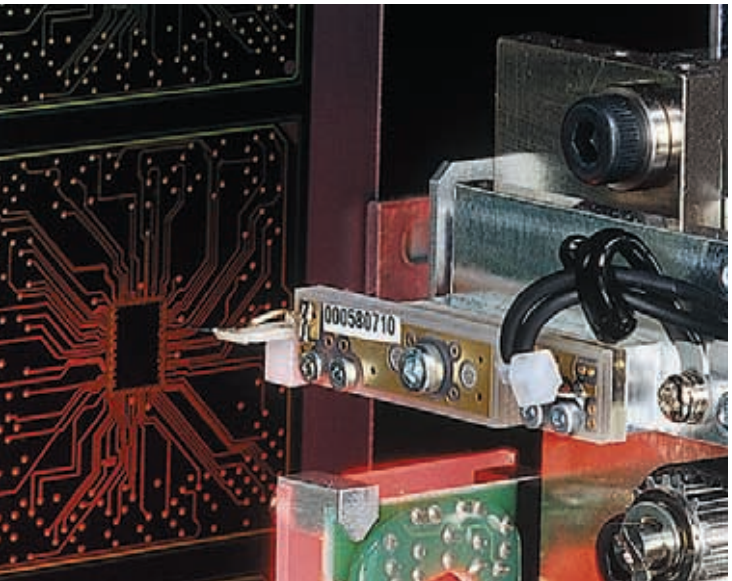
High-Speed Testing With the Capacitance Measurement Method

Capacitance Measurement Using an Internal Ground Layer

Patterns (B through I) on the board exhibit a capacitance between the pattern and the internal ground layer (A) of the board being measured, proportional to the area of the pattern. If there is a broken connection then the detected capacitance value is less than the standard value, and if there is a short circuit then it is larger.

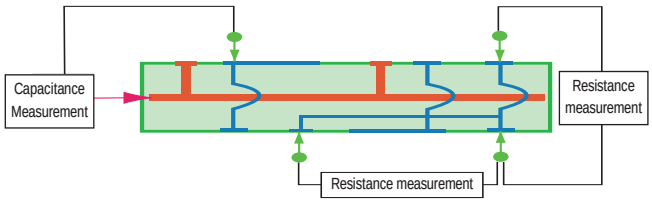


Capacitance measurement is also possible using vacuum clamping.



Combined measurement method

Combination testing for detection of short circuits and broken connections. With combination testing, impedance measurement (capacitance measurement) and resistance measurement are used together to test the electrical circuit network. This facilitates high testing efficiency. (Patent No. 1736393)



Measurement Step Comparison

The capacitance measurement method performs pattern testing with fewer measurement steps than the conductivity detection method. The 1117 can use either method, but the capacitance measurement method greatly reduces the measurement time.

Example With 100 Nets and a Total of 500 Nodes

	Conductivity Detection Method	Capacitance Measurement Method
Discontinuity Testing	All nodes within the same net: 500 - 100 = 400	Measure the capacitance of all nodes to detect discontinuities and short circuits: 500
Short Circuit Testing	nCr = $_{100}C_2$ 100 × (100 - 1) / 2 = 4950	
Measurement Steps	5350	500

■ Maximum Measurement Speed of 0.015 Seconds per Step

High speed testing: maximum speed of 0.015 seconds per step with high precision.

(0.15 mm movement, four arms simultaneously, during capacitance measurement)

■ High Resolution of 5 aF for Capacitance Measurement (1 aF = 10^{-6} pF)

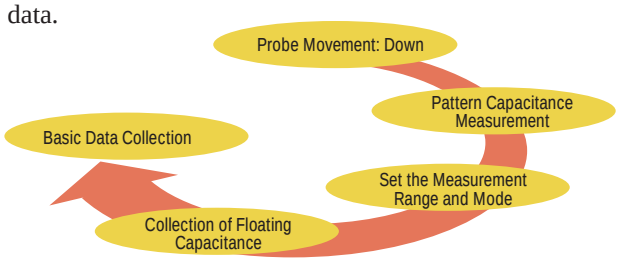
The variation in capacitance (ΔC) when there is a defect is extremely small, so capacitance measurement requires high resolution. The 1117 has a high resolution of 5 aF to accurately detect very small variations.

■ High Accuracy Probing

The positioning return accuracy of ± 20 µm can accurately probe delicate fine-pitch pads.

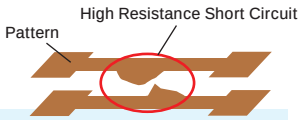
■ Simple Basic Data Collection

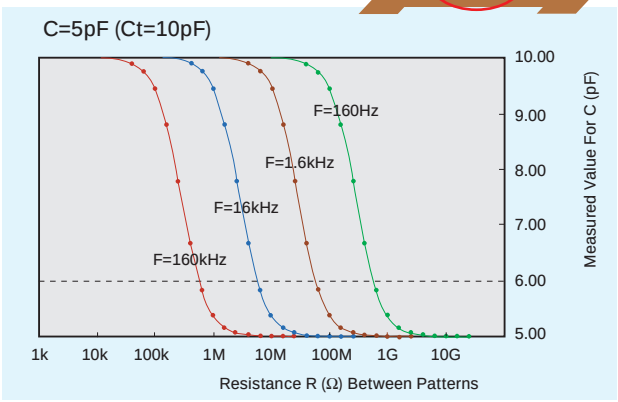
An automatic sequence of operations collects the basic data.

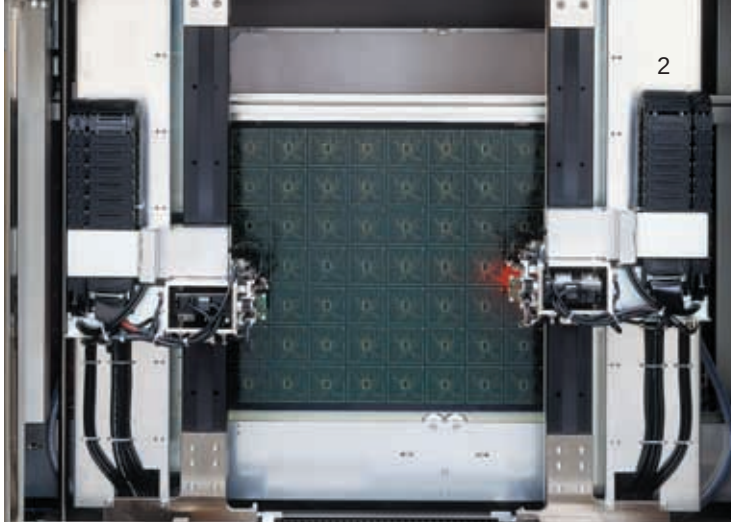


■ Detection of High Resistance Short Circuits with Capacitance Measurement

Capacitance variations can be accurately measured based on the resistance between neighboring patterns, to detect short circuits that have high resistance. The detection range depends on the frequency. A single measurement detects short circuits between one net and all the other nets.







■ Four-Edge Chuck Method

All four edges of the board are chucked for stable measurements. The up and down directions are chucked for the entire surface while the left and right directions are automatically chucked for the center portion.

■ Four-Terminal Resistance Measurement Function

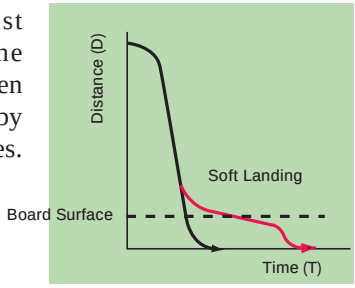
Resistance measurements are done with IVH or through holes by the four-terminal resistance measurement function, which accurately measures very small resistances.

■ Wide Measurement Area

The measurement area is 600 (W) × 500 (H) mm, so the 1117 can be used with large boards.

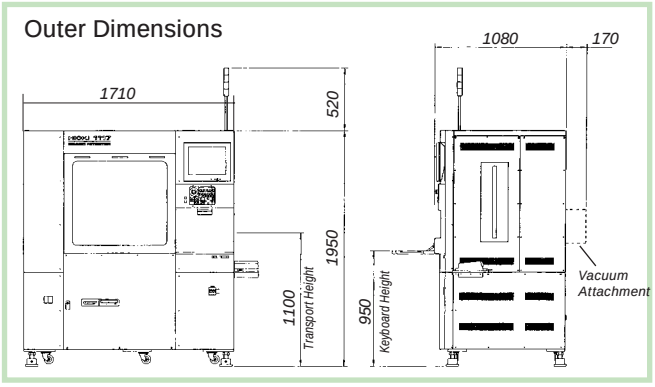
■ Minimization of Gouges

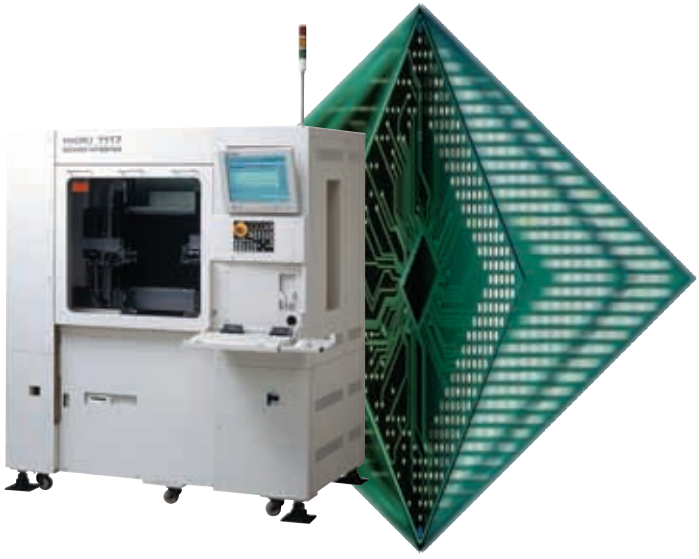
Gouges are kept to a minimum by the high speed soft landing feature, which reduces the speed just before reaching the pattern in order to lessen the striking force, and by impact absorbing probes.



■ INSULATION MEASUREMENT FUNCTION (optional)

Insulation measurement is possible in the DC 250 V range. Highly efficient measurement is possible by combining a net containing the power supply and the chosen net. Capacitance measurement can be done at the same time.





■ 1117 Specification

Number of Arms	4 (two each, front and back)
Number of Test Steps	40,000 steps (300,000 for continuous testing)
Test Ranges	DC Measurement Function Resistance: 400 µΩ to 40 MΩ Capacitance: 4 µF to 400 mF Diodes and Transistors (VF): 0 to 25 V Zener Diodes (VZ): 0 to 25 V Photocouplers: 0 to 25 V Short Circuit: 400 mΩ to 40 kΩ Open Circuit: 4 Ω to 4 MΩ Voltage: 0 to 25 V AC Measurement Function Resistance: 100 Ω to 100 MΩ Capacitance: 10 fF to 10 µF Inductance: 10 µH to 100 H
Measurement Signal	DC Constant Voltage: 100 mV / 400 mV (2 ranges) DC Constant Current: 200 nA to 200 mA (13 ranges) AC Constant Voltage: 1 V / 10 V rms (2 ranges) 160 Hz / 1.6 kHz / 16 kHz / 160 kHz
Measurement Portion	DC Voltage Measurement: 800 µV to 25 V f.s. (8 ranges) DC Current Measurement: 100 nA to 25 mA f.s. (7 ranges) AC Current Measurement: 10 µA to 1 mA rms (3 ranges, for 1 V rms) 1 µA to 100 µA peak f.s. (3 ranges, for 10 V peak)
Decision Range Setting	- 99.9% to + 999.9%, or absolute value
Measurement Time	Minimum 0.015 seconds / step (0.15 mm movement with 4-arm simultaneous probing during capacitance measurement.)
Probing Position Accuracy	Each arm within ± 50 µm (X and Y directions, 20 ± 3 ˚C)
Position Return Accuracy	Within ± 20 µm (probing position, same temperature)
Minimum Movement Resolution	X and Y: 1.25 µm / pulse, Z: 6 µm / pulse
Minimum Probing Pitch	0.1 mm between the left and right arms when using a link-type probe

Probe Work Area	600 (W) × 500 (H) mm
Board Fixation: Carrier Height	1088 ± 10 mm
Board Fixation: Carrier Position	Board vertical position
Fixation Method	Chuck method on four edges of board (sides are chucked for the center of the board only) Vacuum clamp method (optional)
Board Carrier	Belt.
Fixable Boards	Thickness: 0.6 to 10 mm Outer Dimensions: 50 (W) × 70 (H) to 610 (W) × 510 (H) mm
Movable Boards	Thickness: 0.6 to 3.2 mm Outer Dimensions: 50 (W) × 70 (H) to 610 (W) × 510 (H) mm Board Fixation Up-Down: 3 mm There are restrictions on link-type probing with 4 terminal probes. Weight: 2 kg maximum
Component Mounting Limits	Front Surface: 25 mm maximum Mounting is not possible in the middle 50 mm portion of the board in the Y direction Back Surface: 20 mm maximum (including board thickness)
Positioning Correction	Automatic positioning correction
Safety Devices	Emergency stop switch, safety cover (anti-static resin), arm interference prevention software
Display	15-inch liquid crystal display
Power Supply	AC 200 V (single phase), 50/60 Hz Power Consumption: 3 kVA
Pneumatic System	Pressure: 0.5 to 0.99 MPa (dry air)
Operating Environment	Temperature: 23 ± 10 ˚C Humidity: 75 %rh maximum (no condensation) Environment: Avoid use in environments subject to dust, vibration, or corrosive gases Floor Strength: 700 kg/m² minimum
Unit Dimensions	Approximately 1780 (W) × 1950 (H) × 1080 (D) mm
Mass	Approximately 1200 kg

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■ Factory Options

1933-10 INSULATION MEASUREMENT UNIT
1948-01 VACUUM UNIT
1355-01 VACUUM PUMP(AC200 V, three phase)
1356 MAINTENANCE TOOL SET
1941-21 STAMP UNIT for FR ARM
1941-22 STAMP UNIT for FL ARM
1941-23 STAMP UNIT for BR ARM
1941-24 STAMP UNIT for BL ARM
1944-01 EXTENSION I/O BOARD
1945-11 COAXIAL DOWNWARD ILLUMINATION UNIT for FR ARM
1945-12 COAXIAL DOWNWARD ILLUMINATION UNIT for FL ARM
1945-13 COAXIAL DOWNWARD ILLUMINATION UNIT for BR ARM
1945-14 COAXIAL DOWNWARD ILLUMINATION UNIT for BL ARM
1945-15 OBLIQUE ILLUMINATION UNIT FOR FR ARM
1945-16 OBLIQUE ILLUMINATION UNIT FOR FL ARM
1945-17 OBLIQUE ILLUMINATION UNIT FOR BR ARM
1945-18 OBLIQUE ILLUMINATION UNIT FOR BL ARM
1946-03 MONITOR CAMERA
1947-11 1.2 POWER LENS UNIT for FR ARM
1947-12 1.2 POWER LENS UNIT for FL ARM
1947-13 1.2 POWER LENS UNIT for BR ARM
1947-14 1.2 POWER LENS UNIT for BL ARM

■ Options

1139-02 1117 DATA COMPOSITION SOFTWARE
1139-52 FL-Link3 FLY-LINE LINK SOFTWARE
1330-03 MEASUREMENT SECTION CALIBRATION UNIT
1134-02 IMPRESSION SHEETS
1164-02 ONE-WAY CLUTCH
1164-03 PROBE ATTACHMENT
1196 RECORDING PAPER(25m,10rolls)
1350-02 OFFSET BOARD
1172-66 LINK PROBE
1172-67 DOUBLE LINK PROBE
1172-68 LINK PROBE WITH BLADE
1172-69 DOUBLE LINK PROBE WITH BLADE
1172-70 SHOCK-ABSORBING SINGLE NEEDLE PROBE (SK)
1172-71 SHOCK-ABSORBING SINGLE NEEDLE PROBE (WC)
1172-72 SHOCK-ABSORBING TRIANGULAR PYRAMID PROBE(SK)
1172-74 PROBE FOR CALIBRATION
1172-77 SHOCK-ABSORBING SINGLE NEEDLE PROBE (WC SR10)
1172-80 PROBE
1172-81 LINK PROBE
1172-83 DOUBLE LINK PROBE (35µm)

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