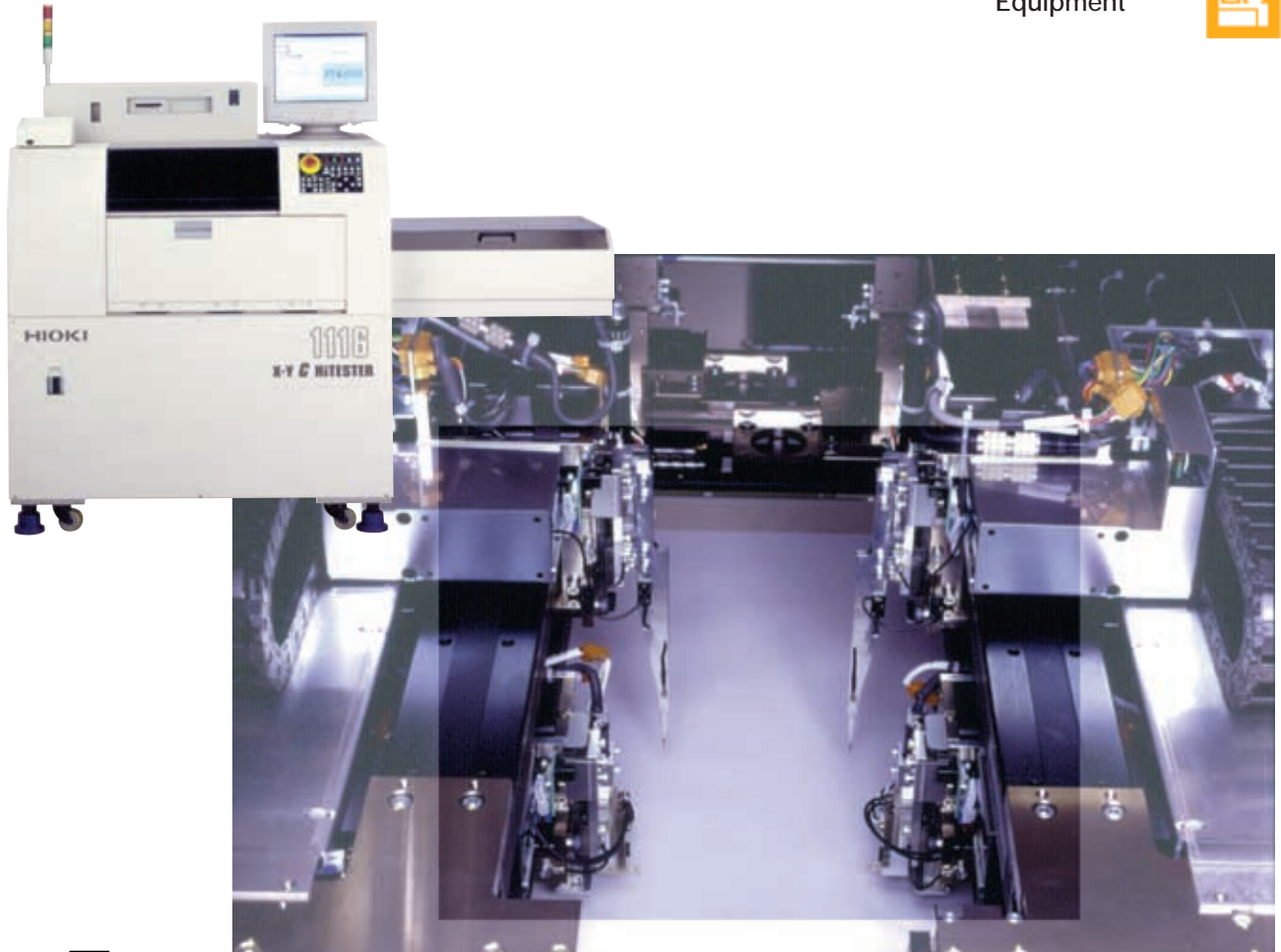




## 1116 X-Y C HiTESTER

Automatic Test  
Equipment



# Four-arm power Maximum speed testing at 0.015 s/step

The 1116 X-Y C HiTESTER is a high-speed substrate tester that uses capacitance measurement to greatly reduce the number of testing steps and time required for testing compared to testers that use continuity testing. With four arms, the new 1116 can test at speeds as great as 0.015 s/step, and can detect extremely small changes at a high resolution of 5aF during capacitance measurement. The 1116 X-Y C HiTESTER is a non-fixtured testing apparatus which not only yields very low running costs, but also has a high-speed soft landing function that minimizes impressions resulting from probe impact. Because there are no restrictions on board type, it can be used for testing plastic, ceramic, and liquid crystal glass panels.



ISO14001  
JQA-E-90091



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

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# From ordinary bare boards to high-density BGA, CSP, or MCM packages Accommodates build-up packages too

## ■ Maximum measurement speed of 0.015 s/step

With four arms, the 1116 X-Y C HiTESTER can test at speeds as great as 0.015 s/step.

(with 0.15 mm movement and all four arms used simultaneously during capacitance measurement)

## ■ Capacitance measurement resolution of 5aF(1aF=10<sup>-6</sup>pF)

Since the variation in capacitance accompanying a fault may be extremely small, high resolution is required for capacitance measurement. With a high resolution of 5aF, the 1116 X-Y C HiTESTER can detect extremely small variations.

## ■ High-precision probing

With a probing accuracy of  $\pm 50 \mu\text{m}$  and a positioning return accuracy of  $\pm 20 \mu\text{m}$ , the 1116 assures accurate probing of fine pitch pattern pads.

## ■ A standard automatic positioning correction function

Together with a high-precision mechanism, the automatic positioning correction function assures an additional degree of probing accuracy.

## ■ Vacuum clamping

The board being tested are fixed using the vacuum clamping method. Since chucks are not required to secure the board during carrying and testing, all areas on the board can be tested.

## ■ Large testing area

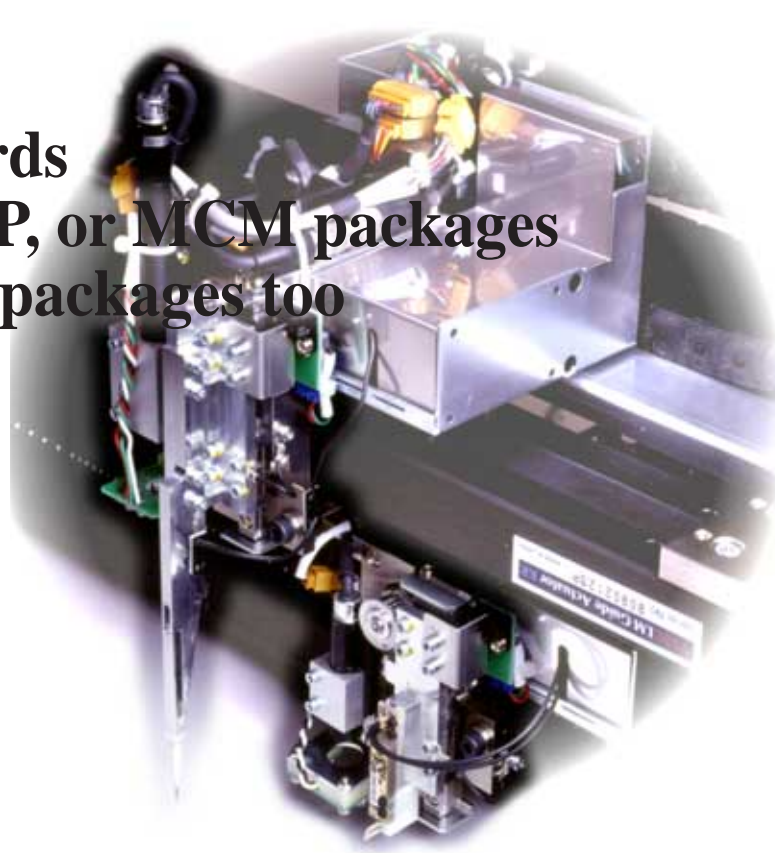
The 1116 X-Y C HiTESTER has a testing area of up to 500 (W)  $\times$  400 (D) mm, allowing the testing of large boards.

## ■ Fine pitch support

Using link-type probes, the minimum probe pitch between the left and right arms is 0.1 mm.

## ■ Two keyboard heights

The keyboard can be placed at two heights to accommodate both standing and sitting working postures.

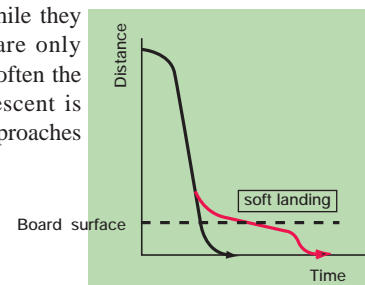


## ■ Minimal probing impact

Probing impact is kept to a minimum with the high-speed soft landing function and shock-absorbing probes.

## ● High-speed soft landing function

The probes are raised while they are being moved, and are only lowered for testing. To soften the impact, the speed of descent is lessened as the probe approaches the target.



## ■ Accommodates boards as thin as 0.1 mm

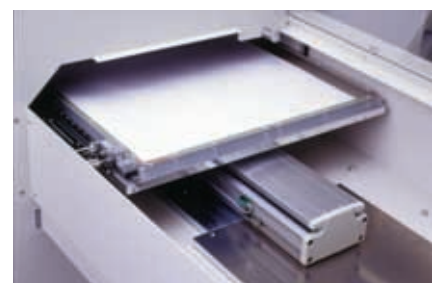
Boards with thicknesses ranging from 0.1 mm to 3.2 mm can be tested, making it possible to test thin boards, such as flexible circuit boards.

## ■ A variety of electrical measurements

In addition to capacitance measurement, the 1116 X-Y C HiTESTER can also measure resistance, inductance, diode VF, and voltage.

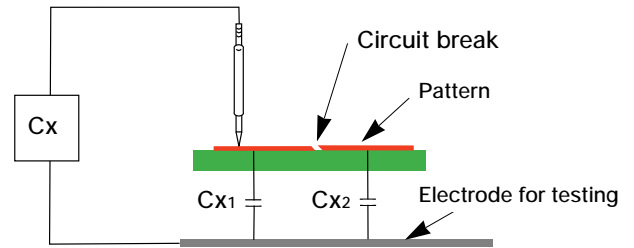
## ■ Loading system is standard outfit

A single axis actuator is used to move the vacuum clamping jig. Boards to be tested can easily be set from outside the main unit.



## High-speed pattern testing using capacitance measurement

Each printed circuit pattern has a particular capacitance, proportional to its area, with respect to the electrically insulated electrode used for testing. If there are circuit breaks, or shorts, then the area of the pattern will differ, and the capacitance will change correspondingly. Therefore, by comparing the capacitance values with those of a reference board, the pattern can be checked for continuity. Since the floating capacitance of the pattern is extremely low, a special-purpose jig with vacuum clamping is used to obtain stable measurement values.



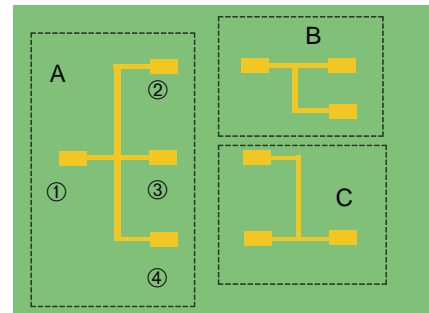
When there is no circuit break,  $C_x = C_{x1} + C_{x2}$   
 When there is a circuit break,  $C_x = C_{x1}$   
 In the case of a circuit break, the capacitance is detected as being lower than that of a reference board; if there is a short circuit, it will be detected as higher.

## Testing steps

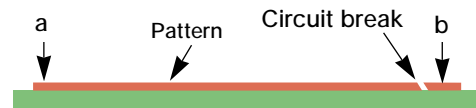
Using the conductivity measurement method to check pattern A in the figure for continuity requires three steps, measuring 1-2, 1-3, and 1-4, and the same is required for patterns B and C. Checking for short circuits in A, B, and C requires another three steps, testing A-B, A-C, and B-C. Thus, if the circuit is complex, the number of steps is very large. Using the capacitance measurement method, discontinuity and short circuit testing can be achieved by measuring at just the endpoints of each pattern.

■ Comparison of testing steps  
 For 100 networks with all 500 nodes

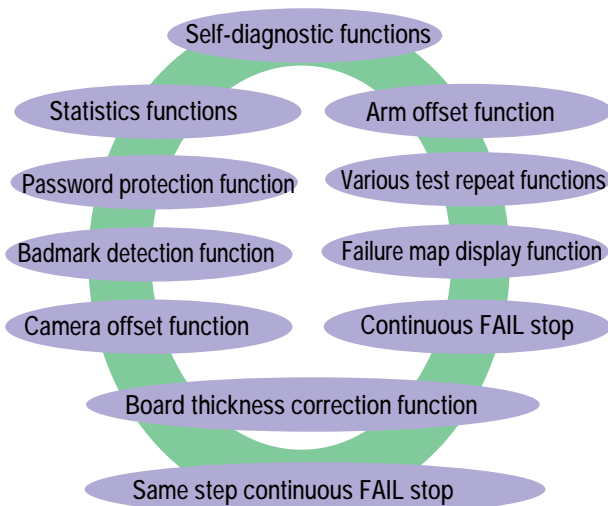
	Conductivity measurement method	Capacitance measurement method
Discontinuity testing	All nodes in the same network $500 - 100 = 400$	Discontinuity and short circuit testing for capacitance measurements of all nodes. 500
Short circuit testing	$nCr = 100C_2$ $100 \times (100-1) / 2 = 4950$	
Testing steps	5350	500



As shown in the figure below, if there is a discontinuity near one end of the pattern, then there is very little change in the capacitance measured from a, but a large change measured from b.



## Convenient features



## Testing data with FLY LINE

FLY LINE searches for network information and end point coordinates from various types of garber and NC data, and automatically extracts the testing points required to conduct pattern tests for printed substrates. FLY LINE produces test data with great efficiency.



Supports unattended operation when used with a handler

## 1116 Specifications

No. of arms	4
No. of probes	4
No. of test steps	Max. 20,000 steps
Test ranges	DC measurement function Resistance :400 $\mu\Omega$ to 40M $\Omega$ Capacitance :4 $\mu$ F to 400mF Diodes, transistors (VF) : 0 to 25V Zener diodes (VZ) : 0 to 25V Short circuit :400m $\Omega$ to 40k $\Omega$ Open circuit :4 $\Omega$ to 4M $\Omega$ Voltage : 0 to 25V AC measurement function Resistance : 100 $\Omega$ to 100M $\Omega$ Capacitance :10 fF to 10 $\mu$ F Coils :10 $\mu$ H to 100H
Measurement signal	DC constant voltage : 100mV/400mV(2 ranges) DC constant current :200nA to 200mA(13 ranges) AC constant voltage : 1V rms /10 V peak (2 ranges) AC frequency :160Hz/1.6kHz/16kHz/160kHz
Measurement ranges	DC voltage measurement : 800 $\mu$ V to 25 V f.s.(8 ranges) DC current measurement : 100nA to 25 mA f.s.(7 ranges) AC current measurement : 10 $\mu$ A to 10mA rms.(4 ranges) for 1 Vrms :100 $\mu$ A/1mA (2 ranges) for 10V peak
Decision range setting	-99.9% to +999.9% or absolute value
Measurement time	Min. 0.015 s/step (0.15 mm movement with 4-arm simultaneous probing during capacitance measurement)
Probing position accuracy	Within $\pm$ 50 $\mu$ m(x- and y-axes)
Positioning return accuracy	Within $\pm$ 20 $\mu$ m (probing position, 20 $\pm$ 3 $^{\circ}$ C)
Minimum movement step	XY : 1.25 $\mu$ m/pulse Z : 60.00 $\mu$ m/pulse
Minimum Probing pitch	0.1 mm Between the left and the right arm while using a link-type probe

Probe work area	500 $\times$ 400mm
Fixed and movable boards	Thickness : 0.1 to 3.2 mm External dimensions : 50 $\times$ 50mm to 526 $\times$ 435mm Component mounting limits : Upper surface ; 12 mm (including board thickness) Lower surface ; not possible Board weight : 2.0 kg max.
Board-carrier	Vacuum jig horizontal carrier with a single axis actuator
Positioning correction	Automatic positioning correction function
Safety devices	Emergency stop switch, safety cover (of anti-static resin), interference prevention (stops arms from colliding)
External memory	FDD, HDD, CD-ROM
Display	17-inch color display
Power supply	200 V AC $\pm$ 10%(single phase) 50/60Hz Power consumption :3kVA
Pneumatic system	Primary pressure: 0.5 to 0.99 MPa (dry air)
Air consumption	Max.0.3NI/min.
Operating environment	Temperature : 23 $\pm$ 10 $^{\circ}$ C Humidity : 75%rh or less(no condensation) Atmosphere : Avoid use subject to dust, vibration, or corrosive gases Floor strength: at least 500 kg/m $^2$
Accessories	Thermal mini printer, printer cable, grease, grease can, arm offset board, keyboard, PS/2 mouse, mouse pad, mouse pocket, PC accessories, Setup disk, leveling jacks (4), color display (17 inch), power cord (loose ends, 3 m), spare fuse, impression sheets
Unit dimensions	1265 (W) $\times$ 1290 (H) $\times$ 1060 (D) mm approx.
Mass	1000 kg approx.

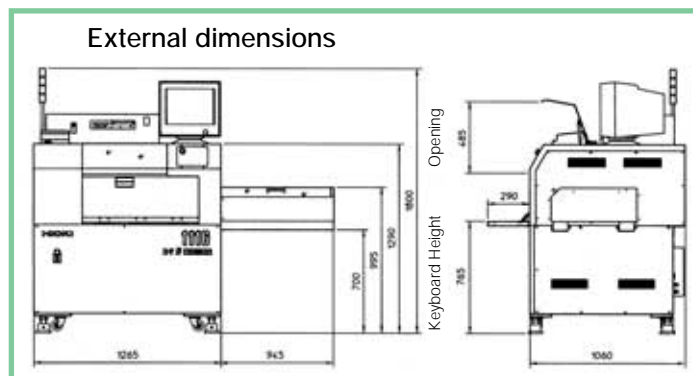
\*Air is required when using the stamp unit.

## 1116 X-Y C HiTESTER

The 1116 does not include a printer. please consult with Hioki regarding availability of English printers.

### ● Options

- 1941-11 STAMP UNIT for R ARM
- 1941-12 STAMP UNIT for L ARM
- 1945-01 COAXIAL DOWNWARD ILLUMINATION UNIT for R ARM
- 1945-02 COAXIAL DOWNWARD ILLUMINATION UNIT for L ARM
- 1945-03 COAXIAL DOWNWARD ILLUMINATION UNIT for MR ARM
- 1945-04 COAXIAL DOWNWARD ILLUMINATION UNIT for ML ARM
- 1330-01 MEASUREMENT SECTION CALIBRATION UNIT
- 1355-01 VACUUM PUMP (AC200 V, three phase)
- 1172-66 LINK PROBE (for L and R ARM)
- 1172-67 DOUBLE LINK PROBE (for L and R ARM)
- 1172-68 LINK PROBE WITH BLADE (for L and R ARM)
- 1172-69 DOUBLE LINK PROBE WITH BLADE (for L and R ARM)
- 1172-70 SHOCK-ABSORBING SINGLE NEEDLE PROBE (SK) (for M ARM)
- 1172-71 SHOCK-ABSORBING SINGLE NEEDLE PROBE (WC) (for M ARM)
- 1172-72 SHOCK-ABSORBING TRIANGULAR PYRAMID PROBE (SK)(for M ARM)
- 1172-74 PROBE FOR CALIBRATION (for L and R ARM)
- 1946-02 MONITOR CAMERA UNIT



- 1139-01 1116 DATA COMPOSITION SOFTWARE
- 1944-01 EXTENSION I/O BOARD
- 1350 OFFSET BOARD
- 1356 MAINTENANCE TOOL SET
- 1134-02 IMPRESSION SHEETS (176 sets of two sheets)
- 1196 RECORDING PAPER (25m,10rolls)
- 1164-02 ONE-WAY CLUTCH
- FL-LINK, FLY LINE

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