

1115 X-Y C HiTESTER

Automatic Test
Equipment



Minimum 0.03 s/step

High-speed pattern testing for IC packages, MCM, and high-density boards

Compared with a continuity tester the 1115 X-Y C HiTESTER is a high-speed pattern tester, which uses a capacitance measurement method to greatly reduce the number of test steps and the time taken. With a high capacitance resolution of 0.5 fF, extremely fine variations can be detected, and the testing is fast, taking only 0.03 s per step at the maximum speed. The X-Y method used does not require a jig for testing, thus yielding very low running costs, and the high-speed soft landing function keeps the probing contact area to a minimum, to support fine pitch boards. There are no restrictions on the material of the boards, and plastic, ceramic, and liquid crystal glass panels can all be tested, with a special-purpose automatic handling system for changing the boards being tested.



ISO14001
JQA-E-90091



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

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

High speed, high precision, high stability

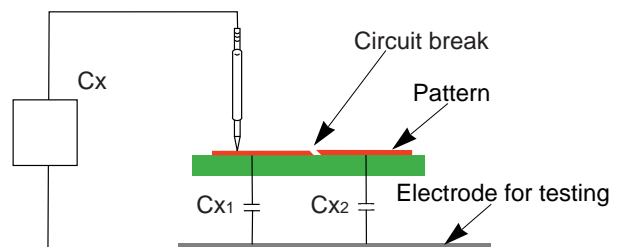
With the rapid advances in mounting technology and packaging technology, the necessity for printed circuit board and semiconductor component testing is increasing. Particularly for testing the PGA, BGA, and MCM IC packages which are now most common and testing of fine-pitch patterns on high-density boards, up until now the requirements of accuracy and time limitations have required general-purpose X-Y testers to be very expensive. Based on its know-how accumulated over years of producing general-purpose testers for mounted boards, Hioki has developed a tester capable of providing higher speed and stability, and at low cost.



High-speed pattern testing using capacitance measurement

On a printed circuit board, each trace 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 trace will be different, and the capacitance will change correspondingly. By comparing the capacitance values with those for a reference board, therefore, the pattern can be checked for continuity.

Since the floating capacitance of the traces is extremely low, a special-purpose jig is used to obtain a stable measurement value. Again, since the variation in the capacitance in the event of a fault may be extremely small, a high resolution is required in the capacitance measurement.

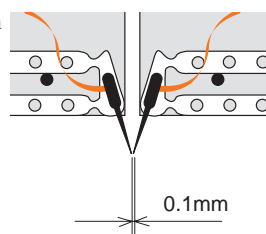


When there is no circuit break, $C_x = C_{x1} + C_{x2}$
 When there is a circuit break, $C_x = C_{x1}$
 In the case of a circuit break, the capacitance is detected as being lower than that of a reference board; if there is a short circuit, it will be detected as higher.

Principal functions and features

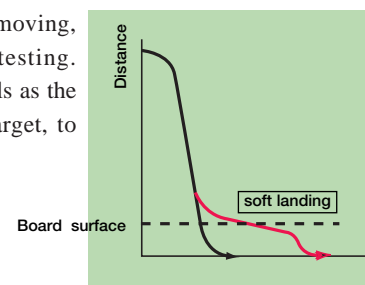
- Step time 0.03 seconds at maximum speed
- Capacitance measurement resolution 0.5 fF
- High-precision probing
(Probing accuracy $\pm 50\mu\text{m}$, positioning return accuracy $\pm 20\mu\text{m}$)
- Automatic positioning correction function as standard equipment
- Easy-to-read, color display
- Large testing area, up to $500 \times 400 \text{ mm}$
- Fine pitch support

Using a link probes, the minimum probe spacing is 0.1 mm.



High-speed soft landing function

The probes rise while moving, and only descend for testing. The speed of descent falls as the probe approaches the target, to soften the impact.



Self-diagnosis functions

Automatic data creation

Failure map display function

Statistics functions

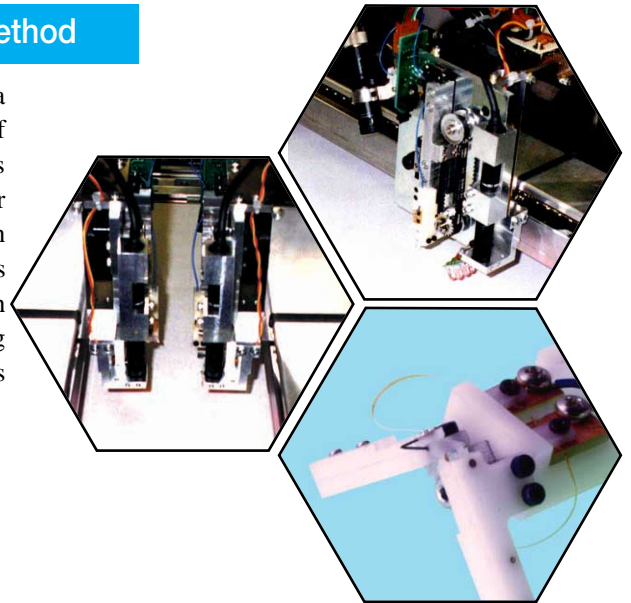
Retry function

Coaxial downward illumination unit (option)

Lighting appropriate for scratches on metal, film, or glass, and for reading marks on liquid crystal substrates. The illumination is uniform over the field of view, allowing a bright image of the whole field of view to be obtained.

Effectiveness of capacitance measurement method

Definitive testing for breaks or short circuits in a pattern using a conventional conductivity tester requires a very large number of steps. Rather than one step per trace, the number of steps is determined by the number of nodes on the traces, and whether open-circuit testing is carried out for all traces or only between adjacent traces, the number of steps is large, and grows astronomical when a large-scale board is tested. Moreover, with a general-purpose tester there have been restrictions on probing separation, and for jig type systems many physical restrictions on pin positioning and limits to the number of steps possible.

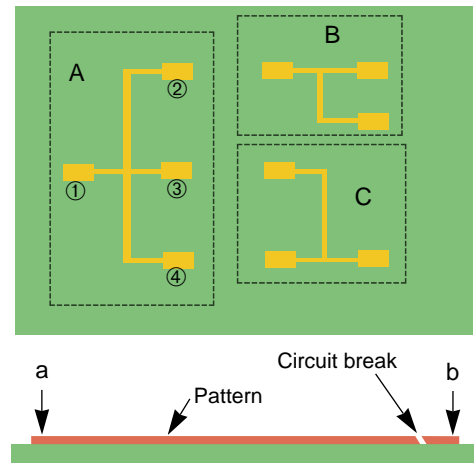


The capacitance measurement method measures the capacitance between a trace and the test electrode. By comparison with measurements with a reference board, both short circuits and circuit breaks can be detected simultaneously, resulting in a greatly reduced step count. Moreover, since only one probing operation is required for each measurement, the physical restrictions of conductivity measurement systems are absent, and this is also an ideal testing method since it can operate regardless of the circuit board material (plastic, ceramic, glass, etc.).

Testing steps

Using a conductivity measurement method, to check trace A in the figure for continuity requires three steps, measuring 1-2, 1-3, and 1-4, and similarly for traces B and C. To check for short circuits among A, B, and C requires another three steps, for 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, circuit break and short circuit testing can be achieved by measuring only on the endpoints of each trace.

As shown in the figure on the right, if there is a circuit break near one end of the trace, then there is very little change in the capacitance measured from a, but a large change measured from b.



Probe

Select the Probes that best suits your needs.



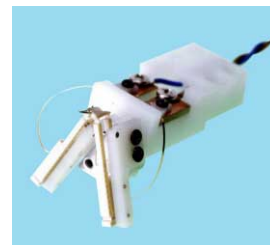
1172-61
LINK PROBE



1172-64
LINK PROBE
WITH BLADE



1172-62
DOUBLE LINK PROBE



1172-63
DOUBLE LINK PROBE
(for 150µm pitch)



SINGLE
NEEDLE
PROBE

1115 Specification

No. of arms	2
No. of probes	2
No. of test steps	Max. 20,000 steps
Test ranges (minimum resolution)	DC measurement function Resistance :1mΩ to 10MΩ (0.5μΩ) Capacitance :100μF to 100mF(0.05μF) Diodes, transistors (VF) : 0.1V to 25V(0.05mV) Zener diodes (VZ) : 0.1V to 25V (0.05mV) Short circuit :10Ω to 1kΩ (50mΩ) Open circuit :10Ω to 1kΩ (50mΩ) Voltage : 0.1V to 25V (0.05mV) AC measurement function Resistance :1kΩ to 100kΩ (5mΩ) Capacitance :10pF to 10μF (0.5 fF) Coils :1mH to 100H (5nH)
Measurement signal	DC constant voltage : 0.1 V, 0.4 V DC constant current :1/10/100μA/1/10/100/200mA AC constant voltage : 1V rms (10 V peak in 10 pF range) AC frequency :160Hz/1.6kHz/16kHz/160kHz
Measurement ranges	DC voltage measurement : 200μV/1/10/100mV/1/10/25V f.s. DC current measurement : 400nA/1/10/100μA/1/10mA f.s. AC current measurement : 100μA/1/10mA rms/100μA peak f.s.
Decision range setting	-99.9% to +999.9% or absolute value
Measurement time	Min. 0.1 s/step (2.5 mm movement, L/R testing same) Min. 0.03 s/step (0.15 mm movement, L/R testing different)
Probing position accuracy	Within±50μm(x- and y-axes)
Positioning return accuracy	Within±20μm (probing position)
Minimum movement step	1.25μm
Probing pitch (Specify when ordering.)	7.5 mm (shock absorbing single needle probes) 0.1 mm (link probes)
Probe work area	500 × 400mm
Limits to test board dimensions	Thickness : 0.1 to 3.2 mm External dimensions 500 × 400 mm max.

Limit to test board weight	2.0 kg max.
Component mounting limits	Upper surface: 30 mm (shock absorbing single needle probes) 3 mm (shock-absorbing close-contact probes) Lower surface: not possible 3 mm from both sides of board Some dead space for sensors and stoppers
Board positioning	Vacuum suction, external guide, both used
Positioning correction	Automatic positioning correction function
Safety devices	Emergency stop switch, safety cover (of antistatic resin), interference prevention (stops arms colliding) Signal tower (3-color) + buzzer
External memory	Compliant with supplied PC
Display	15-inch color display, 9-inch monochrome display
PC interface	Compliant with supplied PC
Functions	Self-diagnosis function, statistics function, automatic data creation, retry function, failure map display function
Power supply	200 V AC±10%(single phase) 50/60Hz Power consumption : 3kVA
Pneumatic system	Primary pressure : 0.5 to 0.99 MPa (dry air)
Air consumption	Max.0.3Nl/min.
Operating environment	Temperature : 23°C±10°C Humidity : 75%R.H. or less(no condensation) Atmosphere : Avoid use subject to dust, vibration, or corrosive gases Floor strength: at least 500 kg/m²
accessories	1350 offset board (1),Shock absorbing single needle probes or shock-absorbing close-contact probes B set (2), 1134-02 Impression sheet (1),System disk (1)
Unit dimensions	1250 (W)×1235 (H)×1020 (D) mm approx.
Mass	650 kg approx.

1115-01 X-Y C HiTESTER (Off-line)

1115-02 X-Y C HiTESTER (Transport System : Single-robot)

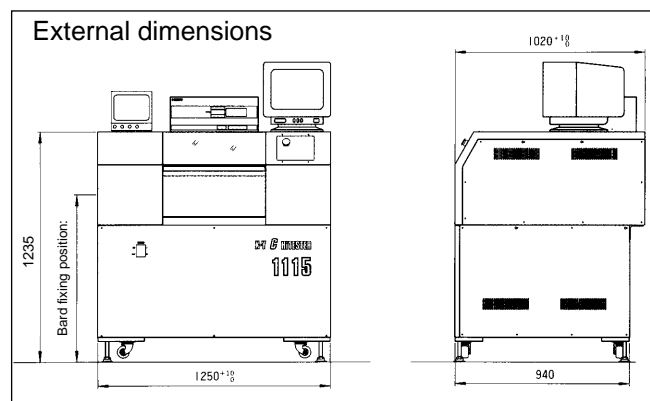
● Factory Options

- 1323 STAMP UNIT
- 1329 PROGRAMMABLE I/O FUNCTION
- 1334 MONITOR CAMERA UNIT
- 1355 VACUUM PUMP(200V AC,Three-phase)
- COAXIAL DOWNWARD ILLUMINATION UNIT
- Peripheral devices (loader, unloader, handler, etc.)

● Options

- 1330 MEASUREMENT SECTION CALIBRATION UNIT
- 1350 OFFSET BOARD
- 1356 MAINTENANCE TOOL SET
- 1134-02 IMPRESSION SHEETS (176 sets of two sheets)
- 1196 RECORDING PAPER (25 m, 10 rolls)

External dimensions



- 1172-61 LINK PROBE
- 1172-62 DOUBLE LINK PROBE
- 1172-63 DOUBLE LINK PROBE (for 150μm pitch)
- 1172-64 LINK PROBE WITH BLADE
- SHOCK-ABSORBING SINGLE NEEDLE PROBE
- FLY LINE

HIOKI

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