



High-speed testing at up to 100 points/sec.

Half the impact mark depth

Now with newly developed low-impact probes and precision soft-landing control
30% faster cycle times for gold plating and fine pattern testing

Featuring newly designed probes and precision control for half the impact mark depth of previous designs*

The Z-axis descent speed for gold plating and fine pattern testing can be set higher than with previous models.

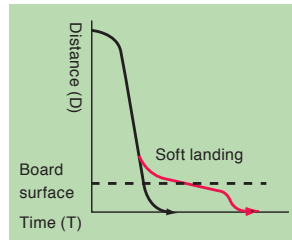
*Compared to the C HiTester 1116.

Reduced-impact link probes CP1072-01(option)

By combining newly designed reduced-impact probes and precision soft-landing control, the FA1116-03 makes it possible to approach the maximum speed setting during fine pattern testing.

Precision soft-landing function

Probes are lowered at high speed. Then, just before they come into contact with the pattern, the motor's acceleration is controlled in an optimal manner to lessen the force of impact at contact.



Laser Height-adjustment unit FA1950-06(option)

The laser board thickness compensation unit checks the height of the testing surface at the start of automatic testing to reduce the effect of differences in board deflection and thickness on probe impact. Probe damage caused by a failure to properly clamp the board can also be prevented.

Reduced fine pattern test times

The FA1116-03 delivers continuous testing of a 15 µm fine pattern at 50 points/sec. (0.03 mm movements, simultaneous use of two arms, capacitance measurement).

Rapid testing, regardless of board type

Easily position the target board and start testing, even for thin-film boards and thick, round boards.

Large testing area

The 610 (W) × 510 (D) mm testing area can accommodate everything from small pieces to large-format boards.

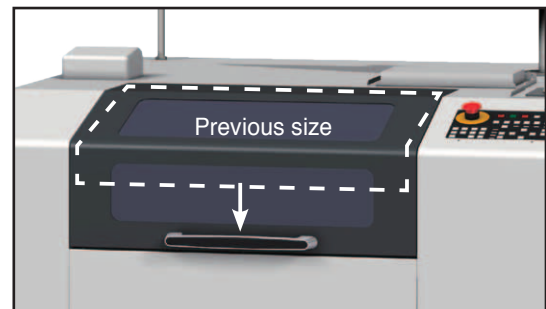
Support for 10 mm probe-up height

Thick ceramic boards and probe cards can be easily positioned in the tester.

Vacuum suction for easy board clamping

A vacuum suction system is used to clamp the board under test. Even thin boards and round boards can be clamped with ease.

Improved front cover for more efficient use



The size of the opening on the front of the tester has been increased by 30%. Increased rigidity and a large handle make it easy to open and close the cover quickly.

Extensive measurement functions and optional units reduce backlogs of untested boards.

High capacitance measurement resolution of 5 aF (1 aF = 10⁻¹⁸F)

Stable, high-resolution measurement ensures that fine pattern defects such as standalone pads are detected. Since capacitance values are displayed directly, differences from the reference board can be easily identified.

Capacitance measurement master creation algorithm

A proprietary algorithm designed by Hioki to keep defective boards from being sent on to the next manufacturing process aids in the creation of capacitance master data, which can be created from a single known-good reference board.

High-speed image processing system

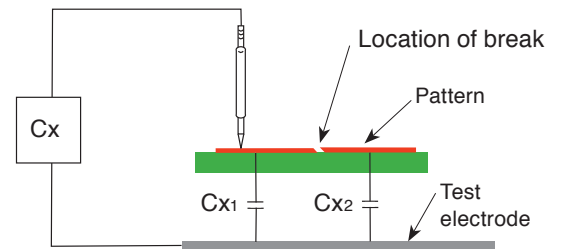
A new image processing driver (with Windows 7 support) speeds alignment, reducing test time.

Optional functionality for enhanced capability

- **MLCC Measurement Unit 1937-40**
A dedicated multi-layer ceramic capacitor (MLCC) mode allows JIS-compliant measured value acquisition.
- **Insulation Measurement Feature 1938-10**
A high-speed insulation test function operates at up to 500 MΩ/250 V. Arc detection support is also available on a special-order basis.
- **Blue Coaxial Downward Illumination Unit 1945-70**
The FA1116-03's coaxial downward lighting uses blue LEDs to provide effective lighting of ceramic and glass boards.
- **Dot Marking Function FA1941-01**
The FA1116-03 uses oil-based ink to create marking dots with a diameter of 2 mm. It can also mark CSPs and other small pieces.

High-speed pattern testing using capacitance measurement

Any given pattern on the board under test will have a certain capacitance relative to the electrically isolated test electrode, and that capacitance is proportional to the area of the pattern. Any short or break in the pattern will cause a corresponding change in the area of the pattern, with a resulting change in its capacitance value. By comparing the measured value to data for a known-good reference board, it is possible to detect pattern shorts and breaks. Since **capacitance values can be read directly**, judgments can be made based even on minuscule changes in the capacitance. Furthermore, the FA1116-03's master extraction algorithm allows the same approach to be used without regard to board type, from single-sided glass boards to multi-layer and high-density boards.



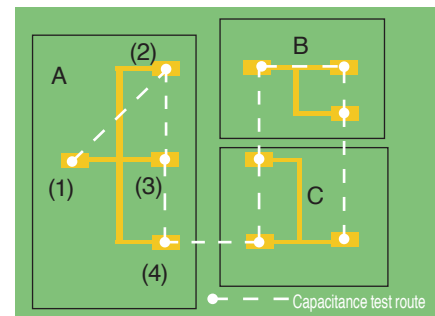
Capacitance value with no break: $C_x = C_{x1} + C_{x2}$

Capacitance value with break: $C_x = C_{x1}$

With a break, the detected capacitance value is less than the corresponding value for the known-good reference board. With a short, the capacitance value increases by the capacitance of the other pattern.

Methods for calculating the number of test steps

In continuity testing, testing for breaks in pattern A require three test steps: (1)-(2), (1)-(3), and (1)-(4). Similar tests are required for patterns B and C. Furthermore, when testing for shorts between patterns A, B, and C, it is necessary to test A-B, A-C, and B-C. As the complexity of the circuits increases, an enormous number of test steps become necessary. In testing using capacitance measurement, it is possible to test for both breaks and shorts with **the minimum number of test points and arm movements** since only the endpoints of each pattern need to be tested.

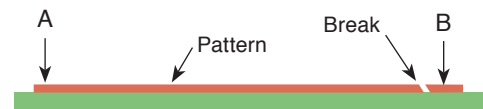


Comparison of test steps

For 100 nets and 500 total endpoints

	Resistance measurement	Capacitance measurement
Testing for breaks	All nodes on same net $500 - 100 = 400$	Detection of breaks and shorts using capacitance measurements for all endpoints 500
Testing for shorts	$nCr = {}^{100}C_2$ $100 \times (100 - 1) / 2 = 4,950$	
Total steps	5,350	500

If there is a break near the end of a pattern as shown below, the capacitance at point B will vary significantly, even though the capacitance at point A varies only slightly. In this way, the break can be reliably detected.

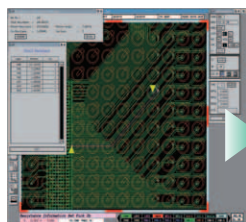


Fail Visualizer UA1782 for repair work

The FA1116-03 can be used in conjunction with the UA1782, which supports boards with embedded passive and active devices, to facilitate repair work. Support for not only the FA1116-03, but also all Hioki electrical testing systems, including the FA1282, C HiTester 1116, and 1230 series (designed for mass-production testing), makes it easy to build a bare board testing system.

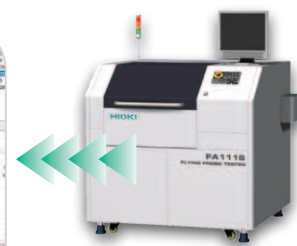
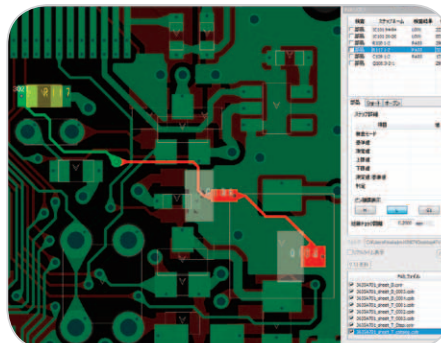
UA1782 Fail Visualizer

Simultaneous display of components and patterns



Importing of display databases

EPA-LINE
FLY-LINE



Importing of fail results

Barcode scanning
Real-time monitoring

FA1116 Specifications

No. of arms	2
No. of probes	2
No. of test steps	Max. 40,000 (300,000 for continuous testing)
Test ranges	DC measurement function
	Resistance : 400 $\mu\Omega$ to 40 M Ω
	Capacitance : 4 μ F to 400 mF
	Diodes, transistors (VF) : 0 to 25 V
	Zener diodes (VZ) : 0 to 25 V
	Short circuit : 400 m Ω to 40 k Ω
	Open circuit : 4 Ω to 4 M Ω
	Voltage : 0 to 25 V
	AC measurement function
	Resistance : 100 Ω to 100 M Ω
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 Vrms / 10 V peak (2 ranges)
	AC frequency : 160 Hz/ 1.6 kHz/ 16 kHz/ 160 kHz
Measurement ranges	DC voltage measurement : 800 μ V to 25 Vfs. (8 ranges)
	DC current measurement : 100 nA to 25 mAfs. (7 ranges)
	AC current measurement : 10 μ A to 10 mAfs. (4 ranges) for 1 Vrms
	: 100 μ A / 1 mA (2 ranges) for 10 Vpeak
Decision range setting	-99.9 % to +999.9 % or absolute value
Measurement time	Min. 0.010 sec./step (Max. 100 points/sec) (0.1 mm movement with 2-arm simultaneous probing during capacitance measurement)
Minimum pad diameter	□ 15 μ m
Minimum movement step	XY : 1.00 μ m/pulse Z : 6.00 μ m/pulse
Minimum Probing pitch	50 μ m Using a link-type probe. Proper operation is subject to certain conditions.
Probe work area	610 (24.02 in)W×510 (20.08 in)D mm

Fixed and movable boards	Thickness : 0.1 to 3.2 mm (0.004 to 0.126 in) External dimensions : 50×50 mm to 610×510 mm (1.97×1.97 to 24.02×20.08 in)
	Component mounting limits : Upper surface - 12 mm : 0.47 in (including board thickness) Lower surface - not possible
Board-carrier	N/A
Operation system	Windows7 32bit
Safety devices	Emergency stop switch, safety cover (of anti-static resin), interference prevention (stops arms from colliding)
External memory	HDD
Display	17-inch color display
Power supply	200 VAC±10 % (single phase) 50/60 Hz Power consumption : 3 kVA
Pneumatic system	Primary pressure: 0.5 to 0.99 MPa (dry air)
Air consumption	Max. 0.3 Nl/min. *Air is required when using the stamp unit.
Operating environment	Temperature : 23±10 °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 ×1, printer cable ×1, grease ×1, grease gun ×1, arm offset board ×1, keyboard ×1, mouse ×1, mouse pad ×1, PC accessories ×1, Setup disk ×1, color display (17 inch) ×1, power cord (loose ends, 3 m) ×1, spare fuse ×1, impression sheets ×1
Unit dimensions	1443 (56.81 in)W × 1656 (65.20)H × 1185 (46.65)D mm
Mass	1000 kg (35273 oz)

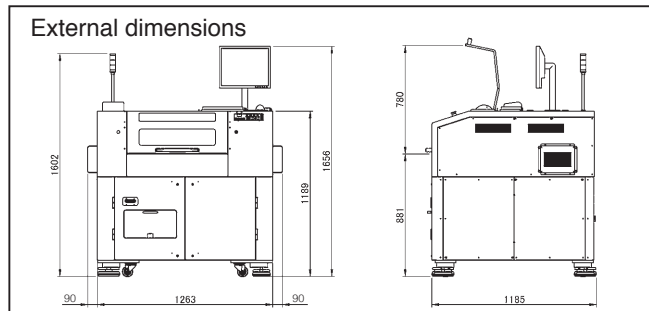
Order code Specification
FA1116-03 off-line

● Factory options

1355-01 VACUUM PUMP (AC200 V, three phase)
1937-40 MLCC MEASUREMENT UNIT
1938-10 INSULATION MEASUREMENT FEATURE
1945-61 COAXIAL DOWNWARD ILLUMINATION UNIT for 2 ARM
1945-70 BLUE COAXIAL DOWNWARD ILLUMINATION UNIT for 2 ARM
1945-23 BLUE OBLIQUE ILLUMINATION UNIT for 2 ARM
1947-62 1.2 POWER LENS UNIT for 2 ARM
FA1395 RECOVERY DISC
FA1941-01 DOT MARKING FUNCTION
FA1950-06 LASER HEIGHT-ADJUSTMENT UNIT

● Options

1139-03 1116-7x DATA COMPOSITION SOFTWARE
UA1781 FEB-LINE INSPECTION DATA CREATION SYSTEM
UA1782 FAIL VISUALIZER
1330-03 MEASUREMENT SECTION CALIBRATION UNIT
(R:Up to 500M Ω ; C,L:ALL)
1356 MAINTENANCE TOOL SET
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)
1172-74 PROBE FOR CALIBRATION (for L and R ARM)
1172-81 LINK PROBE (Link, high-speed version)



1172-82 LINK PROBE (Link, high-speed version)
1172-83 DOUBLE LINK PROBE (Double link, 35 μ m between terminals)
1172-92 LINK PROBE (1172-66 SR30)
1172-93 LINK PROBE (1172-81 SR30)
1172-94 LINK PROBE (1172-82 SR30)
1172-96 LINK PROBE WITH BLADE (1172-67 CUSTOM BLADE)
1172-97 LINK PROBE WITH BLADE (1172-80 CUSTOM BLADE)
1172-99 DOUBLE LINK PROBE WITH BLADE (1172-69 CUSTOM BLADE)
CP1072-01 LINK PROBE for FA1116
1134-02 IMPRESSION SHEETS
1196 RECORDING PAPER (25m, 10 rolls)
1350 OFFSET BOARD (t=2mm)
1350-01 OFFSET BOARD (t=1mm)

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

The Link Probe CP1072-01 is a dedicated option designed specifically for use with the FA1116-03. Please note that it cannot be used with other flying-probe testers.

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