



Automatic Test Equipment



- FLYING PROBE TESTER
- IN-CIRCUIT TESTER
- BARE BOARD TESTER
- DATA CREATION SYSTEM



The Power to Connect

The power to connect that Hioki's printed circuit board testing systems deliver is the power to connect to the future. The ability to continue to support this rich and satisfying lifestyle together with customers is a small part of what testing systems can do. At Hioki, we strive on a daily basis to improve the contact performance--the power to connect with circuit boards--that is the lifeblood of electrical testing and to seek out the true potential of that capability. This is the path that we follow.

SOLUTION FACTORY

The HIOKI Solution Factory integrates all our tasks to provide high-quality products to our customers.



Measurement Technologies to





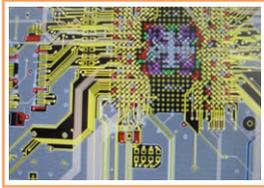
Development



Design



Call center



Board design

Development
 Add ever-greater value
 by establishing
 unique development
 technologies

Sales Service
 Solution sales helps
 customers realize
 their dreams



Repair and calibration



Vacuum deposition



Board mounting



Printing instruction manuals

Production
 The HIOKI production
 system ensures high product
 quality, low
 cost and short
 lead times



Assembly



Shipment



Support New Testing Frontiers



Flying Probe Type

Bare board testing

High-density, Multi-layer Board Solutions

- Assurance of minute via resistance values and detection of formation defects
- Probing of high-density boards
- High-speed measurement of interposer and package boards
- High-resistance insulation testing
- Standard 4-terminal measurement function



■ FLYING PROBE TESTER
FA1817

Testable board size
50×50 mm to 610×510 mm
(max. 24.02×20.08 in)

See page 14.

FC-CSP/Ceramic Board
FPC Solutions

- Capacitance O/S detection function
- Testing of panelized boards
- Flexible support for clamping thin boards



■ FLYING PROBE TESTER
FA1816

Testable board size
50×50 mm to 610×510 mm
(max. 24.02×20.08 in)

See page 12.



■ FLYING PROBE TESTER
FA1283

Testable board size
50×50 mm to 400×330 mm
(max. 15.75×12.99 in)

See page 16.

Populated board testing

High-density Populated Board Solutions

- Testing in multi-product small-lot production environments
- Pseudo-contact testing of IC leads (Standard 4-terminal measurement function)
- Active test (option)

Example of an inline configuration
with model FA1240



■ FLYING PROBE TESTER
FA1240-61

Testable board size
50×50 mm to 510×460 mm
(max. 20.08×18.11 in)

See page 26.



■ FLYING PROBE TESTER
FA1240-63

Testable board size
50×50 mm to 400×330 mm
(max. 15.75×12.99 in)

See page 26.



Measurement Units

Support for Device Embedded Substrates

- LSI reliability testing (I/O pin leakage current testing, LSI standby current consumption testing, Diode-based connection reliability testing)
- Complex component separation testing (when used with a scanner board equipped with guard feature)
- High-current continuity testing up to 150 mA
- Insulation testing with automatic protection for embedded devices
- Four-terminal continuity testing that assures pattern resistance
- Testing number of embedded devices



■ FLYING PROBE TESTER **FA1813**

Testable board size
50×50 mm to 400×330 mm
(max. 15.75×12.99 in)

[See page 10.](#)



■ FLYING PROBE TESTER **FA1811**

Testable board size
45 × 50 mm to 170 × 305 mm
(min. 1.77×1.97 in)
(max. 6.69×12.01 in)

[See page 18.](#)

System Expandability

- Ideal for embedding in automatic testing systems
- Multipurpose design enables measurement between user-specified points, data collection, and other functionalities.

High-speed Testing Solutions

- Support for testing in mass production environments
- Electrolytic capacitor reverse insertion detection function
- I2C-compatible testing
Onboard Programming Function (option)

■ IN-CIRCUIT TESTER



FA1220-02 (Offline type)

Testable board size
390×300 mm (15.35×11.81 in)

[See page 24.](#)



FA1220-11

(Space-saving model)
Testable board size
390×300 mm (15.35×11.81 in)

[See page 24.](#)



■ Test fixture **1160**



■ Test fixture **CP1167** [See page 31.](#)



■ IN-CIRCUIT TESTER **FA1220**

(Desktop type)
[See page 24.](#)

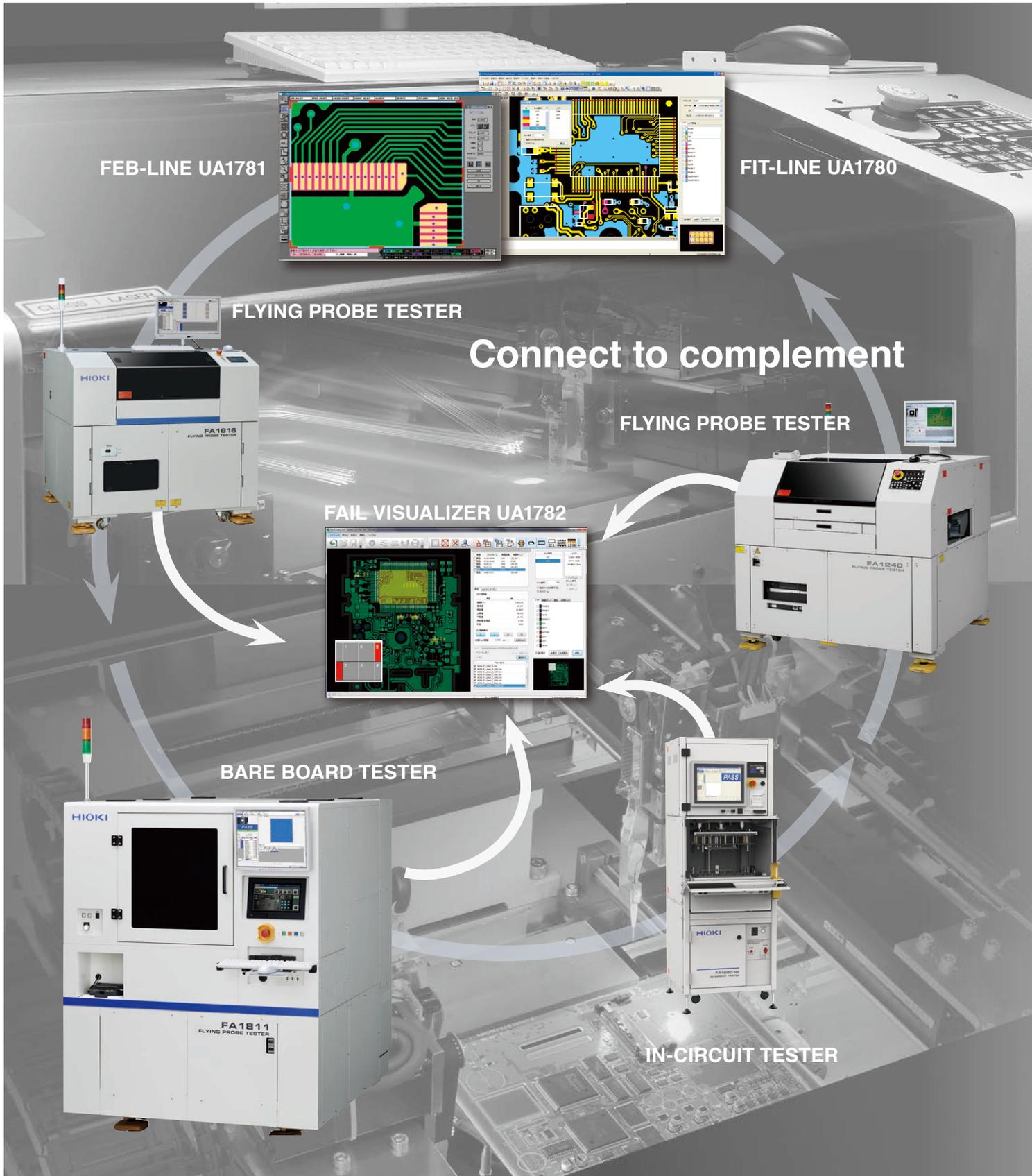
■ SHORT-OPEN TESTER

FA1221
(Desktop type)
[See page 24.](#)

Bare Board Electrical Testing System

Connected through HIOKI format Electrical testing equipment series

All pieces of HIOKI testing equipment, from bare board testers to populated board testers, are connected through the HIOKI format. HIOKI excels in product development with a complementary relationship between populated board testing and bare board testing.



Our bare board testing equipment contains a range of component testing expertise Hioki has accumulated through years of experience in populated board testing.

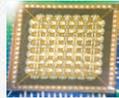
Robust support for testing device embedded substrates

Bringing together populated electronic component measuring technologies

The bare board tester also utilizes the full range of HIOKI's in-circuit tester measurement technologies.

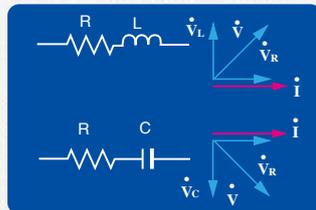
■ LSI reliability testing (EAD testing)

- I/O pin leakage current testing
- LSI standby current consumption testing
- Diode-based connection reliability testing
- Low-power mode (0.1V measurement)



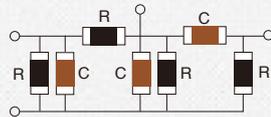
■ Complex component separation testing (when used with a scanner board equipped with guard feature)

- Guard settings eliminate the effects of surrounding circuit components
- Phase separation uses AC measurement



■ Testing of other components (DC/AC testing)

- Capacitors (10 pF to 4 mF)
- Inductance (1 μ H to 100 mH)
- Diodes
- Zener diodes
- Voltage/current measurement
- MLCC (multi-layer ceramic capacitors)



Extensive continuity/insulation testing functionality

Technique that detects any latent defects

■ High-current continuity testing up to 150 mA

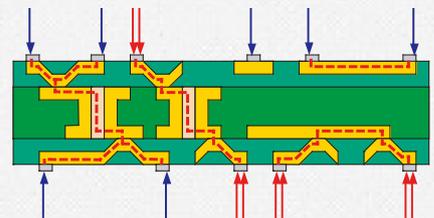
- High-reliability continuity testing with high-current application
- High-speed continuity testing for dramatically reduced measurement times
- Near-open test feature for detecting latent defects

■ Insulation testing with automatic protection for device embedded substrates

- Automatic protection of embedded devices during insulation testing
- Automatic, low-voltage short testing of nets connecting embedded devices
- Micro-short test feature
- Impulse testing feature for detecting latent defects
- ARC detection

■ Four-terminal continuity testing that assures trace resistance

- Trace resistance testing using low-resistance testing down to 400 $\mu\Omega$
- Testing based on theoretical resistance values
- Detection of via defects on HDI substrates



Supported board type includes Feel free to contact HIOKI at any time

■ HDI substrates to assure trace resistance

- The use of theoretical resistance values generated by SIM-LINE and high-precision 4-terminal resistance measurement assures pattern reliability.

■ Device embedded substrates

- HIOKI utilizes measurement expertise developed for in-circuit testers to provide testing of embedded passive and active devices that's one step ahead of the competition. 0.1 V low-voltage measurement not affected by semiconductors

■ Flexible Circuit Board

- Support for thin boards of 0.05 mm
- A tension clamp to securely hold flexible circuit board.

Choose from 4 models offering electrical testing of multifunction boards.

1. Identify latent defects with low-resistance and high-insulation-resistance measurement

4-terminal resistance measurement function

Use Kelvin probes to accurately measure the minuscule resistance of inner via holes (IVHs) and through-holes at outstanding levels of stability.

Large-diameter vias

Power supply net patterns

Large-area patterns

Signal patterns

200 mA continuity testing

Pattern reliability is assured by applying a high current of up to 200 mA, close to the rated current of a typical fine pattern.

Micro-short

High-resistance short

Printed resistance

FA1813/FA1817/FA1283 testing range (from 40.00 $\mu\Omega$ range)

FA1816 testing range (from 40.00 $\mu\Omega$ range)

Test range of typical flying-probe testers

1 $\mu\Omega$

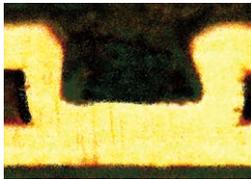
1 m Ω

1 Ω

1 k Ω

Importance of low-resistance testing

- Dedicated probes and a dedicated measurement board that use the 4-terminal low-resistance measurement method make it possible to detect the minuscule resistance values of open vias quickly and accurately.
- When there's an open via, resistance and inductance values increase, interfering with signal transmission. Low-resistance testing with the 4-terminal method using a high-resolution, high-precision instrument makes it possible to quickly assess via connectivity.



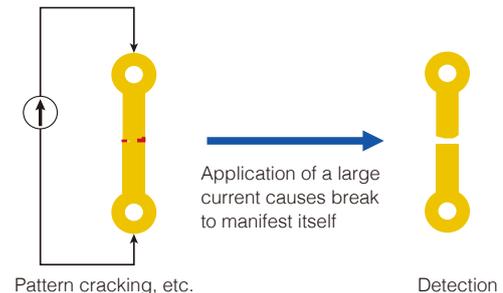
Normal via



Open via

Detecting near-open defects in patterns

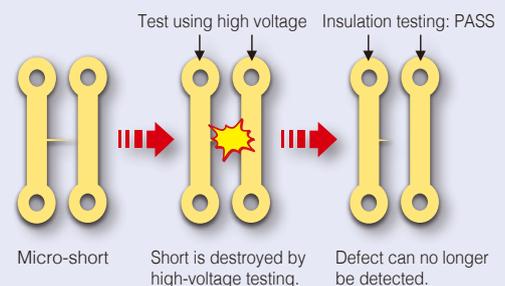
- Incipient breaks in patterns are detected by momentarily applying a high current (up to 200 mA).
- Since high-current continuity testing at up to 200 mA allows resistance to be measured in an environment that mimics the conditions of actual operation, it offers an ideal means of verifying the reliability of pattern and via connections.



Detecting latent pattern defects

Micro-short testing: Improving test reliability

Detect micro-shorts between patterns prior to insulation testing by applying a user-configured low voltage.



2. Augment LCR testing with measurement of boards with embedded devices

Consolidating technologies for measuring mounted electronic components

Insulation testing with automatic protection for peace of mind

- Insulation testing of nets with connected components is automatically carried out separately from other tests.
- Design delivers peace of mind by ensuring that a high voltage is not applied to components.

JIS-compliant MLCC measurement function

- Multilayer ceramic capacitors (MLCCs), whose capacitance values are voltage-dependent, are measured at the appropriate frequency and voltage.

Low-power LCR measurement with application of 0.1 V

- Achieve accurate measurement without causing LSIs and other semiconductors to operate.
- Measurement occurs at a low voltage that will not damage components.

Phase-separation measurement of individual components from composite LCR circuits

- Resistance and capacitance components are isolated and measured accurately based on the phase difference between AC signals. Values as low as 0.1 pF can be tested.

Testing & Measurement, Sorting & Analysis.

Advanced test tools provide functionality ranging from simple continuity and insulation testing to component parameter testing into a single testing system.

Detecting latent defects

Detect latent defects that would go unidentified with conventional testing by using micro-short testing and an extensive range of insulation testing modes.

Suboxides and other conductive impurities

Dust that has absorbed moisture

Organic substrates

Residual etching liquid

Surface contamination

Impurities in insulators

Ceramic substrates

Powerful insulation testing capabilities of the FA1813/FA1817/FA1283 (up to 100.0 GΩ)

Insulation test capability of the FA1816 (up to 500.0 MΩ)

10 kΩ

10 MΩ

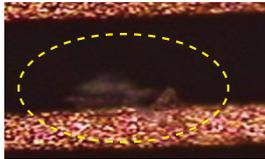
500 MΩ

10 GΩ

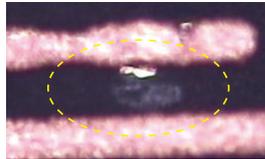
100 GΩ

Detect insulation defects in patterns

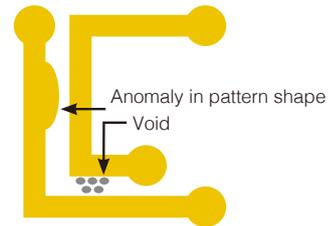
- A 100 GΩ/250 V high-insulation-resistance measurement board developed specifically for the FA1817 makes it possible to detect defects quickly while minimizing the stress caused by imposing high voltages. (FA1817 only)
- Detect abnormalities in pattern shape, impurities that exist between patterns, and insulation defects caused by voids.



Void

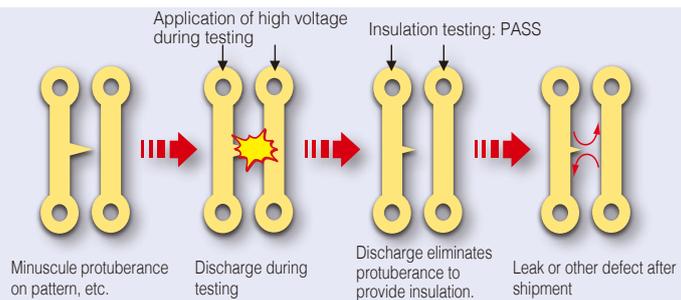


Impurity



Arc detection: Increasing long-term reliability

Detect arc discharges during insulation testing.



(FA1813 standard function, FA1817/FA1283 optional function)

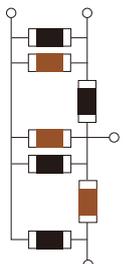
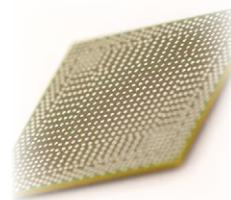
Guarding function

- ICT function keeps measurement signals from flowing into the circuit network.
- Guard potentials can be automatically set based on component connection information.

LSI connection reliability testing

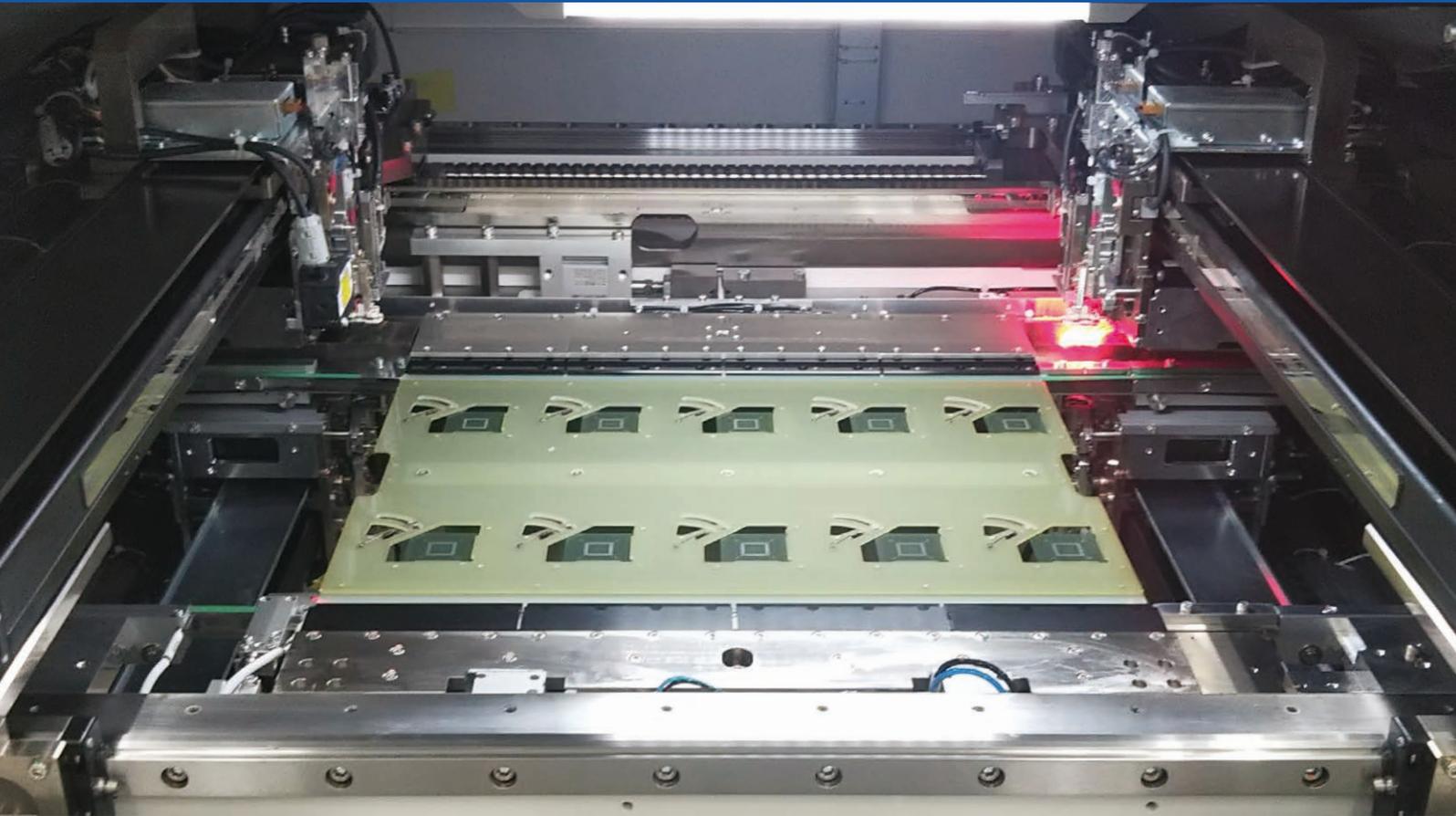
The FA1817 provides a dedicated mode for testing boards with embedded LSIs. (FA1817 only)

- | | |
|--|---|
| 1. Stress on embedded devices caused by the test voltage | ▶ Low-power mode (0.1 V measurement) |
| 2. Bare chip initial defects and stress failures | ▶ LSI current consumption testing |
| 3. Energization current in diode characteristics testing | ▶ Reducing stress for diode characteristics testing by using a minuscule current range of 1 mA or less. |



FA1813 Evaluate high-density substrate reliability with super-high-precision probing

Inspect dual side simultaneously with a total of 4 arms, 2 arms on the top and 2 arms on the bottom
High speed inspection at Max. 76 point/sec.



Half the depth of impact

The FA1813 supports the high-precision probe CP1072-01 and the CP1073 (Hioki's latest probe), both of which were developed with proprietary technology that minimizes pattern damage.



▲ Comparison of impact depth

Choose from an extensive range of models to suit the type of board being tested.



CP1073-01



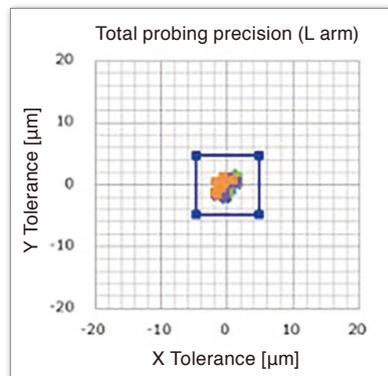
CP1073-11



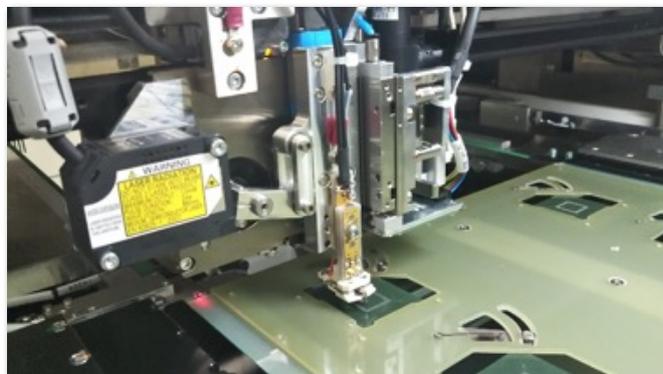
CP1073-12

Accurate probing ensured

Board alignment on the top-surface arms uses high-resolution cameras with a pixel count that's twice of previous models and a high-magnification lens (with 2× optical zoom) to implement highly accurate probing of fine pads on high-density substrate. New functionality that performs a contact check while probing down optimizes the probe stroke to reduce pad damage by minimizing impact force.



Blue lines indicate overall pass/fail limits for precise probing inspection. Plotted points indicate individual arms' probing positions. *



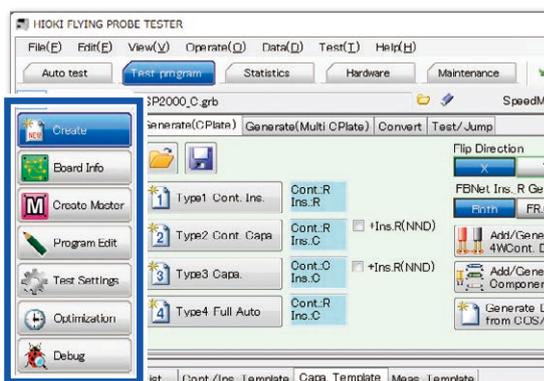
Realizing super-high-precision probing with a newly designed probe tip.

Significantly improved operability (FA1817, FA1816 and FA1813 shared feature)

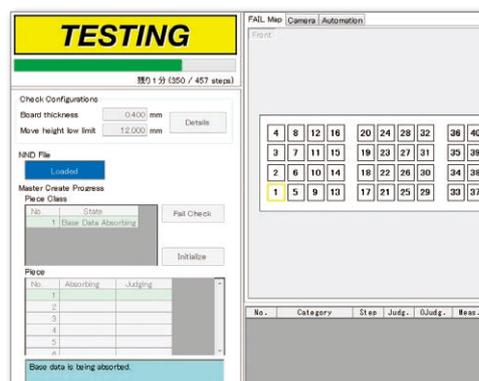
Revamped operation includes a new data creation method that lets you start testing just from the 1st piece.

New workflow menu in test data creation process further simplifies operation.

Now basic value acquisition, golden board judgment, and step additions can be performed easily and automatically with the click of a single button.



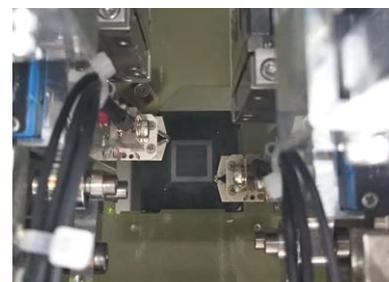
Basic tasks such as data creation have been simplified so that the operator need only follow the appropriate workflow.



Master data creation has been fully automated to save operator time.

Ships standard with all the functionality you need

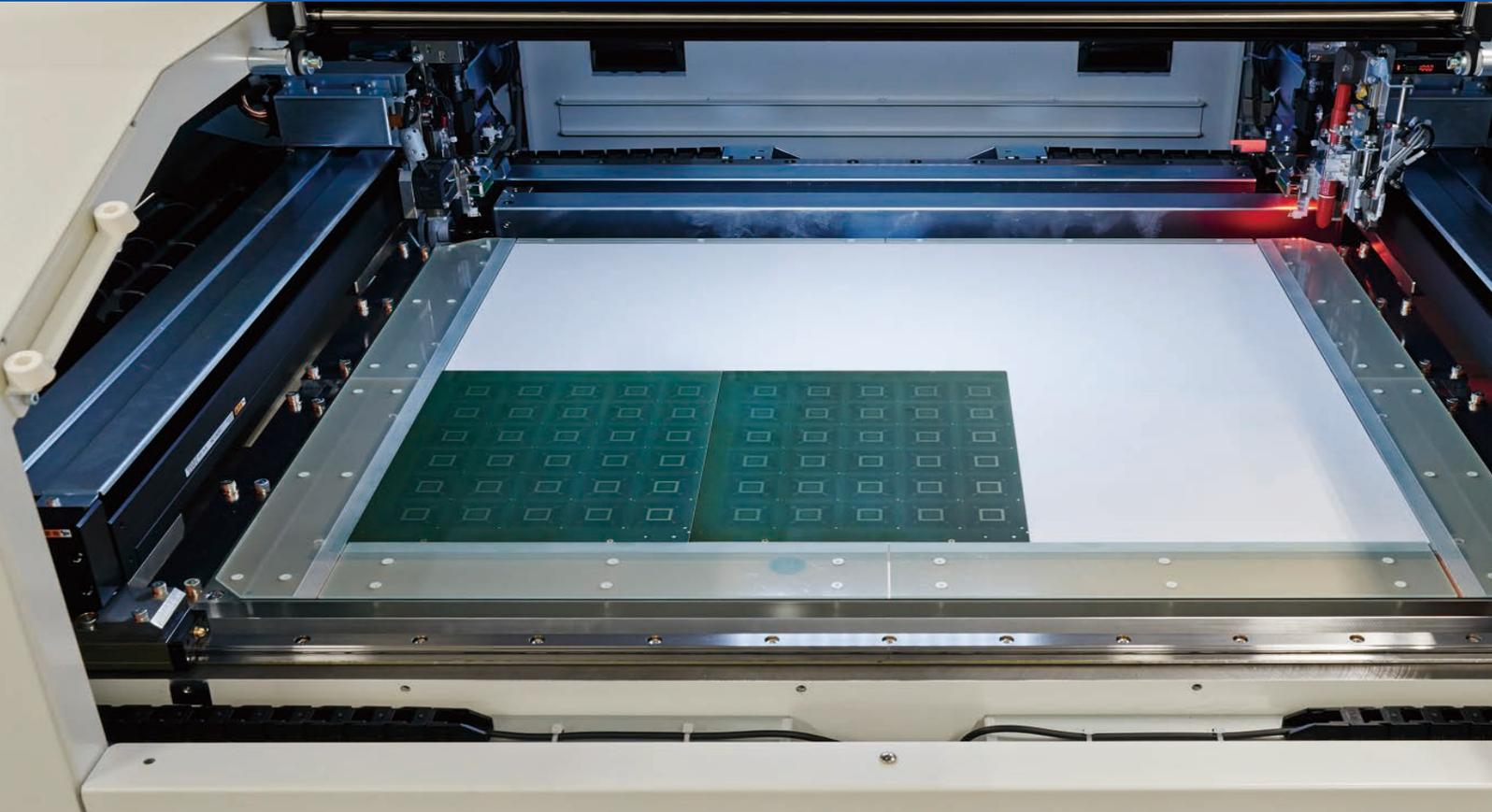
The FA1813 ships standard with exceptionally stable, high-speed low-resistance measurement and high-insulation measurement functionality. To facilitate even more accurate probing, it also ships standard with alignment cameras on all arms and laser board thickness correction. In addition, test data creation incorporates a workflow menu to simplify operation.



FA1816

Horizontal, single-sided tester that delivers high-speed testing using capacitance measurement

Complete tests in the fewest possible steps compared to conventional resistance testing
High-speed testing at up to 100 points/sec.



Capacitance measurement method

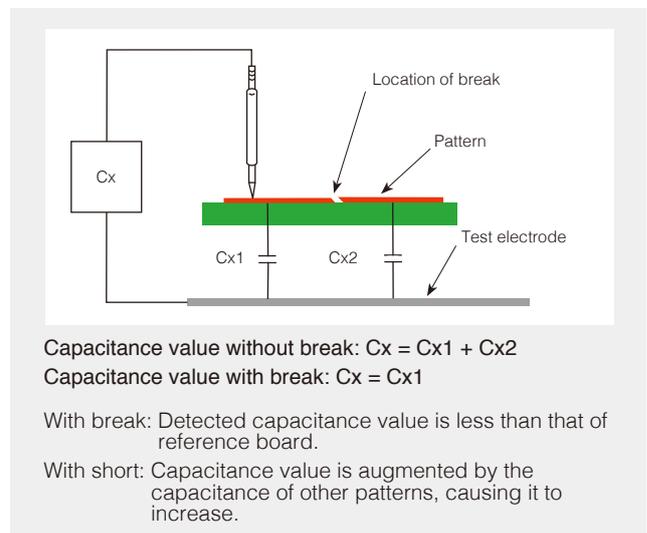
Circuit patterns on boards have a certain capacitance with the electrically isolated test electrode that is proportional to their area.

If a circuit pattern has a defect such as a short or break, its pattern area will change, causing its capacitance value to change. The FA1816 detects circuit pattern shorts and breaks by comparing test values to reference values.

Comparison of test steps (100 nets and total of 500 nodes)

	Continuity testing method	Capacitance measurement method
Testing for breaks	All nodes on same net $500 - 100 = 400$	The capacitance of all nodes is measured to detect breaks and shorts. 500
Testing for shorts	$nCr = 100C2$ $100 \times (100 - 1) / 2 = 4950$	
Test steps	5350	500

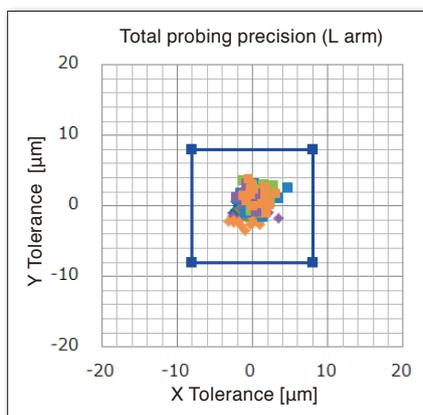
The FA1816 also ships standard with an insulation measurement function so that it can assure insulation performance through insulation measurement as well as through capacitance measurement.



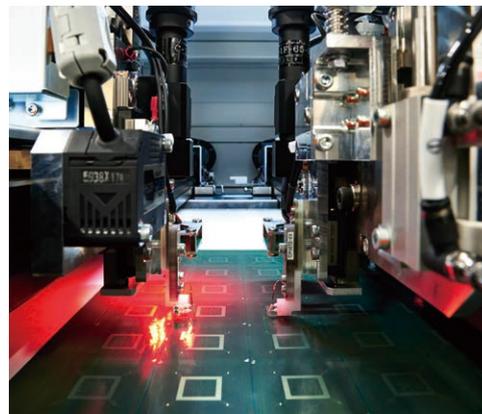
The capacitance measurement method allows testing for breaks and shorts simply by testing all endpoints of each pattern.

Accurate probing ensured

The FA1816 uses high-resolution cameras with high-power lenses (1x optical zoom) to deliver accurate probing of the board. Optional 2x lenses further improve alignment precision.

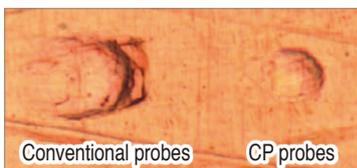


Blue lines indicate overall pass/fail limits for precise probing inspection. Plotted points indicate individual arms' probing positions. *



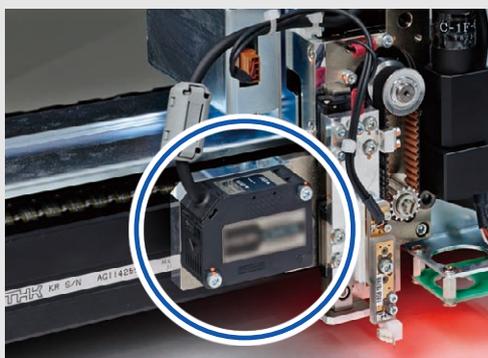
High-precision board alignment

Half impact depth (FA1817 and FA1816 shared feature)



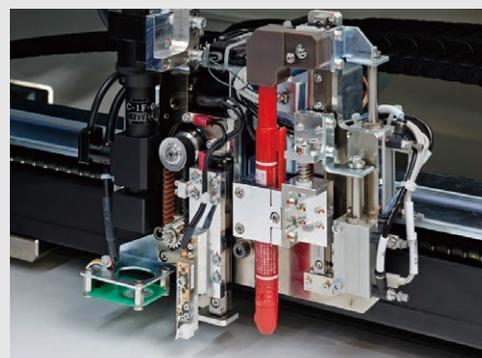
Proprietary probes enable testing with shallower impacts, all without compromising speed.

Options



LASER HEIGHT ALIGNMENT UNIT E4601

A board thickness compensation function using a laser enables contact the board with the optimum force. (Standard on FA1813, FA1817, and FA1283)



DOT MARKING FUNCTION E4603

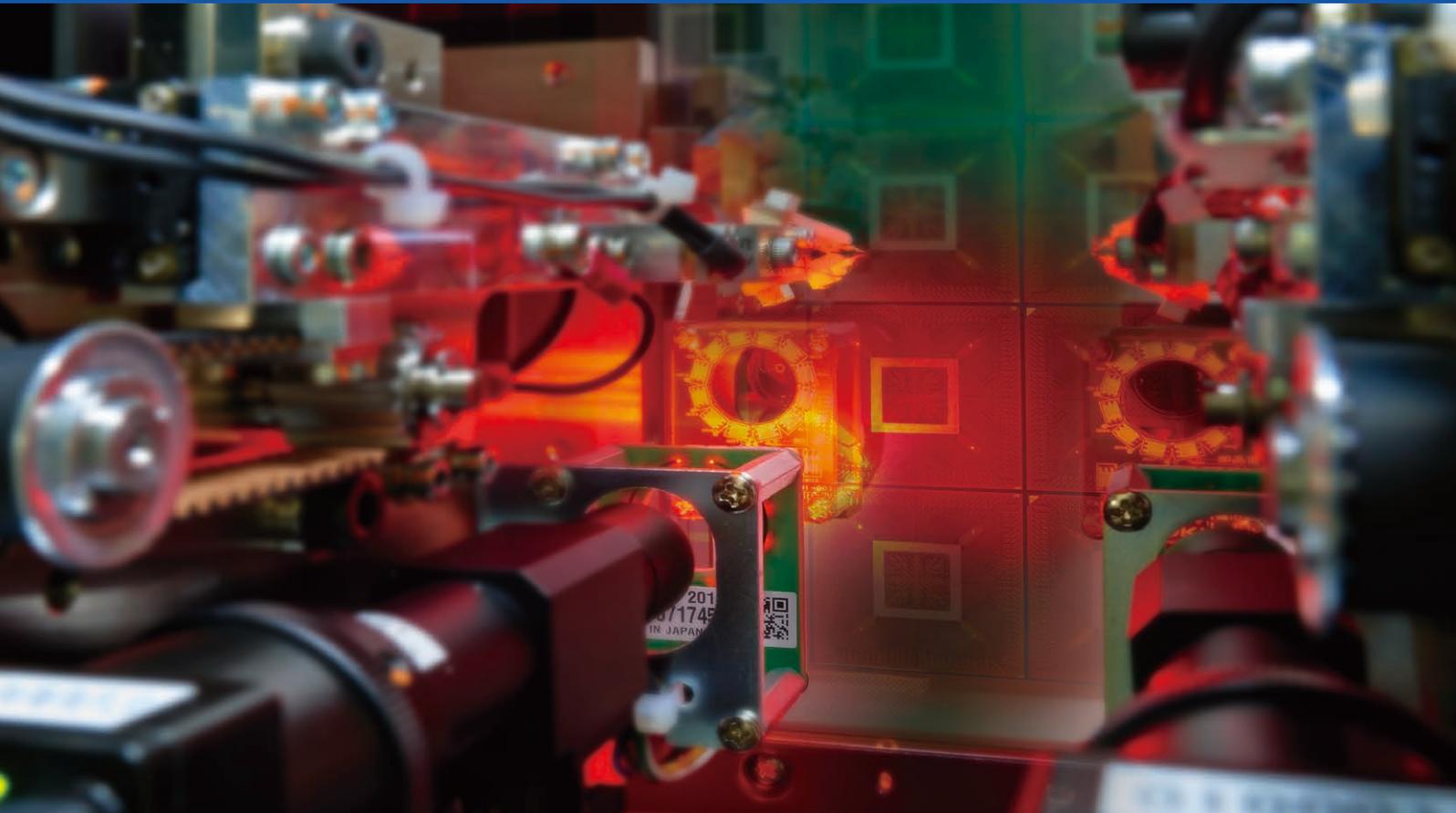
Dot marking using commercially available oil markers

FA1817

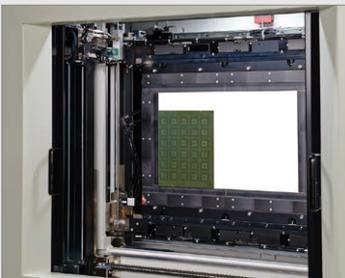
Minimize bending of test substrate

Vertical, double-sided inspection tool with small installation space

Test both surfaces simultaneously with a total of 4 arms (2 front and 2 rear)
High speed inspection at Max. 67 points / sec.



Options



VACUUM UNIT FOR CAPACITANCE TEST E4701

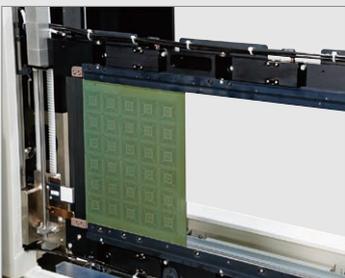
Augment resistance measurement by measuring capacitance on a single surface of the board under test. The E4701 can test boards with a variety of profiles, including thin boards and boards with unusual shapes.



REAR SAFETY COVER E4711

A built-in interior light makes it easy to maintain the system from the rear.

(Shown with cover open)



AIR-TYPE BOARD LOCKING UNIT E4706

Clamp boards in place with one-touch operation. Adjust the board clamp width while viewing a camera image.

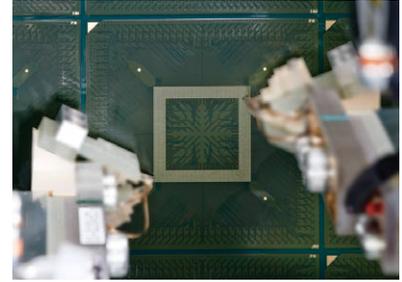


OFFSET STATION E4715 to E4718

Acquire probe offsets while a board is loaded in the system.

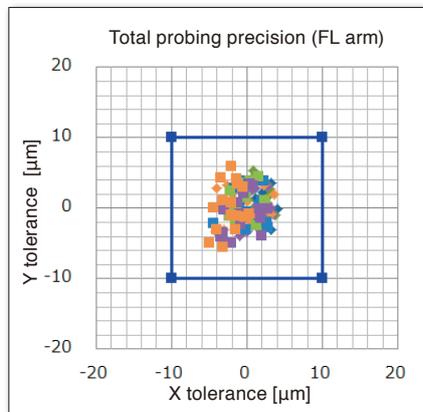
All required functionality built in

The FA1817 ships standard with high-speed low-resistance measurement and high-insulation-resistance measurement functionality that offer excellent stability. Other standard equipment includes alignment cameras on all arms and laser board thickness compensation to facilitate accurate probing. A workflow menu has been added to the test data creation process to further simplify operation.



Accurate probing ensured

The FA1817 uses high-resolution cameras with high-power lenses (1x optical zoom) as well as a laser board thickness compensation function for alignment, ensuring accurate probing of the board and optimal contact. Optional 2x lenses further improve alignment precision.



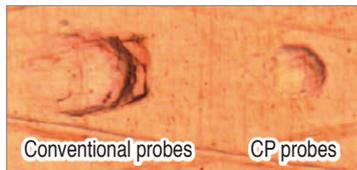
Blue lines indicate overall pass/fail limits for precise probing inspection. Plotted points indicate individual arms' probing positions. *



Laser board thickness compensation function

The FA1817's non-contact board thickness compensation function uses a laser so that probes can contact the board with the appropriate probe stroke.

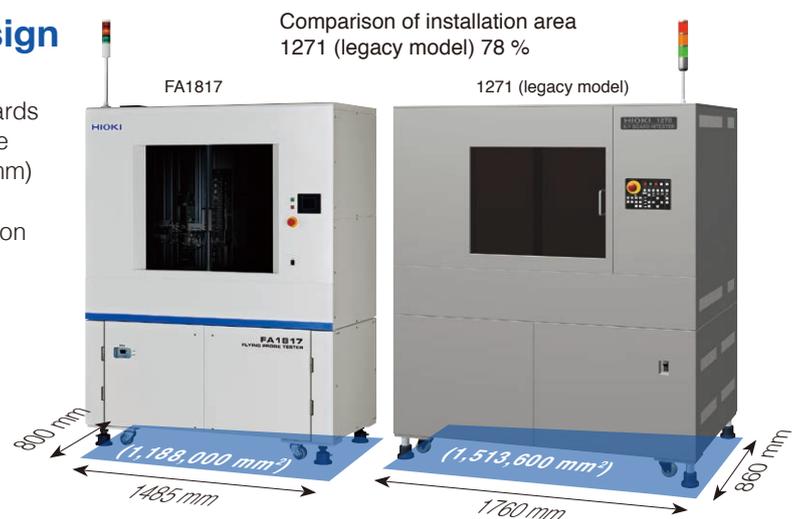
Half impact depth (FA1817 and FA1816 shared feature)



Proprietary probes enable testing with shallower impacts, all without compromising speed.

Space-saving design

Despite being able to test boards of the same dimensions as the legacy 1271 (610 mm x 510 mm) (24.02 inch x 20.08 inch), the FA1817 takes up less installation space than its predecessor.



FA1283

Horizontal, double-sided tester with support for automatic board transport

Inspect both sides simultaneously with a total of 4 arms, 2 arms on the top and 2 arms on the bottom
High-speed testing at up to 100 points/sec.

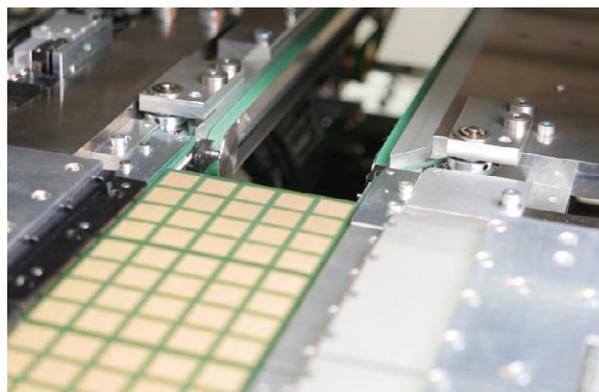


Ships standard with tension clamps that limit flex

Tension clamps let you get to work testing strip boards with a thickness of 0.16 mm right away. A horizontal transport format lets you choose from commercially available Loader/unloader, making it easy to build a low-cost automated testing line.

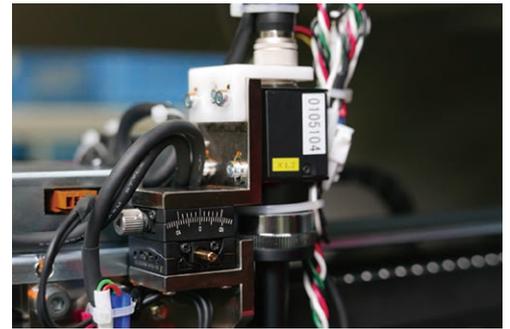
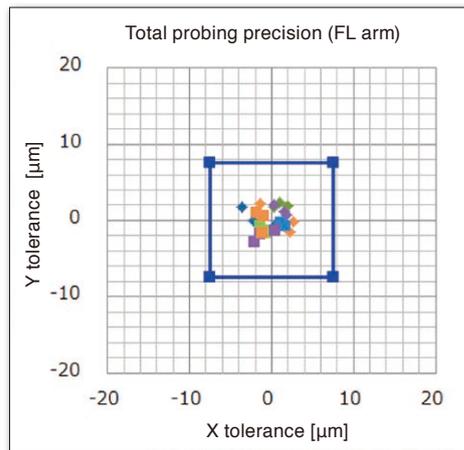
Offline model (without automatic board transport): FA1283-01

Automatic transport model (with automatic board transport): FA1283-11



Automatic transport model: FA1283-11

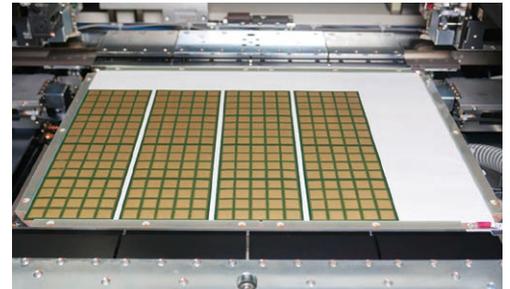
High-precision Probing Function FA1971-01 (option)



Unit is specially designed to minimize misalignment between the each alignment camera's optical axis and its probe's stroke.

Vacuum Unit for Capacitance Test (option)

The E4001 Vacuum Unit for Capacitance Test lets the FA1283 perform open/short testing using the capacitance method in a way that frees the testing process from the effects of board profile, allowing stable performance regardless of board shape and thickness.



Vacuum Unit for Capacitance Test E4001

Laser Board Thickness Compensation Unit (standard equipment)

Measure the position of the board surface with a laser and adjust each probe's contact stroke accordingly to maintain uniform probe force on the board. As a result, the size of probing marks can be minimized without sacrificing test speed.



Functionality for testing embedded devices

The FA1283 is a next-generation bare board tester that draws on the expertise in component measurement that Hioki has gained from populated board testing. In addition to the ability to measure basic components like MLCCs, the system provides guarding functionality for measuring composite circuits as well as measurement functionality that goes beyond that of in-circuit testers, for example to perform phase-separation measurement. In addition, the FA1283 provides dedicated modes for LSI reliability testing, including current consumption testing and leakage current testing. In this way, the system goes beyond the capabilities of LCR meters to deliver state-of-the-art functionality for testing boards with embedded devices.

FLYING PROBE TESTER FA1811

FLYING PROBE TESTER FA1811

Substrate Testing. Revolutionized.

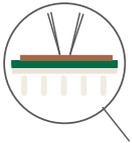
Meeting ever increasing demands for greater analytical power, faster testing speeds and reduced costs.

Achieve both high precision contact and high-speed probing in a space of $\square 10 \mu\text{m}$.

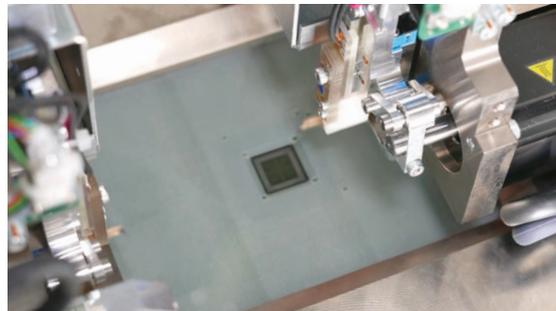
Double test method delivers an operation rate of 100%.



■ FLYING PROBE TESTER FA1811



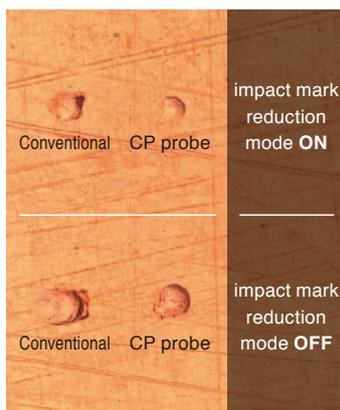
C4 side: $\square 10 \mu\text{m}$ high-precision flying probe
Target: line and space $10 \mu\text{m}/10 \mu\text{m}$



FLYING PROBE UNIT

- Total probing precision: $\square 10 \mu\text{m}$
- Minimum probe pitch: $40 \mu\text{m}$ - Work area: 75 mm (2.95 in) x 75 mm (2.95 in)

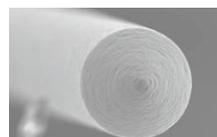
Combine with the latest probe to reduce impact marks



Improved impact mark depth

With an aim to decrease impact mark size and depth, HIOKI developed the FA1811-exclusive impact mark reduction probe. Even compared to the conventional machine FA1116, which reduced the impact mark depth by half, this probe improves impact mark performance.

The size and depth of the impact mark can be selected by combining three types of speed setting, "high-precision mode", "medium-speed mode", and "high-speed mode", and the impact mark reduction mode.



SEM material analysis

We used an SEM to analyze the materials and tip shape used in the probe, achieving contact performance that rivals a semiconductor prober.

Switch the stage on the BGA side for an operation rate of 100%

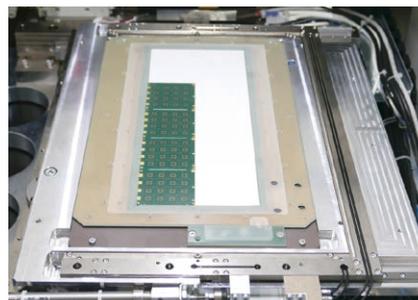
Full-net insulation / continuity test using resistance: x10 max. speed*
 High-speed test using capacitance: x2 max. speed*



**TEST FIXTURE
CP1165-11**

Resistance testing

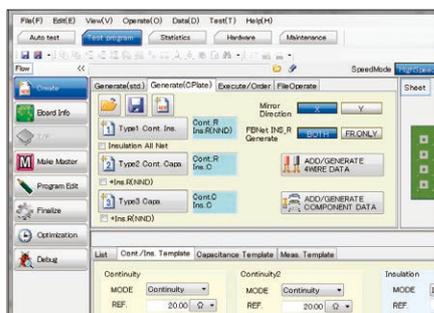
- Board size: Max of □ 80 mm (3.15 in)
- Maximum number of pins: 8192



**VACUUM UNIT FOR
CAPACITANCE TEST E4101**

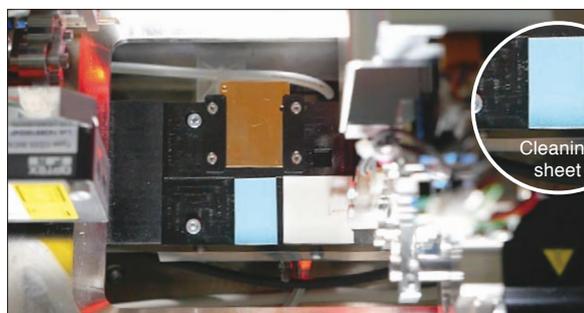
Capacitance testing

- Board size: 105 x 250mm (4.13 x 9.84 in)



Work flow menu

Just follow the work flow to easily perform basic work such as data creation. Everything can be done using a mouse.



Offset station

The shuttle has an offset station and completes the offset in 1/10 of the conventional time. Use probe tip automatic cleaning, a new function, to maintain stable measurements.

FA1811 Specifications

No. of arms	2
Maximum number of test steps	999,999 (max.)
Total probing precision	□ 10 μm
Supported range of board thickness for clamping	400 (W) × 324 (D) mm
Probing Area	75 mm (2.95 in) x 75 mm (2.95 in)
Power supply	AC 200 V±10%(single phase)50/60 Hz Power consumption: 5 kVA
dimensions	1,300 (W) × 1,670 (H) × 1,700 (D) mm
Mass	2,200 kg

Covers a range of testing processes from testing data editing to repair support

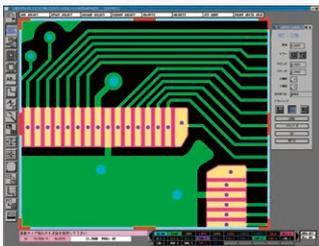
HIOKI provides robust support for the data editing process through high-speed contour and reverse net extraction. The testing result viewer compatible with all HIOKI testing equipment reliably supports failure verification and repair tasks.

FLY-LINE is a comprehensive CAM system for automatically generating endpoint and net information from semiconductor substrate/printed circuit board manufacturing data and outputting electrical test data for use with HIOKI bare board electrical testing systems.

* CAM: Computer Aided Manufacturing

[Bare Board Testing Flow]

FEB-LINE UA1781



Manufacturing data (Gerber data)

CAM data input

RS274D

DXF

RS274X

IPCD356A

Net generation

Automatic test point generation

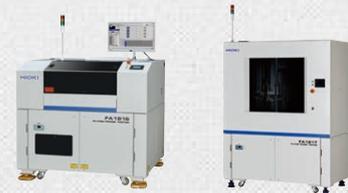
Theoretical Resistance Calculation System (1392)
(Optional)

Device embedded substrate test data creation system (1391)
(Optional)

Test data output
(Alignment mark instructions)



Testing

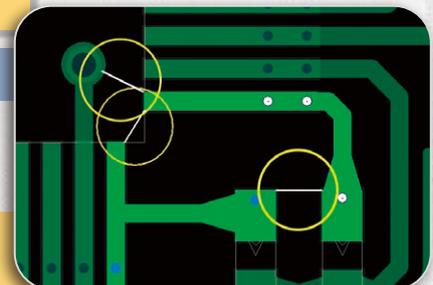
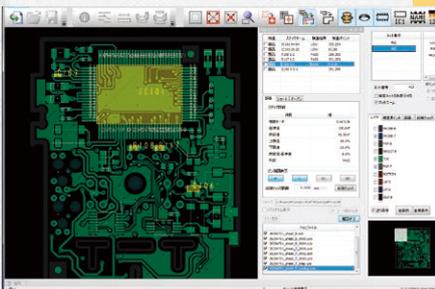


Defect analysis
FAIL VISUALIZER UA1782

View and Check

Check defective points
to determine any
dangerous locations

Statistical analysis
Process Analyzer Pro UA1801
Potential adverse search out



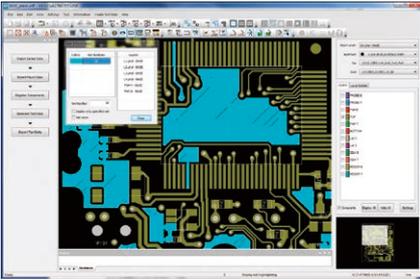
Software Products

1/2 Data Generation Time With New Platform, 3-in-1 Editing Software for Bare Board Testing

FEB-LINE INSPECTION DATA CREATION SYSTEM UA1781

Gerber editing software that embodies the know-how for substrate testing Built-in commands eliminate need for special know-how

- Easily generate test points even on the inner layer for cavity structures (One-point test-point generation)
- Expanded touch panel functions for printed boards (Optional E7001)
- Support for built-in component boards
- High-precision relay-point deletion functionality that reliably delete only the unnecessary relay-points
- Supported in English



■ Specifications Overview

License content	Install CD, license key (USB), instruction manual *Note: Please purchase hardware such as PC and monitor separately.
Operating environment	Windows 10 Pro 64-bit
Data entry function	Gerber file, aperture file, drill file, U-ART database, DXF (optional E7001)
Test data generation function	Net information generation, part test data generation, test point generation, relay-point deletion
Test data output format	SFD, SFDX, NND, IND, CON, COT, COTX, PRTX, LAYOUT

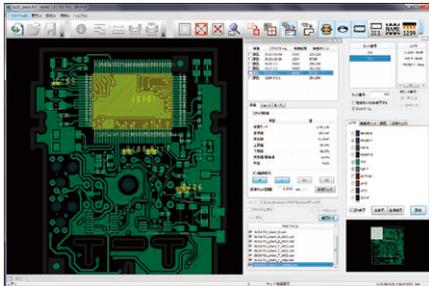
Model No. (Order Code) **UA1781** (Permanent license version)

Robust Support for Repair Work Using Simple Operations and Assistive Functionality for both Bare Board and Populated Board

FAIL VISUALIZER UA1782

The Fail Visualizer UA1782 is a dedicated visualization software for Hioki electrical testing equipment and data creation systems.

- Visualize test results from flying-probe testers
- Pinpoint components and patterns from test result files
- Display the probing positions of test fixtures or test heads for both ICT and bare board testers
- Search for components and nets on device embedded bare board



■ Specifications Overview

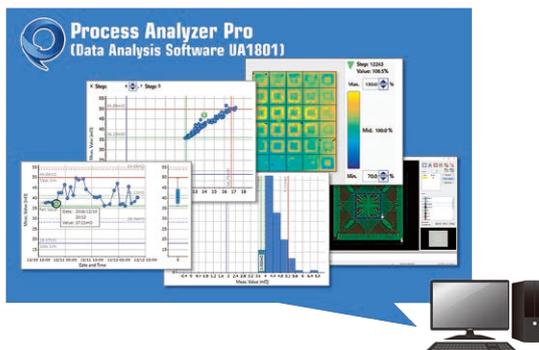
License content	Install CD, license key (USB), instruction manual *Note: Please purchase hardware such as PC and monitor separately.
Database import	Load UA1780 and U-ART databases
Operating environment	Windows 10 Pro 64-bit
Net highlighting	Display user-specified nets with color highlighting. Select whether to display all layers or only top and bottom layers.
Fail list loading with real-time monitoring	Monitor a test result output folder for a testing system at a specified interval and automatically load new test data as it becomes available.

Model No. (Order Code) **UA1782** (supports UA1780 database input)
UA1782-01 (supports IPC-D-356 format input)
UA1782-02 (supports CAN & ADR format input)

Data Analysis Software for Detecting Latent Defects on PASS Boards

Process Analyzer Pro UA1801

- Perform statistical analysis using the latest AI technologies
- Detect significant points that can cause latent defects
- Provide feedback to improve quality in board production and design processes



Free version Download the free version of Process Analyzer here.
https://www.hioki.com/e/lp/2020fa1817_pa/

Note: The Pro and free versions use the same application file.
To access Pro features, you must purchase a license key.

■ Specifications Overview

License contents	License key (USB) only *Note: Please purchase computer, display and other hardware separately and download the installer and documentation from Hioki's website.
Supported test equipment	FA1817, FA1816, FA1811, FA1282-01, FA1282-11, FA1283-01, FA1283-11, 1281, 1281-11, 1281-12, 1281-50, FA1116-03, 1116, 1116-01, 1116-02, 1116-12, 1116-21, 1116-22, 1116-23, 1116-24, 1116-32, 1116-41, 1116-42, 1116-43, 1116-44, 1116-45, 1116-51, 1116-52, 1116-53, 1116-54, 1116-62, 1116-71, 1116-72, 1116-73, 1116-74, 1116-75, 1270, 1271
Operating environment	Operating system: Windows 10 Pro 64-bit; CPU: x64 processor running at 1.0 GHz or better (2.0 GHz or better recommended); memory: 2 GB or better (4 GB or better recommended); other software: Microsoft .NET Framework 4.6 and appropriate language pack
Supported languages	English, Japanese, Simplified Chinese, Traditional Chinese, Korean

Model No. (Order Code) **UA1801-01** (Limited 1-year license)
UA1801-02 (Unlimited license)

Compatible products(As of Aug. 2022.)

FLYING PROBE TESTER



FA1817 FA1283 FA1816 FA1813

Populated Board
Electrical Testing System

Program Test

Complete coverage,

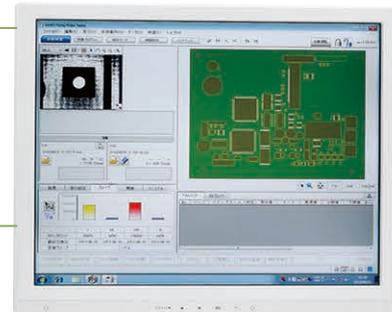
Experience the cumulative difference: UA1780 + FA1240 + UA1782

90% faster data creation

Reduce data creation time by a factor of 10.

93% less line downtime

Slash line stoppage time by a factor of 15.



Operation screen also available in Chinese



Visualize

from data creation, populated board testing, right up to confirmation of defect locations

One of the issues with using flying probe testers is that all steps must be performed in-house, making the testing process a time-consuming undertaking.

By combining multiple components to form a board electrical testing system, Hioki has slashed data creation time by 90% and line downtime by more than 93% compared to previous models.

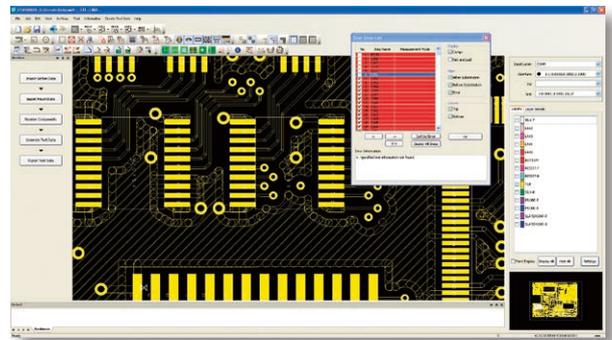
Hioki's approach promises to lower testing man-hours by offering full support for three processes that are essential when using flying probe testers in the field: data creation, electrical testing, and confirmation of defect locations.

Faster programming

FIT-LINE UA1780

Creating test data quickly with nothing but electronic data (no need for actual boards)

Since test coordinates and net information can be created from Gerber data, mounting data, and other design information, it is possible to extract accurate testing information by means of a five-step process. If Gerber data is not available, it can be obtained easily from the board manufacturer. If accurate information is used, it is possible to create data that will not need to be corrected by hand.



Easier testing

FLYING PROBE TESTER FA1240

Easy since you don't have to worry about component shapes

Since the size of components (their width and height) is acquired from the UA1780, the tester can automatically detect when probes will make contact. Workers need only load boards into the system to begin debugging.

Easy debugging: Just leave it to ATG (Automatic debugging)

The ATG function can automatically debug most components since the system acquires net information directly. Now technicians can complete debugging work in the smallest possible number of man-hours, making it easy to create high-quality data.

Faster visualization of defects

FAIL VISUALIZER UA1782

Reliance on the UA1780 for high-speed performance

The Fail Visualizer allows you to check fail locations without stopping the tester. To start confirmation work, you need only load the FA1240's test results into the Fail Visualizer.

Proactive application of FA1240 corrections for superior speed

Since the differences between the actual test data and the Gerber data, for example those due to corrections of test points made on the tester, have already been applied to the display of defect locations, you can easily obtain correct information.

IN-CIRCUIT TESTER FA1220Series

IN-CIRCUIT TESTER FA1220

Helping improve the quality of populated circuit boards

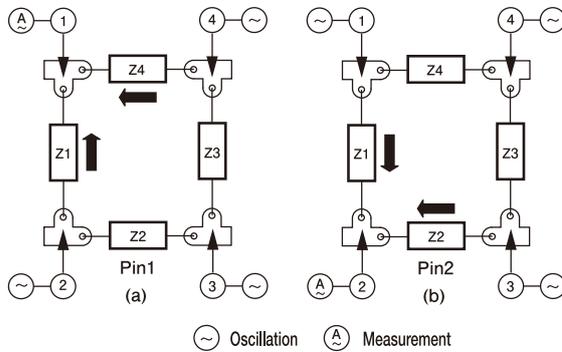
Macro testing (high detection rate with a small number of points)

Macro testing, which measures the impedance of a single user-selected pattern compared to all other patterns, performs similar measurements for all patterns. The advantage of macro testing lies in the fact that the number of measurement steps equals the number of measurement points.

The number of measurement steps that would be required in order to test all possible combinations of 100 measurement points is given by:

$$nCm = n! / ((n-m)! \times m!) = n(n-1) / m = 4950 \text{ where } n = 100 \text{ and } m = 2$$

By contrast, macro testing uses a method such as that illustrated below to perform the test in approximately 1/50 the measurement time and data processing steps since the test consists of just 100 points.



IN-CIRCUIT TESTER FA1220



SHORT-OPEN TESTER FA1221



Inline model FA1220-11

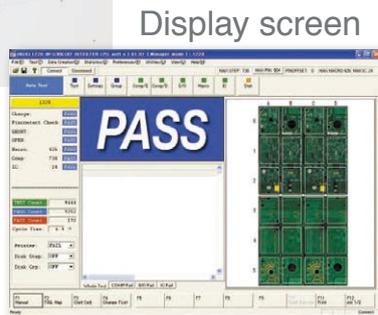


Space-saving model FA1220-02

Features



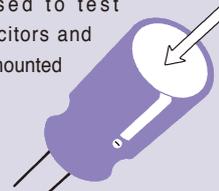
Testing stage (Easily test fixture setup)



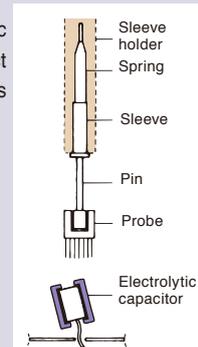
Display screen

Detection of electrolytic capacitor reverse insertion (Optional)

The aluminum cases of electrolytic capacitors can be probed to easily detect reverse insertion, and special probes can be used to test small capacitors and capacitors mounted at an angle.



- Capacitor can be mounted at an angle of up to ±15° (varies with capacitor shape and mounting conditions)



FA1220 / FA1221 / FA1220-02 / FA1220-11 Specifications

Test types and ranges	Round robin short/open, component test
	Macro test: 1 Ω to 10 MΩ (impedance)
	Resistance: 400 μΩ to 40 MΩ
	Low resistance: 40 μΩ to 400 mΩ (Requires E4203)
	Capacitance: 10 pF to 400 mF
	Inductance: 1 μH to 1 H
	Diode and transistor (VF): 0 V to 25 V
	Zener diode (VZ) measurement: 0 V to 25 V (option: 25 V to 100 V)
	Digital transistor (Q): 0 V to 25 V
	Photocoupler test function: 0 V to 25 V
	DC current measurement while applying constant DC voltage: 100nA to 100mA

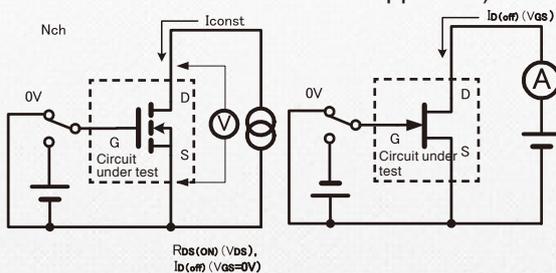
Max. number of test points	2,048 pins (Requires E4201 × 16): FA1220-02/-11 1,024 pins (Requires E4201 × 8): FA1220 128 pins: FA1221 Standard: 0 pin: FA1220 / FA1220-02 / FA1220-11 Standard: 128 pins: FA1221
Max. number of test steps	10,000 steps
Measurement time	Round robin short/open: From approx. 0.8 msec/pin Component: From approx. 0.9 msec/step
Supported board size	390 (W) × 300 (D) mm (FA1220-02/-11) Requires E4262 416 (W) × 340 (D) mm (FA1220-02/-11)
Power supply	100 V AC ±10% (other specifications to be specified at time of order); 700 to 1,000 VA
TESTER dimensions and mass	FA1220,FA1221: Approx. 200 (W) × 323 (H) × 298 (D) mm, 10 kg (352 oz)
	FA1220-02: Approx. 655 (W) × 1,830 (H) × 705 (D) mm, 310 kg (10935 oz)
	FA1220-11: Approx. 780 (W) × 1,760 (H) × 750 (D) mm, 390 kg (13757 oz)

An extensive range of measurement modes

Using the FA1220 as a controller, you can perform active testing on the same pin fixture after ICT testing without the need to reconfigure the system.

FET Active Testing

- A PASS/FAIL judgment of FET operation is made by measuring the voltage and current between the drain and source when on and off voltages are applied to the MOS-FET or J-FET gate. (Both Nch and Pch devices are supported.)

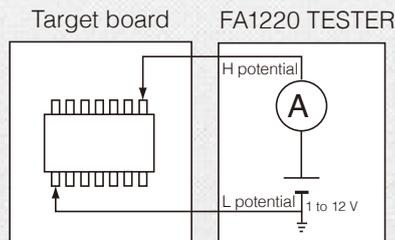


A PASS/FAIL judgment is made based on the OFF current and ON-resistance values.

A PASS/FAIL judgment is made based on the OFF current and measured current (IDSS).

IC Standby Current Measurement

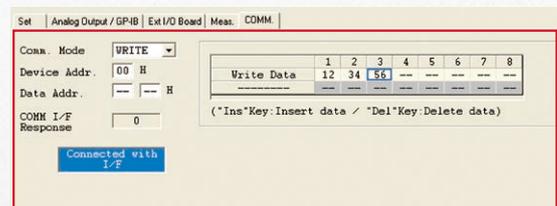
- The standard CURR-CV mode can also support the measurement of minute currents, such as a standby current. You can complete applying constant voltage and measuring of minute currents in a single step.



Current Test Block Diagram

I²C support

- The FA1220 can use the I²C bus to write data to ICs mounted on the board under test, verify written data, and generate controller DIO output.



*I²C is a serial bus standard that is widely used for embedded systems in mobile terminals.

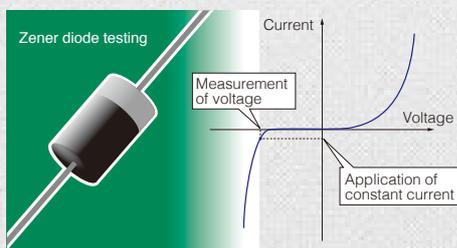
Multi-point Scanner Measurement

- The FA1220 series can conduct tests while switching among a large number of measurement points at high speed, Also supports a logging function, which starts testing at constant intervals.

Upgrading expands the possibility of ICT

Zener voltage and high-voltage insulation testing

High-voltage circuitry with configurable limits broadens testing options by making possible functionality including high-voltage (HV) Zener voltage testing, varistor operating voltage testing, and insulation resistance testing at up to 1 GΩ.

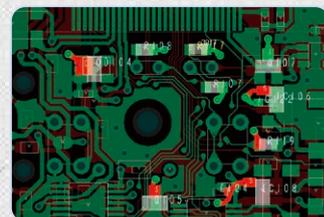


*Requires Scanner Board E4203.

FAIL VISUALIZER UA1782

You can easily find components, identify the probe location or check network information. This changes repair and pin board maintenance.

- Point information view screen



FLYING PROBE TESTER FA1240

FLYING PROBE TESTER FA1240-61/-63

new

1

Simply follow the workflow.

Quickly complete programs that take into account component height

◆ Improved operability

The FA1240-50 features a redesigned user interface.

Control screens make extensive use of graphics to keep operation intuitive.

A high level of visibility on the production floor reflects the user-friendly focus of the system's design.

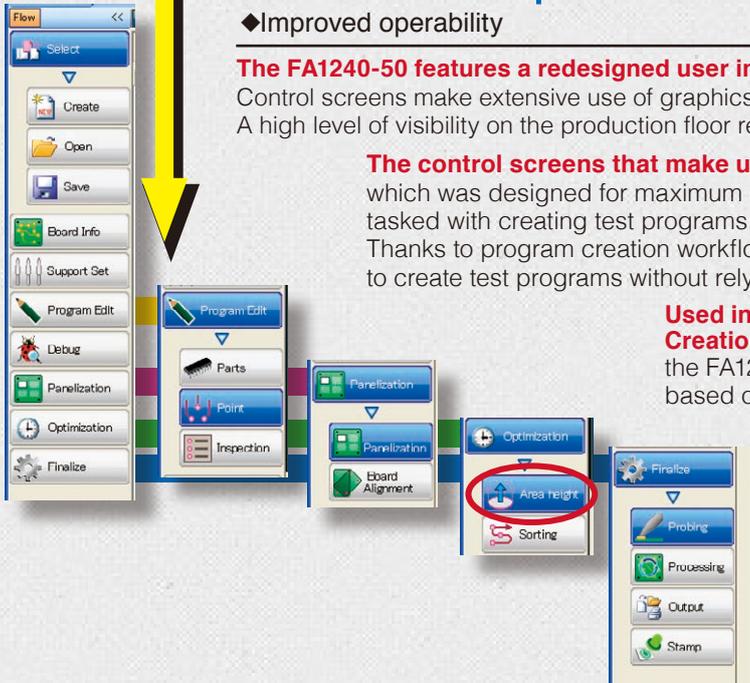
The control screens that make up this newly developed graphical application, which was designed for maximum ease of use, are easy on the operators who are tasked with creating test programs.

Thanks to program creation workflows and an operation assistance function, it's easy to create test programs without relying on system documentation.

Used in conjunction with HIOKI's FIT-LINE Test Data Creation System UA1780 (optional software), the FA1240-50 can automatically avoid arm interference based on component contour information.

Slash line downtime by 93%.

Used in combination with the UA1780, the FA1240-50 can reduce test line downtime by 93% through effective data creation and debugging work. HIOKI invites you to experience the new FA1240-50's man-machine interface for yourself.

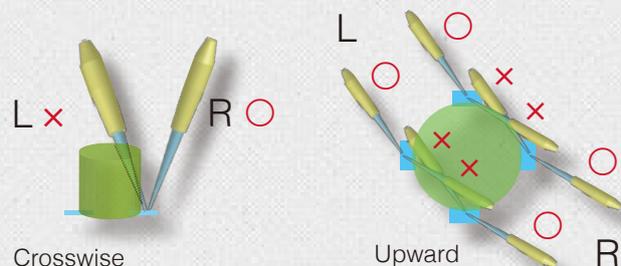
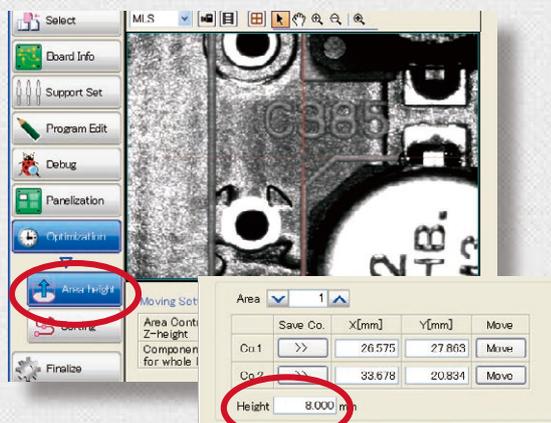
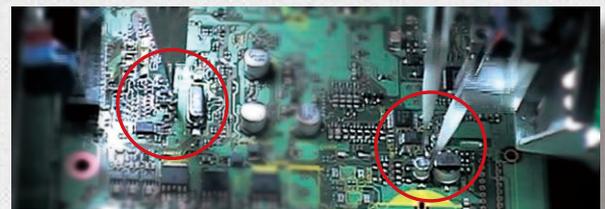


new

2

No time required for checking the contact arm (ATG function & Automatic calculation of arm interference)

By combining the FA1240 and UA1780, you ensure that all necessary component information is taken into account. The system automatically calculates where interference between arms and components will occur and avoids it. Because it is possible to complete cumbersome and time-consuming verification work safely and rapidly, data creation time can be greatly shortened.



Probes are installed at an angle to allow probing of adjacent lands. At probing points near tall components, it is essential to check for interference between angled probes and components and to configure settings to avoid that eventuality.

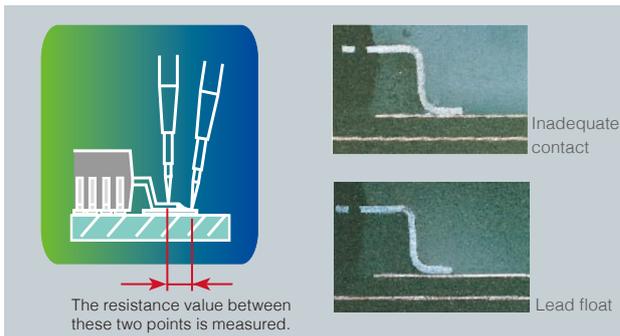
Since UA1780 FIT-LINE data provides physical information about board features such as component shape, size, and height data, the FA1240 **takes into account interference between probes and components based on that information and automatically selects arms from the dual standpoints of safety and optimal efficiency.**

This allows safe, rapid probing without any special knowledge of the apparatus.

Uncompromising "Visualization" Technology

Assured detection of inadequate contact through resistance testing

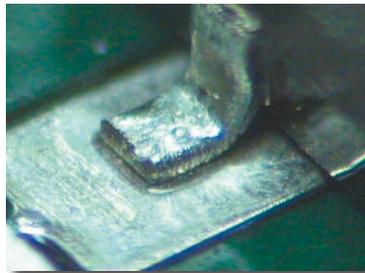
Since HIOKI's proprietary lead float detection function makes judgments based on the resistance values between leads and pads, signal attributes are irrelevant. And since the process is not affected by internal component circuitry, the method also provides an effective means of detecting lead float for ICs and SMT connectors.



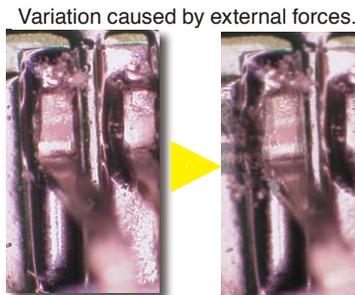
FLYING PROBE TESTER FA1240

Production tests can't find it! Visual tests lead to over-detection!

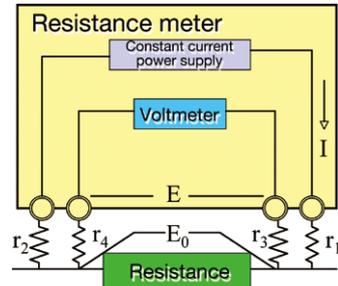
That's why you need 4-terminal resistance measurement for detecting inadequate contact of IC test leads.



- Poor soldering
Solder wicking is poor and the connection resistance has not decreased enough. This passes an operation (powered) test and therefore leads to unidentifiable malfunctions.



- Poor contact
Oxide film on the test lead causes insufficient binding. As there is no significant difference in appearance, this issue is easy to miss.



- 4-terminal resistance measurement
The connection resistance of probes is cancelled for accurate measurement of resistance between terminals. This measurement method is built-in for upper DMM models.

FA1240-61/-63 Specifications

Test types and ranges	Resistor : 400 $\mu\Omega$ to 40 M Ω
	Capacitor : 1 pF to 400 mF
	Inductance : 1 μ H to 100 H
	Diode : 0 V to 25 V
	Zener diode measurement: 0 V to 25 V (option: 25 V to 80 V)
	Digital transistor : 0 V to 25 V
	Photocoupler : 0 V to 25 V
	Short : 0.4 Ω to 40 k Ω Open : 4 Ω to 4 M Ω
	DC voltage measurement : 0 V to 25 V

No. of arms	Single, 4 (L, ML, MR, and R)
Maximum number of test steps	40,000 steps
Probing precision	Within $\pm 100 \mu\text{m}$ (X and Y direction) (for all arms)
Inter-probe pitch	Min.0.15 mm, Min.0.5 mm (when using 4-terminal probes)
Positioning repeatability	Within $\pm 50 \mu\text{m}$ (probing position)
Testable board size	Thickness: 0.6 to 3.2 mm (0.024 to 0.126 in) External dimensions: Min. 50 (W) \times 50 (D) mm to max. 460 (W) \times 510 (D) mm (-61) External dimensions: Min. 50 (W) \times 50 (D) mm to max. 400 (W) \times 330 (D) mm (-63)
Power supply	200 V AC $\pm 10\%$ (single-phase), 50/60 Hz, 6 kVA (5 kVA for FA1240-63)
TESTER dimensions	1,410 (W) \times 1,300 (H) \times 1,380 (D) mm (FA1240-61) 1,320 (W) \times 1,370 (H) \times 1,430 (D) mm (FA1240-63)
Mass	1,250 kg:44091oz (FA1240-61), 1,050 kg:37037oz (FA1240-63)

FIT-LINE Test Data Creation System UA1780

FIT-LINE INSPECTION DATA CREATION SYSTEM UA1780, FAIL VISUALIZER UA1782

Workflow

Step 1 Import Gerber Data

Step 2 Import Mount Data

Step 3 Resister Components

Step 4 Generate Test Data

Step 5 Export Test Data

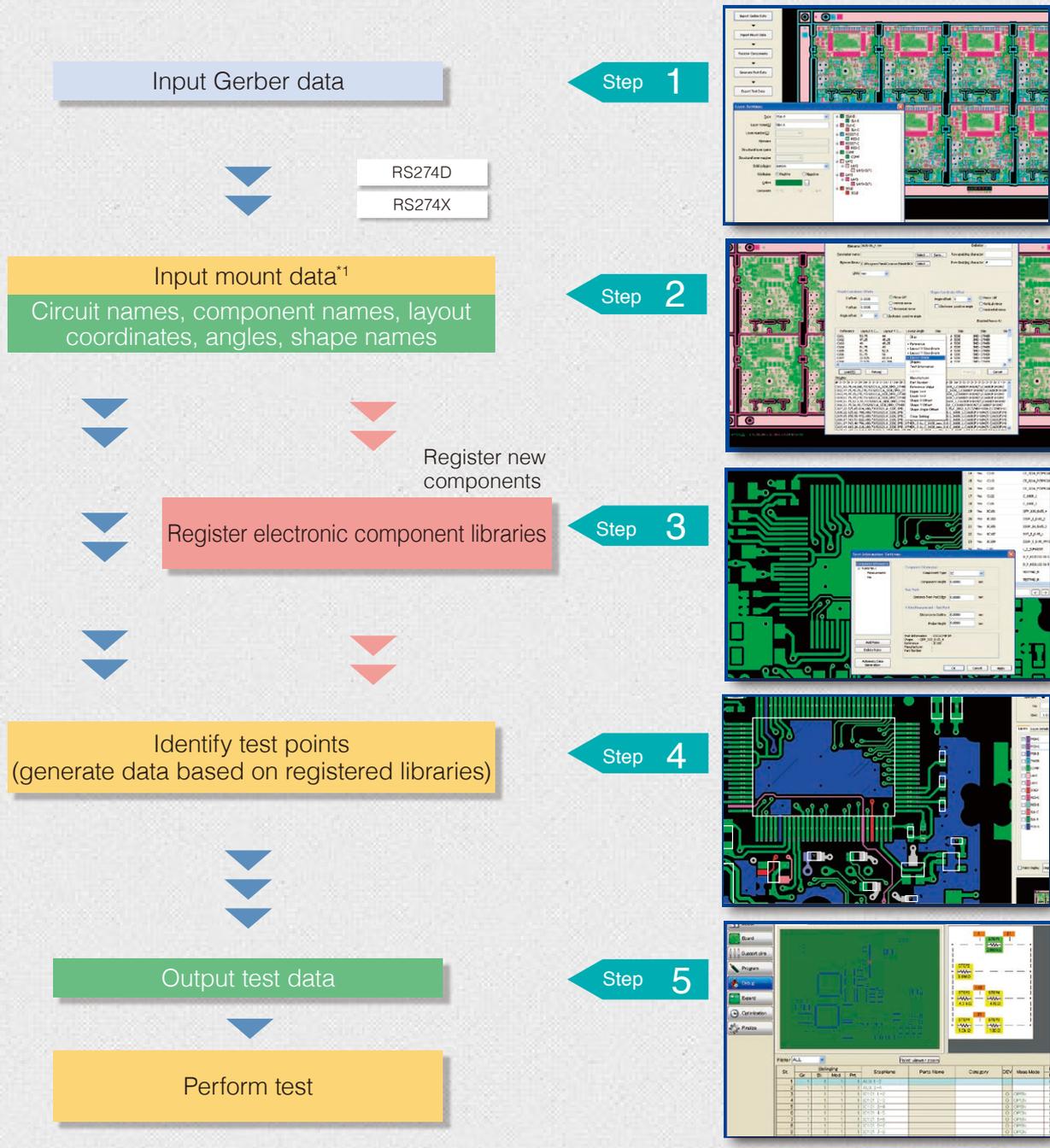
Five Steps

for Creating High-Quality Data
(Simple data creation based on Gerber data and mount data*1)



High-quality data, regardless of who creates it
Utilization of net (circuit) information
Automatic generation of data for detecting solder bridges between adjacent components

UA1780 processing



FAIL VISUALIZER UA1782

Populated Board Testing Equipment

Data is created based on Gerber data and mount data¹ while referencing component library information.

90% reduction in data creation time
More than 93% reduction in line downtime

Gerber data + Mount data¹ → Input → **UA1780 (FIT-LINE)** → Output → FA1240 test data

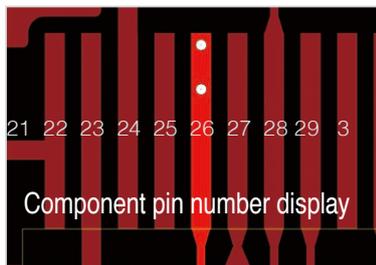
Component libraries

The image shows a software interface with a workflow menu (Import Gerber Data, Import Mount Data, Register Components, Generate Test Data, Export Test Data) and a PCB visualization with highlighted test points.

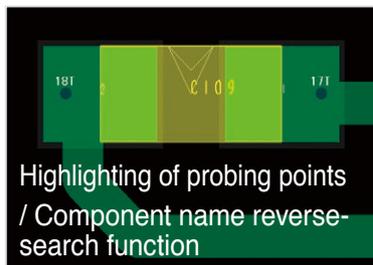
Quickly find the locations of failed components FAIL VISUALIZER UA1782

Since you can select the information you wish to view with a single check, you can accelerate your analysis work

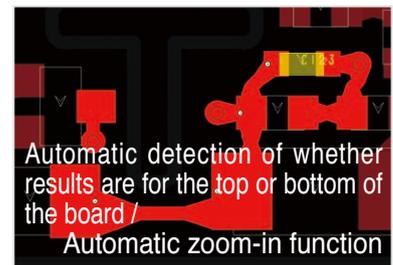
View pin numbers



View probing positions



View the opposite side



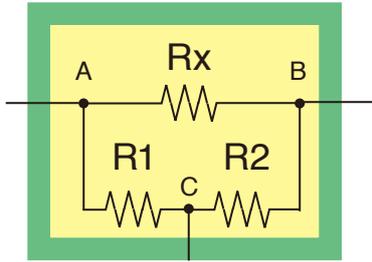
FIT-LINE Test Data Creation System UA1780 (Specifications)

Application CD, license key (USB), user manual	
*Note: User is responsible for providing a computer, monitor, and other hardware.	
Recommended operating environment (for both UA1780 and UA1782)	
Supported OS	Windows10 Professional 64bit
CPU	Core i7 or equivalent
Memory	8 GB or more
Display resolution	1,920 × 1,080 or greater
Disk space	80 GB
Function details (UA1780)	
Gerber data input function	Loading of Gerber files (RS-274X, RS-274D), aperture files, and drill files
Mount data ¹ input function	Loading of CSV files containing circuit names, layout coordinates, angles of rotation, shape names, and component names Support for operations such as rotation and mirroring; Display of mounting positions and other data Support for operations such as rotation and mirroring; Display of mounting positions and other data
Graphical editing function	Figure copying, movement, deletion, etc.
Component library registration function	Display of component lists; registration of component size, height, and pin numbers; registration of test pin intervals, test modes, ratings (threshold values), and upper and lower limit values; duplication of libraries
Test data generation function	Reverse net generation, identification of test points based on components and patterns, automatic movement of test points lying underneath components, generation of open tests between closely spaced pads, etc.
Test point review function	Graphical display of test points
Test data output function	FA1240 files, I240/1114 files
Data management function	Saving of databases and management of component libraries

Testing Technology

Guarding

Guarding functionality is included on all HIOKI populated component testing equipment and testing equipment for device embedded substrates.



Guarding allows parallel elements to be isolated and measured individually.

Suppose combined resistance values R1 and R2 for elements near the terminals of the element under measure Rx on a populated board. If a measurement is taken across the terminals of Rx, the resistance value would be as follows: $1 / [1/Rx + 1/(R1+R2)] = Rx \times (R1+R2) / (Rx+R1+R2)$. Guarding enables these elements to be isolated from one another and measured individually.

Bare board tester latent defect detection function

Open via

When an oxidized film spreads, an insulated state can suddenly develop, causing the circuit to malfunction. Even slight vibration can cause the via to separate.

[Detection of open via defects]

Wiring resistance and contact resistance can be canceled in four-terminal low-resistance measurement, allowing the detection of minute changes in resistance.



Importance of insulation testing

Insulation testing can be performed up to 100 GΩ with 250 V.

[Detection of defective insulation FA1283]

Available models can perform super-insulation testing up to 100 GΩ with a comparatively low voltage of 250 V.

This approach allows the reliable detection of latent defects without overstressing the target board.

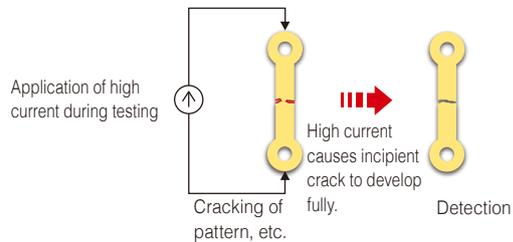


Near-open

Near-open defects are caused by a pseudo-break such as cracks in patterns and open or separated vias. The latent nature of this defect means that its effects will not be evident until a considerable period of time passes following the board's manufacture.

[Detection of near-open defects]

Continuity testing can be performed with current settings of up to 150 mA. The momentary application of a high current causes the pattern to begin to separate, enabling the detection of the defect.

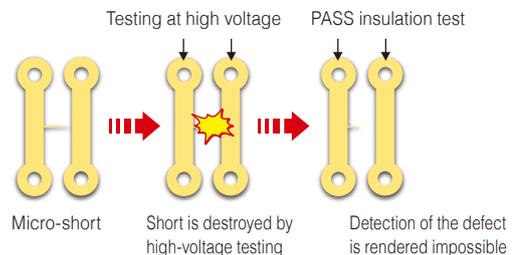


Micro-short

Micro-short defects are extremely fine shorts between patterns. Even fused micro-shorts can interfere with high-frequency signal transmission.

[Insulation micro-short testing]

"Micro-shorts" consisting of a minute amount of contact between adjacent patterns can be destroyed by the application of high voltages, making detection of the defect impossible. HIOKI's micro-short testing function can discover defects such as these by measuring insulation at a low voltage before application of the high-voltage test signal.

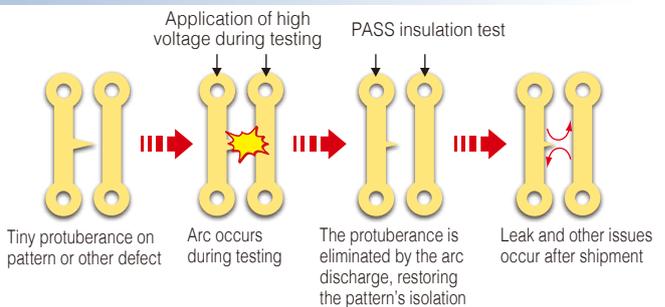


Arc detection (offered in a flying probe system for the first time in the industry)

Detection of arc discharge during insulation testing

[Arc detection]

Arcs are detected when a voltage drop in excess of a preset value is encountered during testing. As shown in the diagram on the right, arc detection functionality prevents a false PASS judgment when testing patterns with a low withstand voltage caused by a tiny protuberance or other shape on one of the patterns, which is burned away when the arc occurs. When such a discharge is detected during testing, the location is judged to suffer from an arc defect, even if the insulation resistance value subsequently exceeds the reference value.

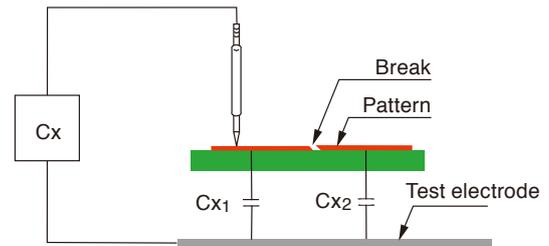


High-speed circuit pattern testing using the capacitance measurement method

Circuit Patterns on boards exhibit a certain capacitance relative to the electrically isolated test electrode, and this capacitance varies with their area. Any shorts or breaks in the circuit patterns cause its area, and therefore its capacitance, to change. By comparing the measured capacitance value to data for a reference board, it is possible to detect shorts and breaks in the circuit pattern.

- Comparison of test steps with 100 nets and 500 total nodes

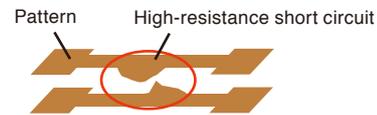
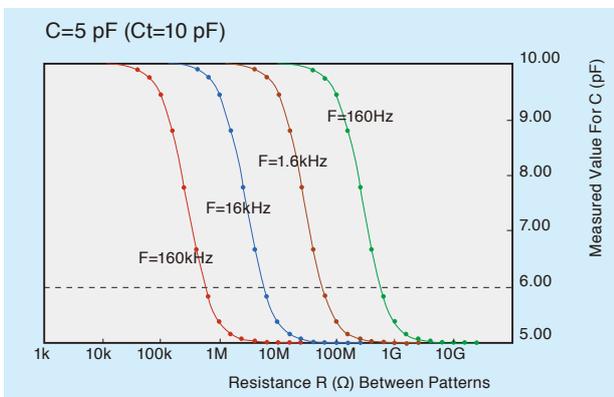
	Continuity test method	Capacitance measurement method
Testing for breaks	All nodes on same net 500 - 100 = 400	Breaks and shorts are detected by measuring the capacitance of all nodes. 500
Testing for shorts	$nCr = 100C2$ $100 \times (100 - 1) / 2 = 4950$	
Test steps	5350	500



Capacitance when there are no breaks: $CX = CX1 + CX2$
 Capacitance when there is a break: $CX = CX1$
 When there is a break, the detected capacitance is lower than the capacitance of the reference board; when there is a short, the detected capacitance is higher than the reference board due to the additional capacitance of the other pattern.

To test for both breaks and shorts, the capacitance measurement method need test only the endpoints of each pattern.

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.

Genuine HIOKI test fixtures

Support for increasingly dense boards and faster transitions from prototyping to mass production... the requirements for test fixture manufacturing grow more rigorous with each passing year. HIOKI leverages its experience as a manufacturer of in-circuit testing equipment to meet the full range of customer requirements.

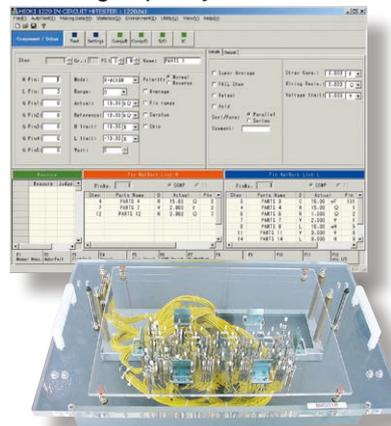
Test fixture 1160 and CP1167 manufacturing

Improved contact reliability means a higher first-run rate!

Manufacturing Requirements

- Customers are asked to prepare the following documentation when ordering a test fixture.
1. Populated board
 2. Bare board
 3. Circuit diagram
 4. BOM (bill of material)
 5. Component layout (Can be determined using bare board if no layout is available.)
 6. Net list (Orders can be processed without a net list.)
- * Fixtures can also be manufactured based on Gerber data.
 For more information, contact your HIOKI distributor.

HIOKI can deliver a stable supply of high-quality test fixtures.



Test Fixture CP1167

Fixture Manufacturing Process



HIOKI Manufacturing division
 Contact HIOKI for information about order lead times.

HIOKI prides itself in meeting customer needs with custom-tailored service.

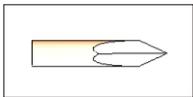
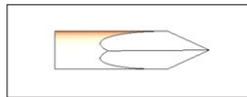
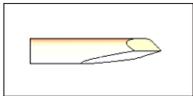
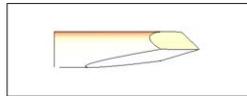
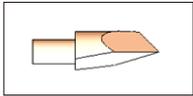
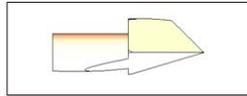
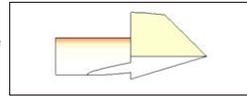
CP Series tip shape (table)

CP1400s

1.27 mm (50 mil) pitch probes

CP1500s

2.54 mm (100 mil) pitch probes

CP1411
BladeCP1511
BladeCP1421
Single-blade
(small)CP1521
Single-blade
(small)CP1422
Single-blade
(large)CP1523
Single-blade
(medium)CP1524
Single-blade
(large)

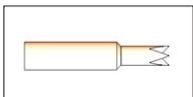
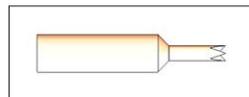
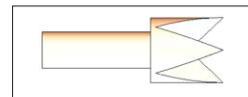
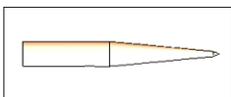
CP1534: Four-pronged (small)



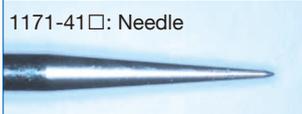
CP1535: Four-pronged (medium)



CP1536: Four-pronged (large)

CP1450
Reduced Headless
CrownCP1550
Reduced Headless
CrownCP1553
CrownCP1471
Needle

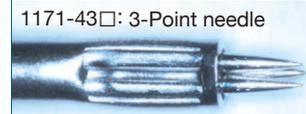
1171 Series tip shape (table)



1171-41□: Needle



1171-42□: Headless crown



1171-43□: 3-Point needle



1171-44□: Crown



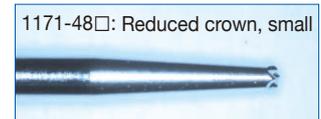
1171-45□: Serrated, small



1171-46□: Serrated, large



1171-47□: Chisel



1171-48□: Reduced crown, small



1171-49□: Reduced Crown, large



1171-4A□: Blade



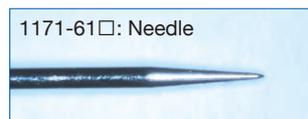
1171-4B□: Chisel, small



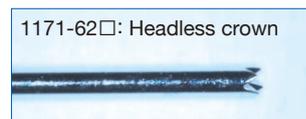
1171-4C□: Chisel, large



1171-4D□: Cup



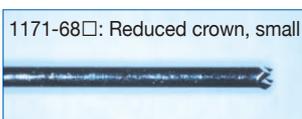
1171-61□: Needle



1171-62□: Headless crown



1171-67□: Chisel



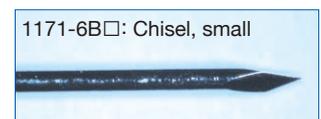
1171-68□: Reduced crown, small



1171-69□: Reduced Crown, large



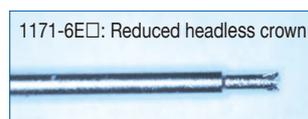
1171-6A□: Blade



1171-6B□: Chisel, small



1171-6C□: Chisel, large

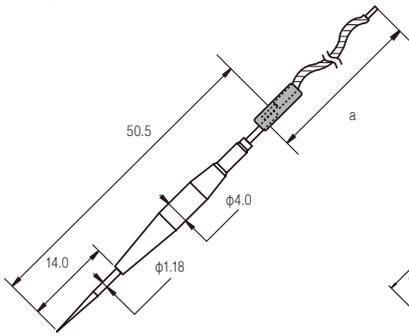


1171-6E□: Reduced headless crown

Dimensional drawings of probes available for populated board testers (flying probe testers)

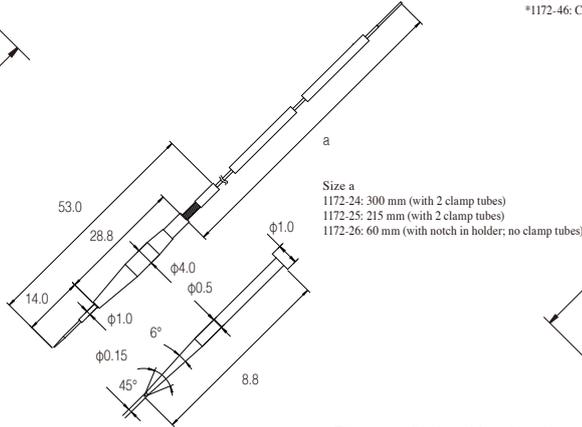
1172-1 □

*1172-19: Conforms to 1172-2 □ dimensions.



*The test cable is soldered in place.

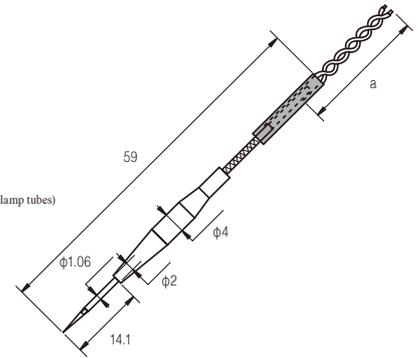
1172-2 □



*The test cable is soldered in place.

1172-4 □

*1172-46: Conforms to 1172-2 □ dimensions.



Stock No.	Model	Tip Shape	Cord lengths (size a)	1114	1240-01,02			1240-03	FA1240
				All arms	L and M arms	R arm	All arms	All arms	
1172-12	Contact probe	Needle	280 mm (11.02 in)		○				
1172-14	Contact probe	Reduced crown, small	280 mm (11.02 in)	○*1	○	○*1			
1172-16	Contact probe	Chisel	280 mm (11.02 in)	○*1	○	○*1			
1172-17	Contact probe	Needle	195 mm (7.68 in)	○		○			
1172-18	Contact probe	Needle	56 mm (2.20 in)				○		
1172-19	Contact probe	Needle	50 mm (1.97 in)					○	
1172-24	Hardened probe	Needle	300 mm (11.81 in)		○				
1172-25	Hardened probe	Needle	215 mm (8.46 in)			○			
1172-26	Hardened probe	Needle	60 mm (2.36 in)				○		
1172-27	Hardened probe	Needle	50 mm (1.97 in)					○	
1172-41	4-terminal probe	1 needle (4-terminal)	202 mm (7.95 in)	○					
1172-43	4-terminal probe	1 needle (4-terminal)	310 mm (12.21 in)		○				
1172-44	4-terminal probe	1 needle (4-terminal)	190 mm (7.48 in)			○			
1172-45	4-terminal probe	1 needle (4-terminal)	62 mm (2.44 in)				○		
1172-46	4-terminal probe	1 needle (4-terminal)	50 mm (1.97 in)					○	

For all of the above products, the probe pressure is 1.35N (when using a 2mm stroke) *1 Can be used with a cable length of 195 mm.

List of probes available for bare board testers

Link Probe (Single Probe)

Link Probe with Blade

4-terminal probe (Kelvin Probe)

For 4-terminal measurement (Reduced-impact type)
Kelvin Probe CP1072-11 : 37 μm pitch
Kelvin Probe CP1072-12 : 21 μm pitch

For fine pattern use (Reduced-impact type)
CP1072-01

For 4-terminal measurement
35 μm pitch
1172-83

For fine pattern use
1172-82

For via evaluation
Blade 4-terminal Probe
1172-99

CP1073-12

Stock No.	Model	FA1811	FA1813	FA1816	FA1817	FA1283
1172-68	Link Probe with Blade		○	○	○	○
1172-99	Double Link Probe With Blade (forLandRARM)		○	○	○	○
1172-81	Link Probe		○	○	○	○
1172-82	Link Probe		○	○	○	○
1172-83	Double Link Probe (HP)		○	○	○	○
CP1072-01	Probe (reduced-impact type)		○	○	○	○
CP1072-11	4-terminal probe		○	○	○	○
CP1072-12	4-terminal probe		○	○	○	○
CP1072-23	4-terminal probe		○	○	○	○
CP1073-01	Link Probe	○	○			
CP1073-11	4-terminal probe	○	○			
CP1073-12	4-terminal probe	○	○			

For repairs, you can either repair the tip or replace the unit board. (Contact your nearest HIOKI distributor for more information.)



Bare Board Testing Equipment						
	FA1811	FA1813	FA1816	FA1817	FA1283-01/-11	
See page	P18	P10	P12	P14	P16	
Test method	Flying Probe Type					
Surface(s) tested	Single	Horizontal, double	Single	Vertical, double	Horizontal, double	
No. of arms	2 (Lower: Test Fixture)	4 (Upper: 2, lower: 2)	2	4 (Top: 2, bottom: 2)	4 (Upper: 2, lower: 2)	
Maximum number of test steps	999,999 (max.)					
Total probing precision	<input type="checkbox"/> 10 μm	<input type="checkbox"/> 12 μm	<input type="checkbox"/> 20 μm	<input type="checkbox"/> 25 μm	<input type="checkbox"/> 15 μm*1	
Probe Work area	75x75 mm (2.95x2.95 in)	400x330 mm (15.75x12.99 in)	610x510 mm (24.02x20.08 in)	610x510 mm (24.02x20.08 in)	400x330 mm (15.75x12.99 in)	
Board clamping	Absorption E4101 (optional)	Test Fixture CP1165-11 (optional)	Clamp	Vacuum-suction	Clamp	Tension clamp FA1283-11 Automatic transport support
Boards suitable for clamping/transport	50x90 mm (1.97x3.54 in) to 105x250 mm (4.13x9.84 in)	<input type="checkbox"/> 10 mm (0.39 in) to <input type="checkbox"/> 120 mm (4.72 in)	50x50 mm (1.97x1.97 in) to 400x330 mm (15.75x12.99 in)	50x50 mm (1.97x1.97 in) to 610x510 mm (24.02x20.08 in)	50x70 mm (1.97x2.76 in) to 610x510 mm (24.02x20.08 in)	50x50 mm (1.97x1.97 in) to 400x330 mm (15.75x12.99 in)
Continuity test	400 mΩ to 1.000kΩ					
Insulation test	1.000 kΩ to 500.0 MΩ	1.000 kΩ to 250.0 MΩ	1.000 kΩ to 100.0 GΩ	1.000 kΩ to 500.0 MΩ	1.000 kΩ to 100.0 GΩ	200.0 Ω to 100.0 GΩ
4-terminal resistance measurement	400 μΩ to 400.0 kΩ		400 μΩ to 400.0 kΩ			
Power supply	AC 200 V Three-phase, 50/60 Hz			AC 200 V Single-phase, 50/60 Hz		
Power consumption	5 kVA	5 kVA	3 kVA	3 kVA	5 kVA	
TESTER dimensions mm (in)	1300(51.18 in)W 1670(65.75 in)H 1700(66.93 in)D	1355(53.35 in)W 1200(47.24 in)H 1265(49.80 in)D	1303(51.30 in)W 1194(47.01 in)H 1167(45.94 in)D	1485(58.46 in)W 1950(76.77 in)H 800(31.50 in)D	1350(53.15 in)W 1206(47.48 in)H 1240(48.82 in)D	
Mass	2,200kg (77,603 oz)	1,130kg(39,860 oz)	1,000 kg (35,274 oz)	1,100 kg (38,801 oz)	1,100 kg (38,801 oz)	
Special measurement						
4-terminal measurement function	Standard					
EAD test	—	—	—	—	Option 100 nA to 100 mA	
LSI function	—	Standard	Custom-order	Option	—	
MLCC measurement	Standard 120 Hz, 1 kHz			Option 120 Hz, 1 kHz		
Micro-short detection	Standard					
Arc test	Standard			Option		
Support software (optional)						
FLY-LINE	•	•	•	•	•	•
FAIL VISUALIZER	•	•	•	•	•	•
Process Analyzer Pro	•	•	•	•	•	•

Notes:

• : Supported , — : N/A

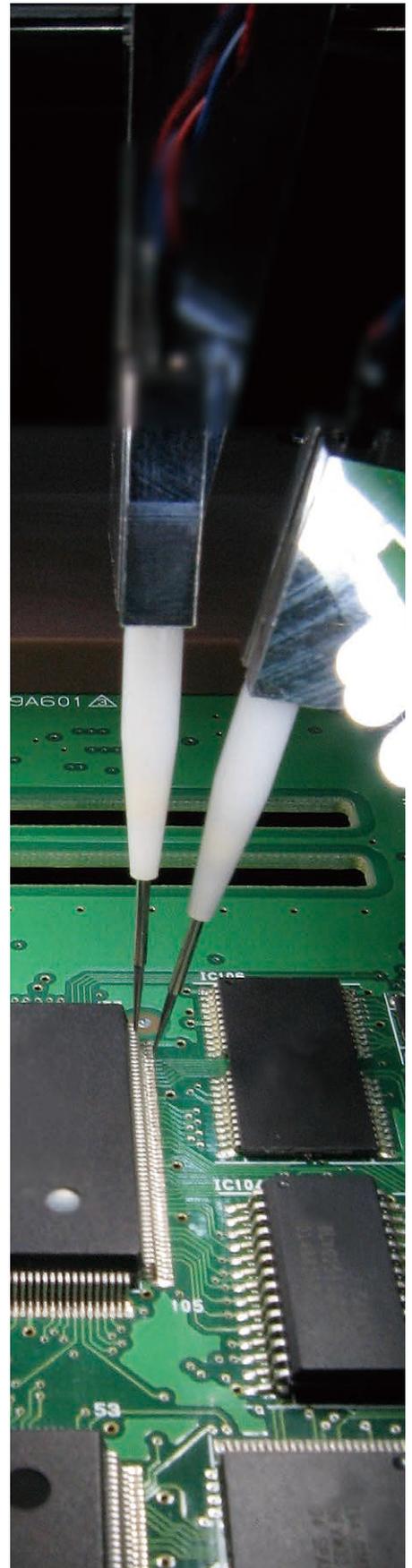
*1: Operating conditions apply when using FA1971-01.

*Contact HIOKI for more information about compatible board sizes when combining testing equipment with other systems.

*Note on testable board dimensions: Width (W) × depth (D) (minimum) to width (W) × depth (D) (maximum) mm

Support software (optional)	Model	Description
FEB-LINE	UA1781	Testing Data Creation System For bare board testing. Data preparation software for general boards, module boards, and printed boards
FAIL VISUALIZER	UA1782	FAIL VISUALIZER Displays data highlighting net information for points that generated errors.
Process Analyzer Pro	UA1801	Process Analyzer Pro Data Analysis Software for Detecting Latent Defects on PASS Boards

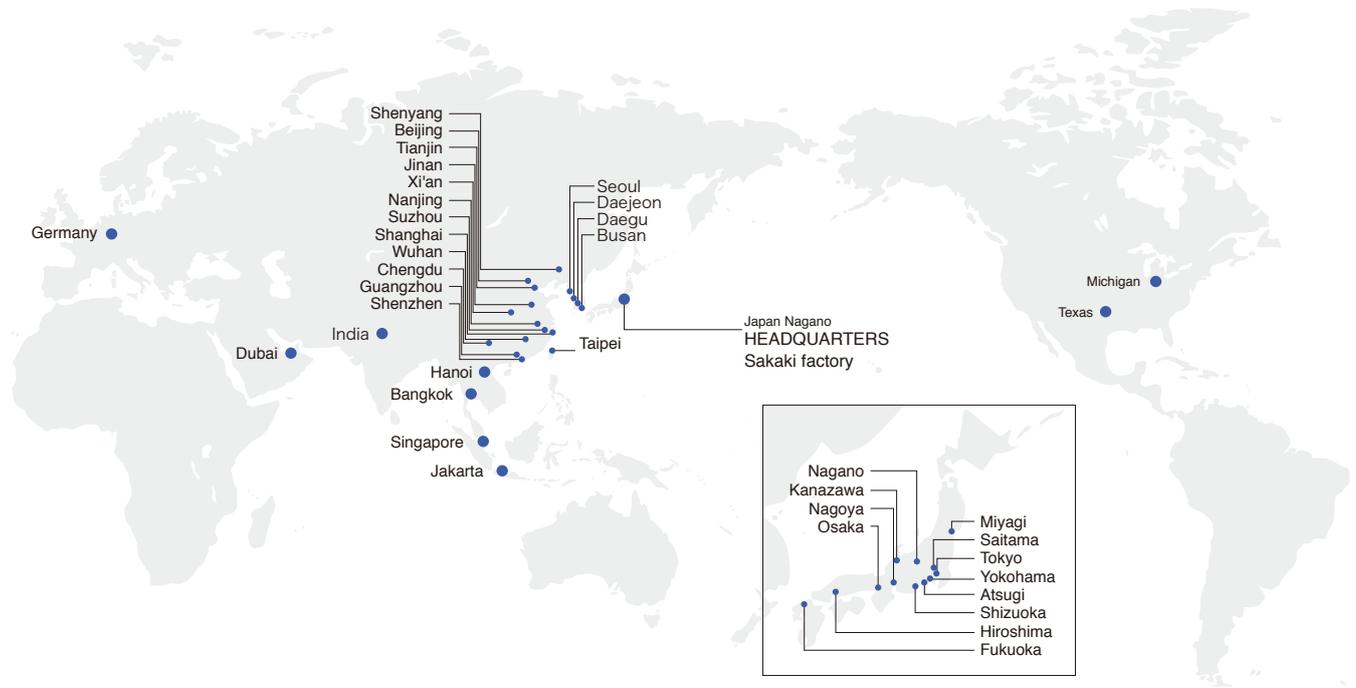
Populated Board Testing Equipment					
	FA1220/FA1221*1	FA1220-02	FA1220-11	FA1240-61	FA1240-63
See page	P24	P24	P24	P27	
Test method	Desktop model	Offline model	Inline model	Flying Probe Type	
Surface(s) tested	Double			Single	
No. of arms	—			4	
Maximum number of test steps	Max. 10,000step			Max. 40,000step	
No. of test points	Max. 1,024*2/128	Max. 2,048		Upper: 4 arms Lower: 8 pins (Clamping pins can be added)	
Min. pad diameter	—			φ800 μm	
Probe Work area (transport margin: 3 mm)	—	Standard Single-sided: 390 x 300 mm (15.35 x 11.81 in) Double-sided: 340 x 240 mm (13.39 x 9.45 in)	Standard Single-sided: 330 x 250 mm (12.99 x 9.84 in) Double-sided: 330 x 210 mm (12.99 x 8.27 in)	50x50 mm (1.97 x 1.97 in) to 460 x 510 mm (18.11x 20.08 in)	50x50 mm (1.97 x 1.97 in) to 400 x 330 mm (15.75x 12.99 in)
Boards suitable for clamping/transport	—	Standard Single-sided: 390 x 300 mm (15.35 x 11.81 in) Double-sided: 340 x 240 mm (13.39 x 9.45 in)	Standard Single-sided: 330 x 250 mm (12.99 x 9.84 in) Double-sided: 330 x 210 mm (12.99 x 8.27 in)	50x50 mm (1.97 x 1.97 in) to 460 x 510 mm (18.11x 20.08 in)	50x50 mm (1.97 x 1.97 in) to 400 x 330 mm (15.75x 12.99 in)
Power supply	100 to 240 V AC Single-phase, 50/60 Hz	100/120/200/220/230/240 V AC (specify at time of order) Single-phase, 50/60 Hz		AC 200 V Single-phase, 50/60 Hz	
Power consumption	0.7 kVA	1 kVA		6 kVA	5 kVA
TESTER dimensions mm (in)	200(7.87)W 323(12.72)H 298(11.73)D	655(25.79)W 1830(72.05)H 705(27.76)D	780(30.71)W 1760(69.29)H 750(29.53)D	1410(55.51)W 1300(51.18)H 1380(54.33)D	1320(51.97)W 1370(53.94)H 1430(56.30)D
Mass	10 kg (353 oz)	310 kg (10935 oz)	390 kg (13757 oz)	1250 kg (44092 oz)	1050 kg (37038 oz)
Scanner boards	E4201,E4202 (128 ch/board) E4204 (64 ch/board) FA1221: 128 ch fixed	E4201,E4202,E4203(128 ch/board)		4 ch/board (for use with lower fixed pins); 1 board can be added	
Scanner cables	E4232 (64 ch/cable)	1152-04 (64 ch/cable)		—	
Round-robin short/open test	4 Ω to 400 kΩ			—	
Short test	400 mΩ to 400 kΩ			400 mΩ to 40 kΩ	
Open test	4 Ω to 4 MΩ				
High-voltage resistance and insulation resistance measurement	Option E4210 (except FA1221) 400 mΩ to 1 GΩ (between 2 pins) (8 mV to 100 V)			—	
Resistance measurement	400 μΩ to 40 MΩ				
Capacitance measurement	10 pF to 400 mF			1 pF to 400 mF	
Inductance measurement	1 μH to 1 H			1 μH to 100 H	
Diode transistor measurement	0 V to 25 V				
Zener diode measurement	0 V to 25 V (Optional: 25 V to 100 V)			0 V to 25 V (optional 25 V to 80 V)	
Voltage (DC) measurement	0 V to 25 V (Optional: 1 mV to 250 V)			0 V to 25 V	
Digital transistor measurement	0 V to 25 V				
Photocouplers measurement	0 V to 25 V				
Macro measurement	1Ω to 10 MΩ			—	
Impedance measurement	1Ω to 10 MΩ			—	
Capacitor reverse insertion test	Standard				
IC reverse insertion test	Standard			—	
Active testing					
FET test	Standard	Standard	Standard	Option	Option
Relay test	Standard *3	Standard *3	Standard *3	Option	Option
3-terminal regulator test	Standard *3	Standard *3	Standard *3	Option	Option
FIT-LINE					
FAIL VISUALIZER	•	•	•	•	•



*1 FA1221 : S/O test and resistance measurement only *2 Can custom order to 2048 pins.

*3 Power supply unit, external I/O, etc. are required.

Support software (optional)	Model	Description
FIT-LINE	UA1780	Testing Data Creation System
FAIL VISUALIZER	UA1782	FAIL VISUALIZER



Global sales network

Japan Bases	
	HEADQUARTERS : HIOKI E. E. CORPORATION (Nagano)
	Sakaki factory (Nagano)
	Tohoku Sales Branch (Miyagi)
	Nagano Sales Branch
	Kanazawa Sales Branch
	Kita-Kanto Sales Branch (Saitama)
Japan	Greater Tokyo Sales Branch
	Yokohama Sales Branch
	Atsugi Office
	Shizuoka Sales Branch
	Nagoya Sales Branch
	Osaka Sales Branch
	Hiroshima Office
	Fukuoka Sales Branch
Representative Offices	
China	Tianjin Representative Office (Tianjin)
UAE	MEA Representative Office (DUBAI)
Overseas Bases	
America	HIOKI USA CORPORATION (Plano, TX)
	HIOKI USA CORPORATION Michigan Office (Novi, MI)
	HIOKI (Shanghai) MEASUREMENT TECHNOLOGIES CO., LTD.
	HIOKI (Shanghai) TECHNOLOGY DEVELOPMENT CO., LTD.
	HIOKI (Shanghai) MEASURING INSTRUMENTS CO., LTD.
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Thailand	HIOKI SINGAPORE PTE. LTD. Thailand Representative Office
Vietnam	HIOKI SINGAPORE PTE. LTD. Vietnam Representative office
Indonesia	PT. HIOKI ELECTRIC INSTRUMENT (Jakarta)
	HIOKI KOREA CO., LTD. (Seoul)
Korea	HIOKI KOREA CO., LTD. Daejeon Office
	HIOKI KOREA CO., LTD. Busan Office
	HIOKI KOREA CO., LTD. Daegu Office
India	HIOKI INDIA PRIVATE LIMITED
Germany	HIOKI EUROPE GmbH (Eschborn)
Taiwan	HIOKI TAIWAN CO., LTD. (Taipei)

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