Electronic Circuit Board Testing Equipment

Series Catalog

Automatic Test Equipment

FLYING PROBE TESTER
IN-CIRCUIT TESTER
BARE BOARD TESTER
DATA CREATION SYSTEM
From Ueda, Shinshu

This year, HIOKI marks the 80th anniversary of its establishment in 1935. As a professional electrical measurement tool provider, we will continue to develop products that offer the solutions our customers need.

Our factory at HIOKI headquarters integrates all our departments — development, production, sales and service — in Ueda City, Nagano Prefecture, widely known as the Shinshu area, abundant with greenery. This factory enables us to promptly respond to customer demand through in-house development and in-house production.

Measurement Technologies to
Support New Testing Frontiers
**Flying Probe Type**

**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

**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**

**FC-CSP/Ceramic Board FPC Solutions**
- Capacitance O/S detection function
- Testing of panelized boards
- Flexible support for clamping thin boards
- 100-GΩ high resistance testing
- Automatic transport support

**See page 13.**

**See page 14.**

**See page 22.**
Moving fixture type

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

- **IN-CIRCUIT** HiTESTER

- **BARE BOARD** HiTESTER

- **FA1232**
  - Double-sided alignment
  - Testable board size
  - 45 × 50 mm to 170 × 305 mm
  - See page 10.

- **BARE BOARD** TESTER

- **FA1232**
  - Double-sided alignment
  - Testable board size
  - 45 × 50 mm to 170 × 305 mm
  - See page 10.

Measurement Units

- **4220-51**
  - Offline type
  - Testable board size
  - 390 × 300 mm
  - See page 20.

- **4220-52**
  - Space-saving model
  - Testable board size
  - 390 × 300 mm
  - See page 20.

- **4220-55**
  - Inline use only
  - Testable board size
  - 390 × 300 mm
  - See page 20.

High-speed Testing Solutions
- Support for testing in mass production environments
- Electrolytic capacitor reverse insertion detection function (option)
- Macro test
- Active test (option)
- **IN-CIRCUIT** HiTESTER

- **Test head (fixture)**
  - 1165-05/-06/-07

- **1231**
  - (Double-sided alignment)
  - Testable board size
  - 15 × 15 mm to 55 × 55 mm
  - See page 9.

- **1230**
  - (Measurement/Control unit only)
  - See page 8.

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

- **Test fixture**
  - CP1167
  - See page 27.
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 μH 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 200 mA**
  - Jig type achieves 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 μΩ
  - 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 boards**
  - Support for thin boards of 0.06 mm
  - A tension clamp to securely hold flexible boards.
BARE BOARD HiTESTER 1230

Measurement unit with support for testing device embedded substrates

Features

- **Embedded LSI testing** (option)
  - The 1236 can perform the following tests on embedded LSIs:
    - Connection reliability test
    - Inter-pin open/short test
    - Current consumption (standby power) test

- **Guarding measurement**
  - The 1230 lets you set guard potentials for up to 5 points, helping you to exclude circuit wraparound as a cause of erroneous readings.

- **Icons facilitating intuitive operation**

### 1230 Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum number of test points</td>
<td>8,192 pins (4,096 top, 4,096 bottom) (*When using 4 scanner boxes)</td>
</tr>
<tr>
<td>Maximum number of test steps</td>
<td>10,000 steps</td>
</tr>
<tr>
<td>Measurement time</td>
<td>Continuity testing: 350 μs; insulation measurement: from 5 ms; capacitance and inductance measurement: from 4 ms; resistance measurement: from 1.8 ms</td>
</tr>
<tr>
<td>General specifications</td>
<td>Computer (Windows XP), 17” LCD display (standard accessory)</td>
</tr>
<tr>
<td></td>
<td>Insulation/continuity testing with high-speed function</td>
</tr>
<tr>
<td></td>
<td>4-terminal measurement support (with mixed 2-terminal/4-terminal steps)</td>
</tr>
<tr>
<td>Power supply</td>
<td>200 V AC ±10% (single-phase), 50/60 Hz, Power consumption: 500 VA (main unit), 600 VA (scanner box)</td>
</tr>
<tr>
<td>HiTESTER dimensions</td>
<td>Main unit: 328 (W) × 222 (H) × 255 (D) mm</td>
</tr>
<tr>
<td></td>
<td>Scanner box: 353 (W) × 327 (H) × 265 (D) mm</td>
</tr>
<tr>
<td>Weight</td>
<td>Main unit: 8.62 kg (with all options) (* CPU board, AD board, IO board, HV board, DC board, AC board, single scanner IF board, 24-V IO power supply)</td>
</tr>
<tr>
<td></td>
<td>Scanner box: 21.10 kg (with sixteen 1138-32 High-precision Scanner Boards)</td>
</tr>
</tbody>
</table>
IC Package Board Tester
Faster, more accurate, easier

■ Index table system
  - The 1231’s index table system feeds, aligns, tests, and ejects target boards simultaneously, delivering wait-free multitasking.

■ Support for fine pattern probing
  - The 1231 supports probing within an area with a diameter of 20 μm at a high level of repeatability.

■ Support for high-density wiring boards
  - Supports 4-terminal testing of high-density wiring boards with 8,192 pins each at the top and bottom. (1231-12)

■ Intuitive interface
  - Easy-to-understand icons facilitate intuitive operation.
  - Graphical display of electronic component connection information

Features

Index table system
Simultaneously feeds, aligns, tests, and ejects boards.

Universal board clamping unit
Supports boards from 15 × 15 mm to 55 × 55 mm.

One-touch test head replacement
Slide

1231-11/12 Specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum number of test points</td>
<td>1231-11: 8,192 (4,096 on top, 4,096 on bottom)</td>
</tr>
<tr>
<td></td>
<td>1231-12: 16,192 (8,192 on top, 8,192 on bottom)</td>
</tr>
<tr>
<td>Maximum number of test steps</td>
<td>10,000 steps</td>
</tr>
<tr>
<td>Cycle time</td>
<td>1.5 sec/piece</td>
</tr>
<tr>
<td>(1.024 points; continuity test; 2 points per pattern; known-good board measurement)</td>
<td></td>
</tr>
<tr>
<td>Min. pad diameter</td>
<td>φ20 μm</td>
</tr>
<tr>
<td>Supported range of board sizes for clamping and transport</td>
<td>0.8 mm to 2.5 mm</td>
</tr>
<tr>
<td></td>
<td>External dimensions: 15 (W) × 15 (D) to 55 (W) × 55 (D) mm (*For other board sizes, please contact your HIOKI distributor)</td>
</tr>
<tr>
<td>Power supply</td>
<td>200 V AC ±10% (three-phase), 50/60 Hz / Power consumption: 6 kVA</td>
</tr>
<tr>
<td>HiTESTER dimensions</td>
<td>Approx. 1,300 (W) × 1,680 (H) × 1,750 (D) mm (excluding protruding parts)</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 2,000 kg</td>
</tr>
</tbody>
</table>
BARE BOARD TESTER FA1232

Robust support for testing device embedded substrates
Bringing together populated electronic component measuring technologies

The FA1232 utilizes the full range of HIOKI’s in-circuit tester measurement technologies.

- Support for an extensive range of tests, from high-density FC-CSP boards to device embedded
- Multichannel test point configuration with 8,192 channels each for the upper and lower fixtures
- Test performance that is fast, highly precise, and highly reliable
- High-speed measurement with parallel measurement
- High-speed movement due to a combination of a lightweight unit and test head
- Jig replacement with the touch of a button (test head 1165-07)
- Additional convenience with genuine HIOKI fixtures thanks to the RFID function

Improved operability

Advanced, intuitive interface for exceptional ease of use

- Easy-to-understand, intuitive icons simplify operation so that functionality is easily accessible, even for users who lack specialized knowledge.

Automatic fixture offset function using dedicated cameras

Self-test function

Data creation screen

Control screen using a large touch panel
Upgrade to speed-oriented head scanner
(Factory Option: FA1138-80)

Testing time for component measurement, continuity and insulation*1 halved*2

Newly developed compact scanner specialized for testing speed

- Up to 12,288 channels each can be expanded for the upper and lower fixtures. Number of test points increased by 50%
- Measurement speed and stability improved with four parallel measurements and cableless units
- Uses 1165-06 test head, also used for 1231
- High-voltage semiconductor switch eliminates the need for maintenance

*1: Isolation voltage: up to 150 V  *2: Compared with high-speed, high-precision scanner 1138-52

Features

Test operation using test fixtures
(Step & repeat method)

Board transport operation
(Two-stage shuttle design)

One-touch fixture installation
with RFID function

*Please contact your HIOKI distributor for more information about supported fixtures.

FA1232-61 Specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum number of test points</td>
<td>16,384 (8,192 top, 8,192 bottom)</td>
</tr>
<tr>
<td>Maximum number of test steps</td>
<td>10,000 steps</td>
</tr>
<tr>
<td>Min. pad diameter</td>
<td>φ20 μm</td>
</tr>
<tr>
<td>Supported range of board sizes</td>
<td>Thickness: 0.1 to 2.5 mm; Dimensions: 45 (W) x 50 (D) to 50 (W) x 305 (D) mm / Thickness: 0.3 to 2.5 mm; Dimensions: 45 (W) x 50 (D) to 170 (W) x 305 (D) mm</td>
</tr>
<tr>
<td>Measurement Units</td>
<td>FA1232-61: High-speed measurement unit</td>
</tr>
<tr>
<td>Power supply</td>
<td>200/220 V AC (3-phase, 3-wire), 50/60 Hz depending on location of use (please specify upon order)</td>
</tr>
<tr>
<td></td>
<td>Power consumption: 5.2 kVA</td>
</tr>
<tr>
<td>HitESTER dimensions</td>
<td>1795(W) x 1740(H) x 2300(D) ±10 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>2,500 kg or less</td>
</tr>
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</table>

HANDLING SYSTEM FA1882-60 Specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>200/220 V AC (3-phase, 3-wire), 50/60 Hz depending on location of use (please specify upon order)</td>
</tr>
<tr>
<td></td>
<td>Power consumption: 2.0 kVA</td>
</tr>
<tr>
<td>Board storage</td>
<td>Stacked in stockers (untested, PASS, FAIL)</td>
</tr>
<tr>
<td></td>
<td>4 categories (Untested, PASS, OPEN/UNTESTED = FAIL 1, SHORT/SHORT+OPEN = FAIL 2)</td>
</tr>
<tr>
<td>Cycle time</td>
<td>Approx. 8.5 sec.</td>
</tr>
<tr>
<td>Board dimensions</td>
<td>Thickness: 0.3 to 2.5 mm; Dimensions: 45 x 50 to 170 x 250 mm</td>
</tr>
<tr>
<td>HitESTER dimensions</td>
<td>1,950 ±10 mm (W) x 1,685 ±15 mm (H) x 1,150 ±5 (D) mm (excluding handles and other protruding parts)</td>
</tr>
<tr>
<td>Weight</td>
<td>800 kg or less</td>
</tr>
</tbody>
</table>
FLYING PROBE TESTER FA1116

High-speed pattern testing with the capacitance measurement method

Half the impact mark depth  High-speed testing at up to 100 points/sec

measurement principle for capacitance method

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

Features

With board loaded

Large aperture

Impact mark comparison
Z-axis speed 150
25 μm pitch

FA1116-03 Specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of arms</td>
<td>2</td>
</tr>
<tr>
<td>Maximum number of test steps</td>
<td>40,000 steps (300,000 steps during continuous testing)</td>
</tr>
<tr>
<td>Measurement time</td>
<td>Max. 100 points/sec (0.1 mm probe movements, 2-arm simultaneous probing, capacitance measurement)</td>
</tr>
<tr>
<td>Min. pad diameter</td>
<td>15 μm</td>
</tr>
<tr>
<td>Probe work area</td>
<td>610 (W) × 510 (D) mm</td>
</tr>
</tbody>
</table>
| Supported range of board sizes for clamping and transport | Thickness: 0.1 to 3.2 mm
External dimensions: 50 (W) × 50 (D) to 610 (W) × 510 (D) mm |
| Power supply                 | 200 V AC ±10% (single-phase), 50/60 Hz, Power consumption: 3 kVA |
| HiTESTER dimensions          | Approx. 1,443 (W) × 1,656 (H) × 1,185 (D) mm |
| Weight                       | Approx. 1,000 kg                   |

When using CP1072

When using 1172-81
X-Y BOARD HiTESTER 1270/1271

High Cost Performance
Double-Sided FLYING PROBE TESTER

Four-terminal resistance measurement (Optional)

Open vias result in increased resistance and inductance, interfering in signal transmission. Four-terminal testing using an instrument with high resolution and precision is needed.

A via is a hole that electrically connects different wiring layers in a board. An open via exists when the connection in a hole does not make complete contact. An open via increases the resistance value and inductance, which interferes with signal propagation.

Features

Fixing flexible boards with tension frames
Testing principles
Testing status

1270/1271 Specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of arms</td>
<td>4 (2 each front and back)</td>
</tr>
<tr>
<td>Maximum number of test steps</td>
<td>40,000 (during continuous testing: 300,000)</td>
</tr>
<tr>
<td>Measurement time</td>
<td>Max. 67 steps/sec (0.15 mm probe movements, 4-arm simultaneous probing, capacitance measurement)</td>
</tr>
<tr>
<td>Min. pad diameter</td>
<td>φ20 μm</td>
</tr>
<tr>
<td>Probe work area</td>
<td>1270: 394(W) × 324(D) mm / 1271: 604(W) × 504(D) mm</td>
</tr>
</tbody>
</table>
| Supported range of board sizes for clamping  | 1270: 50 (W) × 50 (H) to 400 (W) × 330 (H) mm  
                                                1271: 50 (W) × 70 (H) to 610 (W) × 510 (H) mm |
| Power supply                                 | 200 V AC ±10% (single-phase), 50/60 Hz, Power consumption: 3 kVA |
| HiTESTER dimensions                          | 1270: Approx. 1,500 (W) × 1,867 (H) × 860 (D) mm  
                                                1271: Approx. 1,260 (W) × 2,000 (H) × 860 (D) mm |
| Weight                                        | 1270: Approx. 1,000 kg / 1271: Approx. 1,200 kg |
FLYING PROBE TESTER FA1282

Detecting even hidden defects to assure highest quality

The FA1282 satisfies a wide range of measurement and testing requirements.

To detect via connection defects, a tester must offer high-precision (100 μΩ or lower) open via low-resistance measurement capability. Similarly, to verify latent defects such as impurities or voids in the board’s insulation layers and narrowing of gaps due to abnormal pattern shape, a tester must provide resistance measurement capability of 10 GΩ or greater. The FA1282 ships standard with 4-terminal low-resistance measurement and super-insulation testing functionality to meet these requirements, enabling it to detect latent defects such as these.

Features

Dramatically expanding the detection range with low-

Four-terminal resistance measurement function

Uses 4-terminal probes to deliver outstanding accuracy and stability when measuring the minute resistance values of inner via holes (VHs) and through-holes.

Comparative judgment using theoretical resistance values

Theoretical resistance values for patterns can be calculated from the board’s design data using HIoki’s optional SIM-LINE software. Four-terminal testing can then be performed using those values as reference values.

Importance of super-insulation testing (a type of insulation testing)

The FA1282 is capable of super-insulation testing at low voltages of 100 GΩ/250 V. This approach allows the reliable detection of latent defects without overstressing the target board.

Ability to detect latent defects

- **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)
  - Arcs are detected when a voltage drop in excess of a preset value is encountered during testing. As shown below, arc detection functionally 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.

FA1116 testing range

FA1282 testing range

- **Standard testing range**
  - 10 μΩ
  - 100 mΩ
  - 1 Ω
  - 1 kΩ

Uses 4-terminal probes to deliver outstanding accuracy and stability when measuring the minute resistance values of inner via holes (IVHs) and through-holes.

Theoretical resistance values for patterns can be calculated from the board’s design data using HIoki’s optional SIM-LINE software. Four-terminal testing can then be performed using those values as reference values.
High-accuracy probing □15μm and high-speed testing max. 100 p/s

All-Round, High-Speed, Double-Sided Flying Probe Tester

A large number of options are available, including automatic transport and embedded device testing functions. Combine options as needed to minimize additional costs.

Reducing board testing manpower through automated operation

- In-line functionality
- Automatic transport functionality (standard)
- Laser-based board thickness correction (standard)
- General-purpose loader and unloader (optional)
- Horizontal transport with tension mechanism

Elimination of contact errors through automatic board thickness correction and tension features

The minimum necessary probe stroke is used during testing to avoid causing damage to the target board. HIOKI’s standard laser-based board thickness correction functionality reduces the likelihood of contact errors occurring by correcting for board thickness.

The tension mechanism secures the board while correcting its deformation. (Maximum tension: 2 mm)

Probes compensate for deflection in the board based on laser measurements. (up to 2 mm)

Dramatically expanding the detection range with low-resistance and super-insulation testing

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

100 GΩ/250 V testing
High-speed insulation testing with coverage of up to 100 GΩ/250 V detects latent defects and allows insulation resistance between wiring patterns to be judged with unsurpassed reliability.

resistance and super-insulation testing

- Conductive impurities such as suboxides
- Dust that has absorbed moisture
- Non-defective organic product
- Residual etching solution
- Surface contamination
- Impurities in insulators
- Non-defective ceramic product

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

100 GΩ/250 V testing
High-speed insulation testing with coverage of up to 100 GΩ/250 V detects latent defects and allows insulation resistance between wiring patterns to be judged with unsurpassed reliability.

Specifications: FA1282-01 (without transport) / FA1282-11 (with automatic transport)

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of arms</td>
<td>4 (2 each upper and lower)</td>
</tr>
<tr>
<td>Maximum number of test steps</td>
<td>300,000 (max.)</td>
</tr>
<tr>
<td>Measurement time</td>
<td>Max. 100 steps/sec (Capacitance measurement with 4-arm simultaneous probing and 0.15mm movements)</td>
</tr>
<tr>
<td>Min. pad diameter</td>
<td>□15 μm</td>
</tr>
<tr>
<td>Probe work area</td>
<td>400 (W) × 324 (D) mm</td>
</tr>
</tbody>
</table>
| Supported range of board sizes for clamping and transport | Thickness: 0.1 to 2.5 mm  
Outer dimensions: 50 (W) × 50 (H) to 400 (W) × 330 (H) mm |
| Power supply                         | AC 200 V±10%(single phase)50/60 Hz  
Power consumption: 5 kVA               |
| HiTESTER dimensions                  | Approx. 1,350 (W) × 1,626 (H) × 1,240 (D) mm |
| Weight                               | Approx. 1,100 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 check and repair tasks.

FLY-LINE is a comprehensive CAM system for automatically generating endpoint and net information from semiconductor package/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]**

- Manufacturing data (Gerber data)
  - CAM data input
  - 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
**Flying Probe Tester Data Creation System**

**FLY-LINE 1741**

This CAM system automatically generates endpoint and net information and outputs electric test data for use with HIOKI flying probe testers.

- Delivers unlimited automation, from inputting manufacturing data to outputting flying probe data, in a simple package that can be operated by anyone.
- High-speed net/test point generation and near net extraction
- Support for composite data (for RS274X files with a large number of spliced-together layers, unnecessary layers are automatically compressed)

**Theoretical Resistance Calculation System**

**SIM-LINE 1392**

This system calculates theoretical resistance values between electrical test probes.

- Complete recognition of pattern/via branches and series/parallel configuration
- Supports parameter specification by layer
- Etching factor consideration
- Values can be used as reference values for 4-terminal testing

**Device Embedded Substrate Test Data Creation System**

**EPA-LINE 1391**

This system extracts nets related to embedded devices from device embedded substrates manufacturing data and outputs test data for HIOKI bare board electrical testers.

- Creates embedded device layout information from simple graphical input
- Supports both passive (chip components) and active (LSIs) elements
- Automatically calculates element path information and combined reference values for individual elements on the path when multiple elements are connected to the test net

**Defect analysis support**

**FAIL VISUALIZER UA1782**

This system supports the analysis of defects on printed circuit boards using error information from electrical testing systems.

- Highlights any patterns and components determined to be defective in electrical testing
- Proximity check view function that displays checkmarks at solder bridge risk points
- Searching for defective nets and points based on measured capacitance values
- Net search view function that highlights components connected to an identical net
- Supports a wide range of applications, from repairing for mass-production testing to checking device embedded substrates

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**Operating environment**

<table>
<thead>
<tr>
<th></th>
<th>FLY-LINE/Theoretical Resistance/Device Embedded Substrates</th>
<th>FAIL VISUALIZER UA1782</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supported OS</td>
<td>Linux</td>
<td>Windows 7 professional 64bit</td>
</tr>
<tr>
<td>CPU</td>
<td>Pentium 4 at 3 GHz or more</td>
<td>Core i7 or equivalent</td>
</tr>
<tr>
<td>Memory</td>
<td>2,048 MB or more</td>
<td>4 GB or more</td>
</tr>
<tr>
<td>Display resolution</td>
<td>1,280 x 1,024 or more</td>
<td>1,920 x 1,080 or greater</td>
</tr>
<tr>
<td>Disk space</td>
<td>60 GB or more</td>
<td>80 GB or more free space</td>
</tr>
</tbody>
</table>
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
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.
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:

\[ nCm = \frac{n!}{(n-m)! \times m!} = \frac{n(n-1)}{m} = 4950 \]

where \( n = 100 \) 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.

## 1220-50/-51/-52/-55 Specifications

<table>
<thead>
<tr>
<th>Test types and ranges</th>
<th>Macro test: 10 ( \Omega ) to 10 M( \Omega ) (impedance)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistor: 400 ( \mu \Omega ) to 40 M( \Omega )</td>
<td></td>
</tr>
<tr>
<td>Capacitor: 10 pF to 400 mF</td>
<td></td>
</tr>
<tr>
<td>Coil: 1 ( \mu )H to 100 H</td>
<td></td>
</tr>
<tr>
<td>Diode and transistor (VF): 0 V to 25 V</td>
<td></td>
</tr>
<tr>
<td>Zener diode (VZ) measurement: 0 V to 25 V (option: 25 V to 100 V)</td>
<td></td>
</tr>
<tr>
<td>Digital transistor (Q): 0 V to 25 V</td>
<td></td>
</tr>
<tr>
<td>Photocoupler test function: 0 V to 25 V</td>
<td></td>
</tr>
<tr>
<td>Capacitor reverse insertion detection (option)</td>
<td></td>
</tr>
<tr>
<td>IC reverse insertion detection (option)</td>
<td></td>
</tr>
</tbody>
</table>

| Max. number of test points | 2,176 pins (with 3 expansion boxes): 1220-50/-51 |
| Max. number of test steps | 1,536 pins (with 2 expansion boxes): 1220-52/-55 |
| Supported board size | Can be expanded in 64-pin blocks (for pins more than the maximum number, contact Hioki) |
| Power supply | 1220-50: Approx. 305 (W) x 325 (H) x 299 (D) mm, approx. 10 kg |
| HITESTER dimensions and weight | 1220-51: Approx. 1,030 (W) x 1,470 (H) x 710 (D) mm, approx. 240 kg |
| 1220-52: Approx. 655 (W) x 1,610 (H) x 705 (D) mm, approx. 220 kg |

### Features

- **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 \( \pm 15^\circ \) (varies with capacitor shape and mounting conditions)

---

IN-CIRCUIT HiTESTER 1220
An extensive range of measurement modes

Using the 1220 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.)

- **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.

- **I²C support**
  - The 1220 has incorporated I²C control functions, thus eliminating the need for dedicated control applications or linkage with external software.

ICs on the board under test are controlled using the I²C bus. Using its Ratoc Systems I²C controller, the 1220 can write data to target devices, verify write data, and generate controller DIO output. This functionality allows the CURR-CV mode to be used to quickly measure the accurate leakage current after placing the target device in standby mode.

- **Multi-point Scanner Measurement**
  - The 1220-5x 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

**POWER SOURCE UNIT 1937-04**

By integrating the power supply unit within the main unit, it can test circuits while supplying power to the user-specified measurement points.

- Five channels can be generated simultaneously at ±12 V/120 mA (bipolar type).
- Integrated voltmeter allows verification of generated voltage and associated judgments.
- Integrated ammeter allows verification of current consumption and associated judgments.

**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 FA1240-51/-52/-53**

---

### 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% though 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 (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.

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.
Pursuing ease of use and reliability

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

The FA1240’s system software integrates closely with HIOKI’s new Gerber data editing software, UA1780 FIT-LINE. Use the UA1780 to create high-quality test programs quickly and with less need to go back and rework data and settings.

Data creation time

<table>
<thead>
<tr>
<th>Offline data creation</th>
<th>Tester debugging</th>
<th>Line downtime</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component information registration</td>
<td>Coordinate teaching</td>
<td>Checking for arm interference</td>
</tr>
<tr>
<td>Processing Gerber data with the UA1780</td>
<td>Using the UA1780’s component libraries</td>
<td>Using the UA1780’s component libraries</td>
</tr>
<tr>
<td>0 hours</td>
<td>0 hours</td>
<td>0 hours</td>
</tr>
</tbody>
</table>

More than 93% reduction in line downtime

90% reduction in data creation time

Features

Precision probes for 4-terminal measurement

- Resistance meter
- Constant current power supply
- Voltmeter
- Resistance
- \[ r_1 \rightarrow r_4 \] : Wiring resistance, contact resistance

The resistance value between these two points is measured.

IC lead pseudo-contact testing

Four-terminal probes, which are not affected by contact resistance or wiring resistance, are used to test IC leads. These probes can also be used in component testing.

Differences in resistance values are detected.

- Good lead
- Lead float
- Inadequate contact

Testing table / Display screen

Operation screen also available in Chinese

- Testing table
- Display screen

FA1240-51/-52/-53 Specifications

<table>
<thead>
<tr>
<th>Test types and ranges</th>
<th>No. of arms</th>
<th>Maximum number of test steps</th>
<th>Probing precision</th>
<th>Positioning repeatability</th>
<th>Testable board size</th>
<th>Power supply</th>
<th>HITESTER dimensions</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistance : 400 μΩ to 40 MΩ</td>
<td>Single, 4 (L, ML, MR, and R)</td>
<td>40,000 steps</td>
<td>Within ±100 μm (X and Y direction) (for all arms)</td>
<td>Within ±50 μm (probing position)</td>
<td>Thickness: 0.6 to 3.2 mm</td>
<td>200 V AC ±10% (single-phase), 50/60 Hz, 5 A (5 kVA for FA1240-53)</td>
<td>Approx. 1,440 (W) × 1,300 (H) × 1,430 (D) mm (FA1240-51/-52) Approx. 1,320 (W) × 1,270 (H) × 1,430 (D) mm (FA1240-53)</td>
<td>Approx. 1,250 kg (FA1240-51/-52), Approx. 1,050 kg (FA1240-53)</td>
</tr>
</tbody>
</table>
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

Step 1: Input Gerber data
Step 2: Input mount data*1
   - Circuit names, component names, layout coordinates, angles, shape names
   - Register new components
   - Register electronic component libraries
Step 4: Identify test points
   (generate data based on registered libraries)
Step 5: Output test data
Perform test

UA1780 processing

FIT-LINE Test Data Creation System UA1780
FIT-LINE INSPECTION DATA CREATION SYSTEM UA1780, FAIL VISUALIZER UA1782
Data is created based on Gerber data and mount data while referencing component library information.

Quickly find the locations of failed components

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

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)

<table>
<thead>
<tr>
<th>Function details (UA1780)</th>
<th>Gerber data input function</th>
<th>Mount data*1 input function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loading of Gerber files (RS-274X, RS-274D), aperture files, and drill files</td>
<td>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</td>
<td></td>
</tr>
<tr>
<td>Graphical editing function</td>
<td>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</td>
<td></td>
</tr>
<tr>
<td>Component library registration function</td>
<td>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</td>
<td></td>
</tr>
<tr>
<td>Test data generation function</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Test point review function</td>
<td>Graphical display of test points</td>
<td>Graphical display of test points</td>
</tr>
<tr>
<td>Test data output function</td>
<td>FA1240 files, 1240/1114 files</td>
<td>FA1240 files, 1240/1114 files</td>
</tr>
</tbody>
</table>

*Note: User is responsible for providing a computer, monitor, and other hardware.

Recommended operating environment (for both UA1780 and UA1782)

- Supported OS: Windows7 Professional 64bit
- CPU: Core i7 or equivalent
- Memory: 4 GB or more
- Display resolution: 1,920 × 1,080 or greater
- Disk space: 80 GB
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.

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.

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 pattern testing using the capacitance measurement method

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 pattern 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 pattern.

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

<table>
<thead>
<tr>
<th></th>
<th>Continuity test method</th>
<th>Capacitance measurement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testing for breaks</td>
<td>All nodes on same net 500 – 100 = 400</td>
<td>Breaks and shorts are detected by measuring the capacitance of all nodes. 500</td>
</tr>
<tr>
<td>Testing for shorts</td>
<td>nCr = 100C2</td>
<td>100x(100 – 1)/2 = 4950</td>
</tr>
<tr>
<td>Test steps</td>
<td>5350</td>
<td>500</td>
</tr>
</tbody>
</table>

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.
Probe tip shapes available for press-type test fixture 1160 (list)

- **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

  1171-63 £
  Chisel

  1171-64 £
  Reduced crown, small

  1171-65 £
  Reduced crown, large

  1171-6A £
  Blade

  1171-6B £
  Chisel, small

  1171-6C £
  Chisel, large

  1171-6E £
  Reduced headless crown

- **CP Series tip shape (table)**

  1.27 mm pitch probes

  CP1411 £
  Blade

  CP1421 £
  Single-blade (small)

  CP1422 £
  Single-blade (large)

  CP1442 £
  Flat lance

  CP1450 £
  Reduced headless crown

  CP1471 £
  Needle

  2.54 mm pitch probes

  CP1511 £
  Blade

  CP1521 £
  Single-blade (small)

  CP1523 £
  Single-blade (medium)

  CP1524 £
  Single-blade (large)

  CP1532 £
  Claw (small)

  CP1533 £
  Claw (large)

  CP1534 £
  Four-pronged (large)

  CP1535 £
  Four-pronged (medium)

  CP1536 £
  Four-pronged (large)

  CP1543 £
  Flat lance

  CP1540 £
  Reduced headless crown

  CP1550 £
  Crown

  CP1553 £
  S-Point needle

  CP1563 £
  Needle
List of probes available for bare board testers

<table>
<thead>
<tr>
<th>Stock No.</th>
<th>Repair</th>
<th>Model</th>
<th>Tip Shape</th>
<th>Cord lengths (Size a)</th>
<th>1114</th>
<th>1240-01,02</th>
<th>1240-03</th>
<th>FA1240-51,52,53</th>
</tr>
</thead>
<tbody>
<tr>
<td>1172-12</td>
<td></td>
<td>Contact probe</td>
<td>Needle</td>
<td>280 mm</td>
<td>☒</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1172-14</td>
<td></td>
<td>Contact probe</td>
<td>Reduced crown, small</td>
<td>280 mm</td>
<td>☒</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1172-16</td>
<td></td>
<td>Contact probe</td>
<td>Chisel</td>
<td>280 mm</td>
<td>☒</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1172-17</td>
<td></td>
<td>Contact probe</td>
<td>Needle</td>
<td>195 mm</td>
<td>☒</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1172-18</td>
<td></td>
<td>Contact probe</td>
<td>Needle</td>
<td>56 mm</td>
<td>☒</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1172-19</td>
<td></td>
<td>Contact probe</td>
<td>Needle</td>
<td>50 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1172-24</td>
<td></td>
<td>Handeled probe</td>
<td>Needle</td>
<td>800 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1172-25</td>
<td></td>
<td>Hardened probe</td>
<td>Needle</td>
<td>215 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1172-26</td>
<td></td>
<td>Handeled probe</td>
<td>Needle</td>
<td>60 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1172-27</td>
<td></td>
<td>Handeled probe</td>
<td>Needle</td>
<td>50 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1172-41</td>
<td></td>
<td>4-terminal probe</td>
<td>1 needle (4-terminal)</td>
<td>180 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1172-43</td>
<td></td>
<td>4-terminal probe</td>
<td>1 needle (4-terminal)</td>
<td>200 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1172-44</td>
<td></td>
<td>4-terminal probe</td>
<td>1 needle (4-terminal)</td>
<td>190 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1172-45</td>
<td></td>
<td>4-terminal probe</td>
<td>1 needle (4-terminal)</td>
<td>56 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1172-46</td>
<td></td>
<td>4-terminal probe</td>
<td>1 needle (4-terminal)</td>
<td>50 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Stock No.</th>
<th>Repair</th>
<th>Model</th>
<th>Tip Shape</th>
<th>Cord lengths (Size a)</th>
<th>1114</th>
<th>1240-01,02</th>
<th>1240-03</th>
<th>FA1240-51,52,53</th>
</tr>
</thead>
<tbody>
<tr>
<td>1172-66</td>
<td></td>
<td>Link Probe</td>
<td>Needle</td>
<td>280 mm</td>
<td>☒</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1172-67</td>
<td></td>
<td>4-terminal probe</td>
<td></td>
<td></td>
<td>☒</td>
<td></td>
<td></td>
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<tr>
<td>1172-68</td>
<td></td>
<td>Link Probe with Blade</td>
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<tr>
<td>1172-69</td>
<td></td>
<td>Double Link Probe With Blade</td>
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<tr>
<td>1172-70</td>
<td></td>
<td>Shock-Absorbing Single Needle Probe (SK)</td>
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<tr>
<td>1172-71</td>
<td></td>
<td>Shock-Absorbing Single Needle Probe (WC)</td>
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<tr>
<td>1172-72</td>
<td></td>
<td>Shock-Absorbing Triangular Pyramid Probe (SK)</td>
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<td>1172-74</td>
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<td>Probe for Calibration</td>
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<td>1172-81</td>
<td></td>
<td>Link Probe</td>
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<tr>
<td>1172-82</td>
<td></td>
<td>Link Probe</td>
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<tr>
<td>1172-83</td>
<td></td>
<td>Double Link Probe (HP)</td>
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<tr>
<td>CP1072-01</td>
<td></td>
<td>Probe (reduced-impact type)</td>
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<td>☒ Dedicated to FA1116</td>
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</table>

For repairs, you can either repair the tip or replace the unit board. (Contact your nearest HIOKI distributor for more information.)  
* Requires the 1164-03 Probe Attachment.

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

*1172-19: Conforms to 1172-2 dimensions.  
*1172-46: Conforms to 1172-2 dimensions.  
*The test cable is soldered in place.
### Test method
- **Probing method**: Moving future type
- **Alignment**: Double
- **Step & repeat**: No

### Test head
- **Test heads (fixtures)**: 
  - 1138-32 (with high-precision guarding) ●
  - 1138-33 (without high-precision guarding) ●
  - 1138-34 (with general-purpose guarding) ●
  - 1138-35 (without general-purpose guarding) ●
  - 1138-52 (high-speed, with high-precision guarding) ●
  - 1138-36 (high-speed, without general-purpose guarding) ●

### Scanners (128 channel board)
- **Cannot be used together**
  - FA1138-80 (head scanner, with guarding) ●

### Measurement units
- **Standard measurement unit** ●
- **High-speed measurement unit** ●

### Test data
- **Maximum number of test points**: 15,184
- **Maximum number of test nets**: 10,000 nets
- **Maximum number of test blocks**: 30 blocks (data grouped by fixture)
- **Maximum number of test pieces**: 3,000 pieces (maximum of 100 per block)

### Measurement function (system)
- **Measurement to be used together**: 128 scanners

### Measurement unit
- **Measurement method**: Combined

### Test function
- **Test function (high-precision scanner)** (Requires Voltage and Current Measurement Unit 1937-35 and Measurement Switching Board 1937-36)

### Test head (fixtures)
- **Maximum number of pins (top)**: 8,192
- **Maximum number of pins (bottom)**: 8,192

### Power supply
- **Voltage**: 200 V AC, single-phase, 50/60 Hz
- **Voltage**: 200/220 V AC, 3-phase (as per delivery region), 50/60 Hz

### Ratings and appearance
- **System dimensions**
  - 170×305 mm
  - 222 mm (D) × 255 mm (H)

### Weight
- **Approx. 2,000 kg**

### Measurement equipment
- **Bare Board Testing Equipment**

### Function dedicated tests (35)
- **Function dedicated tests (35)**
  - **Dedicated function test (high-precision scanner)** (Requires Voltage and Current Measurement Unit 1937-35 and Measurement Switching Board 1937-36)

### Additional measurement functions
- **Standard**
  - **Standard 5 points with guarding, for scanner use**
### Bare Board Testing Equipment

#### FA1116
- **Model**: FA1116
- **Dimensions** (W) 1270 mm, (H) 1271 mm
- **Weight**: Approx. 1,300 kg

#### FA1282/01/11
- **Model**: FA1282/01/11
- **Dimensions** (W) 1465 mm, (H) 1230 mm
- **Weight**: Approx. 1,000 kg

### Populated Board Testing Equipment

#### FA1282-01
- **Model**: FA1282-01
- **Dimensions** (W) 1760 mm, (H) 2000 mm
- **Weight**: Approx. 2,100 kg

#### FA1282-11
- **Model**: FA1282-11
- **Dimensions** (W) 1500 mm, (H) 1867 mm
- **Weight**: Approx. 1,200 kg

### Test Methods
- **Test method**: Flying Probe Type

### Support Software
- **FLY-LINE**: Standard
- **SIM-LINE**: Standard
- **EPA-LINE**: Standard
- **FAIL VISUALIZER**: Standard

### Notes
- 1: Operating conditions apply when using special, flat-tipped probes.
- 2: Requires Power Source Unit 1037-04 or other power supply unit as well as external ID.
- 3: Contact HIoki for more information about compatible board sizes when combining testing equipment with other systems.

### Specifications
- **Board Dimensions**:
  - Width (W) × Depth (D)
- **No. of pins**:
  - Double: 330 × 400 mm
  - Single: 390 × 300 mm
- **Power supply**:
  - AC 200 V Single-phase, 50/60 Hz
- **DC measurement**
  - 0 V to 25 V
- **Inductance test**
  - 400 μH to 1 GΩ
- **Continuity test**
  - 10 μH to 10 KΩ
- **Photocouplers**
  - 0 V to 25 V
- **Special measurements**
  - Resistance measurement: 10 μH to 10 MΩ
  - Inductance test: 10 μH to 100 H
- **Support software**:
  - FLY-LINE
  - SIM-LINE
  - EPA-LINE
  - FAIL VISUALIZER
  - FIT-LINE
  - FA1782
  - FA1783

### Support Software (optional)
- **FLY-LINE**: Page 17
- **SIM-LINE**: Page 17
- **EPA-LINE**: Page 17
- **FAIL VISUALIZER**: Page 17
- **FIT-LINE**: Page 17

### Notes
- *Supported*, **N/A**: Not supported
- **Single**, **Double**: Single/Double