

## Electrical Testing Verifies Correct Mounting

"Program" "Test" "Visualize"  
Populated Board Testing System

# Program & Test & Visualize

Data Creation / Electrical Testing / Defect Confirmation:

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Create a program from the design data, perform electrical testing with minimal time and cost, and quickly confirm and record defects.



FA1240-61 4-Terminal High-speed Model

FA1241-61 : The CE Mark compliant version of the FA1240-61

# This Populated Board Testing System Does It All

Hioki's approach promises to reduce work hours and improve quality by linking three processes required in tests using flying probe testers in the field:

Data creation, electrical testing, and defect confirmation.

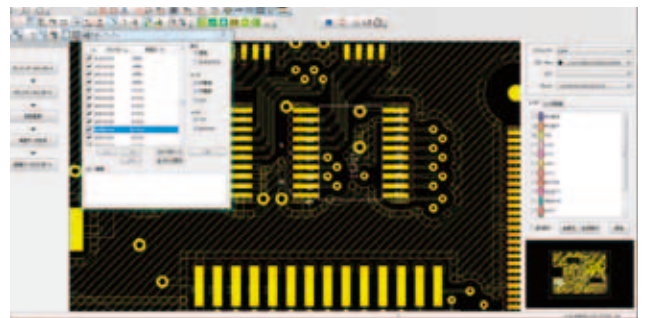
The flying probe tester has been transformed from testing equipment into a board testing system.

## More Accurate Creation

### FIT-LINE UA1780

#### Create test data accurately with nothing but electronic data (no need for actual boards)

Since test coordinates and net (component connection) information can be created from Gerber data, mounting data, and other design data, 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 bare board manufacturer. If accurate information is used, it is possible to create data that will not need to be corrected by hand and improve test quality.



## Easier Measurement

### FLYING PROBE TESTER FA1240

#### Actual board checks reduced to the minimum for easy and fast measurement

Just follow the work flow for easy data creation. Both the areas where the probe is applied and the contacted probe are automatically calculated from design data so you can concentrate on electrical measurement. The addition of the latest sorting algorithms using net information makes tests easier and faster.



## Faster Visualization

### FAIL VISUALIZER UA1782

#### Utilize net information for easy repair

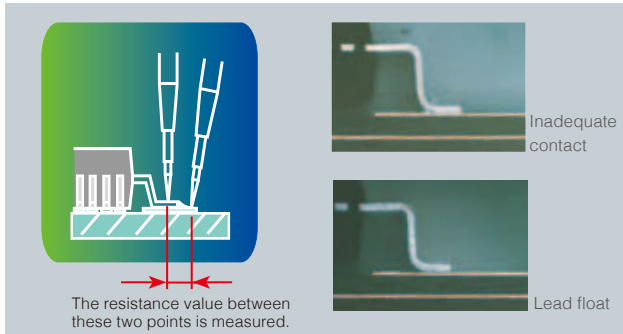
The FAIL VIEWER not only displays defective components, but also searches the net for populated board tests. Use it not only for checking parallel components, but also for searching for resist openings with a high risk of shorting. Search for defects without stopping the testing equipment.



# Uncompromising "Visualization" Technology

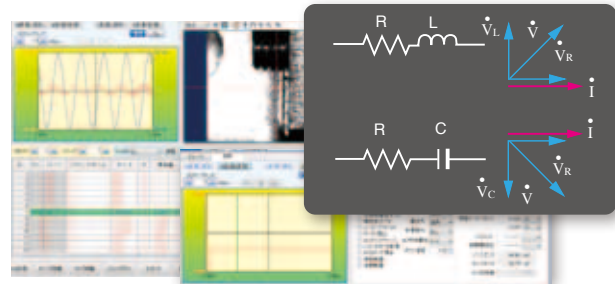
## Assured detection of inadequate contact through resistance testing

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.



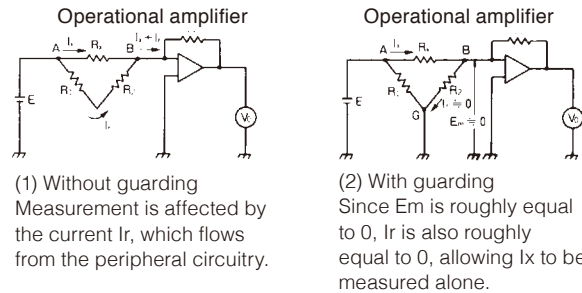
## Phase separation effective in analog circuits

Use DC-measurement mode to perform phase separation measurement which ignores influence from simple serial-parallel elements. The ATG function automatically selects the mode, eliminating stress for the technician.

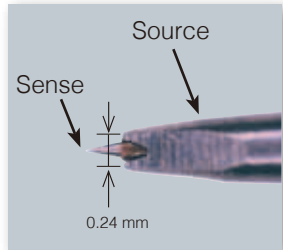


## Guarding that seeks the true value

The guarding function prevents wraparound from the measuring current for measurement according to the embedded value of each component. The ATG function extracts optimal points to improve data quality.



## 4-wire probe eliminates missed shorts



The coaxial 4-wire probe is a dedicated probe developed for detecting inadequate contact. The 4-wire probe's contact check and slip-less ultra-hard structure eliminate the possibilities of shorts due to contact mistakes being missed.

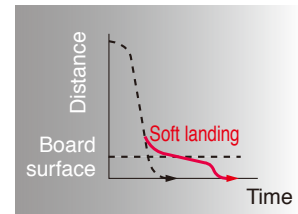
## Shortened test takt for digital boards

The only 4-wire probe in the industry achieves a proximity distance of 0.5 mm (0.02 in) in all directions. (SINGLE PROBE 0.15 mm) Test times are shortened by nearly 25% for S/O tests with contact checks with IC test leads.

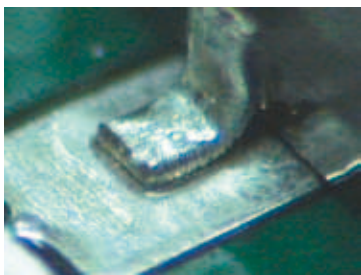


## Soft landing

The speed of the probe's descent is controlled. The speed is decelerated just before the probe makes contact with the board to decrease the impact force and prevent damage to the board. The speed can be set for test steps, groups, or the entire process.

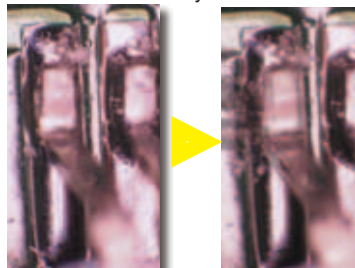


## Production tests can't find it! Visual tests lead to over-detection! That's why you need 4-terminal resistance measurement for detecting inadequate contact of IC test leads.

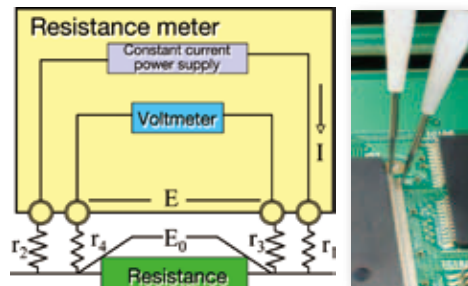


• Poor soldering  
Solder wicking is poor and the connection resistance has not decreased enough. This passes an operation (powered) test and therefore leads to unidentifiable malfunctions.

Variation caused by external forces.



• 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.

"Program" "Test" "Visualize"

# Basics of Populated Board Testing Systems

## Implementation benefits

### Reliable electrical testing

Assuredly perform electrical tests for parts that cannot be covered with an image test.

### Traceability

Electrical measurement values are essential for ensuring long-term reliability.

### Reduced running cost

No significant costs like with a press type.

### Total defect measure

The set-number check also enables confirmation before board population.

### Speedy start-up

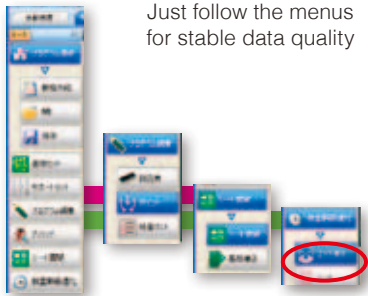
Testing can begin shortly after the board is completed.



## Data creation not relying on individual know-how

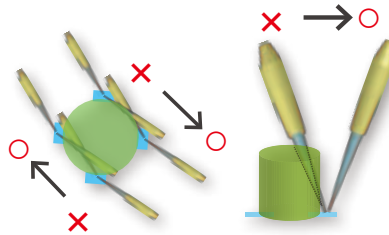
### Easy work flow navigation

Just follow the menus for stable data quality



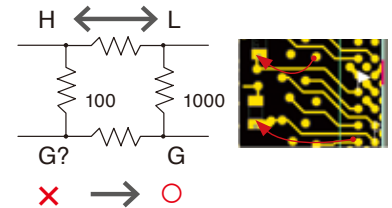
### No teaching required

Automatically calculate contact points and probes from the design data



### Minimal debugging

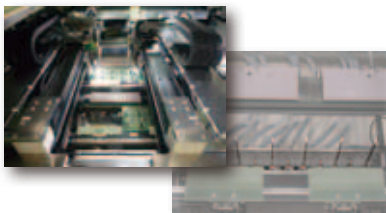
ATG function automatically extracts guard points, and automatically processes parallel components



## Improve operating rate and fully utilize facilities

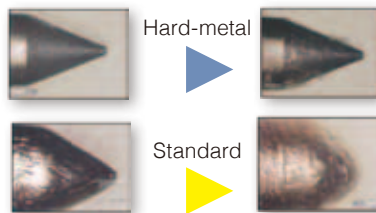
### Automated operation

Rich variation and built-in ID management applications



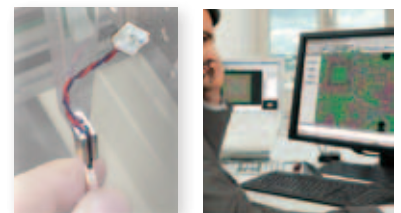
### Long-life probes

Stable contact for up to 3,000,000 uses, prevents pseudo-contact due to slips



### Zero line downtime

One-touch probe for easy maintenance, fail confirmations done offline



## Guarantee range expanded by electrical testing (Optional)

### Active component testing

Test electrical properties using FET, relays, and a 3-terminal regulator.

### Detection of electrolytic capacitor reverse insertion

Electrically detect reverse insertion of the electrolytic capacitor.

### High-voltage Zener testing

Perform voltage testing with a Zener diode up to 80 V.

### Simple power-on test

Power is supplied externally for minimal operation confirmation.

### Simple visual testing



## FA1240-61 / FA1241-61

### Support for large-format boards

Max. 510 (W) mm (20.08 in) x 460 (D) mm (18.11 in)

4-terminal testing high-speed model  
Delivers super-fast testing at up to 40 steps/sec.



## FA1240-63

### Support for M rack boards

Max. 400 (W) mm (15.75 in) x 330 (D) mm (12.99 in)

Model for production lines with a compact design  
Delivers super-fast testing at up to 40 steps/sec.



## Specifications

Item	FA1240-61 FA1241-61	FA1240-63
Measurement speed	Combination measurement: From 0.025 s/step	Combination measurement: From 0.025 s / step
Probe installation angle (L, ML, MR, R)	-13.1°/+8.8°/-3.5°/-3.6°/+3.5°/+3.6°/+13.1°/-8.8°	-13.1°/+8.8°/-3.5°/-3.6°/+3.5°/+3.6°/+13.1°/-8.8°
Min. probing pitch	0.15 mm (0.01 in) (with 4-terminal probes: 0.5 mm (0.02 in))	0.15 mm (0.01 in) (with 4-terminal probes: 0.5 mm)
Probe installation method	One-touch connector	One-touch connector
Testable size	Max. 510 (W) mm (20.08 in) x 460 (D) mm (18.11 in)	Max. 400 (W) mm (15.75 in) x 330 (D) mm (12.99 in)
Max. component mounting range	Upper: 38.0 mm (1.50 in) (including board thickness)	Upper: 28.0 mm (1.10 in) (including board thickness)
External dimensions (W) x (D) x (H)	1410 mm (55.51 in) x 1300 mm (51.18 in) x 1380 mm (54.33 in)	1320 mm (51.97 in) x 1369 mm (53.90 in) x 1325 mm (52.17 in)
Tester mass	1250 kg (44092.45 oz)	1050 kg (37037.66 oz)

### FA1240 Shared Specifications

No. of arms	4 (L, ML, MR, R)
No. of test steps	40,000 (max.)
Coordinate specification method	Step XY
Measurement range	Resistance : 400 $\mu$ to 40 M $\Omega$ Capacitors : 1 p to 400 mF Inductance : 1 $\mu$ to 100 H Diode VZ measurement : 0 to 25 V Zener diode VZ measurement : 0 to 25 V Digital transistor : 0 to 25 V Photocoupler : 0 to 25 V Short : 0.4 to 400 k $\Omega$ Open : 4 to 40 M $\Omega$ DC voltage measurement : 0 to 25 V Function feature voltage measurement : $\pm$ 40 V* Relay on-resistance measurement : 40 m to 40 $\Omega$ * FET on-resistance measurement : 400 m to 400 $\Omega$ * Simple function measurement : $\pm$ 25 V*
Test signals	DC constant voltage: 100 mV / 400 mV (2 ranges) DC constant current: 200 nA to 200 mA (13 ranges) AC constant voltage: 0.1 V rms. (1 range)
Measuring component	DC voltmeter : 800 $\mu$ V to 25 V f.s. (8 ranges) DC ammeter : 100 nA to 25 mA f.s. (7 ranges) AC ammeter : 10 $\mu$ A to 10 mA rms. (4 ranges)
Judgment range	-99.9% to +999.9% or absolute value
Guarding	2 points/step Lower probe channel guard specification
Probing precision	Within $\pm$ 100 $\mu$ m per arm (X/Y direction)
Positioning repeatability	Within $\pm$ 50 $\mu$ m (probing position)
Minimum movement step	X-Y: 1.00 $\mu$ m/pulse Z: 6.00 $\mu$ m/pulse
Probe work area	510 mm (20.08 in) W x 460 mm (18.11 in) D (FA1240-61) 400 mm (15.75 in) W x 330 mm (12.99 in) D (FA1240-63)
Min. pad diameter	$\phi$ 100 $\mu$ m
Component mount range	Bottom: Max. 100 mm (3.94 in) (based on following conditions) 30.0 mm from reference rail: 90.0 mm 125.0 mm from movable rail: 85.0 mm No components within 3 mm (0.12 in) of both side of boards (transport margin)
Display section	17" LCD display

### FA1240 Shared Specifications

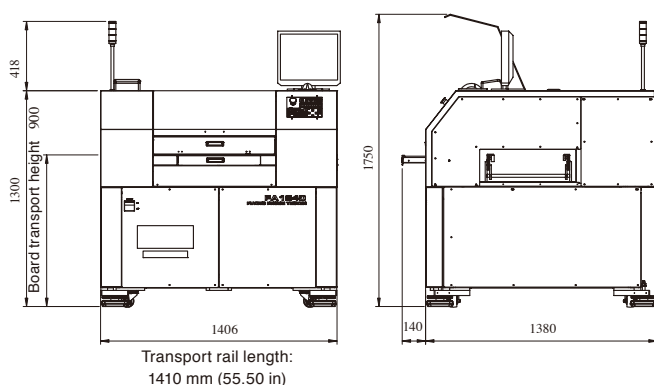
Safety features	Emergency stop switch, safety cover (made of anti-static resin) / Arm and probe interference prevention software / Moving parts interference prevention limit switch / Isolating transformer
Warning features	Signal tower (3-light), buzzer
Power supply used	200 VAC $\pm$ 10% (single phase) 50/60 Hz (*FA1241 is 230 VAC $\pm$ 10%) Power consumption: FA1240-61: 6 kVA FA1240-63: 5 kVA
Pneumatic system	Pressure used (primary): 0.5 to 0.99 MPa (dry air) Set pressure (secondary): 0.5 $\pm$ 0.1 MPa
Air consumption	Max. 0.3 NI/min.
Environmental conditions	Temperature: 23 $^{\circ}$ C $\pm$ 10 $^{\circ}$ C Humidity: 75% RH or less (no condensation) Environment: Avoid use in environments exposed to dust, vibration, and corrosive gases. Floor strength: 500 kg (17637 oz) per m <sup>2</sup> or more
Supplied accessories	Contact probes: 1172-19 (4 probes) Offset board 1350-02 (1 board), denting sheets (132 sheets included) 1134-02, support pin (3 pins), thermal mini-printer (includes 1 roll of paper) (1 unit), ball point driver (for affixing of rails) (1 driver) *1, grease (1 tube), grease gun (1 unit) Instruction manuals (includes one of each of the following: Operator's Manual, Administrator's Manual, and Maintenance Manual) Computer peripherals (1 set), uninterruptible power supply (1 unit), set up CD (1 disk), adjusters (4 units), color display (17-inch) (one unit), power cable (uncrimped end, 3m) (1 cable), spare fuse (1 unit)

\*1: Not included when equipped with the automatic width adjustment function option.

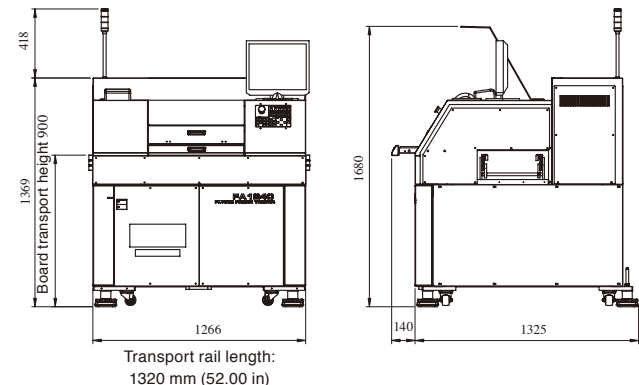
### FA1240 Shared Transport Specifications

Conveyor belts	Flat belts (antistatic material)
Conveyor width reference side	Front side
Transport height	900 mm (35.43 in) $\pm$ 15 mm (0.59 in)
Conveyor speed	Max. 40 m (131.24 ft) / min (no-load conditions)
Direction of transport	Right to left or left to right (specify at time of order)
Supported range of board mass for transport	2.0 kgf or less
Supported range of board thicknesses for transport	0.6mm (0.02 in) to 3.2 mm (0.13 in)

### FA1240-61 \*FA1241-61 dimensions are the same as those of the FA1240-61.



### FA1240-63



## Model: FLYING PROBE TESTER FA1240

Model No. (Order Code)	Specifications
<b>FA1240-61</b>	Large-format boards 4-terminal testing high-speed model
<b>FA1240-63</b>	M rack boards Compact model for production lines
<b>FA1241-61</b>	Large-format boards CE-marked Note: The FA1241-61 is the CE Mark compliant version of the FA1240-61.

## DATA CREATION SYSTEM

Model No. (Order Code)	Product name
UA1780	FIT-LINE INSPECTION DATA CREATION SYSTEM (including 4-year license)
UA1780-01	FIT-LINE INSPECTION DATA CREATION SYSTEM (including 1-year license)
UA1780-11	FIT-LINE INSPECTION DATA CREATION SYSTEM 1-YEAR LICENSE *Product includes license key only.
UA1780-14	FIT-LINE INSPECTION DATA CREATION SYSTEM 4-YEAR LICENSE *Product includes license key only.
UA1782	FAIL VISUALIZER

## Factory-Installed Options

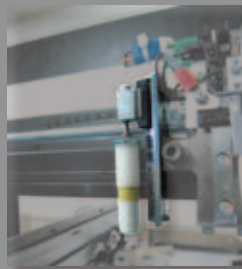
Model No. (Order Code)	Product name	FA1240-61 FA1241-61	FA1240-63
E4413	STAMP UNIT ( only R Arm )	✓	
E4433	STAMP UNIT ( only R Arm )		✓
1942-01	LOADING RAILS		✓
1942-11	AUTOMATIC WIDTH ADJUSTMENT FUNCTION	✓	
1942-12	AUTOMATIC WIDTH ADJUSTMENT FUNCTION		✓
E4412	LAZER HEIGHT-ADJUSTMENT UNIT	✓	
E4432	LAZER HEIGHT-ADJUSTMENT UNIT		✓
1164-56	SUPPORT PIN		✓
E4415	LINE SUPPORT UNIT	✓	
E4435	LINE SUPPORT UNIT		✓

## FA1240 Shared Options

Model No. (Order Code)	Product name
1944-03	EXTENSION I/O BOARD
FA1139-04	OFFLINE SOFTWARE
FA1395	RECOVERY CD
1330	MEASUREMENT SECTION CALIBRATION UNIT
1935-24	DC MEASUREMENT BOARD UNIT (Active Testing)
E4520	HIGH VOLTAGE ZENER MEASUREMENT UNIT
1939-01	MEASUREMENT SWITCH BOARD (Reed Relay Type)
1939-02	MEASUREMENT SWITCH BOARD (Power Relay Type)
1164-02	ONE-WAY CLUTCH

### Stamp unit

Tested boards can be marked with stamps. Module-specific, group-specific, and overall test data stamp settings are supported and provide an effective means of preventing defective and untested boards from getting mixed in with PASS boards.



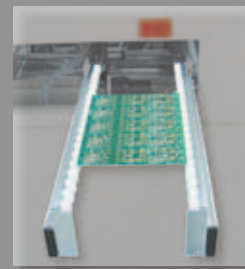
### Automatic width adjustment function

The motor adjusts the rail width to match the board width in the testing program. This feature can be combined with board count setup editing, a standard feature, to allow automatic setup for different boards.



### Roading rails

One untested board can be placed on the feed rails. This assists when feeding the tested board into the transport conveyer or removing it. A feed rail and transport rail can be installed on the right and left sides.



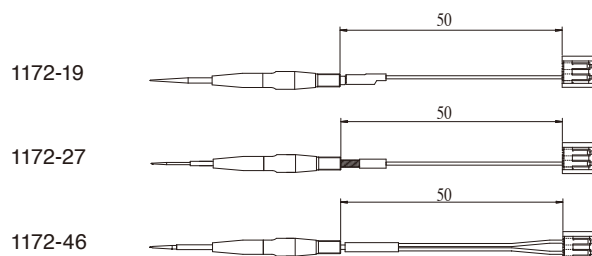
### Line support unit

Used in combination with the automatic width adjustment function. Allows support pins specified for each test program to be raised when moving in the Y-axis direction as appropriate for the size of the board.



## Contact Probe

Model No. (Order Code)	Part name	Probe pressure
1172-19	CONTACT PROBE	1.35 N (when using 2 mm (0.08 in) stroke)
1172-27	HARD METAL PROBE	1.35 N (when using 1.5 mm (0.06 in) stroke)
1172-46	4-WIRE PROBE	1.35 N (when using 1.5 mm (0.06 in) stroke)



## Consumables

Model No. (Order Code)	Part name
1196	RECORDING PAPER (for printer) (set of 10 rolls)
1350-02	OFFSET BOARD
1134-02	SCRATCHSHEET (set of 132 sheets)

# Benchmarks That Let You Experience The Full Performance

Hioki can prepare populated board testing system benchmarks if provided with the three types of data listed below. As always, we recommend that you actually view and try out a system that meets your needs so that you can experience the new level of operability and speed that it provides.

**Step 1** First, imagine the type of board you want to try.

A specific scenario, for example a board for which it was particularly difficult to create data, fine points that are difficult to probe, or a BGA for which it was difficult to prepare data provides an ideal opportunity to try a testing device.

**Step 2** Next, prepare the three types of data listed below so that we can prepare board testing system benchmarks:

**(1) Gerber data:** This is typically known as Extended Gerber (274X) data.

This data is used when creating metal masks during the bare board manufacturing process and is therefore easy to obtain.

Older boards use standard Gerber (274D) data. Even if there is no Gerber data available for your board, please contact a Hioki distributor for recommendations since it is possible for bare board manufacturers to create Gerber data from a sample board.

**(2) Mount data:** This component location data is required by mounters and automatic insertion machines. (It consists of comma or space-delimited data.)

At a minimum, it must include codes that define component mounting coordinates, mounting angles, mounting surfaces, component names, and component shapes.

This data may be either CAD data that is output to the moulder or data that is directly output by the moulder.

**(3) BOM (bill of material):** This data describes the part component names listed in the mount data, for example, "IC1", and what kind of component each one is.

It must include each component's manufacturer, manufacturer model number, and constant.

(Hioki will review any need to adjust the format separately, for example if the mounting data and parts list comprise a single file.)

**Step 3** Finally, provide the bare board and populated board.

We will provide a detailed benchmark report indicating not only the test time for the board, but also the amount of time required to create data, the testing rate, and other information.

"A picture is worth a thousand words."

Gathering information is critical, even when you have not yet begun considering specific equipment. Hioki welcomes your inquiries.

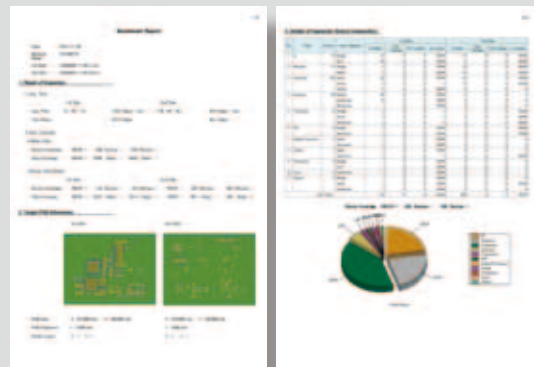
## Benchmark Report

Video report also available

If you cannot come to the demo room, we can create a test video using your board.



Testing time  
Testing cover rate  
Board information  
Component configuration  
Type-based testing



Note: Company names and Product names appearing in this catalog are trademarks or registered trademarks of various companies.

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