RoBAT

RoBAT S1 System Specification Issue 10

1 INTRODUCTION

Vertical 2-headed backplane test system. Completely automated AOI and DC Electrical test.
RoBAT has a firm commitment to ongoing development, and will release additional functions and features from time-to-time.

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2 BACKPLANE SIZE

Maximum backplane size accommodated is:

X (horizontal) direction - up to 650mm (25.5")
Y (vertical) direction - up to 1000mm (39")

An optional indexing system is available to increase the maximum height of board that can be tested to 1400mm (55"). This is a hardware option the moves the backplane under test upwards by 400 mm when given the appropriate signal from the test programme. It consists of a modified mounting frame, a pair of pneumatic cylinders and associated controls. It operates under software control.

A further option extends the length of the machine so that a board of width 1000mm can be tested. *See Section 13 for more details.*

3 COMPUTER SYSTEM (PC)

LGA1155 Motherboard
Intel i7 LGA1155 3.4GHz Processor
8Gb DDR3 1333MHz Memory
1Tb SATA 6Gb/s HDD 7200RPM 32MB Cache* + 240GB Kingston SSD
HD 2GB GDDR3 VGA graphics card
22X DVD±RW serial ATA drive
1Gbit Ethernet
Keyboard
Mouse
Two 24" 1920x1080 Monitors
Thermal printer

The PC specification on delivery may be upgraded without notice.
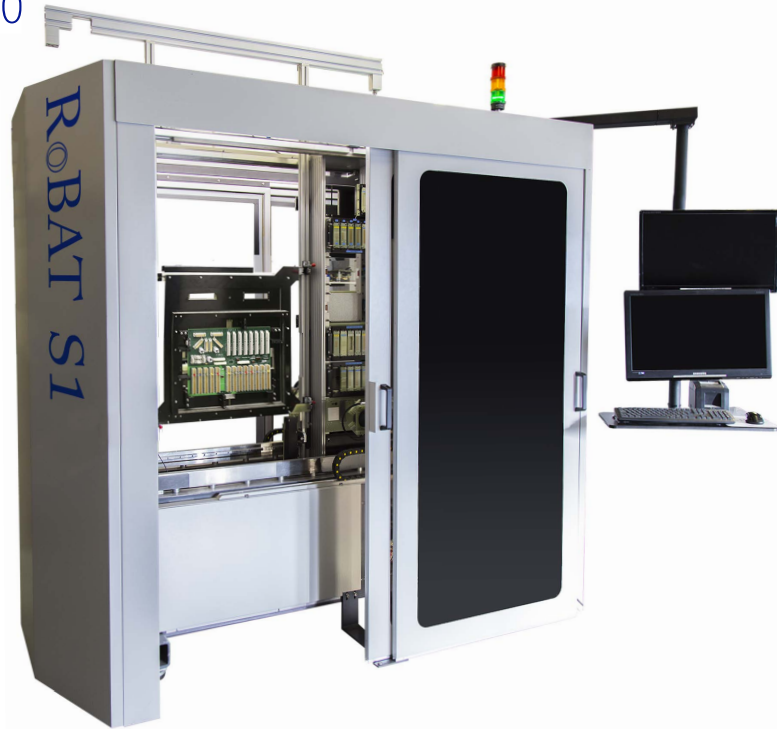
4 MOTION SYSTEMS

Machine is double sided with identical motion function on both sides. The motion system consists of 4 x air bearing linear stepper motors (X & Y axes) 2 x rotary stepper motors (Z axes) plus 2 x DC motors for head rotation These motors are controlled by a six-axis motion controller board.

Parameter	X and Y Axes	Z Axis
Positional Resolution	16µm	7.5µm
Maximum Head Speed	0.6ms^{-1}	0.1ms^{-1}
Positional accuracy	±50µm	±50µm

The test head can be rotated and locked at any angle (0 - 360°).

Z axis example movement times:

For full travel: 1.88 seconds for 144mm
10mm move for insertion: 0.206 seconds for 10mm
Tool engagement time: Typically less than 0.5 seconds

5 MACHINE TEST HARDWARE

The standard machine includes:--

• Motor/camera control board and wiring

• Tool presence detection system

- This allows the machine to test which slots in the magazine racks (front and back) are occupied by magazines.
- It also works in conjunction with the tool control system to indicate which modules are in which magazine slots.
- Each module contains a memory chip which records calibration data for that module. It also records the type and serial number of the module.
- When the head picks up a module this data is checked. If the module is not the one that the machine "expects" it will stop and indicate a fault.

5 MACHINE TEST HARDWARE (cont.)

- Both heads contain 224 test channels which can be operated in 3 modes:
  - Capacitance measurement (from 2pF to 2nF) with an accuracy of +/-5% + DIG
  - Grounding mode in which it can connect the test point to a system ground to do pin-to-pin continuity tests.
  - Drive mode in which it can apply a voltage of 5V at a maximum current of 50mA

- Wiring necessary to support the DMM test option

- The head can be rotated and locked at any angle (0 - 360°)

- Two co-ordinate probe modules are included as standard:
  - Accuracy: (X, Y, Z and Z axes) 0.05mm

- Magazine Racks:
  - The maximum number of magazines on each side is 6
  - Each magazine can hold up to 6 modules
  - Total 6 magazines supplied as standard

6 VISION SYSTEM

The vision system consists of the following main components:

2 x	Progressive-scan colour GigE Vision 2454 x 2056 pixel cameras synchronised with the motion system
8 x	LED lighting modules
2 x	54mm x 45mm field of view, fully telecentric (0.05 degree error) lens with very low distortion (0.03% typical error) and very high resolution (70 line pairs per mm 50% CTF)

This provides the following key features:

- Automatic camera focussing
- Automatic ambient light compensation
- Variable intensity lighting
- AOI testing
- Bent pin scanning
- Pattern locate (absolute or referencing to nearby landmark)
- Barcode reading - serial numbers can be used as a board data reference

All images are stored under the backplane serial number.

7 MODULES

The maximum number of points that can be contacted simultaneously per side is 224.

The maximum size of pin array (and hence size of connector that can be tested in a single pass) is 7 x 32, 14 x 16 etc.

20 modules are supplied with the machine as standard. The selection can be adjusted to take account of a customer's product line.

8 MACHINE SELF-TEST/CALIBRATION

The self-test capability includes:

- Resistance, diode and capacitance measurement testing
- Track shorts / opens measurement calibration
- Module alignment
- Touch probe calibration
- Module to camera alignment
- Open, Short, Through and Load (OSTL) TDR calibration

9 OPERATING SOFTWARE

Windows 7 Professional Operating System
RoBAT S1 Version 1.5.2 (or higher) Software including:

- Machine controller and test sequencer
- Machine Calibration and self-test
- Colour AOI/Bent pin testing
- Bent or missing pin detection.

  The standard deviation of the returned pin position is <10µm relative to a connector average pin position datum. This corresponds to a ±3s reproducibility of ±25µm

- Drivers and diagnostics (where available) for all supplied hardware

Programming Tools

- Data import from Drill File/Netlist, IPC File, ODB++, Neutral File
- Where IPC356 (containing test point names) or a CAD neutral file is available this process is significantly automated
- Template database and tools
- Defining the sequence of AOI Tests, plug operations, AOI Tests, Component tests, Mechanical Probe Tests, Bent Pin Scans, etc.
- Automated board frame design

General Facilities

- Self test software
  - Resistance, Diode, and capacitance measurement testing
  - Track shorts / opens measurement calibration
  - Module alignment
  - Touch probe calibration
  - Module to camera alignment
- Manual machine operation
- Test record kept for each tested backplane with ticket printer
- Failure retest program generation

10 INSTALLATION REQUIREMENTS

Area for machine:

- Height 2510 mm
- Width 2,600 mm
- Depth 3250 mm
- Weight 1350 Kg

Power requirements: 230V ac 50 Hz, 16A (S type breaker)

Compressed air: 6 bar minimum required flow 80 l/min

11 ENVIRONMENT (OPERATION & STORAGE)

Storage / Transportation

Temperature :	-10°C to 60°C
Relative Humidity:	90% or less (non condensing)

Operation

Temperature:	0°C to 35°C
Relative Humidity:	75% or less (non condensing)

12 OFFLINE PROGRAMMING AND FAULT DISPLAY

System programming software can be run on offline stations.
This enables the following offline operations:

Repair Station

- Board errors displayed by loading the log file
- Find Entity/Net/Test point and display the location graphically
- Highlighting of up to 5 different nets simultaneously
- Viewing and processing of captured bent pin images
- Flip and rotate board view

Program Station

- Auto generation of test sequence from Entity placement
- Template based test scripts stored for repeat use
- Drag and drop tool insertions
- Automatic collision detection between tools and UUT
- Full sectioning of tests within the test sequence
- Front and back head interleaving
- Tool viewer
- AOI test editing
- Graphical AOI/DMM test re-ordering
- Electrical test coverage monitoring
- Serial number detail editing
- Automatic DMM test creation
- Offline image processing
- Barcode label position definition
- Auto recovery files created every 1-30 minutes

13 OPTION - BOARD INDEXING

Board indexing is a hardware option that indexes the backplane under test upwards by 400 mm when given the appropriate signal from the test program.

It consists of a modified mounting frame, a pair of pneumatic cylinders and associated controls. It operates under software control.

This option effectively increases maximum height of board that can be tested to 1400mm (55").

14 OPTION - ADDITIONAL MAGAZINES

These provide additional module storage. They can be kept on the machine (a maximum of five magazines per side can be fitted) or stored off-line.

- All magazines are the same and are fully interchangeable.
- The magazines are held in place in the magazine rack by a simple latching mechanism. No tools are required.
- Each module slot in the magazine is fitted with a "module present sensor" and these are wired to a connector on the magazine which mates with another connector in the magazine rack. This forms part of the tool presence detection system.

15 OPTION - DMM HARDWARE / SOFTWARE

This option consists of:--

- Agilent digital multi-meter
- The software to drive this card
- 6-wire cabling all the way to the test points

It is frequently used with:-

- The DMM probe modues (supplied as standard)
- Power-plane isolation measurement between fixed probes

It can be used to measure the following:--

- Resistance tests:
  Range 0.1Ω to$100M\Omega$ accuracy 0.04% ($\pm 4m\Omega$) to 1.6% ($\pm 1.6k\Omega$)
- Capacitance tests:
  Range 1nF to 10 mF accuracy 2% of range

NOTE: Capacitors between 2pF and 2nF can be tested using the Picometer.

2-wire tests are subject to an additional 1Ω -2Ω error due to probe contact resistance. Tests conducted from a test head are usually 2-wire. Tests between switch matrix channels are two, four or six-wire, depending on probe and wiring configuration.

Temperature and humidity extremes can affect tolerances.
Capacitance tolerances can be affected by test parameters selected (by range), depending on type and construction.

16 OPTION - POWER PLANE ISOLATION MEASUREMENT

This feature allows probes to be permanently attached to certain large nets on a backplane, vastly accelerating the testing of pins on these nets.
1 or 2 wires can be connected to each net allowing either 2, 4 or 6-wire tests respectively between planes.
Nets can be switched between analogue ground, DMM+, DMM- , and no connection.
Installed in multiples of 16 channels.
1500V option.