4000Plus Bondtester
Engineered for Excellence

www.nordsondage.com
The Nordson DAGE 4000 Plus is the most advanced bond tester on the market, offering unsurpassed accuracy and reliability. Developed by the world leader in bond testing technology, the Nordson DAGE 4000 Plus represents the industry standard in bond testing.

Irrespective of the industry: semiconductors, or the various microelectronics sectors of automotive, power, hybrid, or high reliability, the Nordson DAGE 4000 Plus has the versatility and accuracy that gives its users total confidence in the quality of its products. It features the latest patented bond testing technology, for example the anti-backlash system. The Nordson DAGE 4000 Plus is capable of testing from 250 milligrams right through to 500kg, catering for both standard and specialized applications. Remember too, that the 4000 Plus builds on the success of the Nordson DAGE 4000, so data correlation between the machines is assured.

Highly Configurable

The Nordson DAGE 4000 Plus provides ultimate versatility. Choose from a range of XY stages up to 300mm of travel in one axis, and a unique range of load cartridges including push cartridges up to 50kg, pull cartridges up to 100kg and shear cartridges up to 200kg (500kg capable using special fixtures for shear). An extensive range of load tools provides for standard and specialized applications. A wide choice of optics is available to suit every application. The standard mainframe vertical working envelope of 120mm will meet most applications. However please consult factory for any special requirements.

Leading The Way In Bond Testing

- Ribbon pull – With an extensive range of load tools including hooks and tweezer jaws, all sizes and types of ribbons can be tested.
- Hot bump/pin pull – A new load cartridge makes this groundbreaking test even better, especially for evaluating PCB substrate materials and low profile solder bumps.
- First bond ball pull of copper wires and pull of studs, bumps and pillars – For the first time custom pull jaws enable tensile tests on these important interconnects.
- Fatigue pull and shear – Fatigue analysis is emerging as an increasingly important method in evaluating solder joint reliability. A mix of software control and hardware enables fatigue testing in both pull and shear modes.
- Passivation layer shear – A combination of software and a special load tool provides a solution to ball shear where access is limited by the passivation layer.

### Featured Applications

- **Extensive Testing Capability**
  Current and emerging applications are fully catered for with load cartridges combined with standard and specialized fixtures to perform shear tests up to 500kg, pull tests up to 100kg and push tests up to 50kp.

- **Image Capture System**
  Quick and simple to set-up, located in close proximity to the test head to aid faster testing. Improves test automation.

- **XY Stage**
  A range of XY stages are available from 160mm x 160mm right through to 300mm x 210mm. Including high precision, higher speed and zone shear options. In addition to this there is even the option of a heated work stage up to 400 degrees C at 200kg max, complete with adjustable temperature control.

- **Pull/Push Test**
  - Wire
  - Ribbon
  - Hot bump/pin pull
  - Cold bump pull
  - Copper wire bond, stud and pillars
  - Stud bump
  - Vector
  - Fatigue
  - Push
  - Sweeper pull
  - Vertical stud pull
  - Cu pillar shear

- **Shear Tests**
  - Ball solder
  - Standard die shear
  - Cold bump pull
  - Cavity
  - Copper wire bonds, stud and pillars
  - Passivation layer
  - Stud bump
  - Low profile zone shear
  - Vector
  - Fatigue shear
  - High force die shear
  - High force pull up to 100kg
  - Horizontal stud pull
  - Cu pillar shear
  - Die pull/flop chip pull
  - Micro bump shear

- **Flexural Testing**

- **Fatigue Testing**

- **Torsion Testing**

- **Brittle Fracture Testing**
Confidence In Your Results

Data Correlation
Nordson DAGE recognizes that data correlation is fundamental for cross referencing test results between old and new platforms. Existing users of Nordson DAGE bond testers (4000 Optima and 4000) can confidently compare data between old and new machines. Further, we know that many users collect data on the same product from multiple machines, either on the same site or even different sites, and need to be sure that the data will correlate with ultimate integrity given identical configurations and test parameters.

Nordson DAGE have carried out exhaustive internal GR&R studies to prove correlation between old and new machines. The 4000 Plus plays a critical role in data correlation but equally important is Paragon™, our bond testing software. Import and export protocols and database management tools also ensure data streams from new, old or multiple machines can be compared.

Data Traceability
The 4000 Plus is calibrated in accordance with International standards, providing full traceability and integrity in product testing. Calibration is performed using O.I.M.L class M1 tolerance weights directly traceable to National Standards; UKAS or optional NIST Class 1 weights.

Automatic Load Tool Alignment
The optional self-aligning shear tool sleeves ensure that the correct load is applied by compensating for misaligned die attach.

Data Integrity
The 4000 Plus offers exceptional repeatability and reproducibility of results, with a total system accuracy of +/-0.1% of the load range selected (see detailed specifications).

Ultimate Step Back Accuracy
Control of shear height (step back) is critical to consistent test results in shear applications.
Nordson DAGE has developed a unique patented anti-backlash system that aids setting and control of step back. Shear height can be set and maintained to single micron accuracy across the range of load cartridges. Additionally, on the 525G load cartridge the step back accuracy is a superlative +/- 0.25 microns. The accuracy is qualified through laser measurement.

Increased Efficiency

Image Capture Camera
The image capture system provides high resolution images for failure mode analysis and alignment with computer aided design (CAD) models. With the built-in light source and dedicated focus adjustment, the images are both bright and sharp. The camera is also versatile, working in conjunction with the side alignment camera to enable precise tool alignment, particularly for small, delicate or difficult samples.

Trinocular Camera
The trinocular camera can be attached to any stereo zoom microscope with a C-mount.
With an appropriate microscope, the field of view can be adjusted from wide to close up and is ideally suited for macro positioning. Used in conjunction with the side alignment camera, the two views (front and side) enable precise tool alignment in small or difficult samples.

Side Alignment Camera
The side view camera is ideal for testing micro features such as copper pillars, micro bumps and TSVs. The system enables an independent view of feature to be tested, providing accurate and repeatable tests. The side alignment camera is attached to the cartridge mount, giving ultra stable, vibration free, imaging with constant focus on the tool tip.
All camera systems use a USB connection and can be field retrofitted.
Reduced Cost of Ownership
Downtime Minimized
Every aspect of the 4000Plus/Plus robust design has been thoroughly tested to ensure superb reliability. A new ergonomic design for load cartridges significantly improves handling when changing them on the machine and reduces the risk of damage. In addition, the 4000Plus/Plus is manufactured in accordance with ISO 9001: 2008, meeting the Machinery Safety Directive, Low Voltage Directive, EMC Compliance, SEMI Safety Guideline (S2 ESH) and RoHS as well as designed to comply with UL requirements.

Compatibility
The 4000Plus/Plus has been designed with continuity in mind. Some accessories from the Nordson DAGE 4000 Plus are forwardly compatible with the 4000 Plus, so you can use your existing stock of equipment and upgrade at your own pace.

Intelligent Software
The 4000Plus utilizes Nordson DAGE’s next generation Paragon™ software. Paragon boasts a highly configurable and intuitive interface as well as a wide variety of advanced functionality, such as automatic GR&R calculation, built-in diagnostics, a range of charts and a unique database search engine wizard. The superior reporting capability enables the creation of personalized reports and provides the ability to easily manipulate data using interactive graphs.

Switch Applications in Just Seconds
The industry-unique multi-function cartridges (MFCs) are designed for use with automatic test routines on the 4000Plus bondtester enabling multi-surface test patterns for complex hybrid packages and ultra-quick application changeover.

Unique Features of the Industry Leading Multi-Function Cartridges*
- Guaranteed correlation with both 4000 and 4000Plus cartridges
- Operators can easily identify which transducer is active when not in use, via the cartridge window
- ‘Park Position’ protects the transducers inside the cartridge rather than leaving one of them exposed and susceptible to damage
- Quick and easy to interchange with single load cartridges
- Frictionless pull to record true load
- Patented air bearing technology for shear testing
- Minimum off-axis tool deflection
- Automatic electromagnetic damping at low loads
- Dual application calibration jigs
- Majority of control electronics and rotation mechanism are inside the cartridge, ensuring zero machine downtime and easy serviceability
- Unique damping system for wire pull

Standards
The Nordson DAGE 4000Plus conforms to, and in many cases exceeds, the following industry standards:

Cold bump pull Shear – Ball/Wedge Load Ranges
S25 25g, 10g, 5g, 2g S25 25g, 10g, 5g, 2g
P100 100g, 50g, 25g, 10g, 5g S100 100g, 50g, 25g, 10g, 5g
P500 500g, 250g, 125g, 62g, 31g S500 500g, 250g, 125g, 62g, 31g
T1000 1kg, 500g, 250g, 125g, 62g, 31g T1000 1kg, 500g, 250g, 125g, 62g, 31g

Multi-Function Cartridges
Semiconductor Load Ranges
S25 25g, 10g, 5g, 2g
P100 100g, 50g, 25g, 10g, 5g
P500 500g, 250g, 125g, 62g, 31g
T1000 1kg, 500g, 250g, 125g, 62g, 31g

Hybrid
S500 500g, 200g, 100g, 50g
PP100 100g, 50g, 25g, 10g

Pull – Vector
S25 25g, 10g, 5g, 2g
P100 100g, 50g, 25g, 10g

Push/Pull
S500 500g, 200g, 100g
P100 100g, 50g, 25g, 10g

XY Tables
Standard 160mm x 160mm Forces up to 2000kg
160mm x 160mm Forces up to 2000kg at 20mm/s
200mm x 200mm High precision up to 5kg
200mm x 200mm Large area XY stage
400mm x 400mm for high speed zone shear
Zone shear: 20kg/100mm/min
Zone shear: 200g/1500mm/min

A variety of XY tables are available according to your test needs. This list is not exclusive and you should consult the factory for special applications.

Z-Axis and Working Envelope
4000Plus Mainframe
75mm Z-axis travel; 120mm working envelope

Specifications
- Envelopes: No. 600mm (including left and right brackets), 1200mm, 1800mm
- Weight: 150kg, 60kg for bonding XY table
- Power Supply: 90-300VAC, single phase
- Pneumatic Supply: 4 bar minimum, 6mm OD plastic pipe. Note some specialized applications may require increased pressures, clean dry air.
- Accuracy: +/- 0.1% full scale deflection for selected load ranges (see detailed load cell specifications).
- Shear (ball and die load) test accuracy <0.5% from 10g to 2000kg
- Grip step back accuracy <0.25mm from 10g to 2000kg

*Patent pending.
A Partner You Can Trust

Nordson DAGE is the market leading provider of award winning test and inspection systems for destructive and non-destructive mechanical testing of electronic components, taking pride in delivering support to both local and international organizations alike. Founded in 1961, with global headquarters in Aylesbury, UK, Nordson DAGE is part of the Nordson Corporation, which has direct operations and sales support offices in more than 30 countries.

Nordson DAGE continues to invest significantly in research and development to remain at the cutting edge of bond testing technology. Nordson DAGE has a truly global presence and is recognized as the industry standard.

For more information, please contact your Nordson DAGE regional office or speak with your Nordson DAGE representative, all of which are listed on www.nordsondage.com.