

Bond Testing

Find Every Failure™

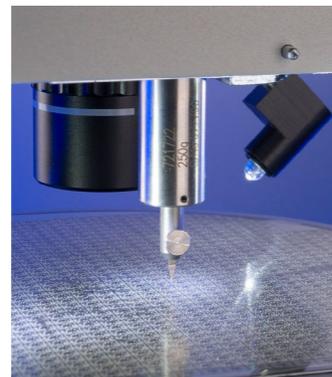
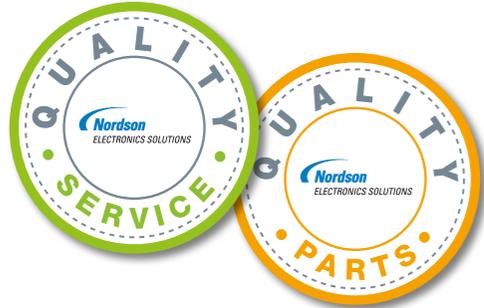
www.nordsondage.com

**Nordson**
ELECTRONICS SOLUTIONS

Complete Integration

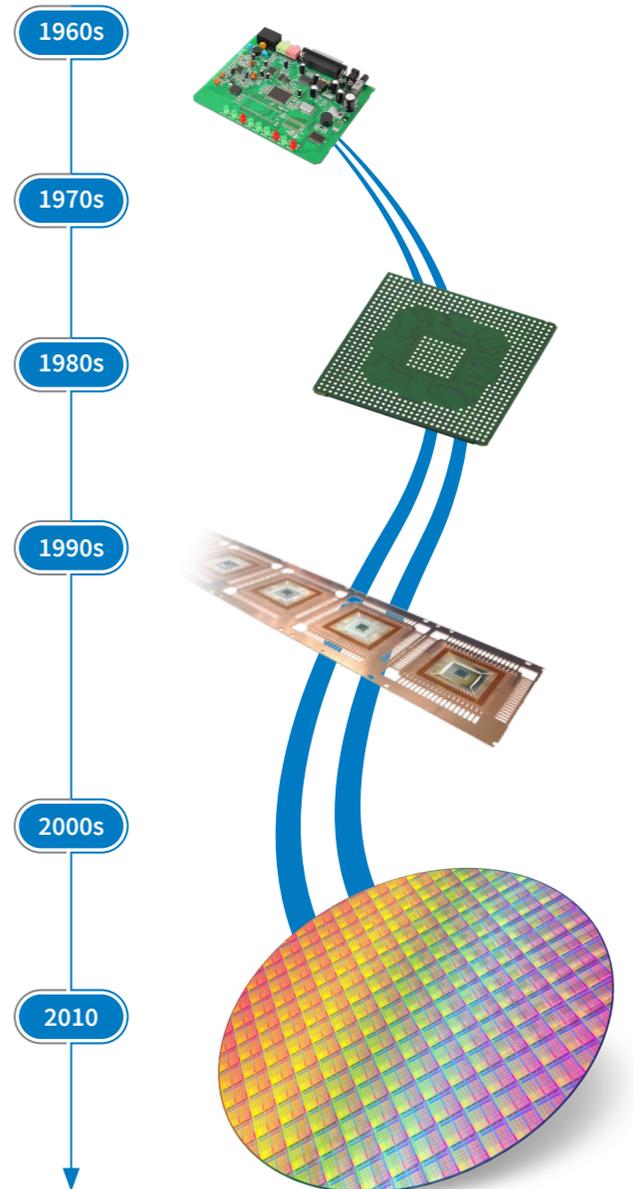
For over fifty years DAGE has been the market leading provider of award winning Bond Test Systems.

Produced at our state of the art production facility in Aylesbury, UK and engineered for excellence to ensure ultimate accuracy and repeatability, DAGE Bondtesters are at the forefront of technology to meet the wide range of applications required by our customers.



Pioneers of Bond Testing

- DAGE established
- First dedicated Bondtesters introduced
- BST12 pull system launched with pull capability up to 100g
- Introduction of Bondtesters with selectable destruct and non-destruct modes
- Adjustable load rate introduced
- MCT20/22 introduces microprocessor control
- First intelligent tool landing and ball shear
- BT22A increases load range to 20kg
- First PC controlled Bondtester, the PC2400
- Hot bump pull load cartridge invented by DAGE
- Industry standard 4000 Bondtester launched
- Series 5000 launched pioneering 25µm ultra-fine pitch
- Cold bump pull test patented by DAGE
- Patents granted on DAGE load cartridge
- Rotating shear load cartridge introduced
- 4000Plus Bondtester launched, industry first dual Bondtester and Micro-materials tester
- Paragon™ software introduces camera assist automation
- 4800 INTEGRA™ with EFEM integration and SECS/GEM



The Right Product for the Right Application

Production

4000
The Gold Standard Bondtester

4000 OPTIMA
Production Bondtester

4000PLUS
Advanced Bondtester

Bond Testing

Operator-Free

4600
Automated Bondtester

4600-W, LF
Automated Parts Handler

4800 INTEGRA™
CLEAN ROOM
Semiconductor Wafer Tester

Automated Bond Testing

R&D

4000 HS
High Strain Rate Tester

PROSPECTOR™
Micro-Materials Tester

Materials Testing

Gold Standard Bondtester - Series 4000

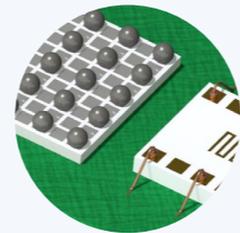
Advanced Bondtester - 4000Plus

Fast set-up, easy to learn, maximum comfort.

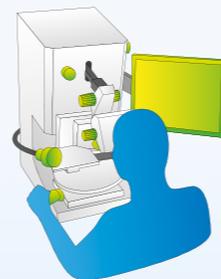
Superior accuracy for complex samples and advanced test types.



Simple PCBAs and components



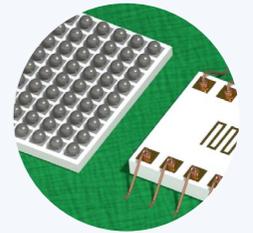
Ergonomic and easy-to-use



High precision



Complex and high density components



High accuracy and high flexibility



Very high precision



“ I spend a lot of time manually testing. I chose the 4000 as it is the most ergonomic and easy-to-use system. ”

“ My samples are complex with a wide variety of components. The 4000Plus gives me the accuracy and flexibility I need. ”

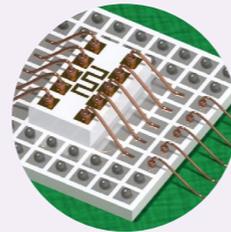
Automated Testing - 4600 Series

Maximum repeatability for the most demanding applications.



“ My interconnects are extremely small and it is crucial to remove operator influence. The 4600 ensures each test is 100% reproducible. ”

Highest complexity products



Maximum repeatability and accountability

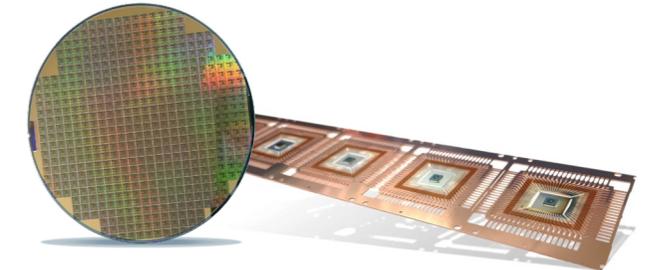


Ultimate precision



Automated Applications

Automatic parts handling with the 4600-W and 4600-LF.



Remove handling errors and operator influence with automated benchtop product handling. Applicable for lead frames and wafers up to 200mm.

Automatic battery cell inspection and testing - 4600 Battery.



Test every connection before your batteries leave the factory. The 4600 Battery non-destructively tests 100% of welds.

Dedicated Wafer Tester - 4800

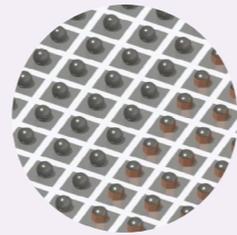
Semiconductor Wafer Tester - 4800 INTEGRA™

High density interconnect quality control.

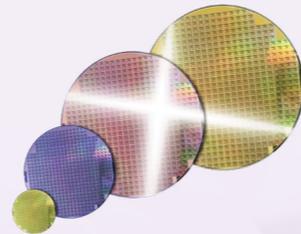


“ I perform front end testing on bumps and pillars for a range of wafer sizes. The 4800 even handles my extremely warped wafers. ”

Micro-bumps, micro pillars



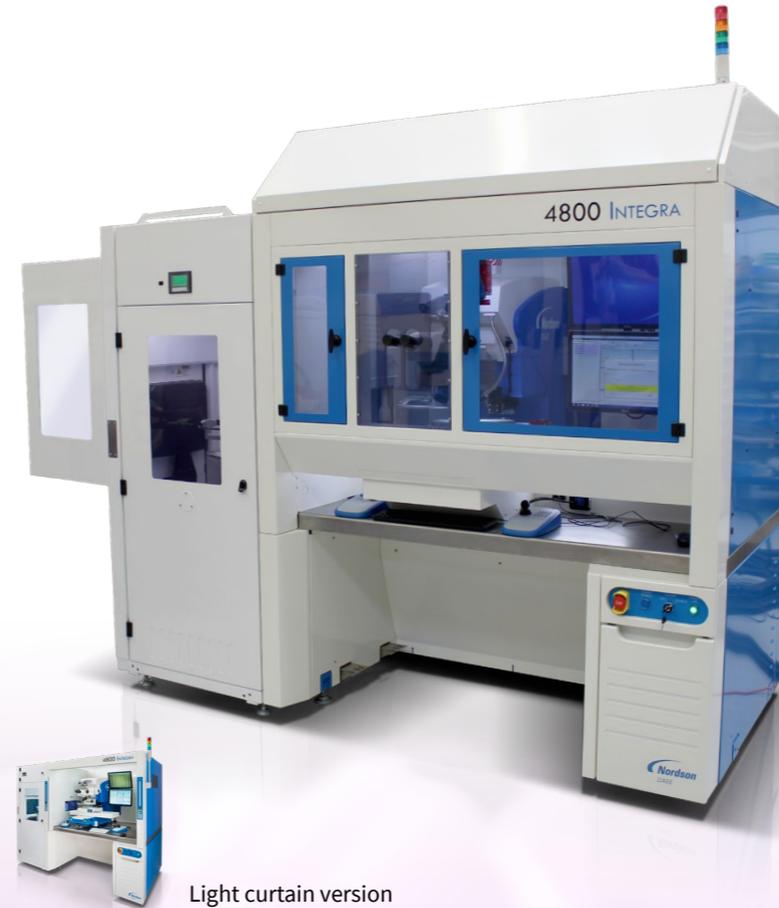
50mm - 450mm wafers



Ultimate precision

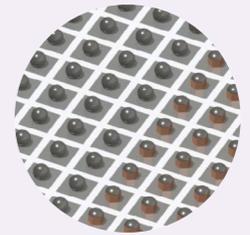


Integrated wafer handling that's clean room compatible.

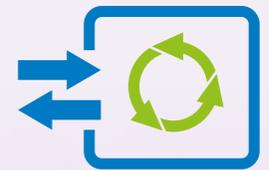


“ I test a high volume of wafers and achieve the highest throughput with the 4800 INTEGRA. ”

Micro-bumps, micro pillars



Island of automation



Extreme precision



Robotic handler

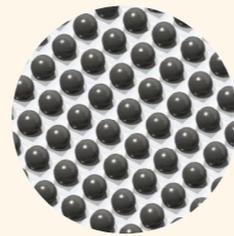
High Strain Rate Tester – 4000HS

Characterize lead free solder and replicate board drop testing using high strain rate tests.



“ I need to qualify the performance of new solder. I can only achieve this with high strain rate testing. ”

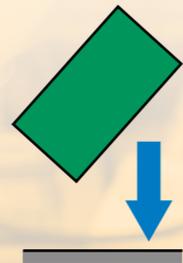
Solder and bumps



Solder characterization



Drop testing simulator



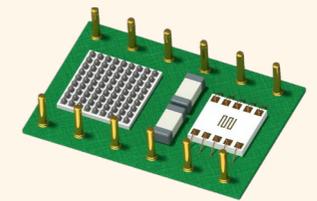
Made for *Micro*™ – Prospector™

Bend, fatigue, creep testing and more with our advanced micro-materials tester.

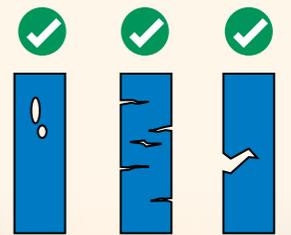


“ I qualify new devices and materials before they are transferred to production. Now I can characterize every component and even do lifetime testing. ”

Entire PCBA



Find complex and unique failure modes



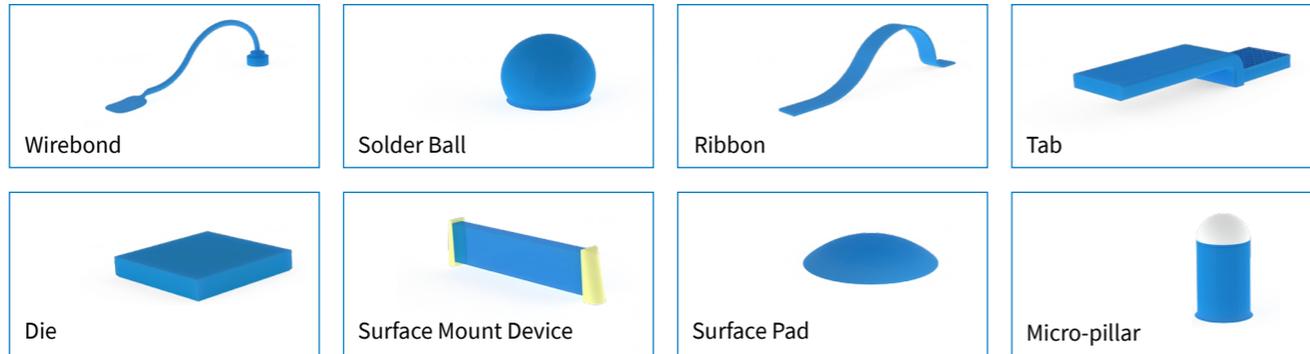
Unique test modes



Electrical Thermal

Find Every Failure

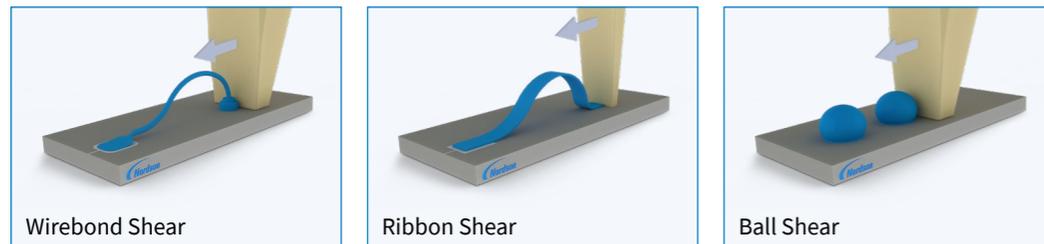
Test Components



Standard Pull Tests

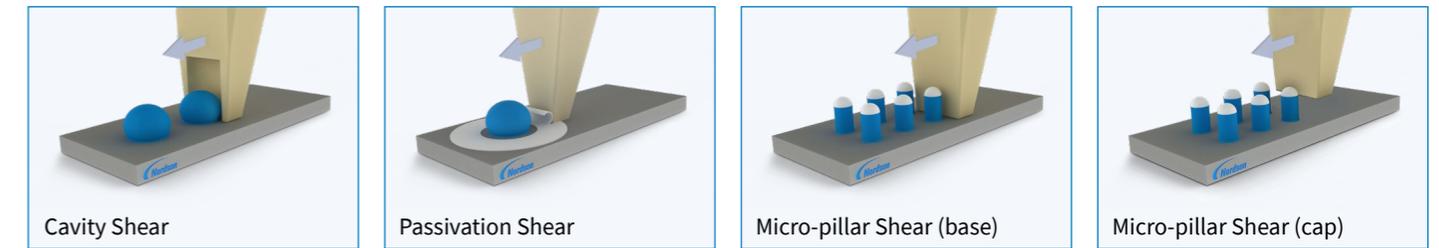


Standard Shear Tests

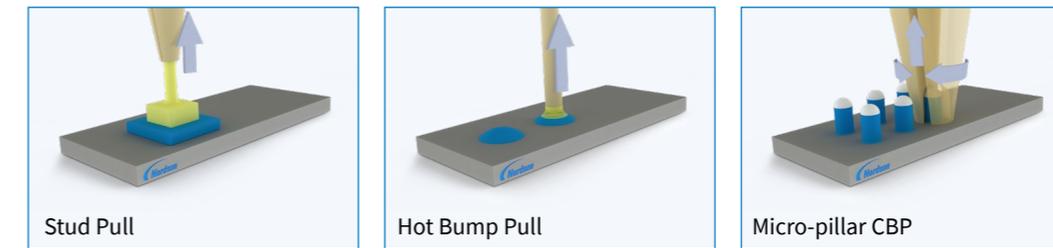


Advanced Tests

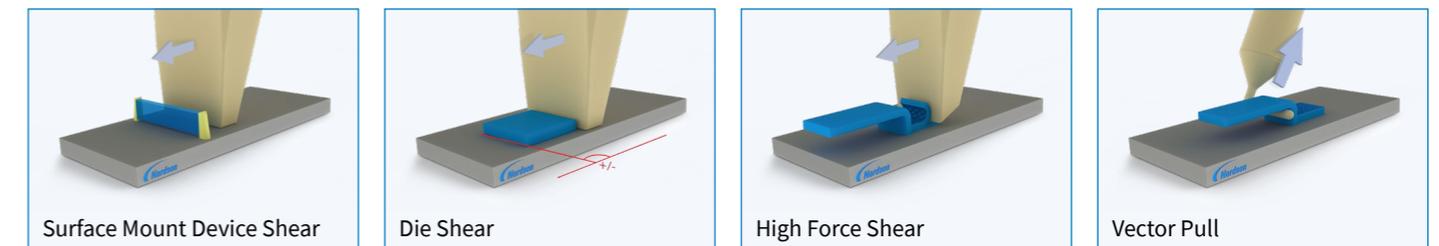
Variable heights and dimensions.



For difficult to grip or small dimensions.



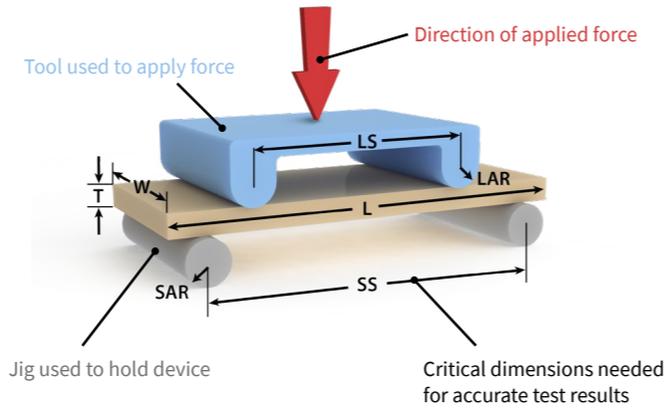
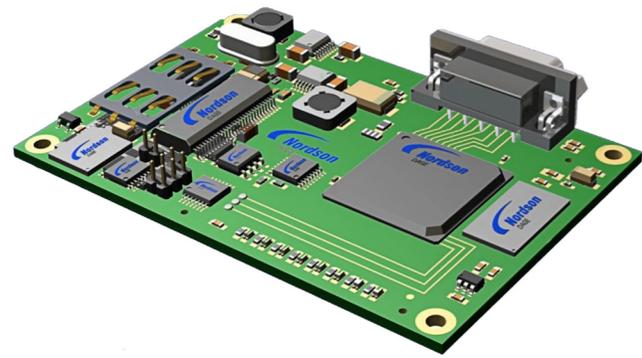
Larger components and higher forces.



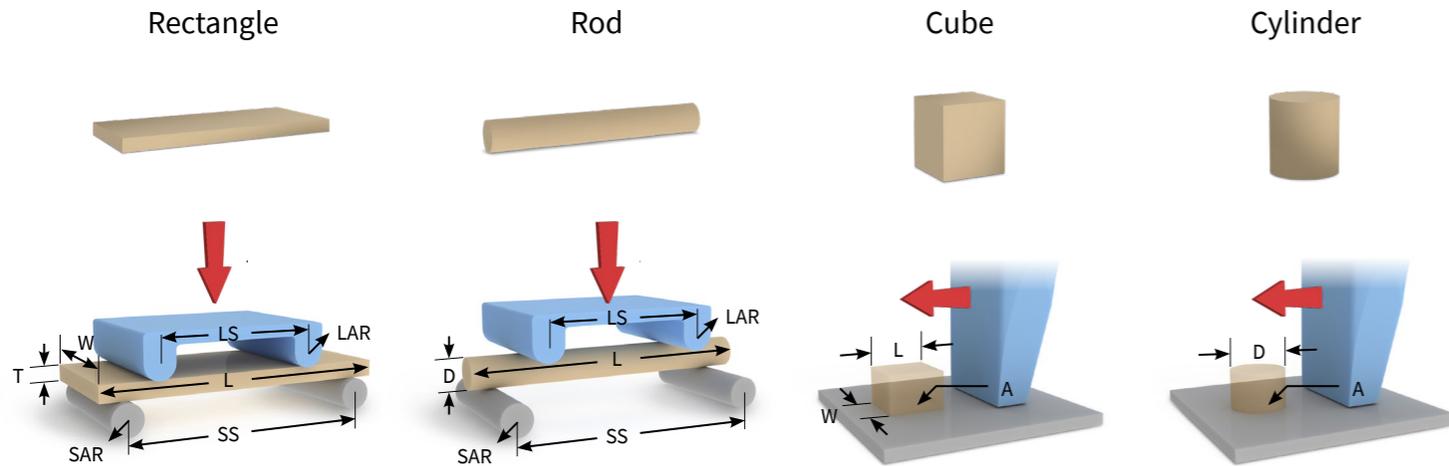
Micro-Materials Testing

Component dimensions vary significantly for micro-materials testing (mm – μm).

Defining the test geometry and sample dimensions enables measurement of underlying materials properties.



Knowing the sample shape and size is critical for data analysis.

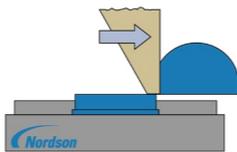
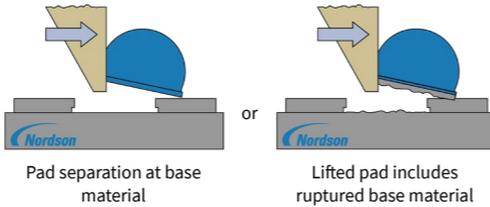
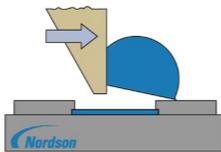
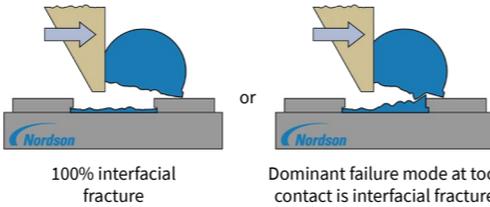


Micro-Materials Test Types

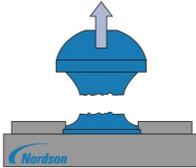
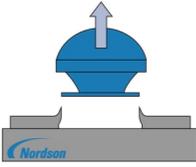
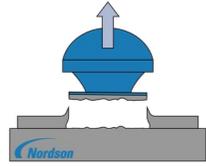
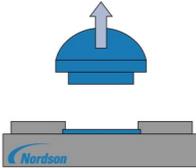
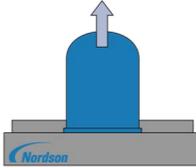
- Material Properties
- Component Lifetime
- Load and Displacement Control
- Stress and Strain
- Statistical Analysis

Bond Test Failure Modes

Solder Ball Shear Testing

Failure Mode	Description	Illustration
Ductile	Solder ball fracture at or above the surface of the solder mask within the bulk solder material.	
Pad Lift	Solder pad lifts with solder ball; lifted pad may include ruptured base material.	 <p>Pad separation at base material or Lifted pad includes ruptured base material</p>
Ball Lift	Solder ball lifts from pad; pad is not completely covered by solder/intermetallic and the top surface of the pad plating is exposed.	
Interfacial Break	The break is at the solder/intermetallic interface or intermetallic/base metal interface. The interfacial fracture may extend across the entire pad or be the dominant failure mode at the tool contact region.	 <p>100% interfacial fracture or Dominant failure mode at tool contact is interfacial fracture</p>

Solder Ball Pull Testing

Failure Mode	Description	Illustration
Type A: Ductile	A – Ductile: Solder ball fracture at or above the surface of the solder mask within the bulk solder material.	 <p>Ductile (pad fracture surface view) </p>
Type B: Quasi-Ductile	B – Quasi-Ductile: Mixed ductile/brittle fracture with the dominant failure mode (>50% area) being ductile.	 <p>Quasi-Ductile (pad fracture surface view) </p>
Type A: Pad Lift Or Type B: Pad Crater	A – Pad Lift: Solder pad lifts with solder ball. B – Pad Crater: Lifted pad includes ruptured base material.	 <p>Pad Lift</p>  <p>Pad Crater</p>
Non-wet	Solder ball lifts from pad and any portion of the pad top-surface plating is exposed.	
Type A: Brittle	A – Brittle: The break is at the solder/intermetallic interface or intermetallic/base metal interface.	 <p>Brittle (pad fracture surface view) </p>
Type B: Quasi-Brittle	B – Quasi-Brittle: Mixed brittle/ductile fracture with the dominant failure mode (>50% area) being brittle.	 <p>Quasi-Brittle (pad fracture surface view) </p>
Ball Extrusion	Solder ball is stretched but not fractured. Invalid failure – repeat test with replacement solder ball samples after appropriate adjustments.	

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