Outermost Technology

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Board Level Reliability Test (BLRT)

Reliability Testing

Why Work with Us?

Scalable Cost
Test labs in US and Asia

Advice & Project Management
Compliments your native skill sets

Continuous Communication
During the entire testing process

ISO, AEC, & IPC
Certified operations

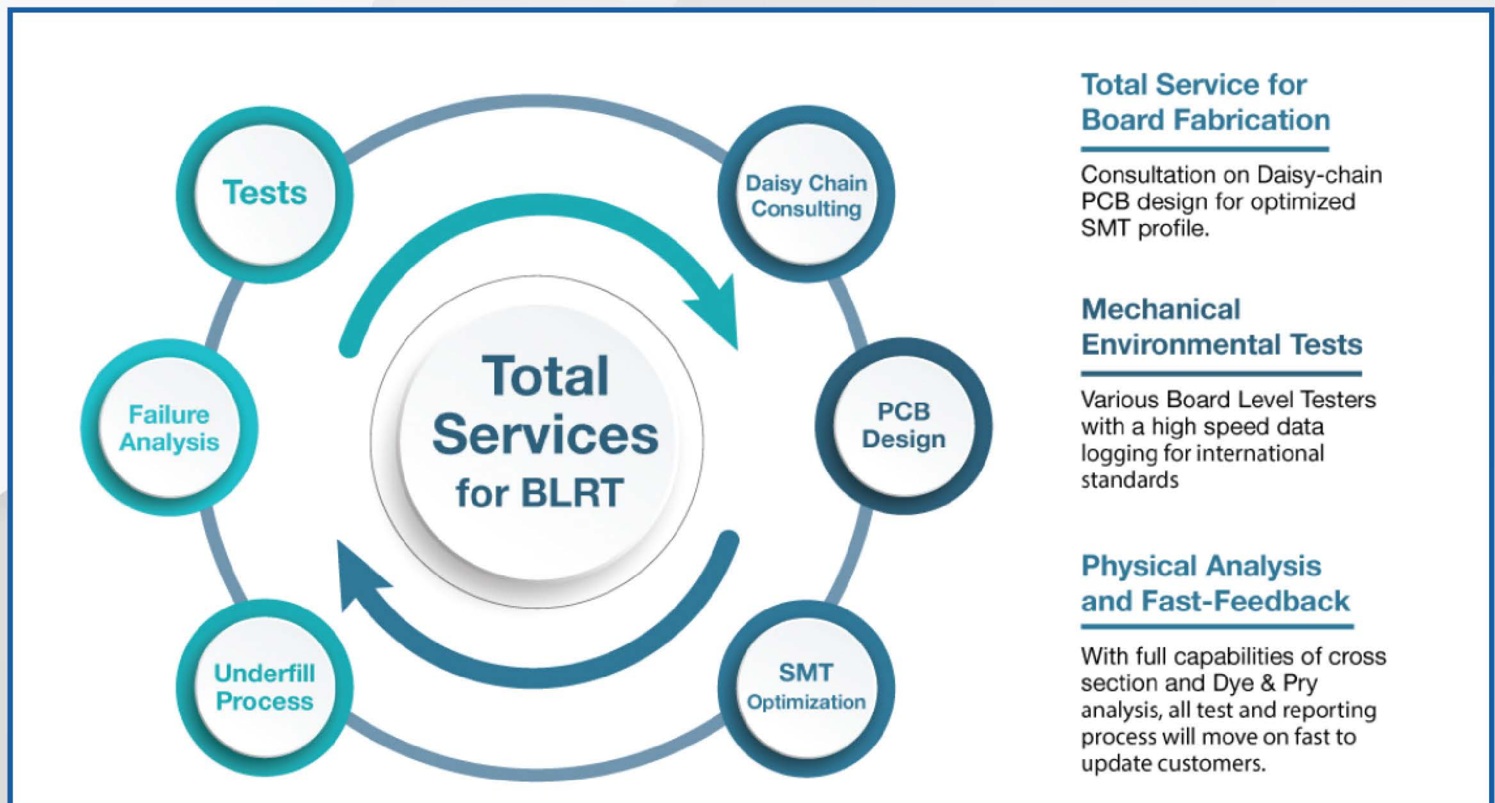
What is BLRT

Assesses reliability of PCB fabrication and IC package solder mounting

- Lamination
- Filled vias
- Annular rings
- Soldered joints/solder balls

Why BLRT

- Ensures reliable interconnect performance under extreme conditions
- Critical assessment for portable, wearable, and automotive devices



Total Service for Board Fabrication

Consultation on Daisy-chain PCB design for optimized SMT profile.

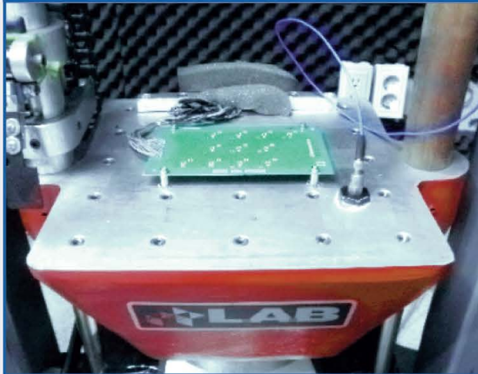
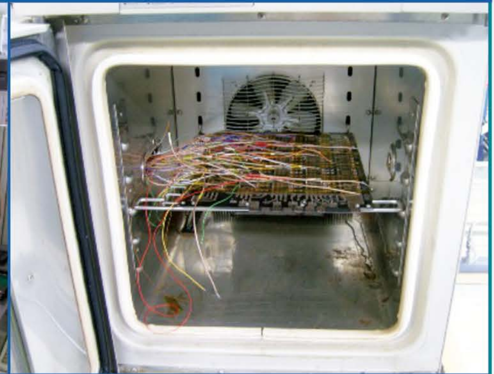
Mechanical Environmental Tests

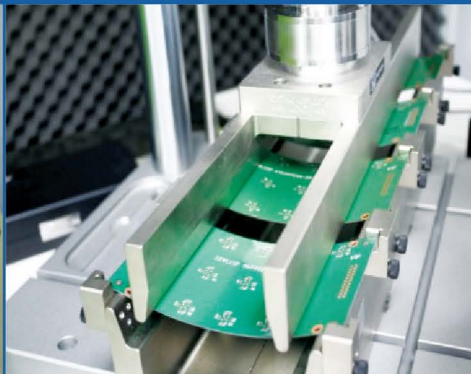
Various Board Level Testers with a high speed data logging for international standards

Physical Analysis and Fast-Feedback

With full capabilities of cross section and Dye & Pry analysis, all test and reporting process will move on fast to update customers.

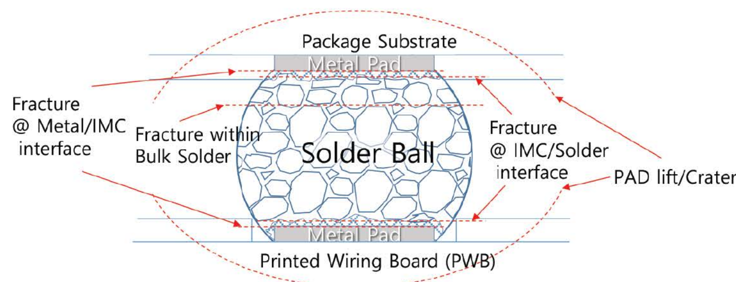
Board Level Reliability Test (BLRT)

Mechanical Shock 1 & 2	Temperature Cycling	Ion Migration
		
Twist and bending stress occur during drop events especially common for hand-held devices	Exposure of products to low and high temperatures might cause cracks and delamination of the package	The increase of current density in the bump due to shrinking critical dimensions favors electro-migration of solder

Vibration	Cyclic Bending	Temperature Humidity High Temperature Storage
		
Repeated vibrations with high accelerations are regarded as common stress in the automotive applications	As bending occurs both in production and under normal usage conditions, testing resistance to bending is essential	IMC is a critical layer that affects the reliability of the joint. This test studies the effect of high temperatures on the IMC

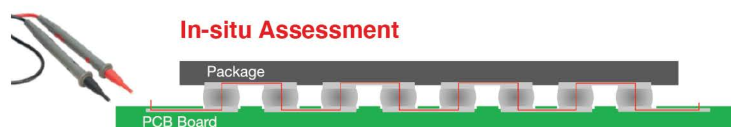
BLRT Process

BLRT detects failures in the solder joint within the solder ball or at the interfaces with the intermetallic compound (IMC).



In addition, any physical deformation in the solder pad will be noted. The mode of each failure will be determined after cross section and imaging.

Before performing the BLRT tests, the component (package and solder balls) is connected to the PCB board by solder mount technology (SMT) to form a daisy chain as described below:



Board Level Reliability Test (BLRT)

Typical Test Conditions

Item	Conditions	Unit
Mechanical Shock 1	1500 g, 0.5 ms; 240 times	# of Times
Mechanical Shock 2	10,000 g, 0.2 ms; 240 times	# of Times
Vibration Test	5 Hz~500 Hz, 30 min by axis with 5 g; 2 hrs	Hours
Cycling Bend Test	Displacement 2.0 mm/1 Hz; 200,000 times	# of Times
Temperature Cycling	5~15°C/min; 500 hrs	Hours
Temperature Humidity Storage	85°C, 85% R.H; 500 hrs	Hours
High Temperature Storage	150°C; 500 hrs	Hours
Board	Daisy chain PCB including SMT	Test
Ion Migration	Contact us for details	

Typical Test Conditions for Mobile & Wearable Devices

<table>
<tr><th>Item</th><th colspan="4">Conditions</th><th>Standard</th></tr>
<tr><td rowspan="4">Mechanical Shock</td><td>Acceleration</td><td>Time</td><td colspan="2">Test Direction/# of Test</td><td rowspan="4">JESD22-B111A</td></tr>
<tr><td>1,500 g</td><td>0.5 ms</td><td colspan="2">-Z axis/1,000</td></tr>
<tr><td>1,500 g</td><td>1.0 ms</td><td colspan="2">-Z/10</td></tr>
<tr><td>5,000 g</td><td>0.25 ms</td><td colspan="2">+Z, -Z/9</td></tr>
<tr><td rowspan="5">Temperature Cycling</td><td>Temp. Range</td><td>Temp. Change Rate</td><td>Temp. Hold Time</td><td>Cycles</td><td rowspan="4">JESD22-A104E</td></tr>
<tr><td>-40°C~125°C</td><td>14°C/min</td><td>10 min</td><td>500</td></tr>
<tr><td>-40°C~85°C</td><td>20°C/min</td><td>23 min</td><td>1,000</td></tr>
<tr><td>-40°C~85°C</td><td>15°C/min</td><td>10 min</td><td>over 220</td></tr>
<tr><td colspan="4">Frequency: 1 Hz/direction: -Z, displacement: 2.0 mm, 200,000 cycles</td><td rowspan="2">JESD22-B113</td></tr>
<tr><td>Cyclic Bending</td><td colspan="4">Loading rate: 1.6 mm/sec, direction: -Z,max strain: 2,300με, 3 cycles (No under-fill)
Loading rate: 1.6 mm/sec, direction: -Z,max strain: 3,800με, 3 cycles (Under-fill)</td></tr>
<tr><td>Monotonic Bending</td><td colspan="4">Loading rate : 2 mm/min/direction: -Z, max strain: 5,000με</td><td rowspan="2">JESD22-9702</td></tr>
<tr><td rowspan="2">Vibration</td><td colspan="2">Sine</td><td>Random</td><td>Time</td></tr>
<tr><td colspan="2">Acceleration: 5 g
Frequency Range: 5~500 Hz</td><td>Acceleration: 1.24 grms
Frequency Range: 2~500 Hz</td><td>30 min
per axis</td><td>JESD22-B103</td></tr>
<tr><td>Temperature Humidity Storage</td><td colspan="4">Temperature: 85°C, humidity: 85%R.H, 1,000 hrs</td><td>JESD22-A101</td></tr>
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