



INTERCONNECT STRESS TEST

Testing Reliability,
Detecting Weak-Spots,
Ensuring Quality

WÜRTH ELEKTRONIK MORE THAN YOU EXPECT

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TESTING RELIABILITY, DETECTING WEAK-SPOTS, ENSURING QUALITY

ENSURING RELIABLE PCBs

The demands on electronic assemblies are constantly increasing. On one hand, shorter development cycles are required due to cost and time pressures. On the other hand, harsh operating conditions lead to specifying higher reliability for the modules. In addition, high-value components are in use, whose replacement is both costly and time consuming. For reliability, the circuit board itself plays a crucial role. Thus, alternative solutions are needed to test and evaluate reliability.

At Würth Elektronik we offer the Interconnect Stress Test (IST) as a method to ensure the reliability of circuit boards. Test coupons, based on the product design, are examined with the IST. These test coupons will experience an accelerated lifetime test. The test represents the thermal stress from soldering as well as the thermal operating conditions in the end application.

The test coupon design enables an easy location and microsection analysis of any failures. With the exact failure data, we generate a failure distribution, which delivers more information than just the failure data points. The combination of microsection analysis and failure distribution enables conclusions to be drawn for weak points and circuit board reliability, before delivery of the circuit board.

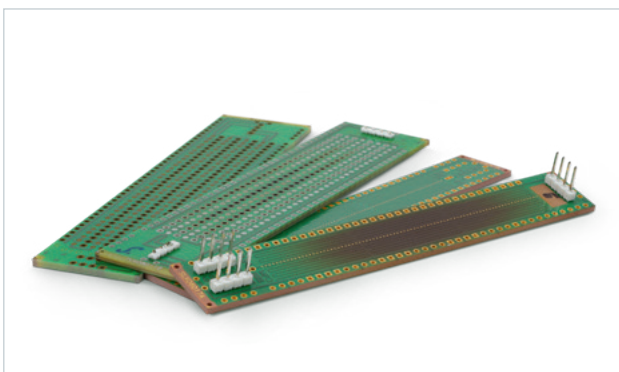
We advise our customers in advance, so you can rely on our experience and expertise in the Interconnect Stress Test. Thereby we can set suitable test parameters that lead to sound results. Furthermore we analyze the results and work together with you to define any further procedures.

PROCEDURE AND PROCESS



Test Parameters

- Planning and consulting with recommendations for test conditions
- The test parameters are critical for the meaningfulness of the reliability test
- Follow-up consultation and support with our experience and expertise



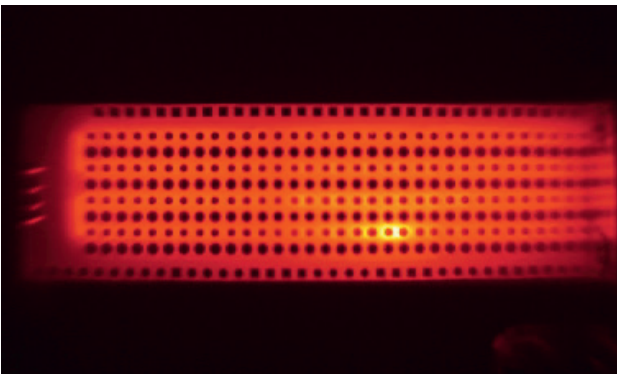
Test Material

- Specific test coupons are based on the product design
- Modelling of the soldering load and the use cycles
- Sacrificial coupon needed for the IST machine setup (required for determining current for simulation of soldering load)



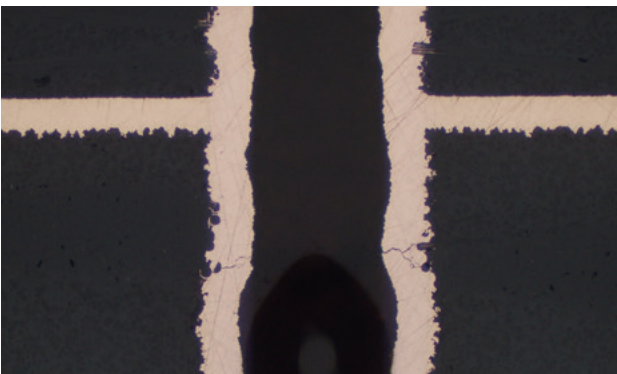
Test Method

- Up to 8 test coupons can be tested simultaneously
- Heating of the test coupons by current feed, cooling by ventilation with ambient air
- Real time measuring of the electric resistance of all test coupons
- Failure criterion: Threshold change in resistance
- Test stops for individual coupons that have reached the threshold failure criterion
- Recording of resistance change and cycles for all circuits



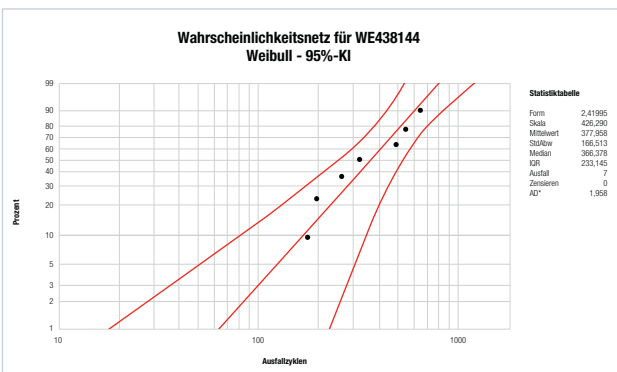
Error Detection

- Current feed of test coupons with a thermal camera
- Weak spots with high resistance are depicted as a "hot-spot"
- Defect locations will be examined for failure analysis



Failure Analysis

- Microsection of the defect location on the test coupon
- Analysis of 3 failures (first, middle and last failure)
- Microsection images of defects provide information about the failure mechanism and source of defect



Statistical Evaluation

- Key element for depiction and analysis of results
- Illustration of the failures with a Weibull distribution
- Assertion about distribution and reliability by form factor and scale value
- Wöhler curve enables extrapolation of the first failure at different operating temperatures



APPLICATIONS FOR THE INTERCONNECT STRESS TEST

- **Product development**
 - Technology qualifications
 - Product releases
 - Evaluation of technology- and design variations
- **Product qualification**
 - Qualification
 - Verification
 - Documentation
- **Product monitoring**
 - Design optimization
 - Process and product troubleshooting
- **Assemblies with high costs and long re-procurement times**
- **Supplier qualification and quality monitoring**
- **High end electronic products**
 - Specification according to IPC class 3 product classification
 - Medical applications
 - Space-, security- and military technology
 - Automotive applications, motorsports, commercial vehicles



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