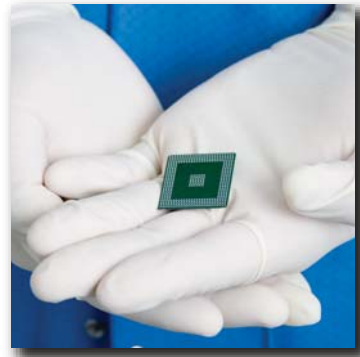


# Best-in-Class Services

## ESD and Latch-Up Services



ESD and Latch-Up testing of electronic components is an expensive part of the design and manufacturing of new products. Increased integration and smaller device geometries increase the risk of device failure due to ESD (Electrostatic Discharge). If those failures happen in the field it will significantly effect customer satisfaction and reliability.

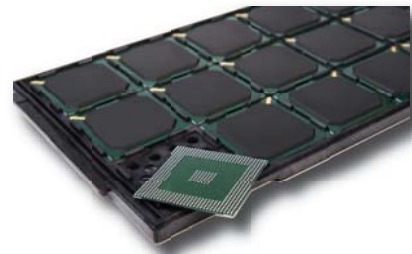
EAG has deep knowledge in providing quality and fast support for your ESD and Latch-Up testing needs.

## ATE Services

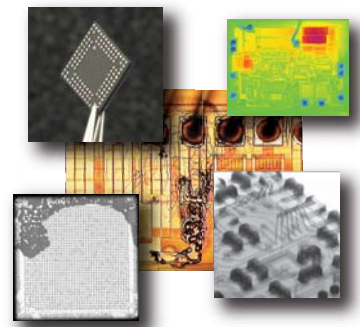
Whether you want a single product tested or you are considering outsourcing all of your testing services, as a full turn-key solutions provider EAG will meet your requirements.

EAG's professional Development Services are comprehensive and utilize standardized test development modules providing cost effectiveness, efficiency and fast development times. What's more, EAG is committed to giving our clients as much flexibility in their service options as they have in developing your products. EAG offer you a full portfolio of choices, ranging from Test Program Development, Electrical Characterization, Test Limit Evaluation, Test Cost Reductions and Multi-site Conversions.

Whatever solution you choose, you'll receive services closely attuned to your requirements, from a provider known for delivering technical excellence and top-flight value. When it needs to be done right, you can count on ATE Services from Evans Analytical Group.



## Failure Analysis Services



EAG provides failure analysis services within the context of our client's commitment to achieve high quality and reliable products at a reasonable cost. Our commitment to achieving this goal has been repeatedly demonstrated in providing testing services that are designed to compliment your internal lab capabilities or to provide full outsourced failure analysis. EAG has optimized service offerings to provide you with the maximum value, fast response, extensive product and system level knowledge, and the widest array of analytical tools. EAG is an integrated laboratory with an unmatched knowledge base that is accessible to all of our clients through our engineering staff. When it needs to be done right, you can count on EAG.

Visit [www.eaglabs.com](http://www.eaglabs.com) for more information about all of EAG's services and solutions.

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## Reliability Qualification Services

# Reliability Qualification Services

Evans Analytical Group® (EAG), is a leading independent provider of integrated testing services and materials characterization. Our services support clients in the development of semiconductor integrated circuits and the development of new materials. With over three decades of supporting clients, EAG is at the forefront of innovation in working with a wide range of newly emerging materials and innovative new products.

As a long term outsource provider to the worlds leading technology companies and new start-up technology innovators, EAG is a proven business partner and we understand many of the challenges facing our clients. We continue to be committed to working closely with our clients who count on fast turnaround times and complete confidentiality.

## Reliability Qualification

Reliability qualification demonstrates the fitness of a product for use in the field and helps our clients better understand the fundamental wear-out mechanisms, detect design marginality combined with parameter drift and determine failure rates due to latent manufacturing defects. EAG provides stress based reliability qualification and knowledge based reliability qualification methodologies based on industry standards. EAG has optimized our services so no matter if you need maximum value and fast response or complete outsourced services, EAG's experienced Reliability Engineers can create qualification plans and perform testing to meet your requirements with strict adherence to applicable JEDEC and MIL-STD specifications.

### Stress Based Testing

Stress based qualification methodology provides a broad approach to identifying failure mechanisms and is a powerful tool to help engineers identify devices that may fail under normal use conditions. Thermal cycling, bias/humidity stress testing are conditions which many products experience and test conditions are designed to accelerate failures compared to field conditions.

### Knowledge Based Testing

Knowledge based qualification methodology is based upon detecting and understanding specific failure mechanisms. When a failure mechanism is known, accelerated testing can be designed to detect those failures prior to placing a product in the field.

## Testing Methods

### Moisture/Reflow Sensitivity Classification

IPC/JEDEC J-STD-020

This test is used to determine the classification level of nonhermetic solid state surface mount devices (SMDs) that are sensitive to moisture-induced stress so that they can be properly packaged, stored, and handled to avoid damage during assembly, solder reflow attachment, and/or repair operations. This will determine the classification level that should be used in Preconditioning.

### Preconditioning

JESD22-A113

Preconditioning is to measure the resistance of nonhermetic surface mount devices to worst-case moisture absorption followed by one cycle of the soldering process and two cycles of rework. A statistical sample of parts is inspected with an acoustic microscope before and after preconditioning. Before they undergo the temperature humidity bias test, the temperature cycle test, the thermal shock test, the pressure cooker test or the highly-accelerated temperature and humidity stress test, surface mount devices are subjected to preconditioning and must later pass a final electrical test.

### HTOL (High Temperature Operating Life Test)

JESD22-A108

MIL-STD-883 Method 1005.8

EIAJ-ED4701-D323

High temperature operating life (HTOL) test is to determine the reliability of products by accelerating thermally activated failure mechanisms. Customer parts are subjected to elevated temperatures under biased operating conditions. Typically, dynamic signals are applied to the devices under stress. The typical Vcc is the maximum operating voltage. The test is used to predict long term failure rates. All test samples must pass final electrical test prior to HTOL testing.

### High-Temperature Storage Life Test (HTSL)

JESD22-A103

MIL-STD-883 Method 1008

The high-temperature storage life test measures device resistance to a high-temperature environment that simulates a storage environment. The stress temperature is typically set to 125°C or 150°C to accelerate the effect of temperature on the test samples. In the test, no voltage bias is applied to the devices.

### Temperature Cycling (TC) Air to Air

JESD22-A104

MIL-STD-883 Method 1010.7

Temperature cycle testing accelerates fatigue failures within a specific die and packaging system. Typical failure mechanisms include die cracking, package cracking, wire bond failure, and first or second level interconnect solder fatigue. The temperature cycling is done in one, two, or three chamber systems that control the air temperature and ramp rate. Ten different temperature conditions and four different soak modes are specified, and the combination of temperature condition and soak mode depends on customer requirements.

### Thermal Shock (TS) Liquid to Liquid

JESD22-A106

MIL-STD-883 Method 1011.9

Thermal shock testing is similar to temperature cycle testing, except that in thermal shock tests an additional stress is provided: a sudden change in temperature due to a rapid transfer time. Thus the test can detect failure mechanisms caused by temperature transients and temperature gradients. The system has two inert fluorocarbon baths that are maintained at the temperature extremes described in the spec. Four different combinations of bath temperatures and dwell times are specified, and EAG engineers can help you choose the conditions that are applicable for your part.

### 2nd Level Interconnect Testing

IPC 9701

Air to air temperature cycling of customer supplied test vehicles is performed to determine the performance and reliability of 2nd level solder joints. This type of testing establishes different levels of performance and reliability of the solder attachments of surface mount devices to rigid, flexible and rigid-flex circuit structures.

### Temperature Humidity Bias (THB)

Life Test 85°C/85% relative humidity

JESD22-A101

EIAJ-IC-121-17

The temperature-humidity-bias test is an environmental test designed to accelerate corrosion and dendritic growth. Although bias is applied, the part is typically put in a low power state to accelerate the failure mechanisms of interest while minimizing self-heating. The duration of the test is 1008 hours, with readouts (final electrical tests) at 168 hours and 504 hours during the test. The stress temperature is 85°C, and the relative humidity is 85%. The bias voltage is typically the maximum operating voltage. Samples of surface mount devices must undergo preconditioning and pass a final electrical test prior the THB test.

### HAST (Highly Accelerated Temperature and Humidity Stress Test)

JESD22-A110 (biased)

JESD22-A118 (unbiased)

The highly accelerated temperature and humidity stress test (HAST) accelerates the same failure mechanisms as the 85°C/85% relative humidity test. The typical test conditions are 130°C/85% relative humidity, under pressure, and non-condensing. The test accelerates the penetration of moisture through the external protective material (encapsulated or seal) or along the interface between the external protective material and the metallic conductor, which pass through it. Samples of surface mount devices are subjected to preconditioning and a final electrical test prior to the highly accelerated temperature and humidity stress test.

### Autoclave or Pressure Cooker Test

JESD22-A102

EIAJ-IC-121-18

The pressure cooker test is an environmental test that measures device resistance to moisture penetration. It is a highly accelerated test that employs conditions of pressure, humidity and temperature. The test conditions are 121°C/100% relative humidity, under pressure, with moisture condensation. Samples of surface mount devices are subjected to preconditioning and a final electrical test prior to the pressure cooker test. After the pressure cooker test, the leads of the test samples can be cleaned before the final electrical test.

