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The chemistry you trust. The support you need.™

Product Note

Hydrogen & Water Getter, Commercial, Type HWGC

The Problem

As long as electronic and optoelectronic devices have been packaged in high reliability hermetically sealed packages there have been problems caused by outgassing of hydrogen and water vapor. These problems run the gamut from hydrogen induced damage to GaAs circuits to corrosion caused by water vapor. The literature is extensive on the problems and their solution. Please see the references section at the end of this tech note for further information.

The Solution

Reliability issues caused by hydrogen and water are typically resolved by a combination of process improvements and by the use of active materials called getters which react with the contaminants to remove them from the system. In commercial high reliability packages it is common to use a getter material that will sorb both hydrogen and water vapor. Active Material's HWGC type getter sorbs both species using well understood chemistry in use since the 1960s. HWGC is configured for convenient mounting in a package.

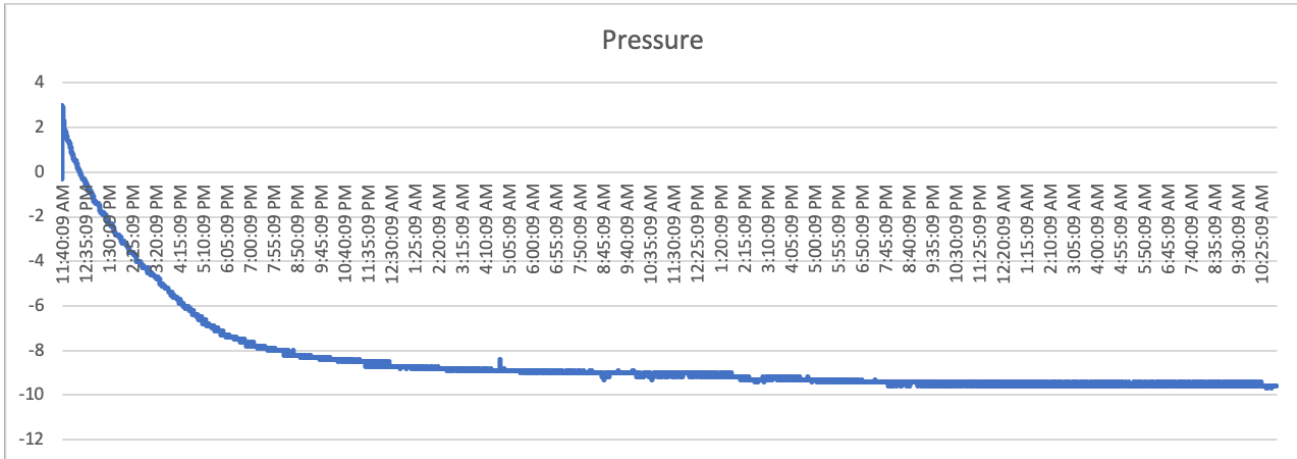
Flexible Configuration

Standard HWGC is provided as a thin molded sheet, 4" x 5" (10.2 cm x 12.7 cm), nominally 0.010" (0.254 mm) thick. The sheet is protected by mylar release liners on both sides. Custom configurations to include molded parts can be quoted on request.

Performance

- HWGC has a hydrogen capacity of ≥ 34.2 torr-liters per gram (45 scc/g) of getter material.
- Moisture capacity varies with the degree of activation of the getter with a practical maximum of 3 to 5 wt%. Active Materials offers a water only getter material with a similar form factor if additional water vapor capacity is required.
- HWGC is flexible from -55C to 150C.
- HWGC is thermally stable to 200C.

Final hydrogen and water vapor concentrations reached in a hermetically sealed device depend on the getter being properly sized for your application and activated. Active Materials engineers are available to assist you in determining the amount of HWGC needed.



HWGC Delta P Sorption Test Curve, Lot 20180904

Example hydrogen sorption curve by delta P for a HWGC getter activated in vacuum at 150C for over 16 hours. The test was run for 47 hours until the end point was called. The hydrogen capacity at end point for this lot is:

38.18	torr-liter/g
50.23	scc/g
38181.82	cc-torr/g

The average sorption speed over the duration of the test is 0.81 torr-liters/hour or 1.07 scc/hour. This rate greatly exceeds the typical hydrogen outgassing rates experienced in microelectronic packages.

The critical design factor is to have enough gettering capacity to meet the system lifetime requirement plus a factor of safety to cover the edge cases in mission critical service like medical devices. While this capacity can be modeled, Active Materials strongly recommends proper determination of the gas loads to be gettered via proper analytics. We highly recommend Oneida Research, www.orslabs.com.

Using HWGC

HWGC is simple to use. Cut an area of the sheet sized to provide the desired hydrogen capacity. The Active Materials engineering team provides assistance in determining how much HWGC to use. Before attaching the getter please remove the release liner on either side of the getter. The getter is typically attached to the desired area of the package using either silicone or epoxy adhesives depending on the surface it is to be attached too. Please contact us for suggestions.

After the adhesive has cured, HWGC must be activated for the water gettering component to work. Getter activation requires temperatures above 100C in a dry or vacuum ambient. A very conservative activation

profile in common use in industry is to expose the getter to rough vacuum at 150C for a minimum of 16 hours. Activation profiles with lower temperatures/time/in air are possible. Please consult with your Active Materials representative for assistance in integrating HWGC into your process.

After activation is complete exposure to air must be minimized as the water gettering component will rapidly rehydrate. Assembly and seal in a dry gas environment is strongly recommended to preserve maximum getter performance.

Customer Support

Our team has decades of engineering experience in getters, gettering, analytics and device packaging. We can help you solve your problems whether it be with gettering materials or engineering services. Please contact us today!

References

“Hermeticity of Electronic Packages,” Hal Greenhouse et al

“Moisture in Microelectronics: Physics and Chemistry of Volatile Species in Hermetic Electronic Devices,” Phillip wh Schuessler

There is a large body of interesting information on the Oneida Research web site at <https://www.orlabs.com/publications/>

Active Materials maintains a large library of literature related to outgassing, getters and gettering, leaks and other topics of interest to the practitioner. Please let us know if we can be of help.

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