

HD MicroSystems™

LIQUID POLYIMIDES

Wafer Level Chip Scale Packaging

In today's mobile world, consumers are demanding smaller size, less weight and more functionality from their portable devices such as mobile phones, PDA's, lap top computers, MP-3 players, and GPS navigation devices. As a result, electronic packaging designers are facing increasing challenges to reduce component size and weight for this expanding portable communication market and at the same time improve the cost effectiveness, reliability and performance of these devices. Wafer Level Chip Scale Packaging, (WL-CSP), in various forms assists the designer in meeting these needs.

Challenge

Driven by the need for higher density devices and higher speed interconnectivity, more advanced WL-CSP were developed that employed copper redistribution layers. The introduction of copper and redistribution layers in these packages created new challenges for the permanent dielectric layer (see Figure 1). In particular, these new upper and lower dielectrics needed to have excellent mechanical properties to handle the thermal and chemical extremes of additional processing, excellent elongation to prevent cracking, good adhesion to new material sets (underfill, UBM's etc), smooth sloping via sidewalls and compatibility with copper (no copper migration).

Figure 1 WL-CSP Dielectric Layer



- No Outgassing
- High Tg (for high lead)
- Sloped Profile
- Chemical Resistance
- High Elongation
- Good Adhesion
- Cu Migration Free

Solution

HD-4100 Series of Liquid Polyimides

Polyimide films have been used successfully for many years in semiconductors as stress buffer layers. Working with key customers and institutions in Taiwan and the United States and utilizing specially designed base polymers and proprietary photolithographic chemistries, HD MicroSystems™ developed a new generation of liquid polyimides, HD-4100, that addressed the unique requirements of WL-CSP applications utilizing copper redistribution layers.

Based on a proprietary polyimide backbone, the HD-4100 Series is optimized for thermal stability and I-line transparency. Cured films have exceptional thermal stability with a T_g (glass transition temperature) of 350°C, low CTE (coefficient of thermal expansion) and a high modulus. Net impact is that structures built from HD-4100 Series products are less likely to undergo deformation frequently associated with lower temperature polymers.

Cured films of HD-4100 are also highly ductile, transparent and resistant to most wet and dry process chemicals. These properties make HD-4100 highly compatible with most semiconductor material stacks and chip scale packaging schemes.

HD-4100 Series products have the same excellent cured film properties as the earlier, successful HD-4000 Series products but with improved copper compatibility. Outstanding stability and wide process latitude make for a low defect and easy to control process. Sidewall angles can be adjusted based on process settings.

For more information on HD MicroSystems™ materials, please contact your local representative:

Americas

HD MicroSystems
250 Cheesequake Road
Parlin, NJ 08859
Tel: 800-346-5656, ext. 13, 14

HD MicroSystems
10080 North Wolfe Road
SW3-200
Cupertino, CA 95014
Tel: 800-346-5656, ext. 11

Europe

HD MicroSystems GmbH
Dupont-Str. 1
61352 Bad Homburg
Germany
Tel: 49-6172-87-1812

Asia

HD MicroSystems, Ltd.
Korakuen Building 14F
4-1, Koishikawa 1-chome, Bunkyo-ku
Tokyo 112-0002, Japan
Tel: 81-3-3868-8124

hdmicrosystems.com
packaging-circuits.dupont.com

Copyright ©2006 DuPont or its affiliates. All rights reserved. The DuPont Oval, DuPont™, and The miracles of science™ are registered trademarks or trademarks of E.I. du Pont de Nemours and Company or its affiliates..

HDMicroSystems™ is a trademark of Hitachi Chemical DuPont MicroSystems, LLC.

NO PART OF THIS MATERIAL MAY BE REPRODUCED, STORED IN A RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR BY ANY MEANS ELECTRONIC, MECHANICAL, PHOTOCOPYING, RECORDING OR OTHERWISE WITHOUT THE PRIOR WRITTEN PERMISSION OF DUPONT or HD MicroSystems.

Caution: Do not use in medical applications involving permanent implantation in the human body. For other medical applications, see "DuPont Medical Caution Statement," H-50102.

This information is based on data believed to be reliable, but DuPont makes no warranties, express or implied, as to its accuracy and assumes no liability arising out of its use. The data listed herein falls within the normal range of product properties but should not be used to establish specification limits or used alone as the basis of design. Because DuPont cannot anticipate or control the many different conditions under which this information and/or product may be used, it does not guarantee the usefulness of the information or the suitability of its products in any given application. Users should conduct their own tests to determine the appropriateness of the product for their particular purposes.

This information may be subject to revision as new knowledge and experience become available. This publication is not to be taken as a license to operate under, or recommendation to infringe, any patent.