



BGA/CSP DEVELOPMENT UPDATE SERVICE

Second Quarter, 2003

The second quarterly BGA/CSP update for 2003 features special coverage of flip chip substrates, with descriptions of new high-density core substrates offered by companies worldwide. Industry trends for laminate flip chip substrates are discussed, including body size, core thickness, substrate finish, and substrate price trends. A market forecast for PBGAs shows growth for both flip chip and wire bond packages. A special section on IC package assembly price trends is included in the report. Average assembly prices are provided for QFPs, wire bond and flip chip PBGAs, laminate substrate CSPs, lead frame-based CSPs, and stacked die CSPs. Sharp's new mobile phone containing a CCD camera is described. New package developments are presented, including ChipPAC's stacked die CSP and joint activities to study tin whisker growth in lead-free packages.

Table of Contents

- 1 Flip Chip Substrates
 - 1.1 Growth for Flip Chip PBGAs
 - 1.2 Flip Chip Substrate Technology Trends
 - 1.2.1 Flip Chip Lead Count, Body Size, Ball Pitch
 - 1.2.2 Flip Chip Substrate Pricing
 - 1.2.3 Surface Finish and Lead-Free
 - 1.2.4 Embedded Decoupling Capacitors
 - 1.3 Laminate Flip Chip Substrate Suppliers
AMITEC, ASE Materials, CMK, Compeq Manufacturing, Dai Nippon Printing, Daisho Denshi, Endicott Interconnect Technologies, Fujitsu Interconnect Technologies, Hitachi Chemical, Ibiden, IBM Japan, Japan Circuits Industrial Company, Kinsus, Kyocera, Mitsui Chemicals, Nanya, NEC Toppan Circuit Solutions, NTK Technologies, Phoenix Precision Technology, Samsung Electro-Mechanics, Shinko Electric Industries, 3M, UniMicron Technology Electronics
 - 1.4 New Substrate Developments
- 2 IC Package Assembly Price Trends
 - 2.1 QFPs
 - 2.2 Wire Bond PBGAs
 - 2.3 Flip Chip PBGAs
 - 2.4 Laminate CSPs
 - 2.5 Lead Frame CSPs
 - 2.6 Stacked Die CSPs
- 3 CSPs for Portable Products
 - 3.1 Camera Phones Expand Mobile Phone Market
- 4 New Package Developments
 - 4.1 ChipPAC's Thin Stacked Die Package
 - 4.2 Tin Whiskers Growth in Lead-Free Packages
- Appendix: Laminate Substrate Suppliers

List of Figures

- 1.1. PBGA market (wire bond vs. flip chip).
- 1.2. AMITEC substrate cross-section.
- 1.3. Cross-section of a 2-2-2 build-up substrate.
- 1.4. Cross-section of stacked vias.
- 1.5. ASE substrate using prepreg as build-up dielectric.
- 1.6. CORE EASEI dense core.
- 1.7. Cross-section core density comparison.
- 1.8. Fujitsu GigaModule thin-coreless substrate.
- 1.9. Ibiden's stacked via.
- 1.10. 3M's new high-performance substrate.
- 1.11. 3M's four-layer substrate.
- 3.1. Sharp's J-Phone.
- 4.1. ChipPAC's stacked die CSP.

List of Tables

- 1.1. Finishes for Flip Chip Substrates
- 1.2. Selected Laminate Flip Chip Substrate Suppliers
- 1.3. Feature Roadmap for ASE's Flip Chip Substrate
- 1.4. Feature Sizes for Compeq's Flip Chip Substrates
- 1.5. HyperBGA® and Hyper-ZEI Features
- 1.6. Kyocera's HDBU and Super HDBU Substrates
- 1.7. Mitsui Chemicals' Flip Chip Substrate
- 1.8. MCL Metal-Core Substrate Features
- 1.9. Features of MCL Flip Chip Substrate
- 1.10. MCL's Design Rules and Roadmap
 - 2.1. Average QFP Assembly Prices
 - 2.2. Average Wire Bond PBGA Assembly Prices
 - 2.3. Average Flip Chip PBGA Assembly Prices
 - 2.4. Average Laminate CSP Assembly Prices
 - 2.5. Average Lead Frame CSP Assembly Prices