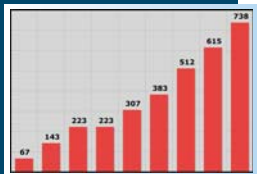
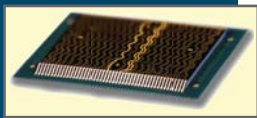
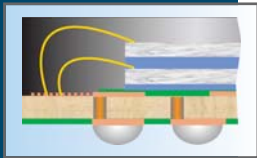


# Advanced Packaging Update: Market and Technology Trends

Vol. 4-009



Volume 4 of the Advanced Packaging Update features special coverage of the market with a forecast for units of BGAs and CSPs by package construction. The BGA market is divided into plastic, tape, and ceramic structures. The CSP market is divided into laminate, flex circuit, and leadframe substrates. Unit growth projections are also provided for stacked die CSP and package-on-package (PoP) shipments. Shipments of package-in-package (PiP) are also included. The market for each package type is based on input from both captive and merchant assembly operations. Key applications and drivers for unit volume growth are highlighted. An economic analysis examines macroeconomic trends and the impact on the semiconductor packaging and assembly industry. A special section is devoted to an examination of alternatives to through silicon via (TSV). The section includes Proximity Computing, developed by Sun Microsystems (now owned by Oracle), stacking technology from Vertical Circuits and 3D Plus, and the deep silicon via technology developed by Jazz Semiconductor (now TowerJazz).

## Table of Contents

- 1 Industry and Economic Trends**
  - 1.1 Economic Trends
  - 1.2 Semiconductor Recovery
- 2 BGA Applications and Market Growth**
  - 2.1 Personal Computers
  - 2.2 Game Machines
  - 2.3 Network Systems, Telecom, and Servers
  - 2.4 BGA Market Projections
- 3 CSP Applications and Market Growth**
  - 3.1 Mobile Phones
  - 3.2 Portable Games and Digital Cameras
  - 3.3 Leadframe CSPs
  - 3.4 Laminate and Flex Circuit CSPs
  - 3.5 Stacked Die CSPs
    - Amkor, Freescale, Fujitsu, Powertech, Renesas, SanDisk, SPIL, Sony, STATS ChipPAC
  - 3.6 CSP Market Projections
- 4 Alternatives to TSV**
  - 4.1 Proximity Communication
    - 4.1.1 Advantages and Challenges
    - 4.1.2 Demonstration Prototypes
    - 4.1.3 Package Assembly
      - Alignment, ClawConnect, Cooling
    - 4.1.4 Optical Integration
    - 4.1.5 Conclusion
  - 4.2 TowerJazz
  - 4.3 3D Plus
  - 4.4 Vertical Circuits
- 2009 BGA and CSP Bibliography

## List of Figures

- 1.1. Subcontractor share of CSP market in 2009.
- 2.1. Apple's WiFi iPad.
- 2.2. AUS EeePC.
- 2.3. Flip chip as a percentage of PBGA shipments.
- 2.4. Subcontractor growth in PBGA shipments.
- 3.1. Two-die top PoP memory stack.
- 3.2. Fujitsu's technology roadmap.
- 3.3. Fujitsu CoC.
- 3.4. Sony's CoC.
- 3.5. PoP market projections (millions of units).
- 3.6. Subcontract assembly growth in CSPs.
- 4.1. Solid model of PxC demonstration vehicle.
- 4.2. Etched inverse pyramid hole.
- 4.3. ClawConnect contacts.
- 4.4. CMOS chip alignment in optical/PxC module.
- 4.5. CMOS chips secured by a spring clip.
- 4.6. SBC18 SiGe PA with DSV.
- 4.7. WDoD process flow.
- 4.8. Volume comparison of WDoD and PoP.
- 4.9. Vertical Circuits' VIP die stack.

## Select List of Tables

- 2.1. BGA Market Projections (millions of units)
- 3.1. CSPs in Smartphones
- 3.2. CSPs on Apple's iPhone 3G S Main Board
- 3.3. Die Stacks and Device Types
- 3.6. Advantages of Various Package Configurations
- 3.8. CSP Market Projections
- 3.9. Subcontractor CSP Shipments

  
**TechSearch**  
INTERNATIONAL

4801 Spicewood Springs Road • Suite 150  
Austin, Texas 78759  
Tel: 512-372-8887 • Fax: 512-372-8889  
tsi@techsearchinc.com • www.techsearchinc.com

Annual subscription – \$3,425 (4 issues)  
Single issue – \$975