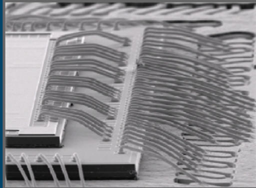
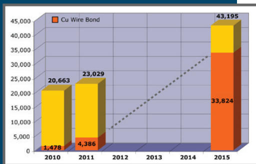
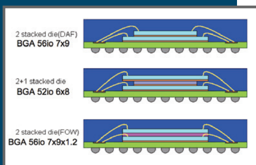
Advanced Packaging Update:
Market and Technology Trends

Vol. 1-011







This volume of the Advanced Packaging Update features special coverage of the transition to copper wire bonding. Information from suppliers of wire, users, and assembly houses provide a clear trend. Wire shipment data was collected from the leading suppliers to determine both the bare copper and palladium-coated copper markets. The adoption of copper wire bonding in PBGAs, FBGAs, QFNs, and stacked die CSPs is documented. An update on automotive electronics is included. New developments in test for TSV wafers are featured. A section on new package developments focuses on TI's 3D stacked QFN package for power devices such as MOSFETs. The report also examines economic trends and the impact on the semiconductor industry.

Table of Contents

1 Industry and Economic Trends
- 1.1 Economic Trends
- 1.2 Future Semiconductor Growth
- 1.3 Tablets and Smartphones Drive Growth

2 Copper Wire Bond Developments
- 2.1 Copper Wire Shipments
- 2.2 Copper Wire Package and Applications
  - 2.2.1 Copper Wire in Automotive Applications
- 2.3 Pad Metallurgy
- 2.4 Company Activities
  - 2.4.1 Advanced Semiconductor Engineering, Inc.
  - 2.4.2 Agency for Science, Tech. and Research
  - 2.4.3 Altera Corporation
  - 2.4.4 Amkor Technology
  - 2.4.5 Cirtek Electronics Corp.
  - 2.4.6 Cisco Systems, Inc
  - 2.4.7 Freescale Semiconductor, Inc.
  - 2.4.8 Kulicke & Soffa Industries, Inc.
  - 2.4.9 MK Electron Co., Ltd.
  - 2.4.10 Spansion, Inc.
  - 2.4.11 STATS ChipPAC, Ltd.
  - 2.4.12 Tanaka Denshi Kogyo K.K.
  - 2.4.13 Texas Instruments, Inc.

3 Automotive Packaging Trends
- 3.1 Japanese Automotive Electronics Recovery
- 3.2 Infineon Technologies, AG

4 Testing Wafers with TSVs
- 4.1 Test Challenges
- 4.2 Benefits of Standardization
- 4.3 Probe Card Developments

5 New Package Developments
- 5.1 TI's New 3D Stacked QFN Package
- 5.2 Mirror Semiconductor's Open Cavity QFN

References

List of Figures

1.1. Monthly U.S. housing starts.
2.1. Au and Cu wire in 2010 and 2011.
2.2. Wire selection by package type.
2.3. QFN shipments using copper wire.
2.4. PBGA shipments using copper wire.
2.5. FBGA shipments using copper wire.
2.6. Stacked die CSP shipments using copper wire.
2.7. ASE stacked die in HVM with copper wire.
2.8. ASE's Cu usage by package and application.
2.9. ASE's Cu shipments by Si node and wire size.
2.10. Amkor stacked die with SSB using 20μm PCC.
2.11. Amkor's copper wire roadmap.
2.12. IMC thickness vs. storage temperature.
2.13. IMC thickness and ball shear strength.
2.14. Bonding parameters for copper SSB.
2.15. Tanaka's copper wire shipments.
2.16. Breaking load and electrical resistivity.
2.17. Ball shear strength for Tanaka's copper wires.
3.1. Material and process improvements,
4.1. Fully routed 6x50 array with 40/50μm pitch.
5.2. PowerStack™ efficiency improvement data.
5.3. Open cavity QFN.

List of Tables

1.1. Spending on Packaging and Assembly Equip.
2.1. Silver Alloy vs. Pd-Coated Copper Wire
2.2. Copper Wire Adoption in Different Markets
2.3. Biased HAST at 120 Hours and 360 Hours
2.4. Test Vehicles for Al and OPM Die Pads
2.5. Reliability Tests for Pad Metallization
2.6. Bare Copper vs. PCC Wire Properties
2.7. Bare Copper vs. PCC Wire Bonding Results
2.9. Reliability Tests for SSB Test Vehicles
3.1. Automotive Packages in Production at Infineon

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 – $3,525 (4 issues)
Single issue – $975

Contents and specifications subject to change without notice. 8/18/11