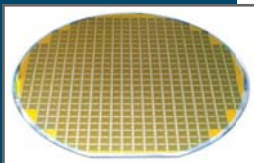
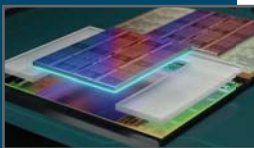
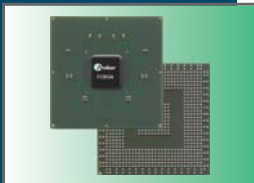


Advanced Packaging Update: Market and Technology Trends

Vol. 4-0122



This issue of the Advanced Packaging Update features an update of build-up substrate supply and demand through 2026. Continuing semiconductor shortages and supply chain disruptions are discussed. A financial analysis of OSATs is also provided. A special section is devoted to developments in hybrid bonding for chiplets. An update on automotive electronics with a focus on electric vehicle and infrastructure growth is provided. Growing applications for SiC are discussed and package trends are highlighted.

Table of Contents

1 Industry and Economic Trends

- 1.1 Economic Trends
- 1.2 China's Power Shortage
- 1.3 Supply Chain Challenges
- 1.4 Semiconductor Capacity Expansion
TSMC, Intel

2 OSAT Financial Analysis

- 2.1 Industry Overview
- 2.2 OSAT Market Performance
- 2.3 Company Highlights
ASE, Amkor, JCET, PTI, TFME, Huatian,
KYEC, UTAC, ChipMOS, Chipbond, Sigurd,
Ardentec, Tong Hsing

3 3D Hybrid Bonding for Chiplets

- 3.1 TSMC's SoIC™
- 3.2 AMD's V-Cache
- 3.3 Intel's Foveros Direct
- 3.4 IBM Research
- 3.5 Samsung Electronics

4 Substrate Shortages

- 4.1 Substrate Size and Features
 - 4.1.1 Increased Body Sizes
 - 4.1.2 Substrate Complexity
 - 4.1.3 New Substrate Technology Requirements
- 4.2 Supply and Demand for FC-BGA
- 4.3 Substrate Trends
 - 4.3.1 New Substrate Suppliers
- 4.4 Improving Substrate Yield
 - 4.4.1 Metrology Developments

5 Electric Vehicle (E-Drive) Market

- 5.1 EV Components
 - 5.1.1 Powertrain
 - 5.1.2 Increased Use of MOSFETs
 - 5.1.3 EV Charging Stations
 - 5.1.4 Materials for SiC Packages
 - 5.1.4.1 Die Attach
 - 5.1.4.2 Encapsulation Materials
 - 5.1.4.3 Embedded Die

- 5.1.5 Component Reliability Requirements
- 5.1.6 Components in Autonomous Driving EVs
- 5.2 E-drive Companies
BMW, BYD, Ford, General Motors, Hyundai,
Stellantis, Tesla, Toyota, Volkswagen,
Mercedes-Benz, The Lucid Group
- 5.3 Semiconductor Suppliers
Infineon, NXP, ST Microelectronics, Rohm
Semiconductor, Renesas, Onsemi, Wolfspeed
- 5.4 Battery Cell and Battery Pack
 - 5.4.1 Battery Module Assembly
 - 5.4.2 Battery Suppliers
Automotive Cells Company, BYD,
Contemporary Amperex Technology, LG
Chem, Microvast, Norhvolt, Panasonic,
Romeo Power, Samsung SDI, SK
Innovation, QuantumScape
 - 5.4.3 Rare Earth Minerals
- 6 U.S. 5G Rollout Hits a Speed Bump
 - 6.1 What is C-band?
 - 6.2 North American Infrastructure for 5G

Partial List of Figures

- 3.1. AMD 3D V-Cache.
- 3.2. Intel's Foveros Direct.

Partial List of Tables

- 2.1. Top 20 OSATs 2021 Quarterly Revenue
- 3.1. SoIC™ Compared to 2.5D and 3D IC
- 4.1. FC-BGA Substrate Supply and Demand
- 4.2. FC-BGA Substrate High Layer Count Demand
- 4.3. Impact of mSAP Adoption
- 4.4. Impact of Substrate Yield Enhancement
- 5.1. Fully Electric Vehicle Launches
- 5.2. Powertrain High-Power Device Examples
- 5.3. Packages in Tesla Model 3 Computer Board
- 5.5. Global Mineral Reserves
- 5.6. Mining Production by Country and Mineral


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 – \$5,100 (4 issues)
Single issue – \$2,500
Corporate license – \$8,750