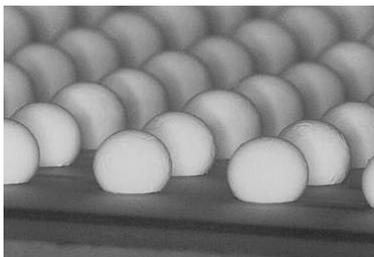


Wafer Bumping

Wafer Bumping Processes and Die Level Interconnect Technology Services



The electrical and mechanical connection between a die and substrate is one of the most critical elements of any flip chip package structure or Wafer Level Package (WLP) structure.

Predominantly lead-free solders are used to create those bump connections and must exhibit superior adhesion to the die, minimal resistance, and result in high assembly yields. Those solder bumps are formed by using either thin film metal deposition, plating or ball loading techniques.

Amkor offers state-of-the-art capability in electroplated bumping and various type of WLCSP technologies in multiple strategic locations (Korea, China, Portugal and Taiwan). These locations are uniquely situated adjacent to major foundry sources to enable our customers reduced time-to-market with integrated factory logistics.

Our all facility has a world-class bumping line with HVM production capability. 300 mm Eutectic, 200 mm and 300 mm lead-free and Cu pillar solder compositions (all low alpha) are production certified. And the facilities offer re-passivation, single- and multi-layer redistribution processes for both flip chip and wafer level chip-scale package applications.

Our Korea, China, Portugal and Taiwan bumping operations are co-located with wafer probe, assembly and final test, enabling Amkor to provide complete "Turnkey" flip chip and WLCSP solutions in these key geographic locations.

These facilities offer economy of scale as both plated bump (solder/CuP bump) and Wafer Level Chip Scale Packaging (WLCSP)/Wafer Level Fan-out (WLFO) continues to grow in the future. This combination of technology and manufacturing capabilities is unparalleled in the subcontract manufacturing industry.

Bumping Process Specifics

Amkor's bumping process is production certified through the full package size range from WLCSP up through large die Flip Chip BGA.

All factories are ISO/TS16949 certified.

Wafer Size	200 mm, 300 mm	300 mm
Solder Compositions	98.2Sn/1.8Ag (all available as low alpha: < 0.002 cts/hr/cm ²), SnAgCu, Doped alloys	63Sn/37Pb
Pad Pitch Lower Limit	50 ~ 500+ μm	
Repassivation Coatings	Polyimide, PBO, Low cure polymers	
Redistribution Materials	Plated Copper	

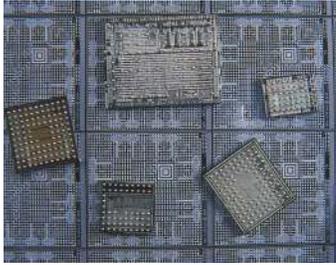


Visit Amkor Technology online for locations and to view the most current product information.



SS15M
Rev Date: 11/17

Related Processes/Services



Wafer Bumping and Wafer Level Chip Scale Packaging (WLCSP) use many of the same basic process steps in production. Key WLCSP developments have resulted in improved wafer level technology known as CSPnl. CSPnl combines plated copper technology and advanced

photopolymers to produce the industry's most robust wafer level solutions. CSPnl is available down to 0.3 mm pitch and supports a range of solder volumes to meet customer requirements.

Closely related to both bumping and WLP production is "die processing" capability, which consists of process steps that transform either bumped or WLCSP product from wafer form into die form. Die processing typically involves test, singulation, inspection and pick-and-place, and Amkor offers these full turnkey services to support our customers at multiple facilities around the world.



Technology Development

- Amkor maintains strong initiatives in the area of technology development to further support customers' future needs. Continuous improvement programs are in place to optimize and cost-reduce the wafer bumping processes.
- Electroplating capabilities will support fine pitch bumping and copper pillar structures
- Higher performance re-passivation materials and low temp cure
- re-passivation
- Thin profile WLCSP and multi-redistribution layer product
- Providing diversity of fan-out WLP
- WLCSP die size support to greater than 144 I/Os and 0.3 mm pitch



Amkor's technology leadership continues to advance flip chip technology as part of our broad portfolio of over 1000 packages. We will continue to partner with leading companies to bring new flip chip products quickly to market. We have the vision and breadth to move flip chip interconnect off the drawing board and into production across a wide range of package formats.

Visit [Amkor Technology](#) online for locations and to view the most current product information.



With respect to the information in this document, Amkor makes no guarantee or warranty of its accuracy or that the use of such information will not infringe upon the intellectual rights of third parties. Amkor shall not be responsible for any loss or damage of whatever nature resulting from the use of, or reliance upon it and no patent or other license is implied hereby. This document does not in any way extend or modify Amkor's warranty on any product beyond that set forth in its standard terms and conditions of sale. Amkor reserves the right to make changes in its product and specifications at any time and without notice. The Amkor name and logo are registered trademarks of Amkor Technology, Inc. All other trademarks mentioned are property of their respective companies. © 2017, Amkor Technology Incorporated. All Rights Reserved.

SS15M
Rev Date: 11/17