

## Wafer Level Packaging CSP<sup>nl</sup><sup>™</sup>

Amkor's wafer level packaging service meets the industry's growing demand for full turnkey assembly and test solutions for CSP (Chip Scale Package) products. Through the acquisition of Unitive, Amkor has adopted the CSP<sup>nl</sup><sup>™</sup> as its standard wafer level package offering. CSP<sup>nl</sup><sup>™</sup> represents the next level in wafer level chip scale packaging as demonstrated by its proven benchmark reliability. Amkor's CSP<sup>nl</sup><sup>™</sup> has been widely adopted as the industry standard for cost effective, reliable, high performance wafer level CSP applications. By integrating our CSP<sup>nl</sup><sup>™</sup> packaging technology with existing die processing and testing services as well as new die processing technologies developed by Unitive, Amkor is able to offer a full turnkey solution for wafer level products.

CSP<sup>nl</sup><sup>™</sup> is a true wafer level CSP package that can incorporate thin film redistribution films to route I/O pads to JEDEC/EIAJ standard pitches, and thereby, avoiding the need to redesign legacy parts for CSP applications. It is available in three options: Direct Bump on Pad (BOP), Bump on Repassivation/Redistribution and Bump on Thick Repassivation/Redistribution. The technology used for CSP<sup>nl</sup><sup>™</sup> results in robust packages that do not require underfill in their applications. CSP<sup>nl</sup><sup>™</sup> is designed to utilize industry-standard surface mount assembly and reflow techniques. By using conventional SMT placement equipment and avoiding the need for underfill, the end-user experiences many of the cost benefits associated with other JEDEC standard area array packages.

Amkor's wafer bumping and test offering is an excellent complement to other Amkor product lines. Through an integrated die processing service, Amkor is able to provide full turnkey wafer bumping, test, die singulation, and tape & reel support for wafer level packaging applications. In addition, Amkor is able to integrate its wafer bumping products into high performance packaging options, such as Flip Chip CSP (fcCSP) and System in Package (SiP). Amkor truly provides one-stop, hassle-free support for wafer bumping, packaging, and test solutions, enabling you to meet your cost and time-to-market objectives.

## CSP<sup>nl</sup><sup>™</sup>

| Features:        | <ul style="list-style-type: none"> <li>• 4-64 ball count</li> <li>• 0.8 mm - 4.5 mm body size</li> <li>• Repassivation, Redistribution and Bumping options available</li> <li>• Electroplated and Ball-loaded bumping options</li> <li>• Eutectic, High Lead and Lead-free solder</li> <li>• Standard JEDEC/EIAJ pitches and CSP solder ball diameters</li> <li>• Compatible with conventional SMT assembly and test techniques</li> <li>• Back-side laser mark compatible</li> <li>• Back-side laminate</li> <li>• Impressive component and board level reliability</li> <li>• Cost effective packaging solution for small ICs</li> <li>• No need for underfill</li> <li>• Full turnkey bumping, test and TnR support</li> <li>• Ship to customer in either wafer form or singulated form</li> </ul> |               |  |       |                 |         |         |         |                  |         |         |         |         |
|------------------|---|---------------|--|-------|-----------------|---------|---------|---------|------------------|---------|---------|---------|---------|
| Package Options: | <table border="1"> <thead> <tr> <th colspan="2">Ball Loading:</th> </tr> <tr> <th>Pitch</th> <th>Sphere Diameter</th> </tr> </thead> <tbody> <tr> <td>0.40 mm</td> <td>0.25 mm</td> </tr> <tr> <td>0.50 mm</td> <td>0.30 mm, 0.35 mm</td> </tr> <tr> <td>0.65 mm</td> <td>0.35 mm</td> </tr> <tr> <td>0.75 mm</td> <td>0.50 mm</td> </tr> </tbody> </table>   | Ball Loading: |  | Pitch | Sphere Diameter | 0.40 mm | 0.25 mm | 0.50 mm | 0.30 mm, 0.35 mm | 0.65 mm | 0.35 mm | 0.75 mm | 0.50 mm |
| Ball Loading:    |   |               |  |       |                 |         |         |         |                  |         |         |         |         |
| Pitch            | Sphere Diameter   |               |  |       |                 |         |         |         |                  |         |         |         |         |
| 0.40 mm          | 0.25 mm   |               |  |       |                 |         |         |         |                  |         |         |         |         |
| 0.50 mm          | 0.30 mm, 0.35 mm  |               |  |       |                 |         |         |         |                  |         |         |         |         |
| 0.65 mm          | 0.35 mm   |               |  |       |                 |         |         |         |                  |         |         |         |         |
| 0.75 mm          | 0.50 mm   |               |  |       |                 |         |         |         |                  |         |         |         |         |
| Reliability:     | <p><b>Package Level:</b></p> <ul style="list-style-type: none"> <li>• Autoclave (PCT) 121°C/100% RH/15 psig, 96 hours</li> <li>• Temp Cycle -55°C/+125°C, 500 cycles</li> <li>• High Temp storage 170°C, 420 hours</li> </ul> <p><b>Second Level Reliability (BLR):</b></p> <ul style="list-style-type: none"> <li>• HAST 130°C/85%RH/33.5psia/Biased, 96 hours</li> <li>• HTOL 150°C/Biased, 300 hours</li> <li>• Temp Cycle -40°C/+125°C, 1000 cycles</li> <li>• Key Push 100cycles/min, 2.7mm max displacement</li> <li>• Bend Test Strain rate 5mm/min, 85mm span</li> <li>• Drop Test 50cm height</li> </ul>   |               |  |       |                 |         |         |         |                  |         |         |         |         |

## Applications:

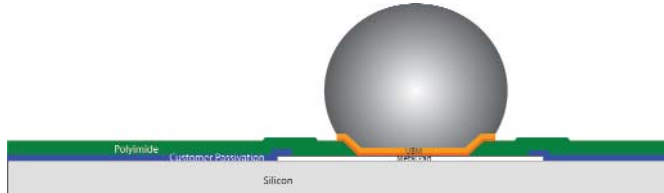
Amkor's CSP<sup>nl</sup><sup>™</sup> is ideal for portable communications and related applications that require a low cost packaging solution with small form factor and improved signal propagation characteristics. EEPROM, flash, DRAM, integrated passive networks, and standard analog devices are all technologies that benefit from the CSP<sup>nl</sup><sup>™</sup> package attributes. End products include mobile phones, PDAs, laptop PCs, disk drives, digital cameras, MP3 players, GPS navigation devices, and other portable products.

VISIT AMKOR TECHNOLOGY ONLINE FOR LOCATIONS AND TO VIEW THE MOST CURRENT PRODUCT INFORMATION.

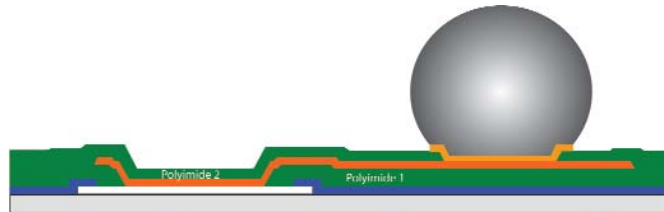


# data sheet

## CSP<sup>nl</sup>™ Cross Sections



Direct Bump on Pad with Repassivation



Bump on Repassivation/Redistribution



Bump on Thick Repassivation/Redistribution

## CSP<sup>nl</sup>™

### Process Highlights

|                        |   |
|------------------------|---|
| Die thickness          | 0.27 mm - 0.45 mm   |
| Redistribution         | 12 $\mu\text{m}$ line (typ.), 26 $\mu\text{m}$ space (typ.) |
| Solder sphere diameter | 300 $\mu\text{m}$ (typ.), 250 $\mu\text{m}$ (optional)      |
| Bump height            | 250 $\mu\text{m}$ (typ.), 210 $\mu\text{m}$ (optional)      |
| Solder ball pitch      | 0.50 mm (typ.), 0.40 mm (optional)                          |
| Visual inspection      | Wafer map output  |

### Standard Materials

|                       |  |
|-----------------------|--|
| Dielectric material   | Polyimide  |
| RDL                   | Copper   |
| UBM                   | Ti/Cu/Ni, TiW/Cu/Ni  |
| Solder Composition    |  |
| <i>Ball Loaded:</i>   | Pb-Free (Sn/3.9Ag/0.6Cu), Eutectic (63Sn/37Pb), High Pb (5Sn/95Pb) |
| <i>Electroplated:</i> | Pb-Free (97.5Sn/2.5Ag), Eutectic (63Sn/37Pb), High Pb (5Sn/95Pb)   |

### Test Services

The CSP<sup>nl</sup>™ format allows for wafer sort integration resulting in reduced cost and improved cycle-time for the customer.

### Shipping

CSP<sup>nl</sup>™ packaged devices are shipped in standard wafer magazines or may be singulated for shipment in tape or tray.

## Capabilities and Services

### Design

- Layout
- Mask tooling

### Manufacturing

- Thin film dielectric and metal patterning
- Wafer bumping (electroplated and sphere placement)
- Automated visual inspection
- Wafer map generation

### Test

- Test software and hardware development
- Probe card design, service, and support
- Test program transfer
- Wafer sort for memory, logic, and analog applications

### Die Processing Integration and Support

- Wafer saw
- Visual inspection
- Wafer map integration
- PnP to tape or tray
- Shipping material design and supply management
- Turnkey solutions
- Drop ship to final customer

[www.amkor.com](http://www.amkor.com)