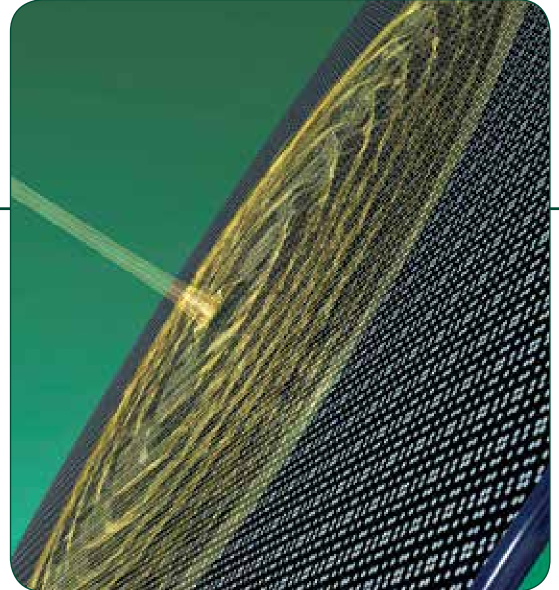
PRODUCT DATA SHEET

Wafer-Level Chip Scale Packaging Fluxes for Microsphere Bumping

Introduction

Until recently, there have been two standard processes for bumping wafers with solder: solder paste printing and solder plating. The limitations of these processes have led to the development of a third, more flexible, method that has two stages: flux printing (usually by stencil or screen), followed by solderball placement.



Fluxes suitable for use in this solder sphere process must have the following capabilities:

Retain Solder Spheres

Solder spheres must be held in place during all process steps after placement, particularly during handling and reflow.

Consistent Solderability

Consistent sphere size and consistent solderability in a low oxygen (typically less than 50ppm oxygen) reflow environment are the two key elements to reducing bump height variability, which can lead to "opens" during the subsequent flip-chip process.

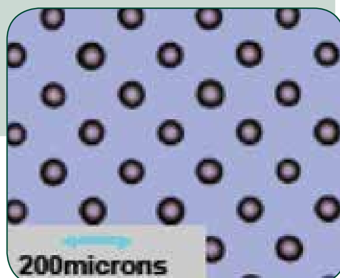
Compatibility with Underfill

After reflow, the bumped chip is used in a direct chip attach (flip-chip) assembly process that typically requires the usage of a capillary underfill material. There must be zero residue after cleaning, or any other residue must be completely compatible with the underfill and also present in such small quantities that it does not block the flow of underfill under the chip. Typically, the wafer-level flux is either:

- Water-soluble: leaving zero residues
- No-clean: with ultralow residues (ULR), typically less than 10% by weight.

Consistent Printability

Depending on the sphere size and alloy type, a flux deposit of 15-35% of the volume of the sphere is sufficient to retain the sphere in place throughout the subsequent reflow process. Consistent printing of the flux necessitates use of a semiconductor grade flux, which guarantees homogeneity. This image illustrates the flux printability for a wafer-level CSP flux.



KEY:	
No problems	◉
Some problems known	○
Significant barriers	△

Considerations	Solder Paste Printing	Plating	Flux/ Solder Sphere Printing
High-Volume Manufacturing	◉	◉	○
Alloy Restrictions	◉	△	◉
Bump Size	△	◉	○
Bump Uniformity	△	◉	○
Voiding	△	○	◉
Cost	○	△	△
Prototyping	○	△	○

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Wafer-Level Chip Scale Packaging Fluxes for Microsphere Bumping

Indium Corporation Wafer-Level Chip Scale Fluxes

The semiconductor grade materials designed for use in these processes are wafer-level chip scale fluxes WS-3622 and NC-510.

Flux Name	WS-3622	NC-510
Flux Type	Water-washable	No-clean
Flux Classification	ORH1	ORL0
Halogen-free	No	Yes
Residue Level	None	<4%
Print Resolution	Down to 100 microns	Down to 50 microns
Viscosity*	9kcps	67kcps
Tack*	570 grams	230 grams
Shelf-life	6 months (-20°C to +5°C)	12 months (+5°C to 30°C)
Packaging	30cc syringes: bubble-free	30cc syringes: bubble-free

**Per J-STD-005A*

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