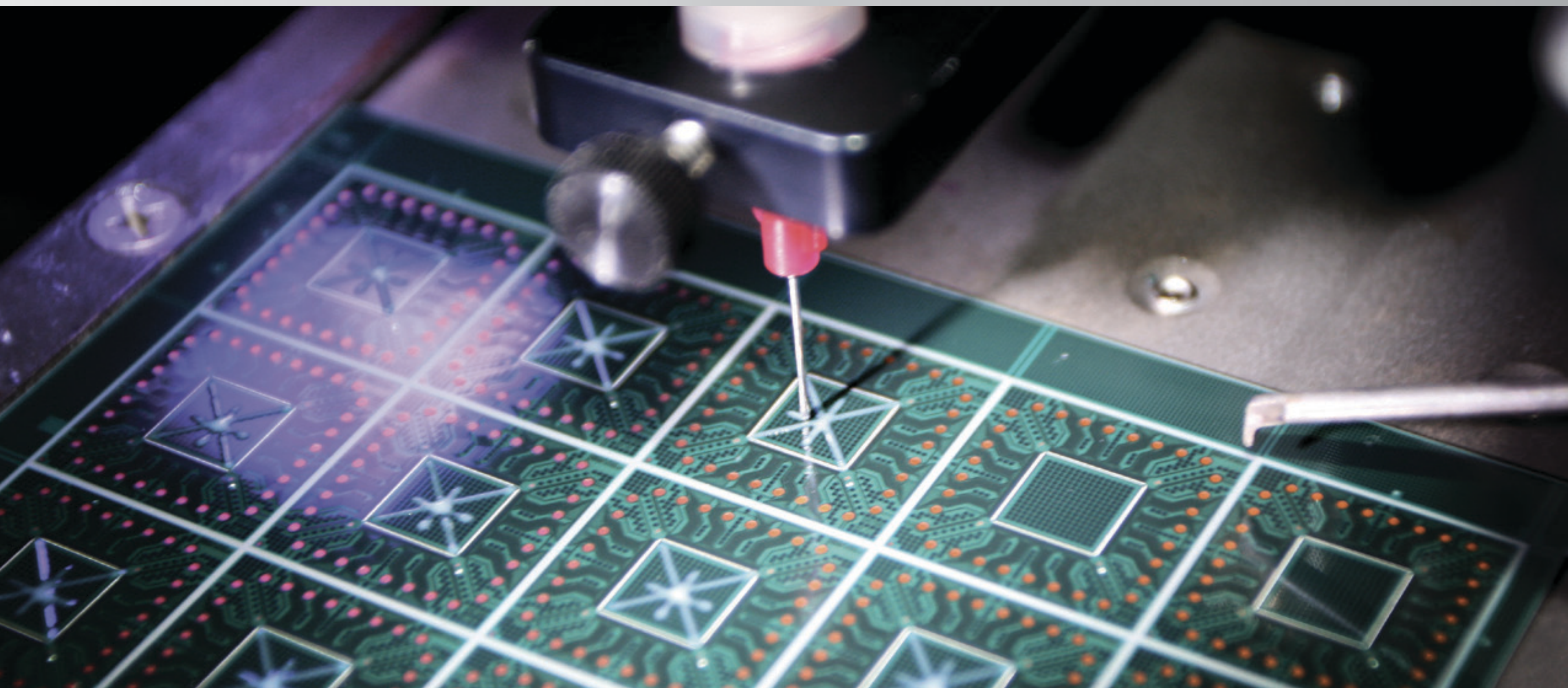
LOCTITE®



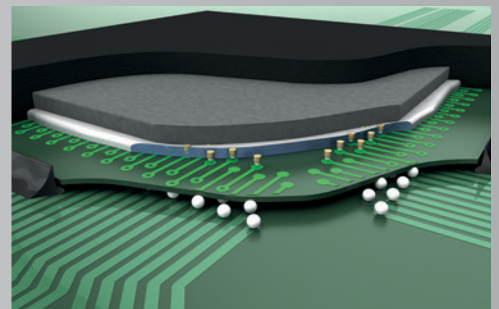
LOCTITE® *ECCOBOND* NCP 5209

ADVANCED UNDERFILL SOLUTION

LOCTITE® *ECCOBOND* NCP 5209 is a non-conductive paste (NCP) underfill designed to facilitate next-generation fine-pitch copper pillar and copper OSP flip-chip devices. Overcoming the voiding and protection drawbacks of conventional capillary underfills, *LOCTITE ECCOBOND* NCP 5209 leverages thermal compression (TC) bonding to offer robust, complete bump protection of flip-chip devices, with bump pitches less than 100 µm and gaps less than 40 µm for a high-reliability result.

Key Benefits

- Outstanding joint formation with SOP, NiAu and Cu OSP pad
- Compatible with a variety of substrates and passivations (polyimide and SiN)
- Design flexibility on chip size and bump configuration
- Ease of processability and workability
  - Good dispensing
  - Long stage life (90 to 120 min.)
- Excellent reliability performance
  - MSL3 capable
  - 1,000 hr. TCT (-55°C to 125°C)
  - 1,000 hr. HTS (150°C)
  - 96 hr. b-HAST (130°C at 85% relative humidity)
- 24 hr. work life



Non-conductive paste bonding to semiconductor die

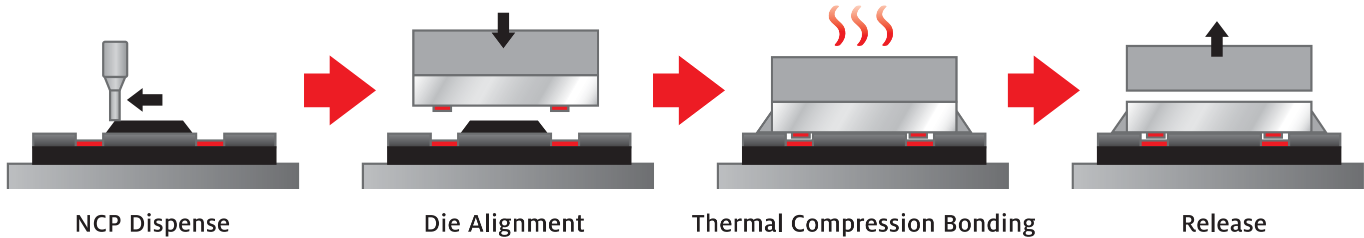
Henkel

LOCTITE®

NCP Technology

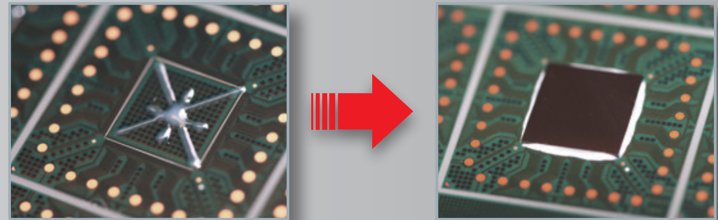
Process Overview

Application Process



NCP Dispensing

- Volume of NCP used will control fillet formation and gap filling
- Dispensing equipment for TC-NCP
  - Time pressure
  - Auger pump
  - Room-temperature dispense; no heat on substrate during dispense
- Dispense pattern: Asterisk (die size > 6 mm × 6 mm)



Optimized volume and pattern will yield complete coverage

CONVENTIONAL CAPILLARY UNDERFILL (POST-APPLIED UNDERFILL)	HENKEL THERMAL COMPRESSION NCP (PRE-APPLIED UNDERFILL)
Warpage after mass reflow, leading to "white bump" issue	Provide bump protection for fine pitch during bonding process
No bump or solder joint protection before underfill	Designed for Cu OSP, allowing for cost reduction in high bump count applications
Higher chip warpage after underfill cure	Very low warpage and no underfill void
Voiding with low gap height, tight bump pitch and increased NSMD size	No flux residue
–	Reduced keep-out zone (small fillet and no resin bleed-out)
–	No "white bump" issue

Across the Board, Around the Globe.

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