DOWSIL™ Optical Silicone Hot-Melt Film

Applications and target devices

- **Applications:** Encapsulation
- **Target devices:** Tablets, laptops, monitors, televisions, signage

Description

Silicone hot-melt film is a heat-curable silicone that, once cured, becomes a nonflowable film that retains its performance, even at temperatures exceeding 100°C.

Silicone hot-melt film is suitable for applications where incumbent curable liquid silicone is difficult to use. This material is designed to be applied by compression molding or vacuum lamination on substrates and shows excellent thermal-stress management (warp-free) in a molded or laminated piece. Cured material shows moderate modulus (hard enough to function as an encapsulant), excellent tensile elongation and adhesion capability to various substrates. The film can be used in optical applications because of its high transparency.

Typically supplied as a transparent film, DOWSIL™ Optical Silicone Hot-Melt Film also is available as a black silicone hot-melt film. With a cured film thickness of 200 µm, the black film has a light transmittance of approximately 0.03%.

Potential applications – dry-process encapsulation

Because of the drawbacks of liquid encapsulation methods, such as dam and dispensing (cumbersome, messy handling of liquids) and compression molding (expensive molds and long cycle times), film-based encapsulation may be a better solution, especially for large substrates. Use of thermal bonding and a vacuum press or vacuum lamination device with silicone hot-melt film provides a dry process for large-area encapsulation.

Key features and benefits

- Excellent stress relaxation for warp-free encapsulation
- Excellent adhesion to various substrates, including ETFE and PET
- Easy processability
  - Tunable viscosity for substrate shape
  - 300 µm silicone hot-melt film can fill 100 µm chip height for many substrate designs
  - Post-lamination cure

Typical material properties of film prototypes

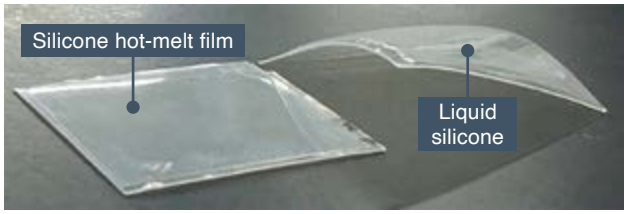
Property	Low-modulus formulation	High-modulus formulation
Tensile modulus	80 MPa	120 MPa
Tensile strength	4.7 MPa	5.6 MPa
Fracture energy	3,300 mJ	960 mJ
Elongation at break	810%	160%
CTE, α1, up to 50°C	160 ppm/°C	150 ppm/°C
CTE, α2, 50-200°C	220 ppm/°C	220 ppm/°C
Reflective index, A.U.	1.41	1.41
Transmittance @ 450 nm, T=0.3 mm	101%	101%
Absorption @ 450 nm, T=0.3 mm	0%	0%

Specification Writers: These values are not intended for use in preparing specifications. Please contact your local Dow Sales Application Engineer or Dow Customer Service before writing specifications on this product.

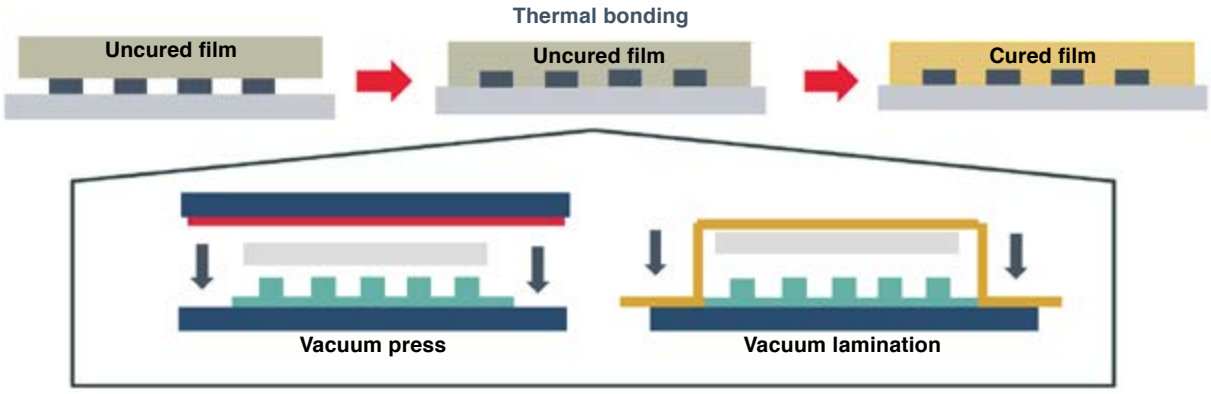
Thermal stress compared with liquid silicone[1]

Property	Silicone hot-melt film	Liquid silicone
Tensile modulus	120 MPa	130 MPa
CTE	220 ppm/°C	210 ppm/°C

[1]Encapsulation thickness 300 µm; PET thickness 200 µm.



Proposed encapsulation process via silicone hot-melt film



Dry process for large-area encapsulation

Learn more

We offer more than just an industry-leading portfolio of advanced silicone-based materials. As your dedicated innovation leader, we bring process and application experience, a network of technical specialists, a reliable global supply base, and world-class customer service.

To find out how we can support your applications, visit **dow.com/electronics**.

Images: dow_40963479529, dow_55800106915.

#16370

Form No. 11-4135-01-0720 AGP