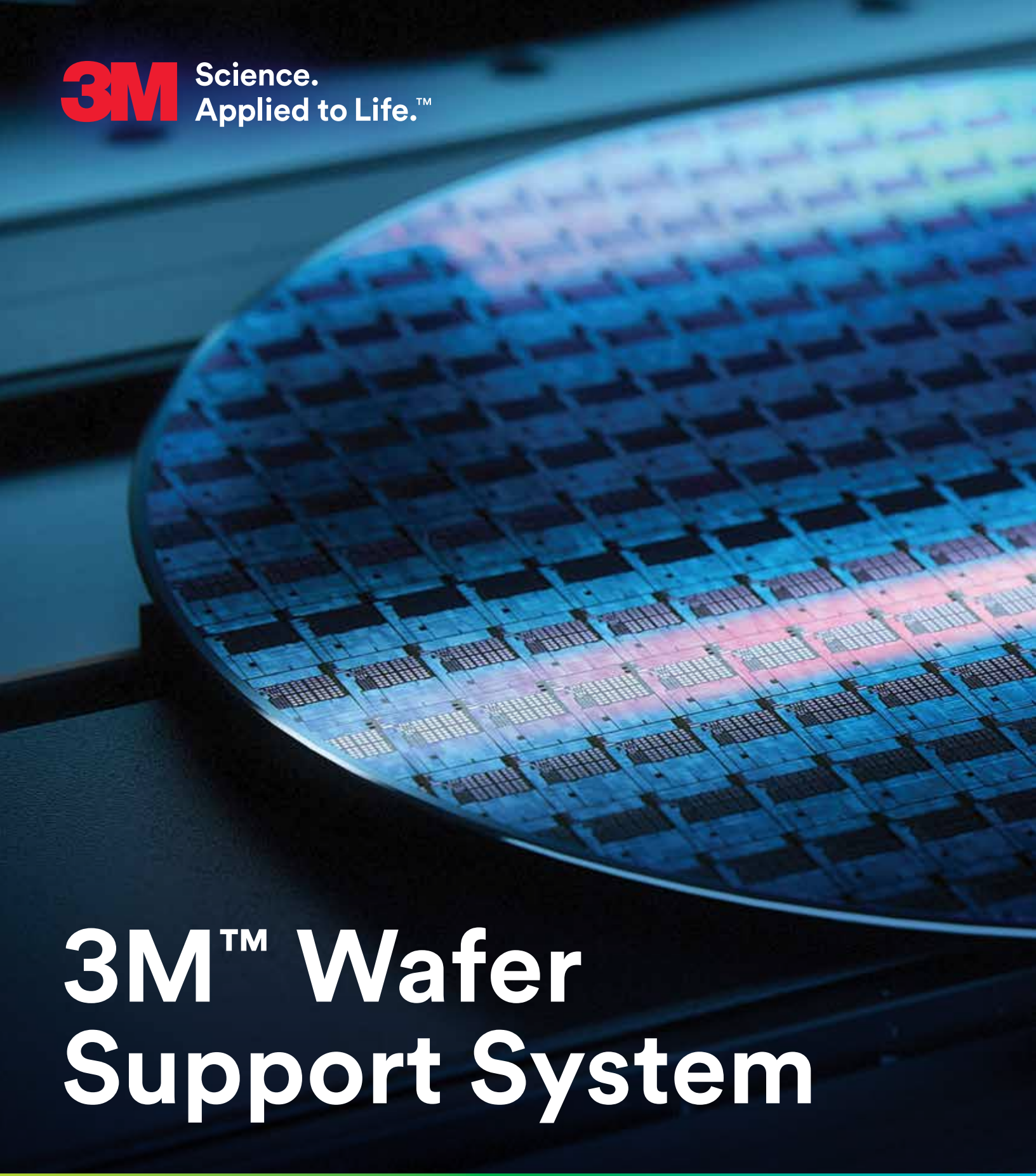


3M Science. Applied to Life.™

3M™ Wafer Support System

All-in-one solution for wafer thinning, fan-out packaging and heterogeneous integration

Helping Semiconductor Fabricators Sustain Yields with the 3M™ Wafer Support System

The 3M™ Wafer Support System (WSS) is a complete, cost-effective temporary bonding and debonding solution for high-volume wafer manufacturing needs including IBGT ultrathin silicon, silicon carbide, and advanced packaging.

Through the combination of a temporary bonding adhesive, a release layer, and an adhesive removal tape, it helps semiconductor fabricators enable new stacked wafer designs and more effective fan-out packaging processes.

Adhesives undergo strict adhesion, thermal and chemical resistance testing, so they can withstand critical process, time, temperature and substrate requirements.

Improved Yield
Less warpage, cracking and edge chipping

High Throughput
Up to 22 wafers per hour

Thin Wafers
Effective down to 20 micron wafer thickness

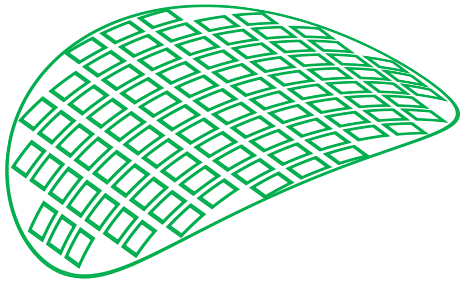
Wafer Processing Compatibility
Works with high temperature/high vacuum processes, common chemistries and low-k film formation processes

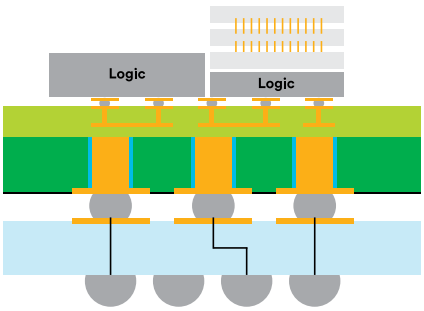
Recyclability
Up to 2/3 of uncured 3M™ UV-Curable Adhesive LC-3200 used in wafer coating can be recycled by the tool, reducing waste

Globally Adopted Solution
More than 150 high-volume WSS tools are currently in service, processing millions of ultrathin wafers per month

Room Temperature Bonding
No need for heat or chemicals

Applications





Power Semiconductor Devices

- **Ultrathin Silicon –** As silicon wafer processing moves to 300mm diameter and simultaneously shrinks to just a few tens of microns thick, maintaining stability during processing is essential.
- **Silicon Carbide –** Silicon carbide (SiC) ICs are one of the components at the heart of electric vehicles and other power devices. SiC wafers are both very hard and very brittle, posing unique processing challenges.

Advanced Packaging

Increasing device density integration in an even smaller footprint calls for thinner and thinner wafers. Technologies include:

- **Fan-out wafer-level packaging (FOWLP) –** Processed wafers are diced and carefully rearranged on a wafer, which is molded to fill gaps. The spaces where gaps have been filled create “fanned out” connection networks.
- **Heterogeneous integration –** Heterogeneous integration takes different components (die, MEMS, sensors, etc.) that have been manufactured in separate processes and combines them into a single overall package. This package can deliver better functionality and operational benefits (system-level performance, ownership costs).

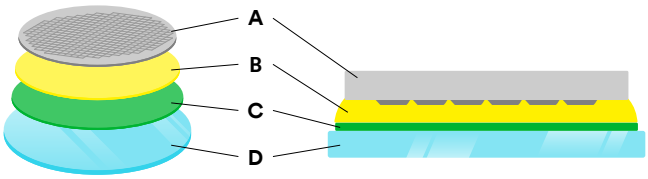
How the 3M™ Wafer Support System Works

When a silicon or silicon carbide wafer is undergoing delicate processes like fan-out wafer-level or panel-level packaging (FOWLP or FOPLP), it needs a rigid, uniform support surface which will help minimize stress on the wafer during important processing steps and which can then easily be removed.

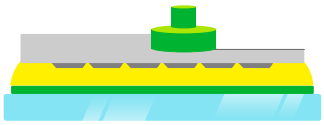
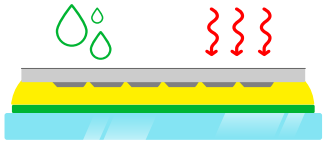
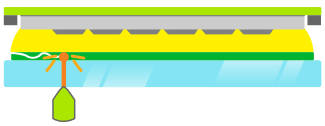
The 3M™ Wafer Support System quickly bonds the wafer to a glass carrier. The carrier and bonding adhesive fully support the wafer throughout processing, and their good heat and chemical resistance are compatible with a wide variety of processing steps.

Once processing is complete, the 3M™ Wafer Support System can be quickly and easily debonded with minimal wafer stress and no extra cleaning.

Understanding the Process Flow



A. Semiconductor wafer
B. 3M™ Liquid UV-Curable Adhesive
C. 3M™ Light-to-Heat Conversion Release Coating (LTHC Ink)
D. Glass carrier
E. 3M™ Wafer De-Taping Tape 3305 (see Step 7 below)

Process Step		Benefits
1	**Bond the wafer to glass carrier** 	• Quick adhesive curing with UV exposure • Room temperature curing • Excellent conformity to surface topography • Up to 2/3 of uncured LC-3200 adhesive can be recycled by the tool
2	**Backgrinding** 	• Good total thickness variation (TTV) after backgrinding (typically 2µm TTV for 300mm wafer) • Wafer fully supported throughout the process
3	**Backside processing** 	• Good heat resistance (up to 260°C/266°F, for 1 hour) • Good chemical resistance to a broad range of process chemistries • Low outgas
4	**Dicing tape application** 	
5	**Laser debonding** 	• Compatible with 308, 355, 532 and 1064nm lasers • Room temperature process • No chemicals necessary • Low wafer stress
6	**Glass carrier lift-off** 	• Room temperature, chemical-free carrier separation, great for fragile substrates • Reusable carrier
7	**Peel off UV adhesive layer** 	• Low wafer stress • High throughput • No post-peel cleaning

A Complete End-to-End Solution

The 3M™ Wafer Support System is a single complete solution consisting of a temporary bonding adhesive, a release layer, and an adhesive removal tape. There are several temporary bonding adhesives available for different viscosities and low-, medium- and high-temperature process needs.

	Product Name	Base Resin	Viscosity	Recommended Application
Adhesive	3M™ UV-Curable Adhesive LC-3200	Acrylic	3500 CP @25°C	Low Temperatures (60+ min @ 150°C; several min @180°C)*
	3M™ UV-Curable Adhesive LC-4200	Acrylic, functional polymer	2150 CP @25°C	Intermediate Temperatures (90 min @180°C; several min @ 200°C)*
	3M™ UV-Curable Adhesive LC-5320	Special acrylate	2500 CP @25°C	High Temperatures (60+ min @260°C; several min @300°C)*

**Thermal performance varies by wafer construction. Wafer evaluations should be used to validate performance in process.*

	Product Name	Composition	Color	Features
Release Layer	3M™ Light-To-Heat-Conversion (LTHC) Release Coating	Thermoplastic resin	*In Solution:* Black *As Coating:* Semi-transparent grey	Enables clean release of adhesive/glass bond

	Product Name	Backing	Adhesive	Standard Roll Length	Tape Thickness	Features
Adhesive Removal	3M™ Wafer De-Taping Tape 3305	Polyester	Rubber	100 meters	2.7 mils	High instant adhesion. Allows for smooth unwind of roll.

Learn more at 3M.com/WaferSupportSystem

Safety Data Sheet: Consult Safety Data Sheet before use.

Regulatory: For regulatory information about this product, contact your 3M representative.

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