

3M Products for Solar Energy



Your ideas.
Our technologies.

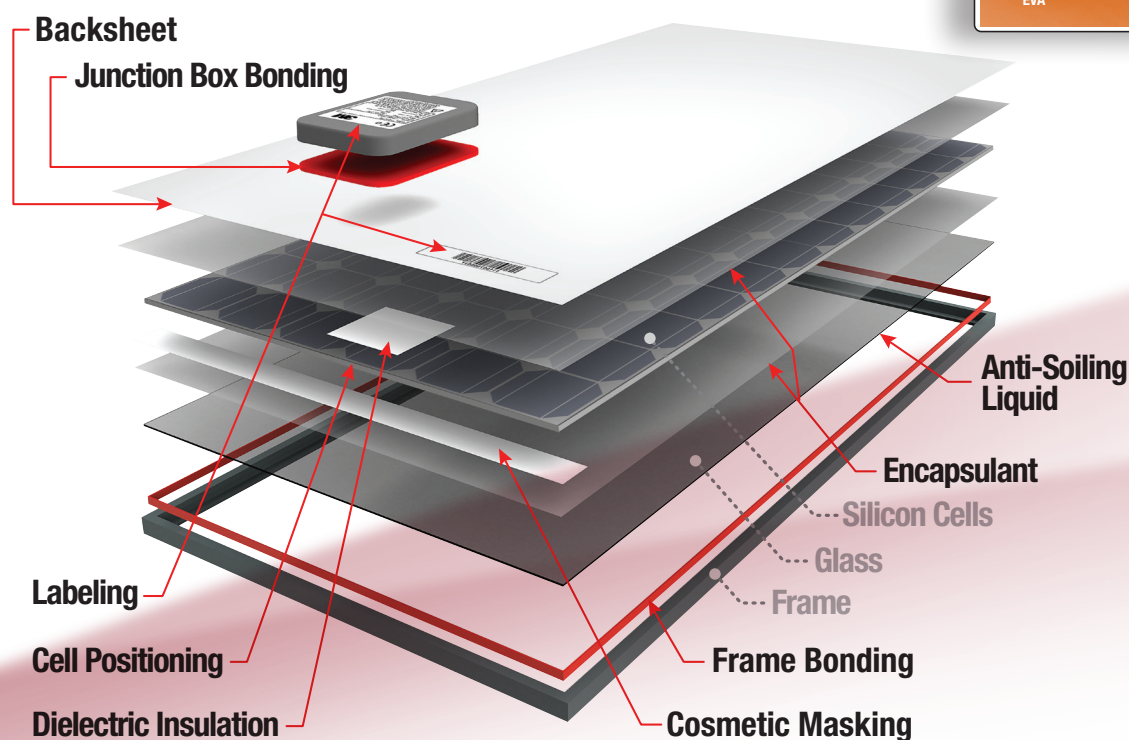
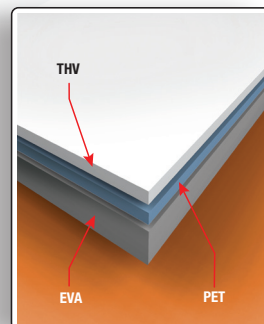
For more than a decade, 3M has been a trusted supplier of advanced materials for the solar industry. Our broad range of products and technologies is designed to enhance performance, improve reliability and drive down the critical cost per watt. As one of the world's leading suppliers of advanced films, tapes, coatings and adhesives, we have the ability to supply products and provide technical support around the world.

Crystalline Silicon (c-Si) Solutions

3M™ Scotchshield™ Film Backsheets

Moisture, heat and UV rays can seriously damage photovoltaic modules. 3M™ Scotchshield™ Film backsheets are uniquely engineered for maximum protection. Featuring 3M's innovative fluoropolymer technology and backed by years of proven, real world performance, 3M™ Scotchshield™ Film backsheets deliver outstanding moisture protection, heat resistance and UV stability. The low moisture vapor transmission rate allows for excellent retention of interlayer adhesion after environmental aging.

Made with a unique solvent-free manufacturing process, 3M™ Scotchshield™ Film backsheets feature a durable outer layer of THV fluoropolymer bonded to PET. Then an extra layer of EVA provides exceptional compatibility with encapsulants for strong, durable bonds. The outer surface is treated to facilitate the use of a broad range of adhesives, tapes and labels.



3M™ Cool Mirror Film 330

3M™ Cool Mirror Film 330 is a polymeric multilayer mirror. It's designed for near IR reflectance at normal incidence with an average reflectance of 89% or greater, and it reflects light specifically in the c-Si response range with a nominal reflection band (700-1250nm). A non-leaded product with non-blinding reflection, it is suitable for rooftop applications. When integrated as a reflector in a non-tracking low concentrated photovoltaic system, 3M™ Cool Mirror Film 330 enables up to 40% higher output compared to a typical installation.*

*Output improvement varies depending on latitude of installation location, time of year, module tilt and mirror tilt.

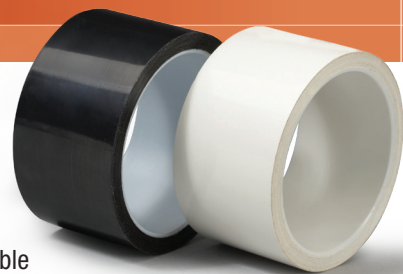
Photo courtesy of

 **tenKsolar®**
fundamentally better solar



3M™ EPE Films

Primarily used for dielectric applications, 3M™ EPE Films can also be used for cosmetic masking of bus wires and connections. 3M™ EPE Films are compatible with encapsulants and available in multiple colors and constructions to meet a broad range of applications.



3M™ Solar Encapsulant Film EVA9000

3M™ Solar Encapsulant Film EVA9000 is a fast cure encapsulant designed to work with PV modules. It protects against UV damage and weathering, while allowing the maximum amount of visible light transmission to solar cells. Conformable and flexible film is easy to laminate and features a low shrinkage rate. It provides a durable bond with both glass and backsheet. Cross-linked EVA9000 film has excellent visible light transparency, strong adhesion and elasticity properties required for solar cell encapsulation, plus decades of protection against UV aging, discoloration and weathering.



3M™ Solar Acrylic Foam Tape

For over 30 years industries worldwide have been using 3M™ Solar Acrylic Foam Tape technology to permanently bond and attach many substrates. The acrylic-based chemistry makes it ideal for critical applications that demand durability, including automotive, electronics, signage, glazing and construction market.

Frame Bonding

3M™ Solar Acrylic Foam Tapes can provide durable attachment solutions for solar module frames. The immediate holding feature allows for high throughput during manufacturing. Compared to sealants, there is no need to clean off any excess material, resulting in less labor and a more professional look. With field experience in millions of solar panels around the world, 3M™ Solar Acrylic Foam Tape is a time-tested solution for frame bonding. 3M™ Solar Acrylic Foam Tapes are all UL certified.



Junction Box Bonding

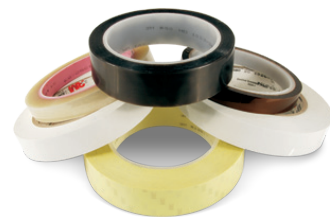
3M™ Solar Acrylic Foam Tape technology enables rapid attachment of junction boxes to solar modules. The easy, no-mess application allows for faster fabrication and can result in a cleaner look, compared to liquid adhesives and mastics. 3M™ Solar Acrylic Foam Tapes are all UL certified.

3M™ Dielectric Tapes

3M™ Dielectric Tapes are excellent high temperature tapes for crystalline silicon (c-Si) and thin film solar applications. Available in a wide variety of widths, they're reliable electric insulators with low outgassing adhesive and can be applied automatically to maximize productivity.

3M™ Specialty Tapes

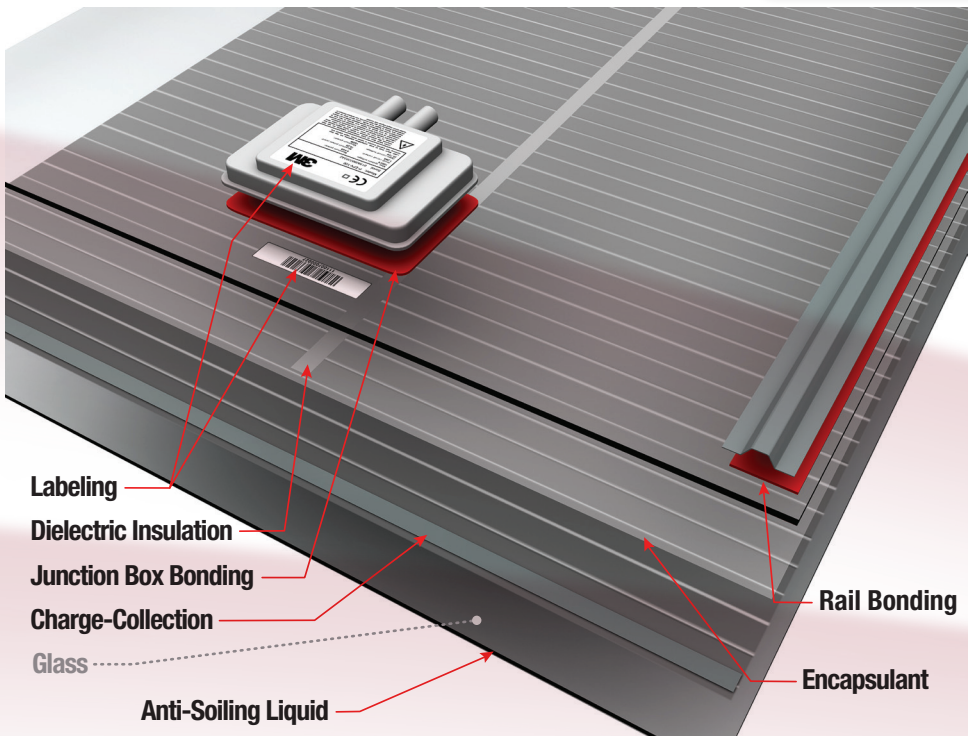
3M provides a wide range of tapes designed specifically for use in PV modules. These durable tapes ensure reliable, long-term application for everything from cosmetic masking to cell positioning.



Thin Film Solutions

3M™ EPE Films

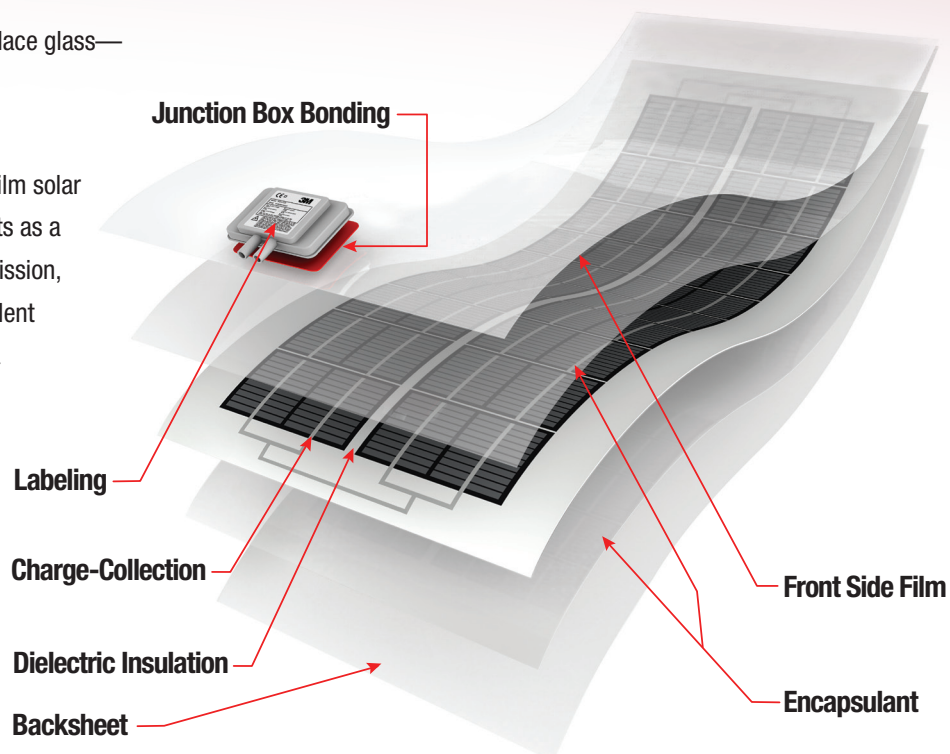
Primarily used for dielectric applications, 3M™ EPE Films can also be used for cosmetic masking of bus wires and connections. 3M™ EPE Films are compatible with encapsulants and available in multiple colors and constructions to meet a wide range of applications.



3M™ Ultra Barrier Solar Film

Transparent 3M™ Ultra Barrier Solar Film to replace glass—enabling high efficiency lightweight, flexible, photovoltaic (PV) modules.

Designed to address the needs of flexible thin film solar manufacturers, 3M™ Ultra Barrier Solar Film acts as a replacement for glass with its high light transmission, superb moisture barrier performance and excellent weatherability. 3M™ Ultra Barrier Solar Film is a multi-layered film made from a 3M proprietary roll to roll vacuum coating process. 3M has combined its knowledge of polymer films, nano technology adhesives and advanced materials to deliver a high-performing front sheet barrier film for the solar industry. 3M™ Ultra Barrier Solar Film is a UL certified component.



3M™ Solar Encapsulant Film EVA9000

3M™ Solar Encapsulant Film EVA9000 is a fast cure encapsulant designed to work with PV modules to protect against UV damage and weathering while ensuring maximum amount of visible light transmission to solar cells. It is conformable and flexible for ease of lamination with a low shrinkage rate and provides a durable bond with both glass and backsheet. Cross-linked EVA9000 film has excellent visible light transparency, strong adhesion and elasticity properties required for solar cell encapsulation and decades of protection against UV-aging, discoloration and weathering.



3M™ Dielectric Tapes

3M™ Dielectric Tapes are excellent high temperature tapes for crystalline silicon (c-Si) and thin film solar applications. Available in a wide variety of widths, they're reliable electric insulators with low outgassing adhesive and can be applied automatically to allow for rapid application to maximize productivity.



3M™ Solar Acrylic Foam Tape

For over 30 industries worldwide have been using 3M™ Solar Acrylic Foam Tape technology to permanently bond and attach many substrates. The acrylic-based chemistry makes it ideal for critical applications that demand durability, including automotive, electronics, signage, glazing and construction market.

Junction Box Bonding

3M™ Solar Acrylic Foam Tape technology enables rapid attachment of junction boxes to solar modules. The easy, no-mess application allows for faster fabrication and can result in a cleaner look, compared to liquid adhesives and mastics.

3M™ Solar Acrylic Foam Tapes are all UL certified.



Rail Bonding

3M™ Solar Acrylic Foam Tapes are also available in thicker product constructions to provide an easy, no-mess application when bonding rails to solar modules. 3M™ Solar Acrylic Foam Tapes are all UL certified.

3M™ Charge-Collection and Bus Tapes

The tin-plated, deadsoft copper foil tapes with a low outgassing pressure-sensitive adhesive or used in applications requiring excellent electrical conductivity from the substrate through the foil backing. The tin plating facilitates soldering to the backing and resists oxidation and corrosion. Suitable for standard thin film laminating temperatures, these tapes are available in a wide range of configurations for applications as charge collectors or buses within thin film solar panels.

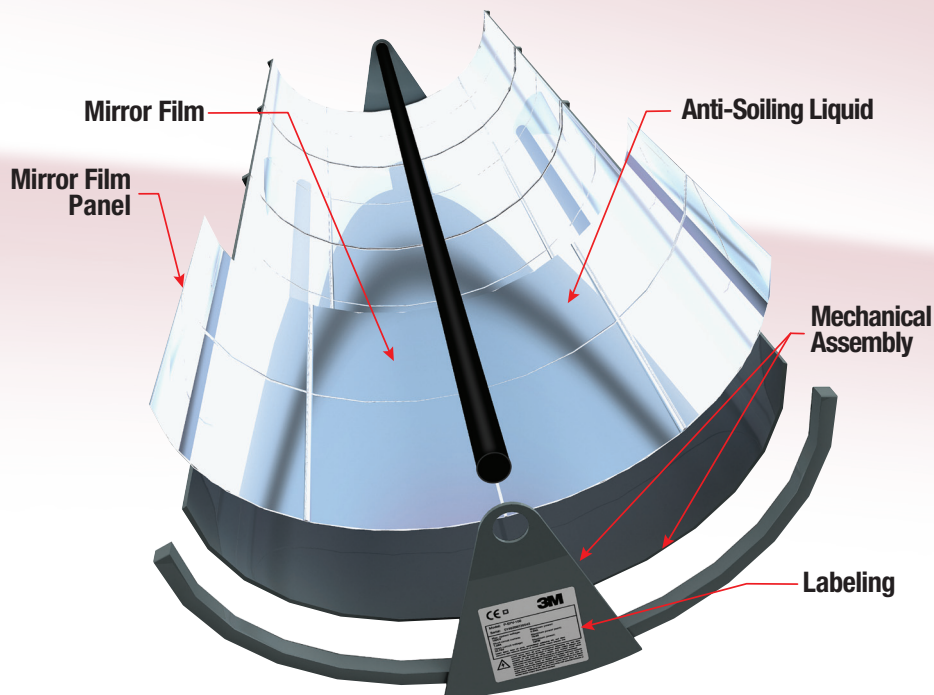


Concentrated Solar Power Solutions

3M™ Solar Mirror Film 1100

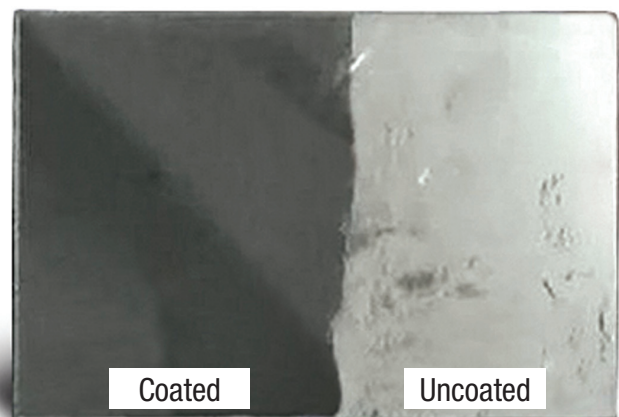
3M™ Solar Mirror Film 1100 is a silver metalized reflective film that has been specifically designed for Concentrating Solar Power (CSP), Concentrating Photovoltaic (CPV) and solar thermal installations. 3M™ Solar Mirror Film 1100 offers many advantages over traditional glass mirrors, including higher reflectance, less weight and improved mechanical properties. These features will increase the output of the Concentrated Solar System and provide greater design flexibility. Additionally, 3M™ Solar Mirror Film 1100 has adhesive on the back for easy application.

Data collected by 3M in production scale parabolic and heliostat reflectors since 1995, and from weathering samples since the 1980s, prove that our mirror films are highly weatherable and maintain reflectance stability.



3M™ Anti-Soiling Liquid

Photovoltaic (PV) modules installed in most outdoor locations accumulate soil on their sun-facing surface, which reduces light transmission to the PV cells, thereby reducing power output. 3M™ Anti-Soiling Liquid is specifically designed as a field applied coating that provides resistance to dry dust soiling. It is an easy to apply water based liquid suitable for arid, dusty environments.



Large Aperture Trough (LAT) 73

Large Aperture Trough (LAT) 73, engineered by Gossamer Space Frames and 3M, sets a new benchmark in solar collector technology for the CSP industry. Through advancements in materials technology, state of the art engineering, and superior design, the LAT 73 offers a step change in performance and reduced cost. LAT 73 uses 3M™ Solar Mirror Film 1100 as a reflective surface and a frame support structure custom designed by Gossamer. The result is an easy to assemble parabolic trough collector with the largest working aperture and the highest geometric concentration ratio in the world today.

LAT 73 leads the industry in optical performance. Technical features include:

- Highly reflective Solar Mirror Film 1100, with a 94.5% solar weighted hemispherical reflectance and 95.5% specular reflectance (25 mradian acceptance angle)
- High accuracy reflective panel constructions, with less than 1.5 mradian RMS slope error
- Integration with space frame that results in intercept factors exceeding 98% at a concentration ratio of 103



3M and Gossamer Space Frames have joined efforts to develop the most technologically advanced solar collector: Large Aperture Trough (LAT) 73.

3M Renewable Energy Division: Unmatched Capabilities

3M's commitment to the renewable energy industry includes a global organization of research and development, sales, marketing, manufacturing, and technical service—all dedicated to developing reliable materials that reduce costs and improve performance.

Expertise

Founded in 1902, 3M has extensive experience developing durable materials for outdoor applications in transportation, commercial graphics and optics. This includes world-class facilities for simulated and real-time weathering exposure and testing.

Innovation

At 3M, the innovation is never-ending. Whether the free-flow of ideas and solutions is occurring among our people, our technologies, our industries or the geographies where we operate, the human and technological connections within 3M enable infinite combinations and applications of expertise as ideas multiply and solutions expand.



Laboratories

USA
Japan
Germany
South Korea
Singapore
China

Manufacturing

USA
Poland
Germany
South Korea
Singapore
Japan
Taiwan
China

Sales & Marketing

USA	Singapore
Canada	China
Mexico	South Korea
Germany	Japan
Denmark	Taiwan
Spain	Malaysia
UK	India
France	Brazil
Italy	

Collaborate with 3M

3M innovation is fundamentally about solving problems. We extend an open invitation to access our experts—present your challenges so we can work together to develop answers and solutions and put 3M's technology to work for you.

United States

3M Renewable Energy Division
800 755 2654

Germany

49 2131 144450

Denmark

45 43 480100

Spain

34 91 3216000

France

33 1 30316161

United Kingdom

44 1344 858000

Italy

39 02 70351

Singapore

65 6450 8888

China

86 21 62753535

Korea

82 2 3771 4043

India

91 80 22231414

Canada

800 364 3577

Brazil

0800 13 23 33

Mexico

52 55 52702250

Taiwan

886 933 896752

Japan

81 3 3709 8283

Malaysia

603 78062888

Other Areas

800 755 2654

For more information on our solar manufacturing product line, contact 3M Renewable Energy at 800-755-2654 or visit us at www.3M.com/solar.

Technical Information: The technical information, recommendations and other statements contained in this document are based upon tests or experience that 3M believes are reliable, but the accuracy or completeness of such information is not guaranteed.

Product Use: Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. Given the variety of factors that can affect the use and performance of a 3M product, user is solely responsible for evaluating the 3M product and determining whether it is fit for a particular purpose and suitable for user's method of application.

Warranty, Limited Remedy, and Disclaimer: Unless an additional warranty is specifically stated on the applicable 3M product packaging or product literature, 3M warrants that each 3M product meets the applicable 3M product specification at the time 3M ships the product. 3M MAKES NO OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY IMPLIED WARRANTY OR CONDITION ARISING OUT OF A COURSE OF DEALING, CUSTOM OR USAGE OF TRADE. If the 3M product does not conform to this warranty, then the sole and exclusive remedy is, at 3M's option, replacement of the 3M product or refund of the purchase price.

Limitation of Liability: Except where prohibited by law, 3M will not be liable for any loss or damage arising from the 3M product, whether direct, indirect, special, incidental or consequential, regardless of the legal theory asserted, including warranty, contract, negligence or strict liability.



Renewable Energy Division

3M Center, Building 235-1S-67
St. Paul, MN 55144-1000
800 755 2654
www.3M.com/solar

Please recycle. Printed in USA.
© 2012, 3M. All rights reserved.
Issued: 09/12
98-0150-0053-6

Scotchshield and 3M are
trademarks of 3M.
Used under license by
3M subsidiaries and affiliates.