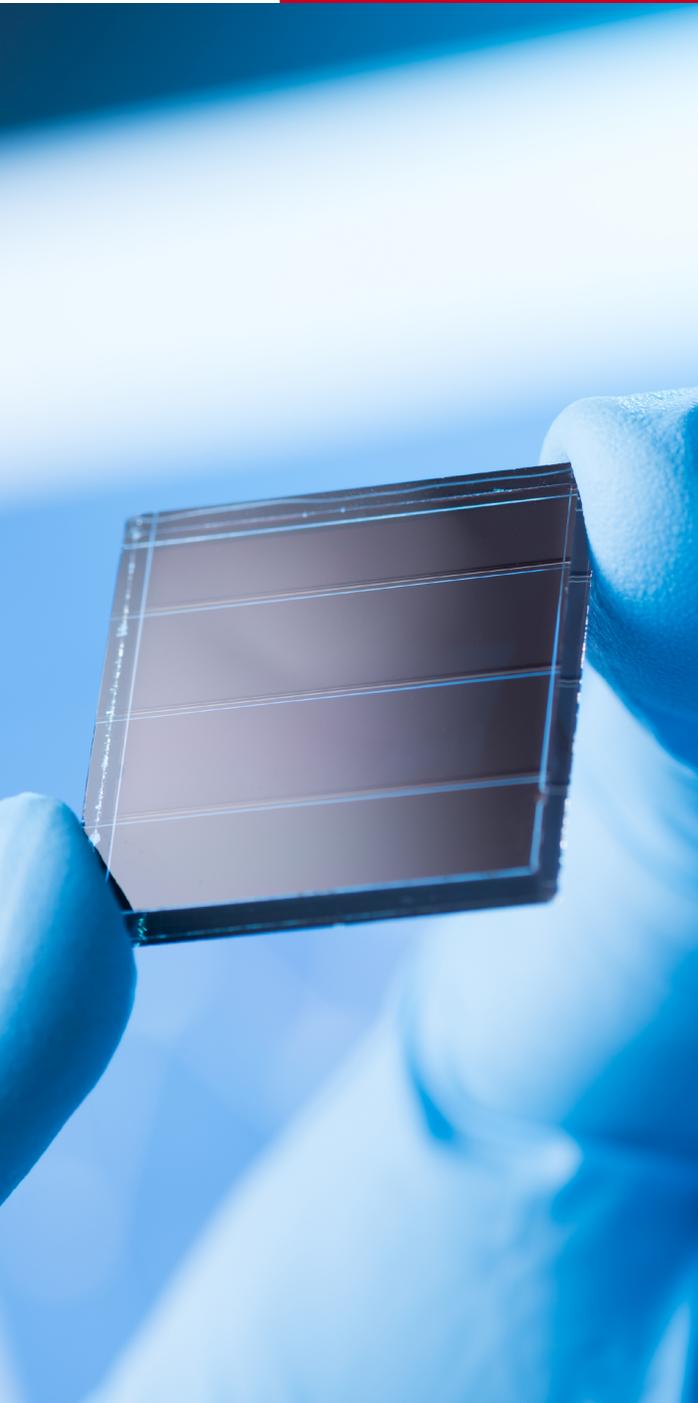


# Photovoltaic (PV) materials testing and certification





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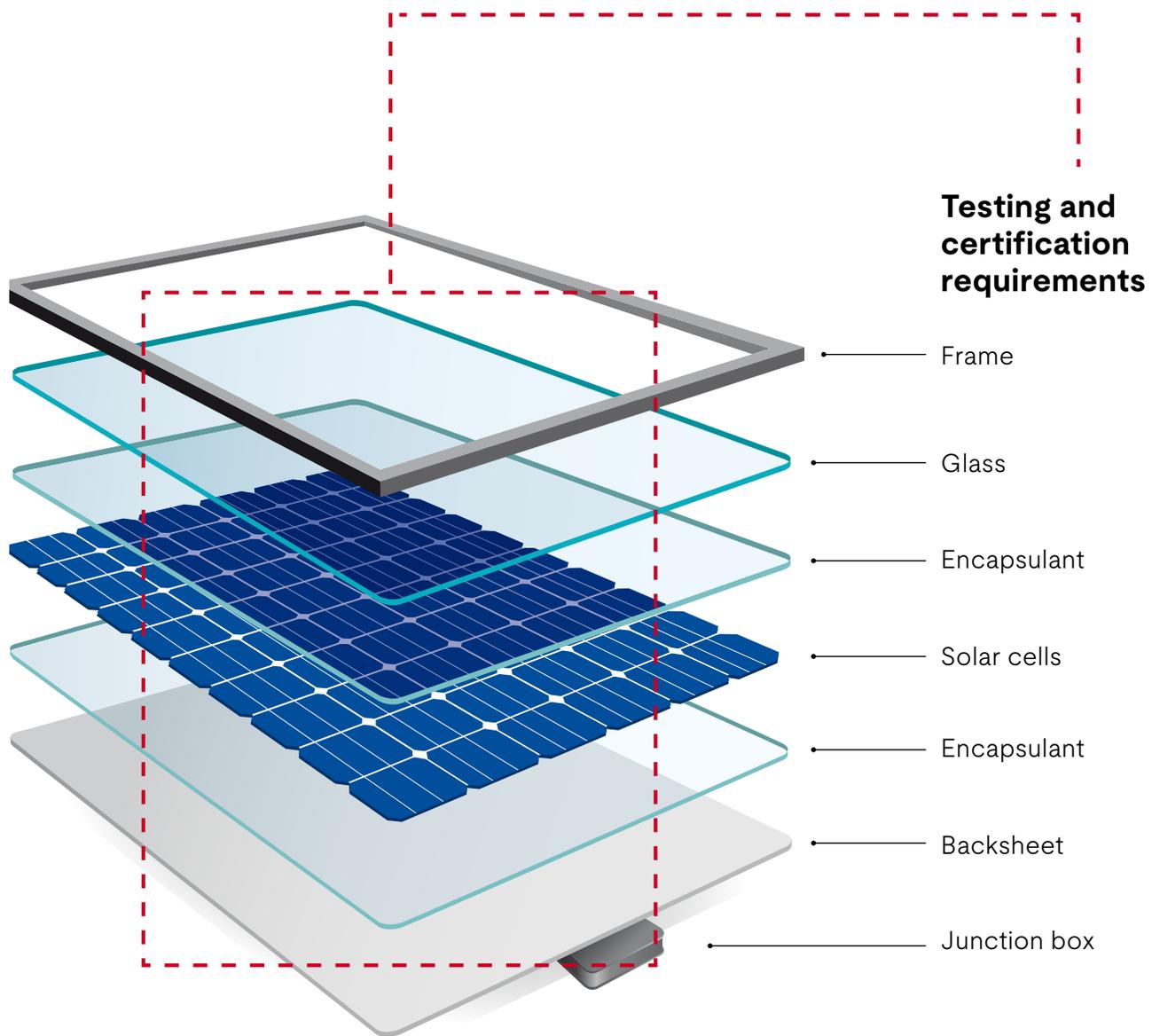
## UL Solutions and the PV industry

Renewable energy is critical for both the well-being of our planet and for optimizing the operating costs of modern buildings. However, due to strict regulations and requirements, photovoltaic (PV) materials must meet the highest standards of performance and safety.

For manufacturers of PV materials, demonstrating compliance is a crucial step in bringing safer products to market. UL Solutions delivers the expertise to test, inspect and certify all necessary materials for the PV industry.

# Testing and certification programs for polymeric materials used in PV modules

Our globally recognized program can help you demonstrate the safety, quality and sustainability of your materials based on a set of objective third-party performance credentials.

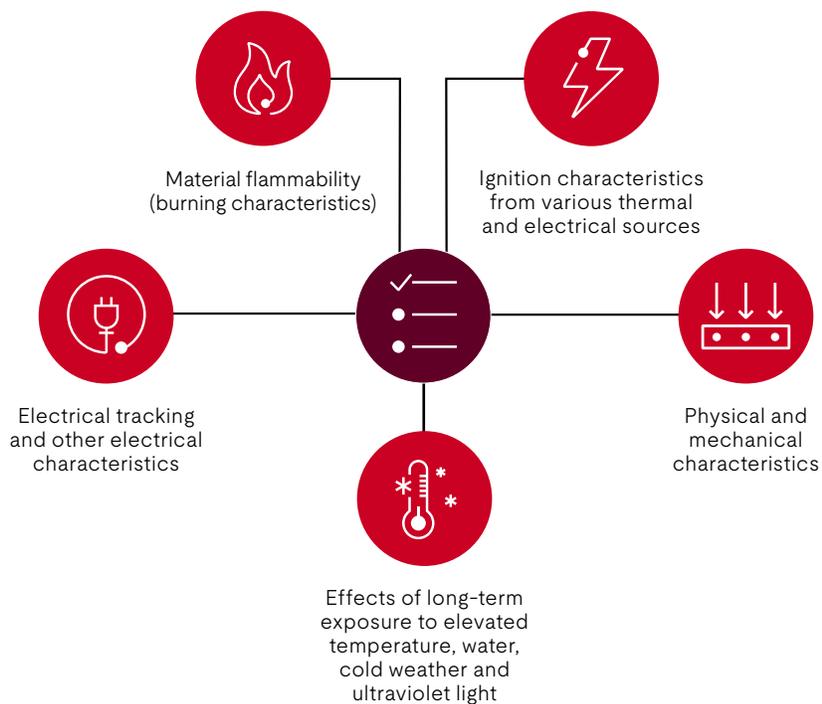


# PV materials testing

PV materials testing programs cover testing common components used in fabricating PV modules or components. The following are representative of components covered under this category:

- Encapsulants
- Frontsheets and backsheets
- Adhesives and sealing materials
- Potting compounds
- Polymetric frames

Our experts can test these materials in accordance with established methods. These tests define material properties and facilitate the investigation of their use in PV product applications. We can test:



# UL Solutions Yellow Card™ Plastics Recognition Program

Our Yellow Card™ promotes the safety and quality of your PV products to existing and potential customers. Yellow Cards are listed in the UL Product iQ® and UL Prospector® databases.

Designers, engineers and suppliers rely on these databases to find trusted providers of recognized materials and components. This is a globally recognized program that provides third-party certification for the quality, safety and performance of your plastic products.



## Yellow Card — Plastics

CCN — QMFZ2, generic plastics

## Yellow Card — PV materials

CCN — QIHE2, polymeric and other materials for use in fabricating photovoltaic modules or their components

## Yellow Card — Frontsheet and backsheet (new)

CCN — QIHF2 (new), polymeric frontsheets and backsheets intended to be used as components of PV modules

## The benefits of the Yellow Card

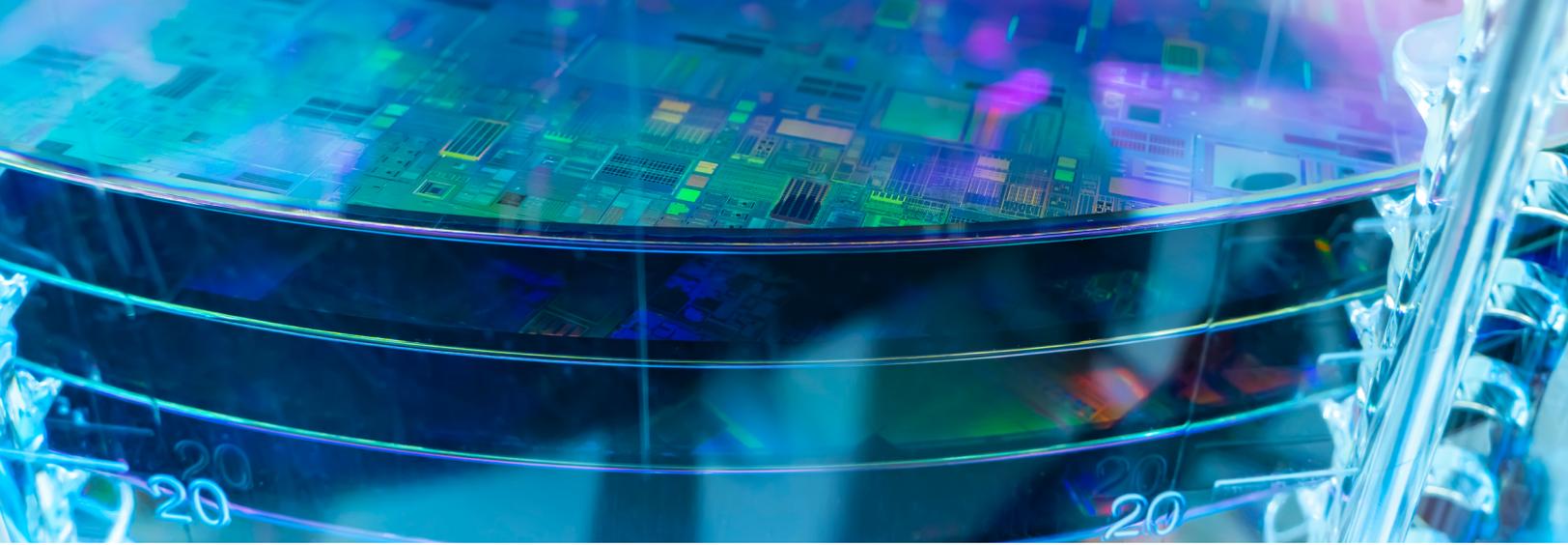
Using UL Solutions–tested and –certified components — identifiable through the UL Recognized Components Mark on the Yellow Card — can save you time and money. By eliminating the need for further materials testing, it can shorten your path to certain certifications.

By applying for a UL Solutions Yellow Card, you can:

- Differentiate your plastics
- Demonstrate safety
- Help others find your products
- Protect your brand
- Demonstrate your plastics' performance to a worldwide customer base



UL Solutions' newly designed Yellow Card specifically for frontsheets and backsheets can help PV module designers easily source the pre-qualified frontsheets and backsheets that meet the latest requirements set forth by both UL Solutions and IEC 62788-2-1.



# UL Solutions PV materials traceability program

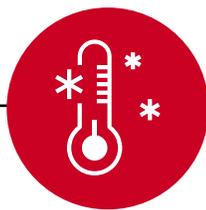
## Identification tests for polymeric materials

It is important to keep polymeric formulations consistent for the supply chain. At UL Solutions, we have introduced a new certification for polymeric materials that will include three identification tests to “fingerprint” the formulation. The tests include:



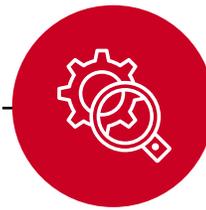
IR

Infrared spectroscopy



TGA

Thermogravimetry



DSC

Differential scanning  
calorimetry

Your “fingerprint” will be stored as reference with the new certification. UL Solutions Follow-up Services apply to any product carrying the UL Mark to verify that it still meets the original requirements under which it was certified. UL Solutions Follow-up Services verify continuing compliance with safety requirements through ongoing material assessments, such as regular manufacturing visits and sample selection with testing as the material is being produced.

## Lifetime testing

Throughout the life span of a UL Solutions certification, we conduct regular inspections of production facilities and products, working toward an end goal of total compliance. In addition, polymeric materials are selected during Follow-up Services and sent to UL Solutions for comparison to the IR, TGA and DSC reference graphs on file.

Successful comparison to the reference IR, TGA and DSC is an indication that no polymeric changes have occurred; it is further evidence that key safety properties of the material remain unchanged. Upon completion, we will issue an inspection report that identifies the model(s) inspected as well as any noncompliance identified by issuing a variation notice. Our field engineers will explain why the variation notice was issued and the process necessary to resolve the noncompliance. Since our services continue throughout the life cycle of your product, UL Solutions is with you every step of the way.



# Why the PV industry looks to UL Solutions

UL Solutions is a global safety science leader with expertise in testing, certifying and inspecting products and materials for the PV and plastics industries. Our specialized programs deliver reliable test data and assessments for polymeric materials used in PV components, providing suppliers and their customers with greater confidence that their products comply with all necessary requirements.

Learn more at  
[UL.com/pvmaterials](https://www.ul.com/pvmaterials).



**[UL.com/Solutions](https://www.ul.com/solutions)**

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