



High Performance Carriers

for Photovoltaics

Carriers

for Wet Processing Systems

SINGULUS TECHNOLOGIES – Innovations for New Technologies

SINGULUS TECHNOLOGIES develops and assembles innovative machines and systems for efficient thin-film coating and surface treatment processes, which are used worldwide in the Photovoltaics, Semiconductor, Medical Technology, Packaging, Glass & Automotive as well as Battery & Hydrogen markets.

The company's core competencies include various processes of coating technology (PVD sputtering, PECVD, evaporation), surface treatment as well as wet-chemical and thermal production processes.

Carriers for Wet Batch Processing Systems

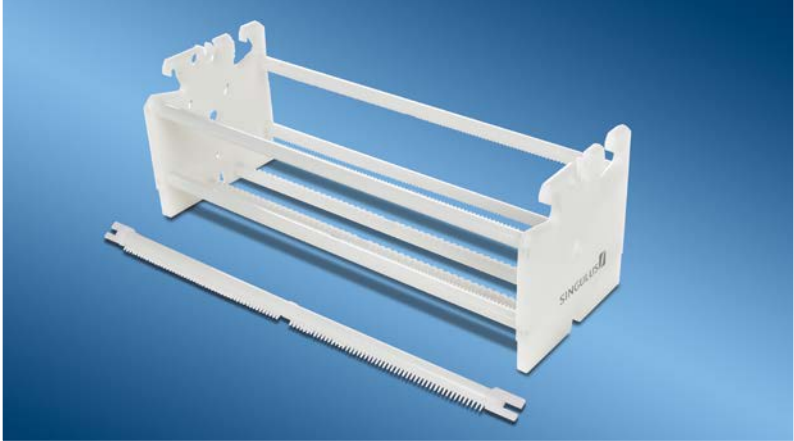
High performance process carriers ensure excellent wafer and cell quality in high performance wet processing systems. SINGULUS TECHNOLOGIES has a long experience in providing complete automated dry-in/dry-out solutions for wet-chemical treatment of Si-wafers for standard, high-efficiency and tandem solar cells. The SILEX III is running with very low breakage rates down to 0.01 % and a high process yield up to 13.800 wph (based on M6 wafer format)

The carriers from SINGULUS TECHNOLOGIES are certified for all current and future batch process applications.

These include gettering and cleaning processes, as well as alkaline texturing processes of mono-crystalline silicon for generating pyramidal-etched surfaces with optimal light trapping, passivation and contacting properties. Also, for polishing processes in combination with chemical etch isolation processes the carriers are the right tools.

The special material requirements for the carriers in ozone based advanced cleaning and conditioning processes are fully archived. Due to the proven stability their use offers substantial cost advantages compared to competitor systems.





ADVANTAGES

- » High quality product under steady quality assurance
- » Substantial cost advantages
- » Dimensional stability under extreme process conditions
- » Low breakage rate < 0.01 %
- » Thin wafer processing down to 115 µm thickness post etching based on M6 format
- » No sticking effects due to optimal tooth shape
- » Low chemical carry over design
- » Homogeneous etching with minimum shadowing and prevention of carrier marks
- » Optimal rinse and spot-free drying performance
- » Injection molded design with optimal surface finishing
- » Carrier up-flow prevention by proper weight & by SINGULUS SILEX III wet process equipment
- » Capacity of max. 115 wafers – pitching 4.76 mm – based on M6 results in throughput up to 13.800 wph
- » Optimized weight design for user friendly handling also with M12 carriers
- » RFID carrier identification with transponder for MES tracking

CARRIER SIZES REGARDING WAFER FORMAT

- » M10/2: up to 230 wafers per carrier
- » M12/2: up to 230 wafers per carrier
- » M0-M6: up to 115 wafers per carrier
- » M10: up to 100 wafers per carrier
- » M12: up to 92 wafers per carrier
- » Special formats on request

CARRIER LENGTH

- » 554, 612 and 700 mm for all wafer formats

AREAS OF APPLICATION WET PROCESSING

- » Etching
- » Cleaning
- » Rinsing
- » Drying

CARRIER MATERIALS

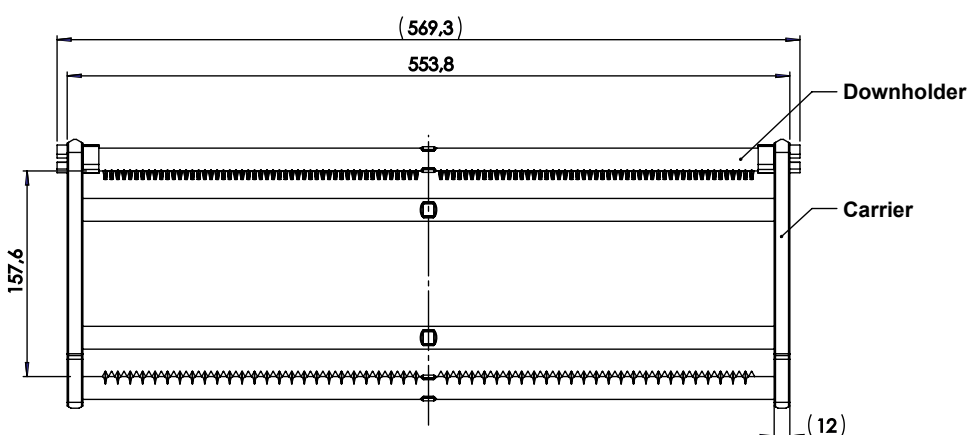
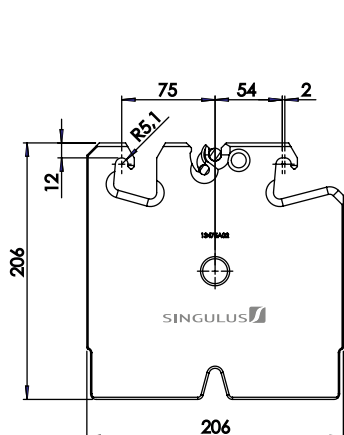
- » **PVDF**: Chemical wet processing at high temperature up to 105 °C and/or strong oxidizing conditions [e.g. Ozone, NAOS]
- » Special **nano-coating** for less chemical carry over and optimized drying quality

INLAY TECHNOLOGY

- » **SST**: Coated metal
- » **CFK**: Metal-free & less weight

LABELLING

- » Unique SINGULUS TECHNOLOGIES serial ID for smart maintenance



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THIN FILM
DEPOSITION

SURFACE
ENGINEERING

THERMAL
PROCESSING

WET
CHEMICAL

SINGULUS TECHNOLOGIES - Thin-Film Coating and Surface Treatment

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SINGULUS TECHNOLOGIES sees sustainability as an opportunity to position itself with innovative products. In the focus are:

- » Environmental awareness
- » Efficient use of resources
- » Avoidance of unnecessary CO₂ pollution

SINGULUS TECHNOLOGIES attaches great importance to responsible and sustainable corporate governance.