

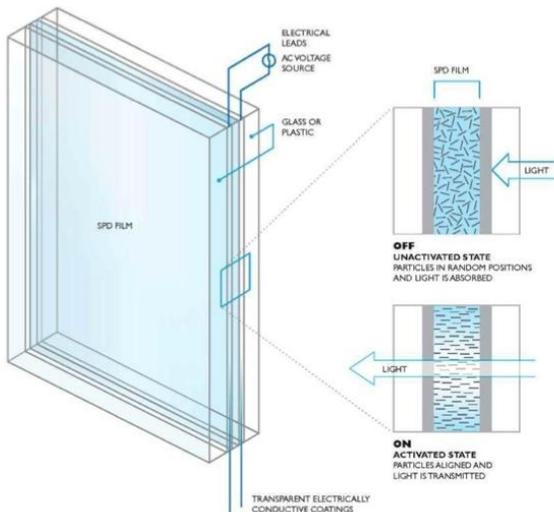
# SPD-SMARTGLASS™

## AUTOMOTIVE APPLICATIONS

Energy efficient SPD-SMARTGLASS is the world's highest-performing "dynamic" glazing. It regulates the amount of light, glare and heat transmitted through windows and other products. Developed by Research Frontiers Inc., SPD-SMARTGLASS uses light-control film produced by Hitachi Chemical Co., Ltd. and Isoclima S.p.A – Finind Group.

SPD-SMARTGLASS is now offered globally through licensed suppliers and their partners for automotive, marine, aerospace, commercial and residential projects. SPD-SMART™ automotive windows are available in standard and custom configurations for OEM and after-market vehicles.

### HOW IT WORKS



SPD-SMART film contains microscopic particles. Regulating the voltage to the film adjusts the particles' orientation, instantly and precisely controlling the passage of light, glare and heat through the film. SPD-SMART film is laminated between panes of glass or plastic substrates. Fabricated SPD-SMART insulated automobile windows are exceptionally energy efficient and may be combined with bullet-resistant glass.



- Front window visors, sidelites, backlites and sunroofs
- Glass and polycarbonate
- Flat or simple curved surfaces
- Shading, privacy, glare- and heat-control within a single, low-maintenance window
- Eliminated the need for mechanical shades
- Automated and manual controls help optimize energy performance and passenger comfort
- Over 99% of harmful UV radiation blocked
- Laminated IGUs with multi-layer film fabrication significantly reduced adjacent freeway noise
- "The change in light level is very dramatic. We have never seen anything like it." – Glazing Contractor



Photos above: SPD-SMARTGLASS in dark and clear states at Research Frontiers' Design Center in Woodbury, NY.

## TECHNICAL DATA

Visible Light Transmittance	<ul style="list-style-type: none"> <li>Unpowered: &lt;1% (Dark)</li> <li>Powered: &gt;50% (Clear)</li> </ul>
Contrast Ratio	<ul style="list-style-type: none"> <li>As high as 170:1</li> </ul>
Number of Light-Control Levels	<ul style="list-style-type: none"> <li>Unlimited</li> </ul>
Switching Speed	<ul style="list-style-type: none"> <li>Seconds</li> </ul>
Control Over Incoming Solar Energy	<ul style="list-style-type: none"> <li>Solar heat gain coefficient (SHGC) as low as 0.06 (blocks 94% of solar energy)</li> <li>Wide range of control over incoming heat; adaptable to regions and weather conditions</li> </ul>
UV Protection	<ul style="list-style-type: none"> <li>Over 99%</li> </ul>
Power Consumption	<ul style="list-style-type: none"> <li>Nominal; As low as 0.06 watts/ft<sup>2</sup></li> </ul>
Width	<ul style="list-style-type: none"> <li>3+ feet (&gt;3+ feet when SPD film is "seamed" within a laminated panel)</li> </ul>
Length	<ul style="list-style-type: none"> <li>No limit; panels up to 9 feet long have been installed</li> </ul>
Substrates	<ul style="list-style-type: none"> <li>Glass or plastic</li> </ul>
Simple Curves	<ul style="list-style-type: none"> <li>Yes</li> </ul>
Insulated Glass Units, Custom Shapes and Fabrications	<ul style="list-style-type: none"> <li>Yes</li> </ul>
Voltage	<ul style="list-style-type: none"> <li>AC</li> </ul>
Controllers	<ul style="list-style-type: none"> <li>Battery DC to AC</li> <li>OEM and After-Market</li> <li>Manual &amp; Automatic control</li> <li>Variety of window controls</li> <li>Sensors (light, heat, occupancy)</li> <li>Interface with on-board automotive systems</li> </ul>
Durability	<ul style="list-style-type: none"> <li>Tested at millions of on/off switching cycles</li> </ul>



**TintMaker  
SPD Control Systems  
Corporation 8-Window  
Auto After-Market**

## FEATURES:

- Intermediate and fully clear states preserve views and support occupant well-being
- Unpowered dark state reduces interior heat build-up, thus lowering cooling costs
- Exceptional solar energy control manages heat gain and energy used for heating and cooling
- Unpowered dark state efficiently reduces nighttime light pollution
- UV-blocking minimizes degradation of interiors and harmful effects to occupants

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