Toward an era of smart windows!

LC MAGIC, a light control film creating a new space with the magic of light.
Create a new space with the magic of light.
The liquid crystal light control film achieves "to show", "not to show" and "serve as a projection screen".

LC MAGIC is an ultra-thin liquid crystal film developed based on Toppan's liquid crystal technological achievements accumulated through our display-related businesses.
The flip of a switch can transform the film state from transparent to opaque, or vice versa.
This innovative product is used in a wide variety of applications, as an alternative to a blind or curtain or as a digital signage screen.
Our lineup is: Normal-Mode film that switches to transparent when power is turned on, and Reverse-Mode film that switches to transparent when power is turned off.

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Modulation of light transmission by polymer network liquid crystals

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Features of LC MAGIC

1. Can provide both higher transparency and full privacy.
   
   Realized 86% total light transmittance and 98% haze. With the Normal-Mode film, light control is available (the degree of transparency can be adjusted).
   
   Note: Feasible with the Normal-Mode film.

2. Can be processed with flexibility (Design flexibility)

   By making a proper electric design prior to modularization, LC MAGIC is freely processable into your ideal shape.
   
   Note: Since the electric characteristics change after modularization, making a significant modification will be impossible.

3. The ultra thin film makes it easier to be applied to curved surface or existing glass.

   The ultra thin film we manufacture eases the process of applying the film onto curved surface or existing glass.

4. Can be used as a projection screen.

   As LC MAGIC is optically developed, the opaque state can display images with high quality and high definition, such as 4K.
   
   Note: In addition to the conventional rear projection, front projection is available.

5. Wide viewing angle

   LC MAGIC has a viewing angle of up to 160 degrees in horizontal and vertical directions.

6. Can be made by the roll-to-roll production.

   The shipment unit per roll is 50m.
   
   Note: Width: 1,500mm (Normal-Mode) and 1,200mm (Reverse-Mode)

7. Production at Toppan’s domestic plants

   Safe and stable supply system with Japanese quality
   
   Note: Manufactured in a class 100 clean room
For a space where privacy is desired!

For a large window or partition!

Normal-Mode film
(Transparent upon power-on and opaque upon power-off)

It is possible to continuously modulate the degree of transparency.
Flexible adjustment according to the application.

Create a privacy environment.
With the higher haze (98%) when opaque, this can provide full privacy.

Adjustable transparency
The degree of transparency can be easily controlled using a controller.

The wide width: 1.5 meters
Can be applied to a large window or partition without replenishing.

Basic data

<table>
<thead>
<tr>
<th>Model No.</th>
<th>NW001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>0.12mm</td>
</tr>
<tr>
<td>Maximum dimension</td>
<td>1,500 × 3,000mm</td>
</tr>
<tr>
<td>Total light transmittance (when activated)</td>
<td>86%</td>
</tr>
</tbody>
</table>
| Parallel light transmittance | ON 82%
OFF 1% |
| Haze | ON 5%
OFF 98% |
| Response time *1 | 0.1sec |
| Power consumption *4 | 5W/m² |
| Driving voltage | AC 40~80V |
| Operating temperature | -10~60°C |
| SWOM (Weathering test) *5 | Passed 2,000 hours of the test |

Note 1: This is a value measured based on JIS K 7361-1 and JIS K 7136, and not a guaranteed value.
Note 2: A value measured at room temperature.
Note 3: This is a response speed of the film at room temperature, not including the activation and response time of the power supply equipment.
Note 4: A value measured at room temperature using the optimal voltage for an area of 1m² (square wave: 60Vrms 40Hz). This is a power consumed by the film only, not including the consumption by other devices (Power supply, etc.).
Note 5: SWOM (weathering test) was conducted based on JIS A 5759. Satisfied the values specified in the Toppan's standard using Toppan-specified adhesive and edge sealing.
Reverse-Mode film
Reverse-Mode film (Opaque upon power-on and transparent upon power-off)

For the environment with a sense of openness!
For energy saving and efficiency!

Economical! The transparent state is available without using electricity.
Suitable for the environment where the clear state is usually desired.

Ecology and energy efficient!
The transparent state is available without turning the system on. This is suitable for the environment where the transparent state is usually required.

Visible even when a power failure occurs!
As the state of the film is transparent in the event of a power failure, viewing field may be secured.

Higher transparency
Developed by focusing on the transparent property of the film.

Basic data

| Parameter                        | RW002 | Thickness | 0.26mm | Maximum dimension | 1,200 × 3,000mm | Total light transmittance (when not activated) | 88% | Parallel light transmittance | ON | 7% | OFF | 80% | Haze | ON | 92% | OFF | 10% | Response time | 0.5sec | Power consumption | 5W/m² | Driving voltage | AC25—80V | Operating temperature | -10—60°C | SWOM (Weathering test) | Passed 2,000 hours of the test |

Note 1: This is a value measured based on JIS K 7361-1 and JIS K 7136, and not a guaranteed value.
Note 2: A value measured at room temperature.
Note 3: This is a response speed of the film at room temperature, not including the activation and response time of the power supply equipment.
Note 4: A value measured at room temperature using the optimal voltage for an area of 1m² (square wave: 40Vrms 60Hz). This is a power consumed by the film only, not including the consumption by other devices (Power supply, etc.).
Note 5: SWOM (weathering test) was conducted based on JIS A 5759. Satisfied the values specified in the Toppan’s standard using Toppan-specified adhesive and edge sealing.
**Option**  We offer various options for each application to enhance the functionality.

<table>
<thead>
<tr>
<th>Color variation</th>
<th>Front projection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple products in black with different tones are available. So, you can choose one suitable for your space. Note: The width of the black type is 1,000mm.</td>
<td>Front projection is available with LC MAGIC, when there is not enough space to put the projection behind the screen.</td>
</tr>
</tbody>
</table>

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<tr>
<th>Electrode</th>
<th>Edge sealing</th>
<th>Installation</th>
</tr>
</thead>
<tbody>
<tr>
<td>The flexible printed circuit used in electronic devices is applied on an electrode area. Easy to handle! It is possible to install the product in a narrow bezel frame.</td>
<td>LC MAGIC is shipped with its edge being protected with the Toppan’s specific material. A dedicated tool realizes precise and reliable edge sealing process.</td>
<td>In addition to installation of glass with LC MAGIC or attachment to existing glass using water, quick installation using self-adhesive sheet is available.</td>
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</tbody>
</table>

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<tr>
<th>Power supply</th>
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| LC MAGIC power supplies based on Toppan’s proprietary design are available. Choose one from two types according to your application. Based on safe and secure design, the device is mounted in a fire-resistant housing having the earth leakage breaking function. Via connection to a commercial wall switch, LP1/LP2 can turn on/off LC MAGIC.  
Note: The power supply of LC MAGIC is certified in some countries. Please confirm with our sales if the power supply is certified or not in your country. |

- **LP1**  Multi-functional model with transmittance adjustment and external control  
LP1 can address an area of approximately 4.5m² of LC MAGIC.  

  - Dedicated operation panel  
    - (Option)  
    - Dedicated operation panel, remote controller (Power on/off, adjustment*)  
  - External control via PC connection  
  Note: Transparency adjustment is supported with the Normal-Mode LC MAGIC only.  

- **LP2**  A thin device with a simple functionality for large areas  
LP2 can address an area of approximately 20m² of LC MAGIC.  

  - (Dimension)  
    - W150xD235xH75.5mm  
  - (Dimension)  
    - W103xD300xH32mm
LC MAGIC is used in various fields (offices, houses, commercial facilities, etc.). It is possible to use LC MAGIC differently at the same location depending on the intended use or time (for security solutions, privacy protection, or as a projection screen).

For VIP or reception rooms
Depending on the contents of the meeting, it is possible to change the state between transparent and opaque with the flip of a switch.

For hotel bathrooms
Can create a privacy environment with a sense of openness

For plant tour route
Depending on the nature of manufacturing, it is possible to control the state of the film between transparent and opaque, which can keep confidentiality from visitors as a security measure.

For building’s external windows
Can select the state of clear and opaque depending on the weather.

For medical facilities
LC MAGIC can be used for spaces in a medical facility (hospital, etc.) protected with privacy as needed. Sanitary product with simple and easy cleaning maintenance

As a digital signage screen
In addition to privacy protection usage, LC MAGIC can be used as a digital signage screen. High resolution image can be projected by utilizing the features of LC MAGIC.

LC MAGIC website
https://www.tappan.co.jp/electronics/english/new_products/lc_magic/

Introduction of the showroom at the Shibaura Office
(YouTube)
https://www.youtube.com/watch?v=F8LnniC-nUY