Panasonic's wide variety of advanced functional films support your cockpit design.

### Major Applications and Our Solutions

**For Head Up Display Units**

**Thermal Insulation Optical Films**
Intercept 80% of incoming near-infrared lights to the HUD unit, and reduce the ambient temperature.

**For Smart Mirrors**

**Anti-Rainbow/Anti-Blackout Films**
Prevent rainbows and blackout when wearing polarized sunglasses.

**For Center Information Displays (CIDs), Instrument Clusters**

**Anti-Reflection Films**
(Anti-Glare Type/Clear Type)
Prevent reflecting images and lights for relaxed and easy operations on the displays.

**Anti-Rainbow/Anti-Blackout Films**
Prevent rainbows and blackout, and no more irritation with polarized sunglasses.

**Moldable Anti-Reflection Films**
Anti-reflection but 150% stretchable. Printable on the back side, and suitable for insert molding.
## Anti-Rainbow and Anti-Blackout Films

### Applications

Smart Mirrors, Center Information Displays (CIDs), Side Displays, Instrument Clusters, and other Automotive Displays.

Control birefringence and prevent rainbows and blackout inevitable with polarized sunglasses, and provide clear visibility on the displays.

### Features

- **Prevent Rainbows and Blackout**

### Layer Structure

- **MUAC4 <Anti-Reflection Type>**
  - AR Layer
  - HC Layer
  - Base Film
  - Base Film: Super Retardation Film
  - Film Thickness: 80 μm

- **MUAH4 <Hard Coat Type>**
  - HC Layer
  - Base Film
  - Base Film: Super Retardation Film
  - Film Thickness: 80 μm

- **MUHA40J <Anti-Fingerprint Type>**
  - HC Layer
  - Base Film
  - Base Film: Super Retardation Film
  - Film Thickness: 80 μm

### General Properties

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>MUAC4 &lt;Anti-Reflection Type&gt;</th>
<th>MUAH4 &lt;Hard Coat Type&gt;</th>
<th>MUAH40J &lt;Anti-Fingerprint Type&gt; (Under Development)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Film</td>
<td></td>
<td>Super Retardation Film (SRF)</td>
<td>Super Retardation Film (SRF)</td>
<td>Super Retardation Film (SRF)</td>
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<tr>
<td>Base Film Thickness</td>
<td>μm</td>
<td>80</td>
<td>80</td>
<td>80</td>
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<tr>
<td>Total Light Transmittance</td>
<td>%</td>
<td>94.6</td>
<td>91.8</td>
<td>92.1</td>
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<tr>
<td>Haze</td>
<td>%</td>
<td>0.3</td>
<td>0.2</td>
<td>0.4</td>
</tr>
<tr>
<td>Minimum Reflectance</td>
<td>%</td>
<td>1.2</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Luminous Reflectance</td>
<td>%</td>
<td>1.8</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Pencil Hardness</td>
<td></td>
<td>HB</td>
<td>HB</td>
<td>2H</td>
</tr>
<tr>
<td>Water Contact Angle</td>
<td>deg</td>
<td>—</td>
<td>—</td>
<td>110</td>
</tr>
</tbody>
</table>

The above data are typical values and not guaranteed values.

### Line-up

- **For Inner-use**
  - Plastic Cover Lens
  - Touch Sensor
  - MUAC4
  - MUAH4
  - LCD

- **For Top Surface**
  - Plastic Cover Lens
  - Touch Sensor
  - MUHA40J
  - LCD
Anti-Reflection Films with Anti-Fingerprint

Applications

Center Information Displays (CIDs), Side Displays, Instrument Clusters, and other Automotive Displays.

Prevent irritating reflected images and lights for easy recognition on the touchscreen. Easy to wipe off the fingerprints. Clear type and anti-glare type are available for your choice.

Features

Minimize glare and reflected images for better visibility.

- **Clear Type**
- **Anti-Glare Type**

Layer Structure

- **C100N** <Clear Type>
  - Clear AR Layer
  - Base Film
  - Base Film: TAC
  - Film Thickness: 60μm or 80μm

- **G101N** <Anti-Glare Type>
  - Anti-Glare AR Layer
  - Base Film
  - Base Film: TAC
  - Film Thickness: 40μm

Types

- **C100N** (Under Development)
- **G101N** (Under Development)

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>C100N (Under Development)</th>
<th>G101N (Under Development)</th>
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</thead>
<tbody>
<tr>
<td>Base Film</td>
<td></td>
<td>TAC</td>
<td>TAC</td>
</tr>
<tr>
<td>Base Film Thickness</td>
<td>μm</td>
<td>60 or 80</td>
<td>40</td>
</tr>
<tr>
<td>Color</td>
<td></td>
<td>Neutral</td>
<td>Neutral</td>
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<tr>
<td>Total Light Transmittance</td>
<td>%</td>
<td>95.8</td>
<td>95.9</td>
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<tr>
<td>Haze</td>
<td>%</td>
<td>0.3</td>
<td>4.2</td>
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<tr>
<td>Minimum Reflectance</td>
<td>%</td>
<td>0.3</td>
<td>0.3</td>
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<tr>
<td>Luminous Reflectance</td>
<td>%</td>
<td>0.4</td>
<td>0.5</td>
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<tr>
<td>Pencil Hardness</td>
<td></td>
<td>3H</td>
<td>3H</td>
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<tr>
<td>Water Contact Angle</td>
<td>deg</td>
<td>110</td>
<td>110</td>
</tr>
</tbody>
</table>

The above data are typical values and not guaranteed values.

General Properties

Cutting-Edge Low Reflectance

- Anti-Fingerprint

- Highly Durable Surface

Panasonic Corporation Industrial Solutions Company
Electronic Materials Business Division

https://industrial.panasonic.com/cuif/ww/contact-us
**Thermal Insulation Optical Films**

Intercept 80% of near-infrared lights entered into the Head Up Display (HUD) units and reduce the ambient temperature inside of the HUD units. Visible lights are transmitted, and originally generated images will not be spoiled. Easy to apply, just replace with your current dust cover.

### Features
- Protect HUD units from direct sunlight.
- To apply, simply replace with the current cover.

### Layer Structure
- **IRC102**
  - Thermal Barrier Layer
  - Base Film
  - Base Film: PMMA/PC
  - Film Thickness: 180~375 μm
- **IRC104**
  - Thermal Barrier Layer
  - Base Film
  - Base Film: PMMA/PC
  - Film Thickness: 180~375 μm

### General Properties

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>IRC102 (Under Development)</th>
<th>IRC104 (Under Development)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Film</td>
<td></td>
<td>PMMA/PC</td>
<td>PMMA/PC</td>
</tr>
<tr>
<td>Base Film Thickness</td>
<td>μm</td>
<td>375</td>
<td>375</td>
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<tr>
<td>Visible Light Transmittance</td>
<td>%</td>
<td>78.0</td>
<td>81.0</td>
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<tr>
<td>Near-Infrared Light Transmittance</td>
<td>%</td>
<td>9.9</td>
<td>21.5</td>
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<tr>
<td>Haze</td>
<td>%</td>
<td>1.0</td>
<td>1.4</td>
</tr>
<tr>
<td>Pencil Hardness</td>
<td></td>
<td>3~4H</td>
<td>3~4H</td>
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<tr>
<td>Retardation</td>
<td>nm</td>
<td>15</td>
<td>15</td>
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</tbody>
</table>

The above data are typical values and not guaranteed values.

**Applications**

- Head Up Display Units

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**Panasonic Corporation Industrial Solutions Company**
**Electronic Materials Business Division**

https://industrial.panasonic.com/cuif/ww/contact-us
Moldable Anti-Reflection Films with Anti-Fingerprint

150% stretchable while having anti-reflection and anti-fingerprint functions. Printable on the back side and suitable for curved design molding parts.

**Applications**

Decorative Cover Lens and Other Insert Molding Parts

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**Features**

High stretchability fits to the curved surface. Anti-reflection provides better visibility. Printable on the back side.

**Layer Structure**

- **GSP107A**
  - AR/AF* Layer
  - Base Film
  - Base Film: PMMA/PC
  - Film Thickness: 300 μm

- **GSP108C**
  - AR/AF* Layer
  - Base Film
  - Base Film: PC
  - Film Thickness: 300 μm

*Anti-Fingerprint

**General Properties**

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>GSP107A (Under Development)</th>
<th>GSP108C (Under Development)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Film</td>
<td>—</td>
<td>PMMA/PC</td>
<td>PC</td>
</tr>
<tr>
<td>Base Film Thickness</td>
<td>μm</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>Haze</td>
<td>%</td>
<td>0.8</td>
<td>0.5</td>
</tr>
<tr>
<td>Total Light Transmittance</td>
<td>%</td>
<td>93.3</td>
<td>93.5</td>
</tr>
<tr>
<td>Photopic Reflectance</td>
<td>%</td>
<td>1.4</td>
<td>0.9</td>
</tr>
<tr>
<td>Pencil Hardness</td>
<td>—</td>
<td>2H</td>
<td>B</td>
</tr>
<tr>
<td>Scratch Resistance(Cloth, 500g/cm², 200times)</td>
<td>—</td>
<td>No remarkable scratch</td>
<td>No remarkable scratch</td>
</tr>
<tr>
<td>Water Contact Angle</td>
<td>deg</td>
<td>107</td>
<td>107</td>
</tr>
<tr>
<td>Anti-Fingerprint</td>
<td></td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Chemical Resistance(Sunscreen SPF45)</td>
<td>—</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Stretching Rate(Stretching under 150°C)</td>
<td>—</td>
<td>140~150% (No crack)</td>
<td>120~130% (No crack)</td>
</tr>
</tbody>
</table>

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