Protection, Light Control and Display Enhancement

**3M Display Protection Films**

- Extend the life of your displays with 3M’s durable, precision-designed protection films that protect and enhance displays while maintaining their own look and luster.

**3M Glassy Protection Film (GL2020)**
- Helps prevent damage, scratches and scuffs
- Inhibit glass in extracted machines
- High clarity, glossy finish
- Scratch-resistant way to ease surface
- Chemical and disinfectant resistant

**3M™ Anti-Glare Protection Film (AGF6200)**
- Scotchgard™ easy-to-clean surface
- Anti-glare matte to reduce mirror-like reflections
- Color-neutral anti-reflection technology
- Helps prevent damage, scratches and scuffs
- Enhances display clarity while maintaining glossy finish
- Reduces annoying reflections

**3M™ Glossy Protection Film (GLS200)**
- High clarity, glossy finish
- Helps prevent damage, scratches and scuffs
- Polarizes a backlight’s output to allow more light to pass through the LCD
- Maximizes the recycling efficiency of LCD backlights
- Provides more than 98% reflectance across the entire spectrum
- Backlight reflector for LCDs
- Thin, 100% polymer reflector film

**3M™ Light Control Film (LCF)**
- Creates visual security or contrast improvement on the outside of LCD
- ±30 degree viewing angle perpendicular to the louvers
- Provides improved life

**3M™ Uniformity Tape (UT)**
- ±24 degree viewing angle perpendicular to the louvers
- Efficiently spreads light from an LED light source within a linear plane
- Microreplicated lens film with adhesive on one side
- Prismatic film that manages the angular output of light to increase brightness
- Increases brightness and amount of available light on entire LCD
- Reduces annoying reflections
- Helps prevent damage, scratches and scuffs

**3M™ Advanced Light Control Film (ALCF)**
- Creates visual security or contrast improvement on the outside of LCD
- ±30 degree viewing angle perpendicular to the louvers
- Polycarbonate based film

**3M™ Dual Brightness Enhancement Film (DBEF)**
- Polarizes the matrix to allow the amount of light to increase brightness
- Refractive technology compresses backlight output to one view
- Can pass two views at 90 degrees
- Variety of configurations for specific needs

**3M™ Brightness Enhancement Film (BEF)**
- Refraction technology compresses backlight output to one view
- Helps prevent damage, scratches and scuffs
- Increases brightness and amount of available light on entire LCD

**3M™ Glossy Low Reflection Protection Film (GLR320)**
- High clarity, glossy finish
- Helps prevent damage, scratches and scuffs
- Polarizes a backlight’s output to allow more light to pass through the LCD
- Maximizes the recycling efficiency of LCD backlights
- Provides more than 98% reflectance across the entire spectrum
- Backlight reflector for LCDs
- Thin, 100% polymer reflector film

**3M™ Glossy Protection Film (GLS200)**
- Helps prevent damage, scratches and scuffs
- Inhibit glass in extracted machines
- High clarity, glossy finish
- Helps prevent damage, scratches and scuffs
- Polarizes a backlight’s output to allow more light to pass through the LCD
- Maximizes the recycling efficiency of LCD backlights
- Provides more than 98% reflectance across the entire spectrum
- Backlight reflector for LCDs
- Thin, 100% polymer reflector film

**3M™ Anti-Glare Protection Film (AGF6200)**
- Scotchgard™ easy-to-clean surface
- Anti-glare matte to reduce mirror-like reflections
- Color-neutral anti-reflection technology
- Helps prevent damage, scratches and scuffs
- Enhances display clarity while maintaining glossy finish
- Reduces annoying reflections

**3M™ Anti-Glare Protection Film (AGF6200)**
- Helps prevent damage, scratches and scuffs
- Co-Crystal and selective technology
- Anti-glare mate to reduce iridescent reflection
- Scratch-resistant way to ease surface
- Chemical and disinfectant resistant

**3M™ Automotive Grade Films**

- Designed to increase passenger viewability, increased thermal management and more
- Increase display brightness. Benefits can include improved driver/passenger visibility, improved thermal management and more open interior designs.
- 3M™ ALCF-A2+ has the added advantage of brightness enhancement with the inclusion of DBEF into construction.

**3M™ Light Control Film (LCF)**
- Creates visual security or contrast improvement on the outside of LCD
- ±30 degree viewing angle perpendicular to the louvers
- Provides improved life

**3M™ Advanced Light Control Film A2+ and A2**
- Multi-view reflective prismatic technology
- Reflects light from different glass surfaces of automobiles
- Low brightness polycarbonate film
- ±30 degree viewing angle perpendicular to the louvers
- ALCF-A+ features a reflective polarizer (DBEF)

**3M™ Automotive Grade Films**

- Offering benefits critical to the automotive industry
- 3M offers a full line of enhancement films that can be used to increase the design freedom for automotive interiors. They are used to manage reflections, manipulate light distribution and increase display brightness.

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- Scotchgard™ easy-to-clean surface
- Anti-glare matte to reduce mirror-like reflections
- Color-neutral anti-reflection technology
- Helps prevent damage, scratches and scuffs
- Enhances display clarity while maintaining glossy finish
- Reduces annoying reflections

**3M™ Anti-Glare Protection Film (AGF6200)**
- Helps prevent damage, scratches and scuffs
- Co-Crystal and selective technology
- Anti-glare mate to reduce iridescent reflection
- Scratch-resistant way to ease surface
- Chemical and disinfectant resistant

**3M™ Automotive Grade Films**

- Designed to increase passenger viewability, increased thermal management and more
- Increase display brightness. Benefits can include improved driver/passenger visibility, improved thermal management and more open interior designs.
- 3M™ ALCF-A2+ has the added advantage of brightness enhancement with the inclusion of DBEF into construction.

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- Creates visual security or contrast improvement on the outside of LCD
- ±30 degree viewing angle perpendicular to the louvers
- Provides improved life

**3M™ Advanced Light Control Film A2+ and A2**
- Multi-view reflective prismatic technology
- Reflects light from different glass surfaces of automobiles
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- ±30 degree viewing angle perpendicular to the louvers
- ALCF-A+ features a reflective polarizer (DBEF)

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- Scotchgard™ easy-to-clean surface
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- Color-neutral anti-reflection technology
- Helps prevent damage, scratches and scuffs
- Enhances display clarity while maintaining glossy finish
- Reduces annoying reflections

**3M™ Anti-Glare Protection Film (AGF6200)**
- Helps prevent damage, scratches and scuffs
- Co-Crystal and selective technology
- Anti-glare mate to reduce iridescent reflection
- Scratch-resistant way to ease surface
- Chemical and disinfectant resistant

**3M™ Automotive Grade Films**

- Designed to increase passenger viewability, increased thermal management and more
- Increase display brightness. Benefits can include improved driver/passenger visibility, improved thermal management and more open interior designs.
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- Creates visual security or contrast improvement on the outside of LCD
- ±30 degree viewing angle perpendicular to the louvers
- Provides improved life

**3M™ Advanced Light Control Film A2+ and A2**
- Multi-view reflective prismatic technology
- Reflects light from different glass surfaces of automobiles
- Low brightness polycarbonate film
- ±30 degree viewing angle perpendicular to the louvers
- ALCF-A+ features a reflective polarizer (DBEF)
Protection, Light Control and Display Enhancement

3M™ Display Protection Films

Extend the life of your displays with 3M’s durable, precision designed protection films that protect and enhance displays while maintaining their own look longer.

• Chemical and disinfectant resistant

3M Glassy Protection Film (GLS200)
- Helps prevent damage, scratches and scuffs
- Installs in minutes on workstation monitors
- High clarity, glossy finish
- Scathegrip™ easy-to-clean surface
- Chemical and disinfectant resistant

3M™ Light Control Film (LCF)
- Creates visual or contrast improvement on the outside of LCDs
- ±20 degree viewing angle perpendicular to the louvers
- Polarized liquid film

ALCF-A2 and A2+ manage reflections created by stray light exiting automotive displays and instrumentation. These reflections, on the windshield or side glass, can be a cause of driver and passenger distraction. Offering the light allows automotive interior designers to be more open. ALCF-A2+ has the added advantage of brightness enhancement with the inclusion of DBEF in its construction.

3M™ Enhanced Specular Reflection Filter (ESR)
- Multilayer, reflective polarizer
- Increases brightness and amount of available light over entire LCD
- Polarizes a backlight’s output to allow more light to pass through the LCD
- Light normally absorbed and lost by the backlight is reflected back to the viewer

3M™ Brightness Enhancement Film (BEF)
- Refraction technology compresses backlight output to the on-axis viewer
- Can cross two sheets at 90 degrees
- Variety of configurations for specific needs

3M™ Dual Brightness Enhancement Film (DBEF)
- Multilayer, reflective polarizer
- Increases brightness and amount of available light over entire LCD
- Polarizes a backlight’s output to allow more light to pass through the LCD
- Light normally absorbed and lost by the backlight is reflected back to the viewer

3M™ Dual Brightness Enhancement Film (DBEF)
- Can cross two sheets at 90 degrees
- Variety of configurations for specific needs

3M™ Anti-Glare Protection Film (AGF6200)
- Scotchgard™ easy-to-clean surface
- Anti-glare matte to reduce mirror-like reflections
- Color-neutral anti-reflection technology
- Helps prevents damage, scratches and scuffs

3M™ Glossy Protection Film (GLS200)
- Helps prevent damage, scratches and scuffs
- Installs in minutes on workstation monitors
- High clarity, glossy finish
- Scathegrip™ easy-to-clean surface
- Chemical and disinfectant resistant

3M™ Anti-Glare Matte Protection Film (ARMR220)
- Scotchgard™ easy-to-clean surface
- High clarity, glossy finish
- Instant upgrade in mechanical robustness
- Helps prevents damage, scratches and scuffs

3M™ Glossy Low Reflection Protection Film (GLL200)
- Helps prevent damage, scratches and scuffs
- Reducing annoying reflections
- Enhance display clarity while maintaining glossy finish
- Scathegrip™ easy-to-clean surface
- Chemical and disinfectant resistant

3M™ Anti-Reflection Matte Protection Film (ARMR220)
- Scotchgard™ easy-to-clean surface
- High clarity, glossy finish
- Instant upgrade in mechanical robustness
- Helps prevents damage, scratches and scuffs

Design freedom through reflection control

ALCF-A2 and A2+ manage reflections created by stray light eating automotive displays and instrumentation. These reflections, on the windshield or side glass, can be a cause of driver distraction. Offering the light allows automotive interior designers to be more open. ALCF-A2+ has the added advantage of brightness enhancement with the inclusion of DBEF in its construction.

Light Control Films

Manage the distribution of light with 3M’s microlouver films that create privacy, manage reflections or improve display contrast.

3M™ Advanced Light Control Film Poly-carbonate (ALCF-P)
- Creates visual security on the inside of LCDs
- ±20 degree viewing angle perpendicular to the louvers
- Available with或 without matte treatment
- Compatible with most touch systems

3M™ Advanced Light Control Film A2 and A2+ (ALCF-A2/ALCF-A2+)
- Offers lightweight solution for glass and non-glass surfaces
- Low brightness polarizing films
- ±20 degree viewing angle perpendicular to the louvers
- ALCF-A2+ features a reflective polarizer (DBEF)

Advanced solutions for protection, light control and display enhancement.

3M™ Automotive Grade Films

Offering benefits critical to the automotive industry

3M offers a full line of enhancement films that can be used to increase the design freedom for automotive designers. They are used to manage reflections, manipulate light distribution and increase display brightness. Benefits can include improved driver/passenger usability, increased thermal management and more open interior designs.

3M™ Glossy Low Reflection Protection Film (GLL200)
- Helps prevent damage, scratches and scuffs
- Installs in minutes on workstation monitors
- High clarity, glossy finish
- Scathegrip™ easy-to-clean surface
- Chemical and disinfectant resistant

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3M™ Automotive Grade Films
- Reduces annoying reflections
- Enhances display clarity while maintaining glossy finish
- Scathegrip™ easy-to-clean surface
- Chemical and disinfectant resistant

3M™ Automotive Grade Films
- Reduces annoying reflections
- Enhances display clarity while maintaining glossy finish
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- Chemical and disinfectant resistant

For more information visit our website at www.3m.com/displayenhancement or call 1.800.553.9215 for the complete line of film products and the designers, engineers and brands that implement them.

Display Materials Systems Division

3M Center, Bldg. 235-2S-62
St. Paul, MN 55144-1000

Display Materials and Systems Division

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3M.com/3Mmark
3M™ Display Films offer advanced solutions for display enhancement above and below the display surface.

### Environmental Performance and Specifications

<table>
<thead>
<tr>
<th>Product</th>
<th>Cold Dry Heat</th>
<th>Heat &amp; Humidity</th>
<th>Thermal Shock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product 1</td>
<td>Parameter 1</td>
<td>Parameter 2</td>
<td>Parameter 3</td>
</tr>
<tr>
<td>Product 2</td>
<td>Parameter 4</td>
<td>Parameter 5</td>
<td>Parameter 6</td>
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</tbody>
</table>

- **Cold Dry Heat**
  - 95°C/1,000 hours
  - 85°C/1,000 hours
  - 65°C/95% R.H./1,000 hours
  - 65°C/90% R.H./1,000 hours

- **Heat & Humidity**
  - 65°C/95% R.H./1,000 hours
  - 65°C/90% R.H./1,000 hours

- **Thermal Shock**
  - One hour at -40°C followed by one hour at +95°C
  - One hour at -40°C followed by one hour at +85°C

### Products List

- **LOUVER FILMS**
  - ALCF-P
  - ALCF-A2
  - ALCF-A2+
  - LCFHI-T48
  - LCF PlusII
  - LCF PC100K
  - LCF PC200K

- **PRISM FILMS**
  - BEF II 90/24
  - BEF II 90/50
  - BEF3-T-155

- **REFLECTIVE POLARIZERS**
  - DBEF-D2-400
  - DBEF-D2-280
  - DBEF-Q-V2 with OCA
  - DBEF II
  - DEBEF-Q-V2

- **REFLECTOR**
  - ESR
  - UNIFORMITY TAPE
  - D50A

- **TRANSMISSION HAZE CLARITY**
  - PENCIL HARDNESS REFLECTION

### Protection Films

- **GLR** (Glossy Low Reflection)
  - 96% 0.6% 99% 3H(200g) 1.95% .130mm
  - -40°C/500 hours
  - 85°C/500 hours
  - 60°C/90% R.H./500 hours **

- **GLS200** (Glossy Protection)
  - 92% 2% 99% 4H(500g) N/A .155mm

- **ARMR220** Protection*
  - 96% 2.5% 80% 3H(500g) 1.6% .155mm

- **AGF6200** (Anti-Glare Protection)
  - 94% 20% 40% 3H(500g) N/A, anti-glare matte .146mm

- **ARMR200** Protection*
  - 94% 2.5% 80% 3H(500g) 1.6% .155mm

*Typical Value
**Noncondensing
<table>
<thead>
<tr>
<th>Products</th>
<th>Thickness</th>
<th>Code</th>
<th>UV420</th>
<th>UV300</th>
<th>UV100</th>
<th>VLT100</th>
<th>VLT200</th>
<th>VLT300</th>
<th>VLT400</th>
<th>VLT500</th>
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<td>LCF PlusII</td>
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<td>BEF II 90/50</td>
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<td>D50A</td>
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</tr>
</tbody>
</table>

**Typical Value**

*3M products*
# Environmental Performance and Specifications

## Products

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Thickness</th>
<th>Designation</th>
<th>Pencil Hardness</th>
<th>Reflection</th>
<th>Applied Thickness</th>
<th>COLD</th>
<th>DRY HEAT</th>
<th>HEAT &amp; HUMIDITY</th>
<th>THERMAL SHOCK</th>
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</thead>
<tbody>
<tr>
<td>GLR*</td>
<td>0.195mm</td>
<td>GLR320</td>
<td>3H</td>
<td>0%</td>
<td>GLS LCD Panel</td>
<td>96%</td>
<td>0.6%</td>
<td>99%</td>
<td>200g</td>
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<tr>
<td>GLS200*</td>
<td>0.155mm</td>
<td>GLS200</td>
<td>4H</td>
<td>2%</td>
<td>0.155mm</td>
<td>92%</td>
<td>2%</td>
<td>80%</td>
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<tr>
<td>ARMR220 Protection*</td>
<td>1.6%</td>
<td>0.155mm</td>
<td>3H(500g)</td>
<td>2.5%</td>
<td>80%</td>
<td>N/A</td>
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<tr>
<td>AGF6200*</td>
<td>0.146mm</td>
<td>AGF6200</td>
<td>N/A</td>
<td>20%</td>
<td>Matte</td>
<td>94%</td>
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<td>Lovefilm 100K</td>
<td>0.450mm</td>
<td>LCF PlusII</td>
<td>N/A</td>
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<td>N/A</td>
<td>150um</td>
<td>N/A</td>
<td>N/A</td>
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</tr>
<tr>
<td>Lovefilm 200K</td>
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<td>N/A</td>
<td>N/A</td>
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*Typical Value
**Noncondensing
Protection, Light Control and Display Enhancement

3M® Display Protection Films
- Extend the life of your displays with 3M’s durable, precision-designed protection films that protect and enhance displays while maintaining their own look longer.
- 3M® Glassy Protection Film (GL2020)
  - Helps prevent damage, scratches and scuffs
  - Installs in a matter of minutes
  - High clarity, glossy finish
  - Scalloped® easy-to-clean surface
  - Chemical and disinfectant resistant

ALCF-A2+ features a reflective polarizer (DBEF)
- ±30 degree viewing angle perpendicular to the louvers
- Low birefringent polycarbonate film
- Prevent nighttime reflections from glass surfaces of automobiles
- 3M™ Advanced Light Control Film A2 and A2+
- Compatible with most touch systems
- Available with or without matte hardcoat
- Create visual security on the outside of LCDs
- 3M™ Advanced Light Control Film Polycarbonate (ALCF-P)
- High uniformity over entire LCD
- ±24 degree viewing angle perpendicular to the louvers
- Helps prevent damage, scratches and scuffs
- Coating and reflector technology
- Anti-glare mate to reduce intrusive reflections
- Scalloped® easy-to-clean surface
- Chemical and disinfectant resistant
- 3M Anti-Glare Protection Film (AGF6200)
- Scotchgard™ easy-to-clean surface
- Anti-glare matte to reduce mirror-like reflections
- Color-neutral anti-reflection technology
- Helps prevents damage, scratches and scuffs
- 3M™ Anti-Reflection Matte Protection Film (ARMR220)
- Scotchgard™ easy-to-clean surface
- Reduces annoying reflections
- Helps prevents damage, scratches and scuffs
- 3M™ Glossy Low Reflection Protection Film (GLR320)
- Scotchgard™ easy-to-clean surface
- High clarity, glossy finish
- Instant upgrade in mechanical robustness
- Helps prevent damage, scratches and scuffs
- 3M™ Glossy Protection Film (GLS200)
- Scotchgard™ easy-to-clean surface
- High clarity, glossy finish
- Provides more than 98% reflectance across the entire spectrum
- Backlight reflector for LCDs
- Thin, 100% polymer reflector film
- 3M™ Enhanced Specular Reflection (ESR)
- Increases brightness and amount of available light user sees LCD
- Polarisates a backlight’s output to allow more light to pass through the LCD
- Light normally absorbed and lost by the backlight is "re-polarized" and reflected back, creating a more uniform distribution of light
- 3M Brightness Enhancement Film (BEF)
- Refraction technology compresses backlight output to increase brightness
- Helps prevents damage, scratches and scuffs
- 3M™ Dual Brightness Enhancement Film (DBEF)
- Multilayer, reflective prismatic
- Increases brightness and amount of available light user sees LCD
- 3M™ Dual Brightness Enhancement Film without Scalloped Surface (DBEF-A2)
- Brightness enhancement with the inclusion of DBEF in its construction.
- 3M™ Display Enhancement Films
- Efficiently spreads light from an LED light source within a linear plane
- Microoptically lensed film with adhesive on one side
- Reduces brightness on-axis viewer
- Maximizes the recycling efficiency of LCD backlight
- Reduces brightness on-axis viewer
- 3M™ Dual Brightness Enhancement Film (DBEF-A2+ with Scalloped Surface)
- Brightness enhancement with the inclusion of DBEF in its construction.
- 3M™ Anti-Reflection Matte Protection Film (ARMR220)
- Helps prevents damage, scratches and scuffs
- 3M™ Glossy Protection Film (GLS200)
- Scotchgard™ easy-to-clean surface
- High clarity, glossy finish
- Helps prevents damage, scratches and scuffs
- 3M™ Glassy Protection Film (GL2020)
- Helps prevent damage, scratches and scuffs
- Installs in a matter of minutes
- High clarity, glossy finish
- Scalloped® easy-to-clean surface
- Chemical and disinfectant resistant
- 3M™ Automotive Grade Films
- Light normally absorbed and lost by the backlight is "re-polarized" and reflected back, creating a more uniform distribution of light
- 3M™ Enhanced Specular Reflection (ESR)
- Increases brightness and amount of available light user sees LCD
- Polarisates a backlight’s output to allow more light to pass through the LCD
- Light normally absorbed and lost by the backlight is "re-polarized" and reflected back, creating a more uniform distribution of light
- 3M™ Brightness Enhancement Film (BEF)
- Refraction technology compresses backlight output to increase brightness
- Helps prevents damage, scratches and scuffs
- 3M™ Dual Brightness Enhancement Film (DBEF)
- Multilayer, reflective prismatic
- Increases brightness and amount of available light user sees LCD
- Helps prevents damage, scratches and scuffs
- 3M™ Glassy Protection Film (GL2020)
- Helps prevent damage, scratches and scuffs
- Installs in a matter of minutes
- High clarity, glossy finish
- Scalloped® easy-to-clean surface
- Chemical and disinfectant resistant

Brightness Enhancement Films
- Recycling, light management films increase the brightness of LCD backlights. Use them to increase brightness in the display, or transmit them into power-saving or thermal management.
- 3M Brightness Enhancement Film (BEF)
- Polarisates the angular output of light to increase brightness
- Reflection technology compresses backlight output to one axis viewer
- Can pass 2000x at 00 degree
- Variety of configurations for specific needs
- 3M Dual Brightness Enhancement Film (DBEF)
- Multilayer, reflective prismatic
- Increases brightness and amount of available light user sees LCD
- 3M™ Enhanced Specular Reflection (ESR)
- Film, 105% polymer reflector film
- Backlight reflector for LCDs
- Increases brightness and amount of available light user sees LCD
- Reflects backlight output to allow more light to pass through the LCD
- Light normally absorbed and lost by the backlight is "re-polarized" and reflected back, creating a more uniform distribution of light

Design freedom through reflection control
ALCF-A3 and A2+ manage reflections created by stray light eating automotive displays and instrumentation. These reflections, on the windshield or side glass, can be a source of driver distraction. Following the light allows automotive interior designers to be more open. ALCF-A2+ has the added advantage of brightness enhancement with the inclusion of DBEF into construction.

3M has been supplying enhancement films to the LCD monitor industry since its emergence, reliably offering solutions customized to meet the demands of new technologies. 3M is committed to providing industry-leading service and support for the complete line of film products and the designers, engineers and brands that implement them.

For more information visit our website at www.3m.com/displayenhancement or call 1.800.553.9215 for the complete line of film products and the designers, engineers and brands that implement them.

Advanced solutions for protection, light control and display enhancement.

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