

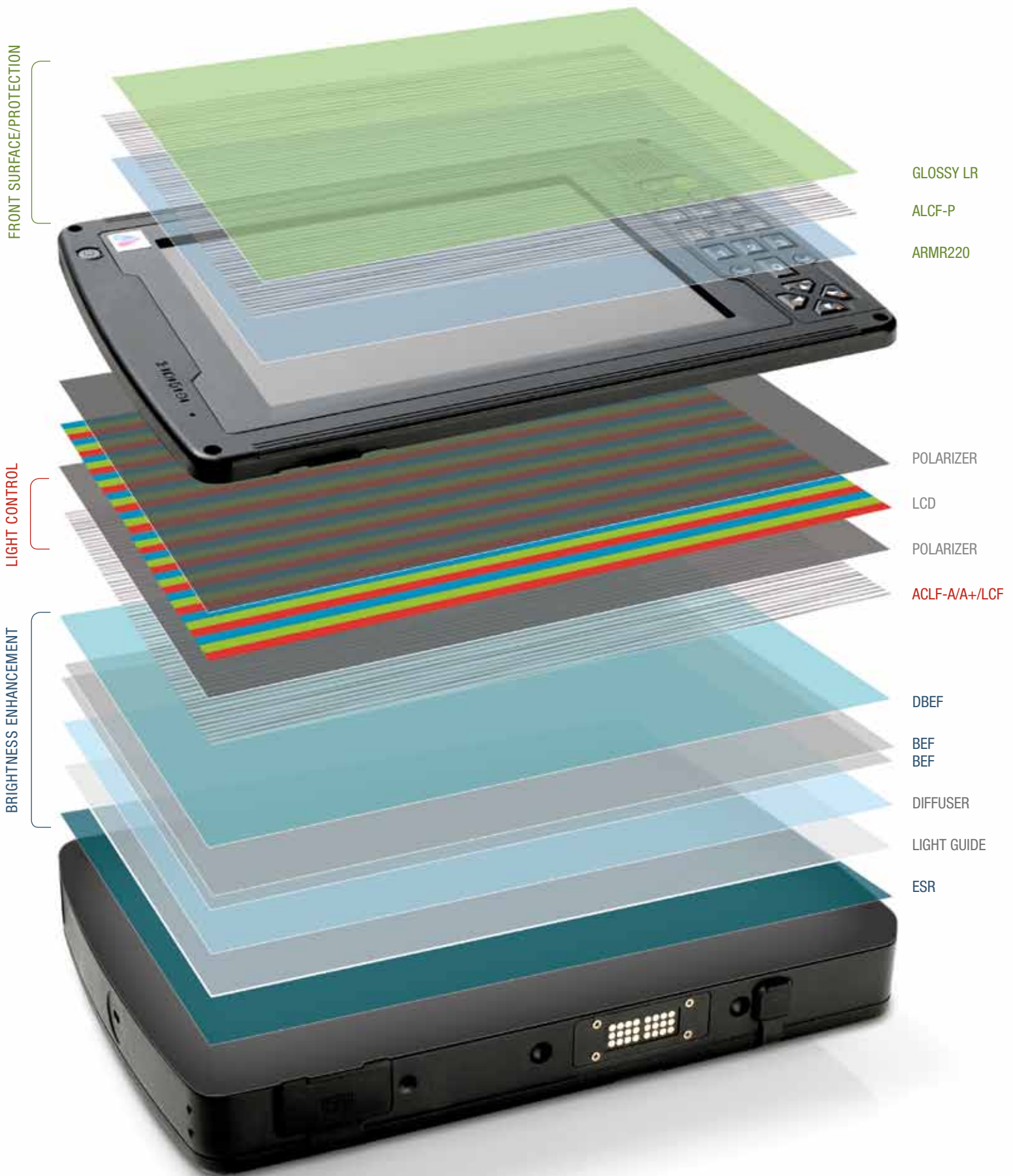


# Advanced Solutions

for Light Enhancement, Control and Protection



# Specialty films protect, enhance and control screen performance





# Advanced technology designed to direct and enhance light

Highly intelligent engineering harnesses the full capacity of light, transforming displays to be remarkably brighter, more durable and less reflective.

## PROTECTION FILMS

3M™ Protection Films help protect displays against damage that can occur from the rigors of everyday use. Engineered with a low-tack adhesive, the films are easy to apply and easy to remove. Available in a variety of finishes to meet specific application requirements.

**3M™ Glossy Protection Film** offers a glossy finish to help maintain the finish of a glossy display or instantly upgrade a matte display to high-gloss. Optically clear, ultra-thin film offers greater than 93% transmission, keeping displays bright with no color distortions.

**3M™ Glossy LR Protection Film** features a low reflection coating for clear, sharp display enhancement and ambient light management. Optically clear, ultra-thin film allows up to 93% transmission, keeping displays bright with no color distortions.

**3M™ Anti-Reflection Matte Non-Conductive Protection Film (ARMR220 NC)** uses an advanced non-conductive coating technology to protect displays against scratching and damage. Features a near color-neutral anti-reflection surface treatment and an anti-glare coating to reduce mirror-like reflections.



## LIGHT CONTROL FILMS

**3M™ Advanced Light Control Film (ALCF)** is a microlouver film that controls the distribution of light. ALCF can be used to create privacy, control reflections or improve display contrast.

**ALCF-P** is a louver film with a 60 degree viewing angle and is available with or without a matte hardcoat. ALCF-P is designed to be used on the outside of an LCD, and can go between the touch panel and the LCD.

**ALCF-A** and **LCF** are louver films with low birefringent polycarbonate substrates. This allows them to be used in the backlight of a liquid crystal display. A common use is to prevent night reflection onto glass surfaces in automobiles. ALCF-A has a 60 degree viewing angle. **ALCF-A+** is a louver film combined with a reflective polarizer (DBEF).



## BRIGHTNESS ENHANCEMENT FILMS

**3M™ Brightness Enhancement Film (BEF)** and **3M™ Dual Brightness Enhancement Film (DBEF)** are recycling, light management films that are used to increase the brightness of backlights used in LCDs. The primary goal in adding these films can be to increase brightness in the display or it can be translated to power savings or thermal management.

**BEF** is a prismatic film that manages the angular output of light from the backlight. This film uses refraction to compress the backlight output towards an on-axis viewer. BEF films can be used as single sheets or as two sheets crossed at 90 degrees to each other. Available in various configurations, BEF can be customized for specific application needs. BEF can also be used in combination with DBEF and ESR.

**DBEF** is a multilayer, reflective polarizer. This film works to polarize the backlight's output so that it can transmit through the LCD. Light of the wrong polarization is reflected into the backlight. This light would normally be absorbed, and lost, by the rear polarizer of the liquid crystal panel. DBEF increases both brightness and the amount of light available over the entire LCD. Similar to BEF, DBEF is available in a variety of configurations that can be useful for specific applications. DBEF can also be used in conjunction with BEF and ESR.

**3M™ Enhanced Specular Reflector (ESR)** is a thin film, 100% polymer reflector. ESR is used as the backlight reflector for LCDs. This film provides >98% reflectance, across the entire visible spectrum, to maximize the recycling efficiency of LCD backlights. ESR can be combined with BEF and DBEF films for specific applications.



# Environmental Performance and Specifications

	TRANSMISSION	HAZE	CLARITY	PENCIL HARDNESS	REFLECTION	APPLIED THICKNESS	COLD	DRY HEAT	HEAT & HUMIDITY	THERMAL SHOCK
PRODUCTS										
PROTECTION FILMS										
GLR (Glossy Low Reflection)	≥ 93%	≤ 1.6%	≥ 99%	≥ 3H	≤ 1.95%	130 um with adhesive	-40°C /500 hours	85°C /500 hours	60°C/90% R.H./500 hours **	85°C for 1 hour to -40°C for 1 hour, 100 cycles
GLS 100 (Glossy Protection)	≥ 90%	≤ 3%	≥ 99%	≥ 4H	N/A	152 um with adhesive				
ARMR220 Protection	≥ 93%	≤ 3%	≥ 75%	≥ 3H	≤ 1.6%	152 um with adhesive				
	COLD	DRY HEAT		HEAT & HUMIDITY		THERMAL SHOCK		NON HALOGENATED	APPLIED THICKNESS	
PRODUCTS	-40°C/ 1,000 hours	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 **	One hour at -40°C followed by one hour at +95°C	One hour at -40°C followed by one hour at +85°C			
LOUVER FILMS										
ALCF-P(1) with adhesive	X		X	X			X		482 um	
ALCF-P ABR0/ABR2	X		X	X			X		533 um	
ALCF-A+/LCF	X	X			X		X		380 um	
ALCF-A+	X	X			X		X		490 um	
LCF PlusII	X		X	X			X		730 um	
LCF PC100K	X	X		X		X			450 um	
LCF PC200K	X	X		X		X			650 um	
PRISM FILMS										
BEF II 90/24	X	X		X		X			140 um	
BEF II 90/50	X	X		X		X		X	150 um	
BEF3-T-155	X	X		X		X			155 um	
BEF III 90/50 Matte	X	X		X		X			160 um	
BEF III 90/50 10T	X	X		X		X			278 um	
IDF	X		X	X		X			155 um	
TRAF II	X		X	X		X			155 um	
REFLECTIVE POLARIZERS										
DBEF-D2-400	X	X		X		X			395 um	
DBEF-D2-280	X	X		X		X			280 um	
DBEF-Q with adhesive	X	X			X		X		138 um	
DBEF II	X		X	X			X		150 um	
DBEF-E	X		X	X			X		132 um	
DBEF-Q	X		X	X			X		113 um	
REFLECTOR										
ESR	X	X		X		X			66 um	



## MILITARY

- AVIATION PANELS
- RUGGED LCDs
- MILITARY PANELS
- INSTRUMENT PANELS

## FINANCIAL

- ATMs
- LCD DISPLAYS

## MEDICAL

- MEDICAL RECORD DISPLAYS

## ENTERTAINMENT

- GAMING STATIONS
- OUTDOOR DISPLAYS
- PERSONAL DEVICE DISPLAYS

## TRANSPORTATION

- CHECK-IN STATIONS
- INFORMATION BOARDS
- INSTRUMENT PANELS

## RETAIL

- SIGNATURE CAPTURES
- KIOSKS
- DIGITAL SIGNAGE
- POINT OF SALE

## AUTOMOTIVE

- AUTOMOTIVE DISPLAYS
- NAVIGATION SYSTEMS
- REAR VIEW MIRRORS
- ENTERTAINMENT DISPLAYS



# 3M™ Automotive Grade Films

## Offering Benefits Critical to the Automotive Industry

3M offers a full line of Display Enhancement products designed to amplify the performance of electronic displays by making them brighter, whiter, thinner and more vivid in color. These products offer versatility and add value to virtually any electronic display application. These films are also proven to offer highly effective outcomes in automotive applications.

- Center stack displays
- Instrument cluster
- Rear view mirror
- Rear seat displays



## Design freedom through reflection control

**ALCF-A, ALCF-A+** and LCF redirect light to reduce unwanted reflections and glare from automotive displays and instrumentation. ALCF-A+ has the added benefit of providing additional brightness with its multifunctional design with DBEF. This provides a variety of options for environmental performance, including automotive industries and ruggedized applications.

*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.*



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For more information visit our website at  
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