

3M™ Contrast Enhancement Film



The Clear Advantage

High purity,
optical-grade
adhesive films
for joining
transparent
materials

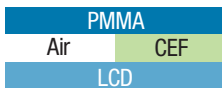
3M

Engineered to speed assembly, improve display performance

Contrast Improvement by 3M™ Contrast Enhancement Film



Cross-section



Air area: Black is gray
CEF area: Black is black

3M™ Contrast Enhancement Film is a new pressure sensitive adhesive technology that provides crystal clear, high reliability optical coupling and mechanical joining for various transparent materials.

This advanced, optical-grade adhesive offers a number of significant performance and productivity-enhancing advantages:

Contrast Enhancement – When 3M Contrast Enhancement Film is applied between the cover lens and display module, 3M tests show an approximate 7x improvement in image quality, compared to displays using an air gap. This greatly enhances visibility in bright, outdoor environments.

Exceptional Clarity – Tailored refractive index enables light coupling to your specific display requirements.

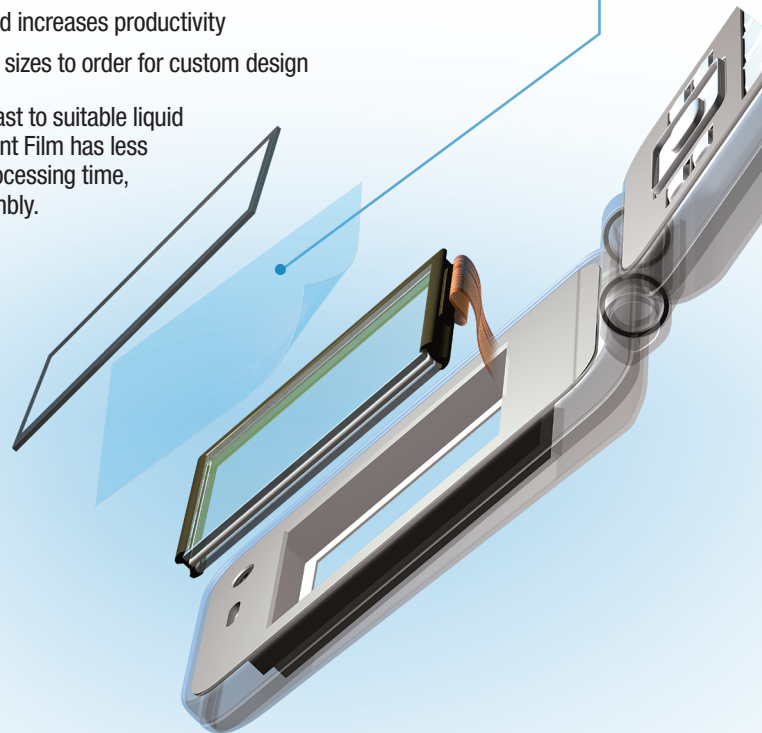
High Purity – Unlike conventional non-cleanroom adhesives, 3M Contrast Enhancement Film has no contaminants, such as bubbles, gels, or particles, that can contribute to optical and visual defects.

Easy to Apply – Custom pre-cut adhesive transfer film is delivered between two sheets of release coated polyester film, for easy application.

- Construction provides uniform caliper and easy release of supporting films
- Simplifies assembly process and increases productivity
- Available in custom shapes and sizes to order for custom design

Speeds Assembly Time – In contrast to suitable liquid adhesives, 3M Contrast Enhancement Film has less contamination, and requires less processing time, increasing productivity during assembly.

Meets Environmental Aging Requirements – 3M Contrast Enhancement Film performs in high temperature and high humidity environments. UV-resistant product is available upon request.





Improved Properties, Compared to Liquid Adhesives

	3M™ Contrast Enhancement Film	Liquid Adhesive
Processability	Good	Poor
Cleanliness	Good	Poor
Processing Time	Good	Poor
Shelf Life	Good	Poor
Storage Conditions	Good	Poor
Controlled Adhesion	Average	Good
Adhesive Wet Out	Average	Good
Controlled Thickness	Good	Poor
Removability (Select product)	Good	Poor

Recommended Applications

	Touch Screen	Control Panel	Optical Film	Viewing Window Lens
Handheld Device	•		•	•
Industrial Display	•	•		
Consumer Display			•	
Medical Instruments	•	•	•	

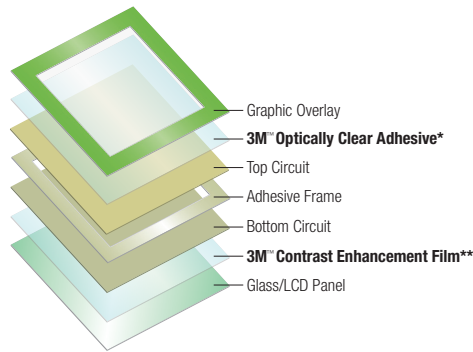
See
the Light



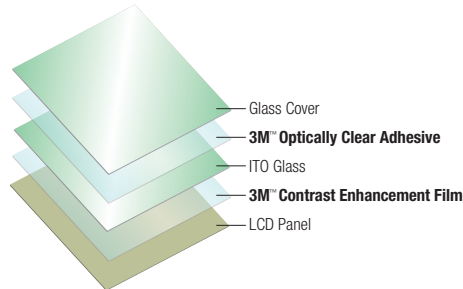
3M™ Optically Clear Adhesives

Touch Screen Applications

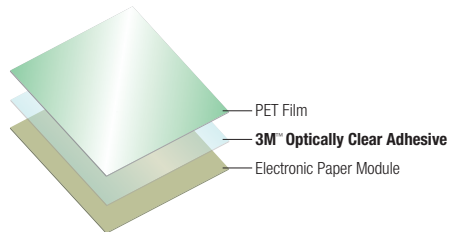
Resistive Touch Screen



Capacitive Touch Screen



Electronic Paper



Ask 3M about these upcoming OCA products for touch circuit manufacturing:

- OCAs in different thicknesses
- OCAs for bare ITO contact
- OCAs with higher refractive index

* OCA (Optically Clear Adhesive) is used in non-gap filling applications.

** CEF (Contrast Enhancement Film) is a gap filling film used to enhance display.

Optical Characteristics

- 99% light transmission
- <1% haze level
- Birefringence-free
- 1.47 refractive index
- Designed and manufactured to eliminate common adhesive visual defects including bubbles, dirt and gels

Product Highlights

- Environmental stability under high temperature and high humidity
- Excellent choice for high outgassing plastic substrates (e.g. PMMA, PC)
- Solves “air bubble” problem on plastic surface application
- Available in widths up to 54.3" (1380mm) for Products 817x Series and 60" (1524mm) for others

Recommended Applications

- Touch screens, for bonding film and glass laminates
- Transparent graphic overlays
- Projection screens
- Avionics/military displays
- Optical management films for LCD

3M™ Optically Clear Adhesive

Product Number	Adhesive Thickness (mil)	Peel Adhesion to Glass (oz/in)	PET Release Film	Refractive Index	Haze (%)	Coating/ Processing Environment	Typical Applications	
8171	1	42	2.0 mil/2.0 mil	1.475	0.6	Cleanroom	PC/PMMA Substrate	
8172	2	45	2.0 mil/2.0 mil	1.474	0.8			
8173D ²	3	41	2.0 mil/2.0 mil	1.474	1			
8211	1	54	2.0 mil/2.0 mil	1.473	0.1		General Purpose	
8212	2	65	2.0 mil/2.0 mil	1.475	0.6			
8213 ¹	3	69	2.0 mil/2.0 mil	1.473	0.4			
8214 ¹	4	67	2.0 mil/2.0 mil	1.474	1.2			
8215 ¹	5	69	2.0 mil/2.0 mil	1.473	0.8			
8271	1	47	2.0 mil/2.0 mil	1.485	0.3			'Bare' ITO Surface
8271S	2	46	2.0 mil/2.0 mil	1.489	1.0			
8272	2	57	2.0 mil/2.0 mil	1.485	0.3			
8273 ¹	3	67	2.0 mil/2.0 mil	1.487	0.3			
8273D ^{1,2}	3	60	2.0 mil/2.0 mil	1.489	1.4			
8274 ¹	4	80	2.0 mil/2.0 mil	1.487	0.1			
8275 ¹	5	80	2.0 mil/2.0 mil	1.487	0			

¹ Made to order. Longer lead time required.

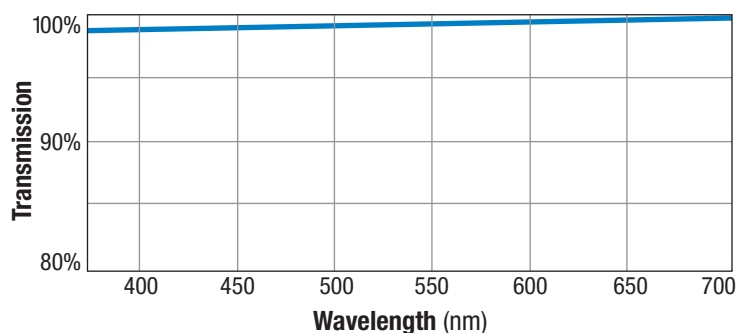
² D=Double coated OCA

3M™ Contrast Enhancement Films

Optical Characteristics

- Light transmission rate exceeds 99%, without reflective loss correction
- 3M™ Contrast Enhancement Film is a non-birefringent
- Refractive index is 1.47, close to the reflectivity of ordinary transparent material
- Higher refractive index available on request

3M™ Contrast Enhancement Film Transmission Rate



When used in a laminated construction and corrected for reflection loss above technical information is for reference only, not to be used as specifications.

3M™ Contrast Enhancement Film

Product Number	Adhesive Thickness (mil)	Peel Adhesion to Glass (oz/in)	PET Release Film ²	Refractive Index	Haze (%)	Coating/ Processing Environment	Typical Application ¹
CEF0705	5	75	2.0 mil/2.0 mil	1.487	0.1	Cleanroom	Gap filling, 'Bare' ITO Surface
CEF0707	7	84	2.0 mil/2.0 mil	1.487	0.1		
CEF0805	5	84	2.0 mil/2.0 mil	1.473	0.8		Gap filling, high adhesion
CEF0807	7	85	2.0 mil/2.0 mil	1.473	0.8		
CEF08A05	5	110	2.0 mil/2.0 mil	1.473	0.2		
CEF08A07	7	115	2.0 mil/2.0 mil	1.473	0.2		
CEF0910	10	106	3.0 mil/3.0mil	1.471	0.8		

Note 1: Rigid to rigid surface bonding application; flat or textured fabric surface.
 Note 2: All products are also available with 5 mil liner on one side upon request.

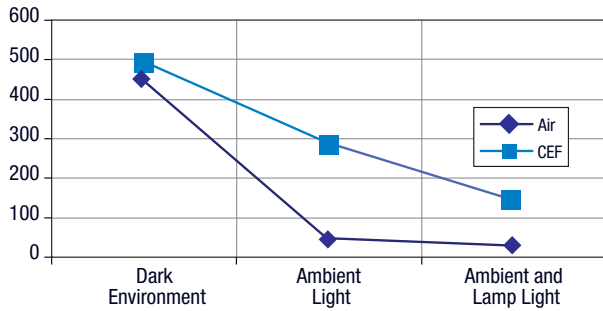
Contrast Improvement by 3M™ Contrast Enhancement Films

	Air Area			CEF Area		
	Brightness of Black (cd/m ²)	Brightness of White (cd/m ²)	Contrast*	Brightness of Black (cd/m ²)	Brightness of White (cd/m ²)	Contrast
Dark	0.571	254.4	445.5	0.553	271.5	491.0
Room Light ¹	6.268	265.6	42.4	0.980	279.5	285.2
Room Light + Desk Light ²	11.70	276.2	23.6	2.177	305.0	140.1

Illuminance of measurement point: 1) 360 lx, 2) 2000 lx by TOPCON TECHNOHOUSE CORP. BM -7

* Individual results will vary by display.

Contrast Ratio



Optical Characteristics after Environmental Testing:

3M™ Optically Clear and Contrast Enhancement Adhesives have passed the following environmental testing in the laboratory; there is no change in appearance, physical, or optical characteristics, and there is no distinct change in light transmission rate over the visible wavelength range.

Environmental Test Item	Conditions	Test Time
High Temperature	+ 85°C	500 Hours
Low Temperature	- 40°C	500 Hours
High Temperature/High Humidity	+ 70°C at 90 % RH	500 Hours
Hot/Cold Cycling	1 hour@ -40°C/1 hour@+85°C	200 Cycles
UV Exposure	ASTM G-26 Type, B, BH	500 Hours



Important Notice: Before using this product, you must evaluate it and determine if it is suitable for your intended application. You assume all risks and liability associated with such use. Please consult the 3M product technical data sheet and Material Safety Data Sheet before use.

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