3M™ Optically Clear Adhesives 8211 • 8212 • 8213 • 8214 • 8215

Product Description

3M™ Optically Clear Adhesives (OCA) are highly specialized optically clear free-film adhesives offering superior clarity and excellent adhesion to various types of transparent substrates. 3M OCAs are easy to convert and are contaminant-free, resulting in improved bubble resistance in laminations exposed to high temperature and high humidity. Common applications include displays, touch panels and others requiring an optically clear bond.

3M™ Optically Clear Adhesives 8211 / 8212 / 8213 / 8214 / 8215

3M OCA 8211, 8212, 8213, 8214 and 8215 are for use in general purpose applications including display touch applications where very high adhesion is critical.

Construction

Products	3M™ Optically Clear Adhesive				
	8211	8212	8213	8214	8215
Adhesive Type:	Acrylic	Acrylic	Acrylic	Acrylic	Acrylic
Adhesive Carrier:	None	None	None	None	None
Approximate Thickness:					
Release Liner	2.0 mil (50 micron) Polyester	2.0 mil (50 micron) Polyester	2.0 mil (50 micron) Polyester	2.0 mil (50 micron) Polyester	2.0 mil (50 micron) Polyester
Adhesive	1.0 mil (25 micron)	2.0 mil (50 micron)	3.0 mil (76 micron)	4.0 mil (100 micron)	5.0 mil (125 micron)
Release Liner	2.0 mil (50 micron) Polyester	2.0 mil (50 micron) Polyester	2.0 mil (50 micron) Polyester	2.0 mil (50 micron) Polyester	2.0 mil (50 micron) Polyester

Typical Physical Properties and Performance Characteristics

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

Optical Performance to Environmental Conditions:

3M™ Optically Clear Adhesives have withstood the following environmental tests conducted in the 3M laboratory under the conditions specified without any appreciable deterioration in visible appearance, physical integrity or optical performance. Over the entire test duration there was no significant change in transmission over the visible spectrum.

	Condition	Duration
High Temperature	+85°C	500 hours
Low Temperature	-40°C	500 hours
High Temp/Humidity	+65°C / 95% R.H.	500 hours
Thermal Shock	One hour at -40°C followed by one hour at +85°C	200 cycles
UV	WRC Cycle #4-15	500 hours

Peel Adhesion:

ASTM D3330 modified, 180 degree peel, 12 in./min.
305 mm/min. 2.0 mil polyester to various surfaces.

Products		3M™ Optically Clear Adhesive 8211		8212		8213		8214		8215	
		(oz/in)	(N/100mm)	(oz/in)	(N/100mm)	(oz/in)	(N/100mm)	(oz/in)	(N/100mm)	(oz/in)	(N/100mm)
20 minutes dwell at RT	Glass	54	59	65	71	69	76	67	73	69	76
	Acrylic	47	51	50	55	54	59	62	68	57	62
	Polycarbonate	49	54	58	63	64	70	73	80	50	55
72 hours dwell at RT	Glass	60	66	71	78	63	69	84	92	84	92
	Acrylic	50	55	54	59	58	63	70	77	66	72
	Polycarbonate	54	59	61	67	67	73	80	88	71	78

Shear Adhesion:

ASTM D-3654 Procedure H
1/2" x 1" Overlap, minutes to failure.

	3M™ Optically Clear Adhesive 8211	8212	8213	8214	8215
Heat Aged (70°C) 500g, stainless steel	>10,000	>10,000	>10,000	>10,000	>10,000

Color:

ASTM E 1164-07 / CIELAB
(BYK Gardner TCS Plus Spectrophotometer, Model 8870)

3M™ Optically Clear Adhesive 8211	8212	8213	8214	8215
L* = 97.08	L* = 97.1	L* = 97.08	L* = 97.08	L* = 97.12
a* = -0.01	a* = -0.02	a* = -0.01	a* = -0.02	a* = -0.05
b* = 0.16	b* = 0.15	b* = 0.16	b* = 0.19	b* = 0.19

Typical Physical Properties and Performance Characteristics (continued)

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

Refractive Index:

(± 0.0005 measured for Sodium D line @ 25°C)

3M™ Optically Clear Adhesive				
8211	8212	8213	8214	8215
1.473	1.475	1.473	1.473	1.473

Haze:

Haze was measured according to ASTM D1003-92

3M™ Optically Clear Adhesive				
8211	8212	8213	8214	8215
0.1%	0.6%	0.4%	0.5%	0.8%

Transmission:

ASTM E903, D1003, and E284

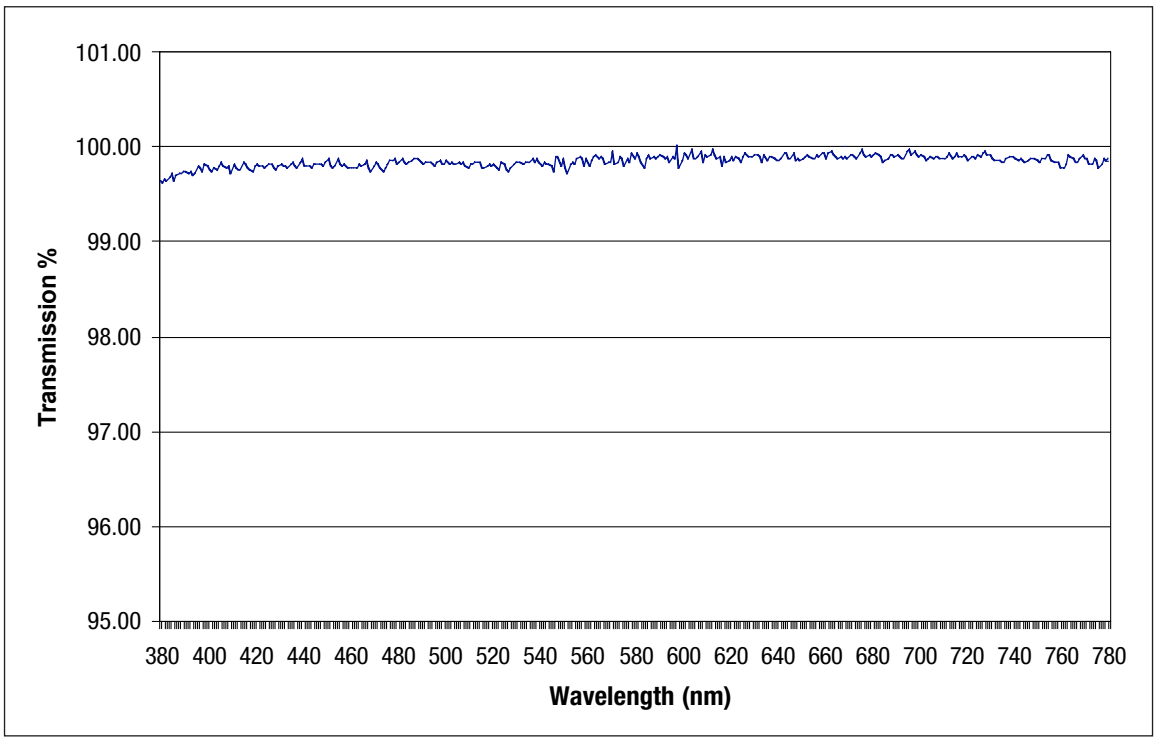
We calculate internal transmittance by correcting sample Transmittance (TLT) for the sample Reflectance (TLR) in accord with the definition of internal transmittance (τ_i) found in ASTM E284. This measurement is meant to show whether the sample has any absorptance in the visible range of the spectrum. A perfect sample with no absorptance would have a value of τ_i = 100 percent (± error of measurements, typically ± 0.5 %).

Internal Transmittance (**%TLT$_i$, τ_i**) is calculated as follows:

$$\%\ TLT_i = [(\%TLT_S) / (\%TLT_{100} - \%TLR_S)] * 100$$

Transmittance vs. Wavelength

Typical 3M™ Optically Clear Adhesive 821X



Typical Physical Properties and Performance Characteristics (continued)

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

Shelf Life:

Product retains its performance and properties for two years from date of manufacture if properly stored at room temperature conditions of 72°F (22°C) and 50% relative humidity. Storage in a plastic bag is recommended.

Application Techniques

For maximum bond strength the surface should be thoroughly cleaned and dried. To obtain greatest benefit, laminations should be done in a class 10,000 cleanroom or better and using equipment with static charge elimination.

Bond strength can be improved with firm application pressure and moderate heat causing the adhesive to develop intimate contact with the bonding surface.

Maximum bond strength is achieved after 72 hours of dwell time.

Available Sizes

Available Lengths (subject to minimum order requirements): Maximum length - 3M™ Optically Clear Adhesives 8211, 8212, 8213, 8214 and 8215	180 yards or 540 feet
Available Widths (subject to minimum order requirements): Maximum width - 3M™ Optically Clear Adhesives 8211, 8212, 8213, 8214 and 8215	60 inches
Normal Slitting Tolerance	± 1/32 in. (0.8 mm)
Core Size	3.0 in. (76.2 mm)

General Information

- Light transmission >99% when corrected for reflection losses.
- Non-birefringent when removed from carrier film.
- High temperature, humidity, and UV resistance.
- Long term durability without yellowing, delaminating, or degrading.
- High cohesive and peel strength for reliably bonding most transparent substrates.
- 3M™ Optically Clear Adhesives 8211, 8212, 8213, 8214 and 8215 are coated and converted in a clean room.
- 3M optically clear adhesives are inspected to reduce the occurrence of bubbles, dirt, gels and other optical distortions.
- Wound on plastic cores and wrapped in plastic to eliminate paper fiber contamination.
- Two film liners for optimum adhesive smoothness and differential release for ease of processing and protection from contamination.
- Available in roll goods only.

Application Ideas

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

Processing:

Laminating

Recommended nip roll or roller platen press type laminator to maintain optical aesthetics when laminated. Hand lamination not advised. Use best process control standards possible to control variables. (See **3M Laminating Technical Bulletin** for additional information.)

Certification/Recognition

MSDS: 3M has not prepared a MSDS for these products which are not subject to the MSDS requirements of the Occupational Safety and Health Administration's Hazard Communication Standard, 29 C.F.R. 1910.1200(b)(6)(v). When used under reasonable conditions or in accordance with the 3M directions for use, these products should not present a health and safety hazard. However, use or processing of the product in a manner not in accordance with the directions for use may affect their performance and present potential health and safety hazards.

TSCA: These products are defined as articles under the Toxic Substances Control Act and therefore, are exempt from inventory listing requirements.

RoHs Complaint/REACH Compliant: These products comply with the European Union's "Restriction of Hazardous Substances" (RoHs) initiative and with European REACH regulations 2002/95/EC and 2005/618/EC.

For Additional Information

To request additional product information or to arrange for sales assistance, call toll free 1-800-251-8634. Address correspondence to: 3M, Electronics Markets Materials Division, 3M Center, Building 225-3S-06, St. Paul, MN 55144-1000. Our fax number is 651-778-4244 or 1-877-369-2923. In Canada, phone: 1-800-364-3577. In Puerto Rico, phone: 1-787-750-3000. In Mexico, phone: 52-70-04-00.

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60-5002-0347-0

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