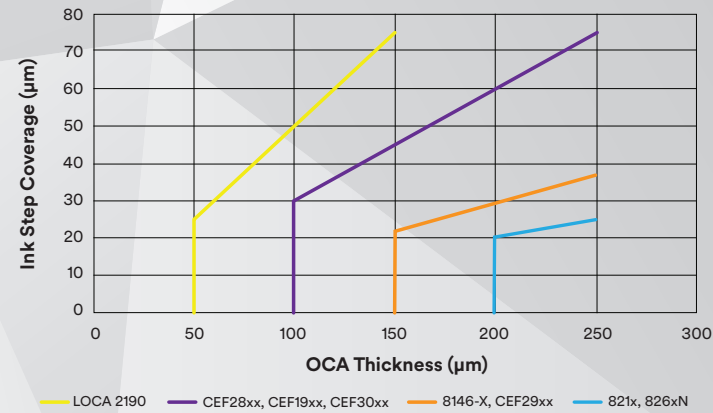


3M™ Contrast Enhancement Film (CEF) Product Summary

	CEF05	CEF06	CEF19 ¹⁾	CEF28 ¹⁾	CEF29	CEF30 ¹⁾	CEF31	CEF61 ¹⁾
PMMA/PC Compatability	○	●	○	●	○	○	○	○
Dk Value @ 100 KHz	4.39	5.60	2.89	4.27	4.68	4.0	4.0	9.0
Touch Sensor Compatible (Low Acid)	●	●	●	●	●	●	●	●
High Ink Step Covering	○	○	●	●	●	○	○	●
Mura Resistance	○	○	●	●	●	○	○	●
Anti-whitening	●	○	●	●	●	●	●	●
Storage Modulus (Pa, 25°C)	1.0 x 10 ⁵	1.2 x 10 ⁵	1.1 x 10 ⁵	8.6 x 10 ⁴	6.2 x 10 ⁴	2.0 x 10 ⁵	3.1 x 10 ⁵	6.5 x 10 ⁴

¹⁾ UV curable type
 ○ = Good
 ● = Better

Ink Step Coverage vs. 3M™ Optically Clear Adhesive (OCA) Thickness



- 3M CEF (CEF28, CEF19, CEF30) enable thinner bondlines and superior ink step coverage
- Typical ink step heights:
 - Black border: 10-20µm
 - White/light colored border: up to 60µm
- Ink step coverage values should be used as a guide; actual results are application dependent

Enhance your touch sensor design.



Thickness Reduction



Productivity



Enhanced Visual Quality



Robustness



3M Display Materials & Systems Division
 3M Center, Building 235-1E-54
 St. Paul, MN 55144-1000
 U.S.A.
 1-800-3M HELPS
3m.com/displayfilms

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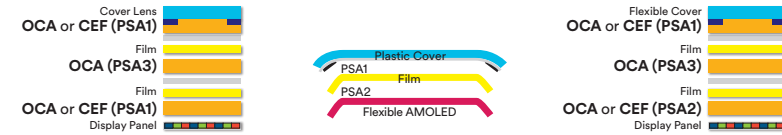
Product Selector



3M Display Materials & Systems Division
 3M™ Optically Clear Adhesives Selection
 Guide for Touch Applications

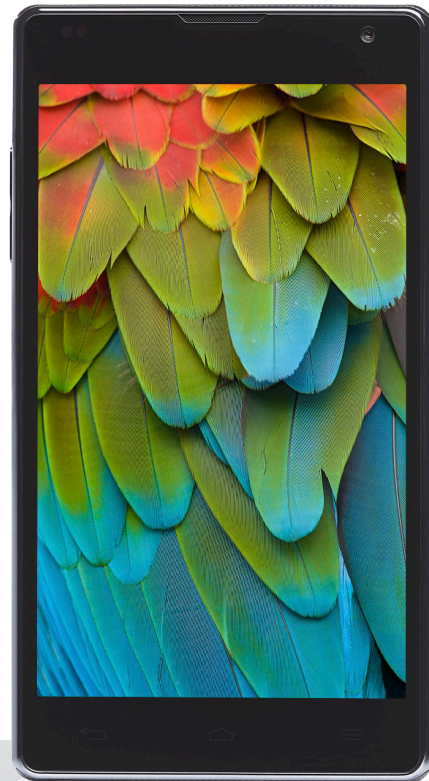
Recommended 3M™ Optically Clear Adhesive (OCA) Solutions

OLED



Construction

	Curve (>10 mm)	Bent (<5 mm)	Flexible / Foldable
Touch Materials / Characteristics	Glass Cover Lens Black border / Color Border ITO	Glass Cover Lens Black border / Color Border ITO	Plastic (Film) Cover Lens Black Border / Color Border Metal Mesh
PSA Needs / Attributes	PET	PET / COP	PET / COP / CPI
3M OCA Recommended Solutions	PSA 1	★ / ★★	★ / ★★
	PSA 3	★	★
	PSA 2	★★★	★★★
3M OCA Recommended Solutions	PSA 1	3M OCA 8146-x / CEF28	3M Concept Samples
	PSA 3	3M OCA 8146-x	3M Concept Samples
	PSA 2	3M CEF28 / CEF19	3M CEF30 / CEF31



PSA Attributes List

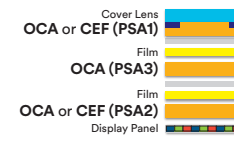
- ★ Low Dk
- ★ High Dk
- ★ Thin
- ★ Low Acid
- ★ UV Blocking
- ★ Low MVTR
- ★ Flowable
- ★ Non-UV Cure
- ★ Outgas Tolerant
- ★ High Ink Step

Direct Bonding



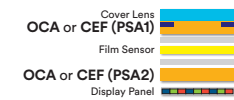
Construction		OGS	In-cell	On-cell
Touch Materials / Characteristics		Glass Cover Lens Black border / Color Border ITO	Glass Cover Lens Black border / Color Border ITO	Glass Cover Lens Black border / Color Border ITO
PSA Needs / Attributes	PSA 1	★★★ / ★★	★★★ / ★★	★★★ / ★★
3M OCA Recommended Solutions	PSA 1	3M CEF28 / CEF19 / CEF29	3M CEF61 / CEF28 / CEF29	3M CEF61 / CEF28 / CEF29

GFF Sensor



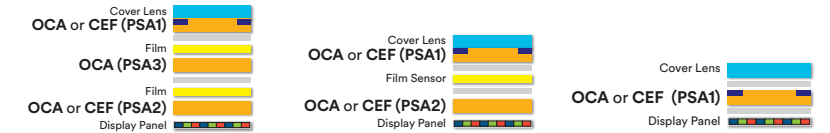
Construction		Handheld	Tablet / Notebook	All-in-One
Touch Materials / Characteristics		Glass Cover Lens Black Border / Color Border ITO / Metal Mesh PET / COP	Glass Cover Lens Black Border / Color Border ITO / Metal Mesh / Ag NW PET / COP	Glass Cover Lens Black Border ITO / Metal Mesh / Ag NW PET
PSA Needs / Attributes	PSA 1	★★★ / ★★	★★★ / ★★	★★★
	PSA 2	★★★	★★★	★★★
	PSA 3	★★★	★★★	★★★
3M OCA Recommended Solutions	PSA 1	3M OCA 8146-x / 8148-x	3M OCA 8146-x / 8148-x	3M OCA 8146-x / 8148-x
	PSA 2	3M OCA 8146-x	3M OCA 8146-x	3M OCA 8146-x
	PSA 3	3M CEF19	3M CEF19	3M CEF28

G1F Sensor



Construction		Handheld	Tablet / Notebook	All-in-One
Touch Materials / Characteristics		Glass Cover Lens Black Border / Color Border ITO / Metal Mesh PET / COP	Glass Cover Lens Black Border / Color Border ITO / Metal Mesh / Ag NW PET / COP	Glass Cover Lens Black Border ITO / Metal Mesh / Ag NW PET
PSA Needs / Attributes	PSA 1	★★★ / ★★	★★★ / ★★	★★★
	PSA 2	★★★	★★★	★★★
3M OCA Recommended Solutions	PSA 1	3M OCA 8146-x / 8148-x	3M OCA 8146-x / 8148-x	3M OCA 8146-x / 8148-x
	PSA 2	3M CEF19	3M CEF19	3M CEF28

Plastic Cover Lens



Construction		PFF	P1F / P2F	Direct Bond
Touch Materials / Characteristics		Plastic Cover Film Black Border / Color Border ITO / Metal Mesh PET	Plastic Cover Film Black Border / Color Border ITO / Metal Mesh PET	Plastic Cover Film Black Border / Color Border ITO
PSA Needs / Attributes	PSA 1	★★★ / ★★	★★★ / ★★	★★★ / ★★
	PSA 3	★★★		
	PSA 2	★★★	★★★	
3M OCA Recommended Solutions	PSA 1	3M CEF05 / CEF06N	3M CEF05 / CEF06N	3M CEF05 / CEF06N
	PSA 3	3M OCA 8146-x		
	PSA 2	3M CEF29	3M CEF29	

Automotive



Construction		CG / GS	Direct Bond	2D Curve Glass
Touch Materials / Characteristics		Glass Cover Lens Black Border ITO	Glass Cover Lens Black Border ITO	Glass Cover Lens Black Border ITO
PSA Needs / Attributes	PSA 1	★	★★	★★
		Require good robustness after severe aging condition		
3M OCA Recommended Solutions	PSA 1	3M CEF28 / CEF19 / CEF29 3M CEF05	3M CEF28 / CEF19	3M CEF28

- | | |
|--|--|
| Ag NW Silver Nanowire | OGS One Glass Solution |
| CEF Contrast Enhancement Film | P1F Plastic cover film version of G1F |
| COP Cyclo-Olefin Polymer | P2F Plastic cover film version of G2F |
| GFF Glass, Film, Film | PET Polyethylene Terephthalate |
| G1F Glass, One Film | PFF Plastic, Film, Film |
| ITO Indium Tin Oxide | PSA Pressure Sensitive Adhesive |
| MVTR Moisture Vapor Transmission Rate | UV Ultra-Violet |
| OCA Optically Clear Adhesive | |