3M Science. Applied to Life.™

3M Display Materials & Systems Division

Technical Data 2019

3M™ Contrast Enhancement Film

CEF35XX Series

- Low modulus over a broad temperature range
- Elasticity for quick recovery after folding

Product Description

3M™ Contrast Enhancement Films CEF35XX offers a low modulus over a broad temperature range, as well as elasticity to provide quick recovery after folding. CEF35XX can be laminated via conventional film Optically Clear Adhesive (OCA) lamination process. No UV curing required.

Construction

Product	3M CEF3501	3M CEF3502	3M CEF3503	3M CEF3504
Adhesive Type:	Acrylic	Acrylic	Acrylic	Acrylic
Adhesive Carrier:	None	None	None	None
Approximate Thickness:				
Release Liner:	50 um (2.0 mils) Clear Polyester	50 um (2.0 mils) Clear Polyester	50 um (2.0 mils) Clear Polyester	50 um (2.0 mils) Clear Polyester
Adhesive:	25 um (1.0 mil)	50 um (2.0 mils)	75 um (3.0 mils)	100 um (4.0 mils)
Release Liner:	75 um (3.0 mils) Clear Polyester	75 um (3.0 mils) Clear Polyester	75 um (3.0 mils) Clear Polyester	75 um (3.0 mils) Clear Polyester

The 3M family of optically clear adhesives for electronic displays are usually available in two forms. 3M OCA come in roll good form. 3M Contrast Enhancement Films (CEF) are available in die-cut form.

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.

Performance to Environmental Conditions:

The following environmental tests were conducted in the 3M laboratory under the conditions specified without any appreciable deterioration in visible appearance (no bubbles, delamination, etc.). Sample construction is cover glass/3M CEF35XX/ LCD glass.

	Condition	Duration
High Temperature	+95°C	1000 hours
Low Temperature	-40°C	1000 hours
High Temp/Humidity-1	+65°C/90%RH	1000 hours
High Temp/Humidty-2	+85°C/85%RH	1000 hours
Thermal Shock	-40°C and +85°C (1 hour dwell, <1 min ramp time)	TBD
UV	.55 W/m^2 at 340nm, Daylight filter	250 hours

Peel Adhesion:

ASTM D3330 modified, 180 degree peel from glass, 1 cm wide peel strips, 12 in/min (305 mm/min), 2.0 mil polyester backing, 3M CEF35XX.

Peel Adhesion to Glass		
Dwell Time	20 min dwell at 25°C/50%RH	3 days dwell at 25°C/50%RH
Units	N/cm	N/cm
3M CEF3501	3.4	6.6
3M CEF3502	3.6	6.0

Color:

Ultra Scan Pro (Hunter Lab), ASTM E308, D65/10°
3M CEF3501 on LCD glass.

3M CEF3501	3M CEF3502	3M CEF3504
L* = 97.0	L* = 97.0	L* = 97.0
a* = -0.02	a* = -0.02	a* = -0.02
b* = 0.17	b* = 0.18	b* = 0.19

Refractive Index:

(+ 0.0005 Metricon measurements)

3M CEF35XX		
405 nm	532 nm	633 nm
1.4840	1.4728	1.4681

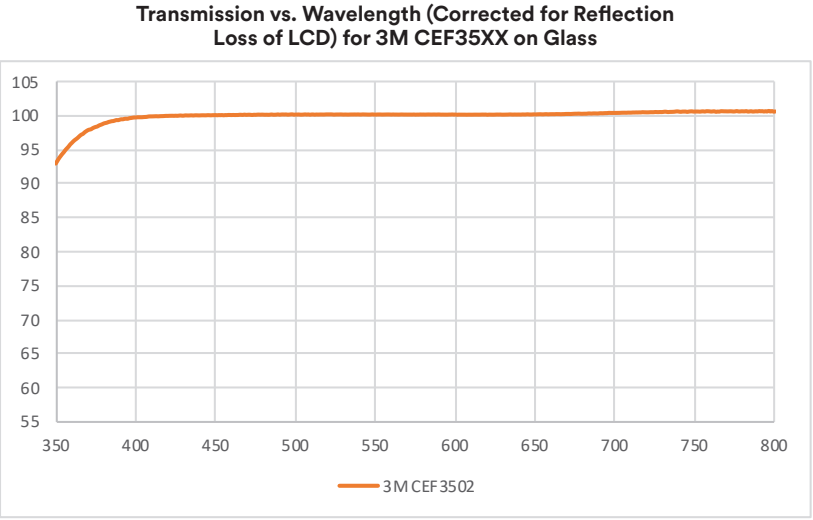
Haze:

Haze is measured according to ASTM D1003-92,
3M CEF35XX on LCD glass.

3M CEF3501	3M CEF3502	3M CEF3504
0.1%	0.1%	0.1%

Transmission Curve:

3M™ Contrast Enhancement Film CEF35XX



Typical Electrical Properties at Room Temperature:

ASTM-D150-92. 3M CEF35XX

Dielectric Constant:

3M CEF35XX	
Frequency (kHz)	Dielectric Constant
100	5.44
500	5.22

Suggested Lamination Process

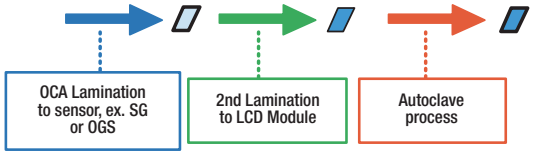
Step 1: Remove secondary liner, and then laminate 3M CEF35XX to first adherent substrate by roller at room temperature

Recommendation: roller pressure 0.1 – 0.2 MPa, roller speed 0.5 – 1 m/min

Step 2: Remove primary liner, and then laminate 3M CEF35XX/first adherent to second adherent by vacuum lamination (if rigid-to-rigid bonding)

Recommendation: Vacuum condition < 50 Pa, pressure around 0.1 – 0.2 MPa

Step 3: Autoclave process recommendation: 30-60°C/3-5kgf/cm^2/20-30min



Storage

- Avoid applying pressure or resting objects on the product to prevent marking, denting, or deforming the surface.
- Wear gloves to prevent fingerprints or nail marks when handling.
- Product needs to be unpacked and handled in a clean-room facility.
- Store in sealed bag at 25°C or below.

Regulatory

For regulatory information about this product, please contact your 3M representative.

Technical Information

The technical information, recommendations and other statements contained in this document are based upon tests or experience that 3M believes reliable, but the accuracy or completeness of such information is not guaranteed.

Product Use

Many factors beyond 3M's control and uniquely within the user's knowledge and control can affect the use and performance of a 3M product in a particular application. Given the variety of factors that can affect the use and performance of a 3M product, user is solely responsible for determining if the product is fit for a particular purpose and suitable for user's method of application.

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