



[Product list]

Chemical materials for Display module

exax : excellent and expert, Global Leader



Profile

Name of company	exax Inc.
CEO	Jip-Hoon, Chung
Date of incorporation	March, 1976
Major business	Mixed Chemicals, Materials for electronics & RFID
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E-mail	pjh@exax.co.kr
Company status	KOSDAQ listed
Homepage	www.exax.co.kr



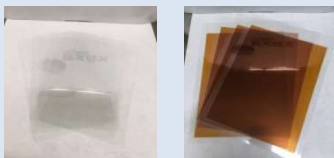
Optical Clear Adhesive Foldable OCA

Application

- Foldable Display
- Glass/PET/PI

Performance

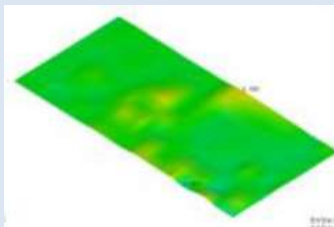
- Low storage modulus
- Excellent Recovery rate
- Various forms of OCA



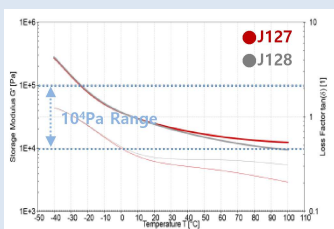
Optical Properties

- Haze < 0.5 , YI < 0.5
- Transmittance > 99%

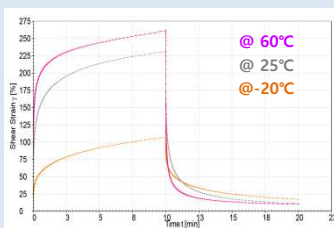
▼ Waviness (After folding)



▼ Storage Modulus (G')

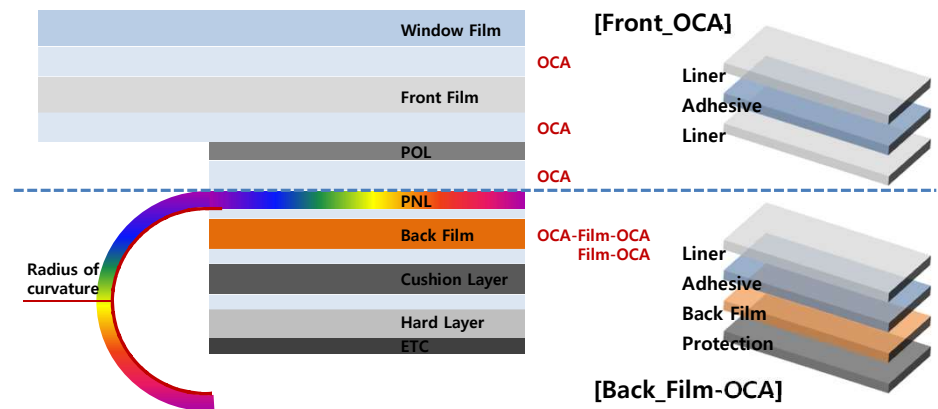


▼ Creep&Recovery (J128)



OCA for Foldable OLED display

❖ Foldable display structure and OCA type



SPECIFICATION

❖ General Properties

Contents		FJA-J127			FJA-J128		
Chemical Type		Acryl polymer					
OCA Thickness [μm]		25	50	100	25	50	100
Release [gf/in.]	Light	<8			<8		
	Heavy	<30			<30		
Adhesive Strength [gf/in.]	PI	>550	>650	>700	>550	>600	>650
	Glass	>750	>800	>850	>900	>950	>1000
In-folding Result_Waviness (Adhesive 25μm)	Static	< 0.07mm (3R, 24hr, RT)			< 0.07mm (3R, 24hr, RT)		
	Dynamic	<0.07mm (3R, 70k cycle, RT)			<0.07mm (3R, 70k cycle, RT)		

❖ Rheology Properties

Contents		FJA-J127			FJA-J128		
Temp.		@-20°C	@25°C	@60°C	@-20°C	@25°C	@60°C
Storage Modulus [Pa]		8.3×10 ⁴	2.6×10 ⁴	1.7×10 ⁴	8.2×10 ⁴	2.4×10 ⁴	1.5×10 ⁴
Creep& Recovery [Strain_%]	Creep Max	>80	>125	>130	>100	>230	>260
	Recovery Min	<10	<5	<5	<17	<11	<11
	Recovery Rate	>90	>95	>97	>85	>95	>96



Direct Bonding OCR

Application

- ITO coating Glass
- Glass/PMMA/PC
- Polarizing Film

Performance

- Process Optimization
- Various substrate adhesion
- Transmittance rate 99% ↑
- Haze 1% ↓
- Yellowish (b*) 1.0 ↓

OCR Thickness

- 100 ~ 300 μm

Stable reliability condition

- HT : **110°C, 1,000hr**
- HTHH : 85°C/85%, 1,000hr
- TC : -40~100°C, 500 cycle
- UV : UV aging 1,000hr

Specialty in DB Process

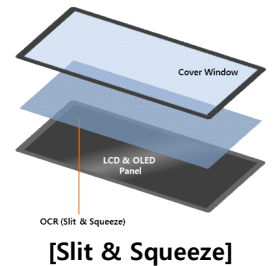
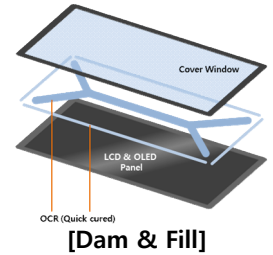
- Dam & Fill : **MURA-Free**
- EXO-S300, EXO-S500
- Injection (Low viscosity)
- EXO-L300
- Squeeze (High viscosity)
- EXO-T6000
- Slit coating (Normal viscosity)
- EXO-T1000, EXO-J1003
- Quick Curing (@365nm LED)
- EXO-L300, EXO-S500
- **High Hardness (OLED)**
- EXO-S200

High heat resistance

❖ High temperature (110°C) Stability

- ▶ No Yellowish at high temperature compared to other company's OCR.

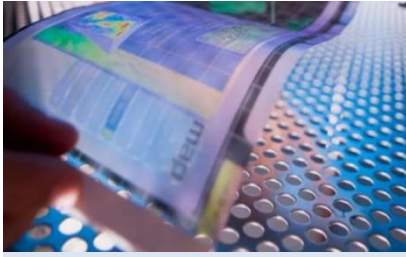
Section (Yellow index)	Competitor OCR	EXO OCR
0hr	0.34	0.33
1,000hr	1.50	0.81
Image		



SPECIFICATION

Automotive OCR

Item	EXO L300	EXO T1000	EXO T6000	EXO J1003	EXO S200	EXO S500	
	Base material	Acrylic	Acrylic	Acrylic	Acrylic	Acrylic	Acrylic
Cure Energy(mJ/cm ²) (@300mW/cm ² UV / Metal)	1,500	3,000	3,000	3,000	3,000	1,500	
Viscosity (cPs @ 25°C)	350	4,500	60,000	5,400 ~7,000	1,500 ~10,000	3,500 ~7,000	
Transmittance rate (%) (average 380~780nm)	>99	>99	>99	>99	>99	>99	
Refractive Index	1.47	1.49	1.48	1.49	1.48	1.49	
Cured shrinkage (%)	3.9	1.2	3.9	3.6	5.4	2.2	
Hardness (Shore 00)	8	10	30	5	95(JA)	10	
Elastic modulus (KPa)	28	78	170	120	5,200	47	
Elongation (%)	800	600	500	1,000	200	630	
Adhesion Strength (Glass to Glass)	Shear (N/cm ²)	97	216	330	217	2,130	133
	Peel (N/cm)	2.6	5.2	3.8	10	-	2.3
HAZE (85°C/85%)	0hr	0.04	0.04	0.03	0.08	0.1	0.05
	1,000hr	0.27	0.07	0.25	0.25	0.26	0.10
Yellowish (85°C/85%)	0hr	0.20	0.28	0.3	0.43	0.42	0.28
	1,000hr	0.36	0.32	0.4	0.47	0.11	0.31



Multi Bending Layer TFT UV Resin

UV Resin for Flexible OLED display

Application

- Flexible display
- FPCB/Glass

Performance

- Process Optimization
- Various substrate adhesion
- **Modulus Optimization**
- Tacky Free

Applicable Equipment

- Jetting Valve
- Dispenser

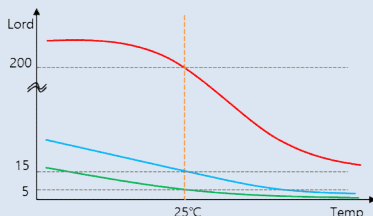
Stable reliability condition

- HT : 100°C, 1000hr
- HTHH : 60°C/90%, 1000hr
- TC : -40~100°C, 500 cycle

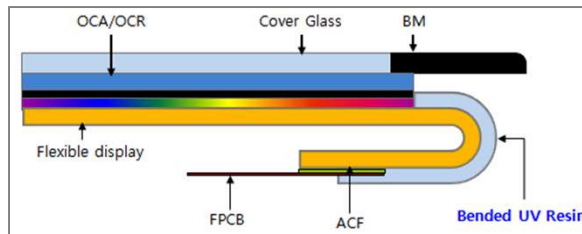
Process Spec.

- Modulus
 - Low (Mobile) : EX-R325FD-02, 03
 - High (Watch, Tablet) : EX-R325FD-01

- Modulus graph



- UV curable resin by LED 365nm lamp
- No de-lamination, No crack at the bended area
- Securing Modulus Optimization technology



[Ø1.0mm Banding]

SPECIFICATION

Contents	EX-R325FD-01	EX-R325FD-02	EX-R325FD-03
Base Material	Hydrophobic Urethane Acrylate		
Appearance	Yellowish liquid		
Viscosity (cPs at 25°C)	1500 ± 300	850 ± 100	800 ± 100
Cure Dosage(mJ/cm ²) (@300mW/cm ² 365nm LED)	1,500	1,000	1,000
Liquid Specific Gravity	0.98	0.98	0.98
Hardness (Shore JA)	75 ± 5	73 ± 5	70 ± 5
Water Absorption (%)	< 0.5%	< 0.5%	< 0.5%
Adhesion Strength on Glass (N/mm ²)	2.5 <	2.5 <	2.5 <
Tensile Strength (MPa)	7.5 ± 1	4.5 ± 1	5.0 ± 1
Tensile Modulus (MPa)	200 ± 2	15.0 ± 1	6.0 ± 1
Elongation(%)	200 <	250 <	250 <
Storage Modulus (Pa)	1.5 × 10 ⁶	4.1 × 10 ⁵	5.8 × 10 ⁵
Storage Life	6 Months	6 Months	6 Months



Black Side Seal UV Resin

Application

- TV & Monitor Side Seal
- Al, PC, Glass

Performance

- Process Optimization
- Various substrate adhesion
- **O.D Optimization**
- **High O.D curing technology**

Applicable Equipment

- Jetting Valve
- Spray

Stable reliability condition

- HT : 100°C, 1000hr
- HTHH : 60°C/90%, 1000hr
- TC : -40~100°C, 500 cycle

Process Spec.

- Viscosity
 - **Low (Spray)**
: EX-V100-V5
 - Normal
: EX-R380N, EX-SPS-07
 - High
: EX-LSS-S01
- O.D (Optical Density)
 - Low (1.0 > @100µm)
: EX-R380N, EX-V100-V5
 - High (1.0 < @100µm)
: EX-SPS-07, EX-LSS-S01
- Cured Lamp
 - **LED 365nm**
: EX-SPS-07
 - LED 405nm
: EX-R380N, EX-V100-V5
EX-LSS-S01

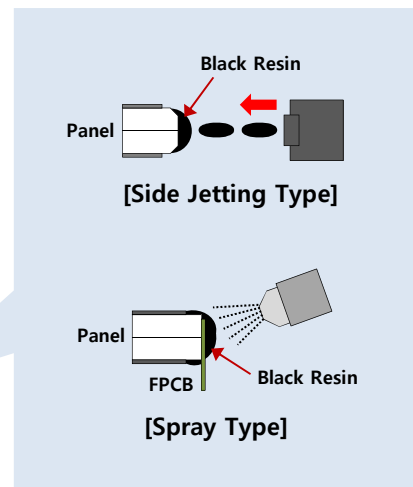


Excellent Blocking of light leakage

- ❖ UV curable resin by LED 405 & 365nm lamp
- ❖ Excellent curing performance



Bezel-less Type



SPECIFICATION

Contents	EX-R380N	EX-V100-V5	EX-SPS-07	EX-LSS-S01
Base Material	Hydrophobic Urethane Acrylate			
Color	None Carbon Type		Carbon Type	
Viscosity (at 25°C)	3,000 ± 300	100 ± 20	3,200 ± 500	65,000 ± 1,000
Optical Density (380~770nm)	0.5 (@200µm)	0.7 (@ 50µm)	>1.1 (@100µm)	>1.7 (@100µm)
Cure Dosage (mJ/cm ²) (@300mW/cm ² 405nm LED)	>700	>1,000	>1,000 (365nm LED)	>30,000
Liquid Specific Gravity	0.97	0.96	0.98	0.98
Hardness	75 ± 5	90 ± 5	85 ± 5	65 ± 5
Adhesion Strength on Glass (N/mm ²)	>2.5	>2.5	>2.5	>5.0
Elongation (%)	>70	>400	>50	>500
Storage Life	6 Months	6 Months	3 Months	3 Months



Elastic coating Adhesive UV resin



EX-N8200

Photo-curable modified urethane resin for flexible coating and adhesive

▼ Product Description

EX-N8200 is designed for flexible hard coating and adhesive on glass, metal and versatile plastic substrate. This product is based on modified urethane resins cured by UV/EB/LED light and makes it suitable for use in application requires good flexibility, toughness and elastomeric property

General Product Data

Base backbone	Modified urethane resin
Appearance	Transparent liquid
Viscosity, 100% resin	43,000 (cps, 60°C)
Viscosity, TMCHA 30%	8,800 (cps, 25°C)
Solid Content(%)	100
Specific gravity	1.10
Refractive Index(25°C)	1.486

Recommended Acrylate monomers

Monomer	Content(%)	Result
EHA, THFA	-	Good viscosity reduction
TMCHA, TBCHA	10 – 40	Improve flexibility adhesion
PETA, DPHA	> 30	Improve toughness hardness

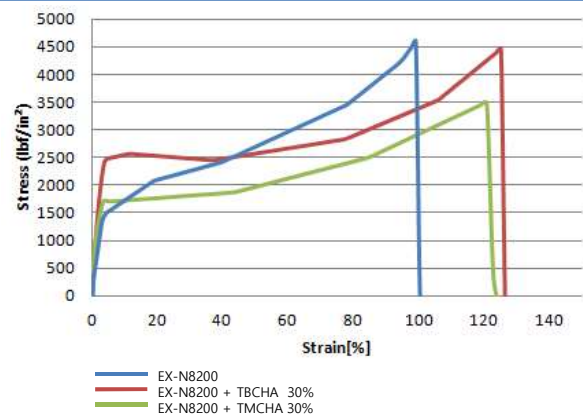
Typical Cured Performance

Appearance	Transparent
Cured surface	Tack-free
Shore Hardness	95(A), 66(D)
Elongation(%)	100
Tensile strength(psi)	4,351
Haze	0.75
Yellow index	0.5

Performance of cured Adhesion

Substrate	Shear Strength (psi)	Cross cut (ASTM D3359)
Glass/Glass	3,280	-
Glass/Steel	3,109	-
PET	-	5B
PC, ABS	-	5B
PMMA	-	3B

Stress-Strain Curve

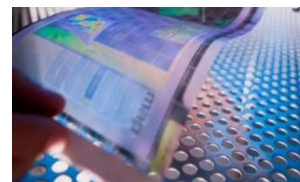


Type of Application

UV Protective coating :
Flexible plastic & film, Elastic materials

Industrial UV adhesive :
Bonding Glass, metal and plastic

General soft coating





OLED Protector White, Black & Clear

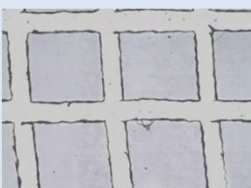
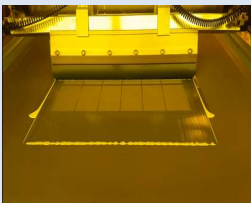
OLED Protector

- ① **White OLED Protector**
 - For Normal rigid display
- ② **Black OLED Protector**
 - For tablet, note PC
 - Block light leaking
- ③ **Clear OLED Product**
 - For Hole camera display
 - High Transmittance
 - Low Haze

Adhesion

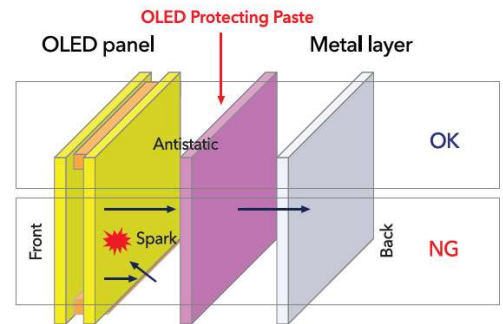
: **Cross-Cut Test**

All Product : 100/100

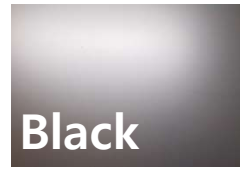


▶ Protect OLED Panel against Acid Solution Discharging static current on OLED Panel

- **Excellent Chemical Resistance**
 - Resistance about Ethanol / IPA
- **Antistatic : Prevent Static**
 - Surface Resistance(Ω) : 10^{10}
- **Excellent Coating**
 - Prevent Detaching & Flowing
- **Good Reliability**
 - After PCT & 85/85, Keeps Property



▶ Image



▶ Specification

	How to measure	Unit	White	Black	Clear
Viscosity	Haake Viscometer (Spindle Haake C60, 20rpm)	cPs	13,000 ± 5,000	10,000 ± 5,000	4,000 ± 500
Thixotrophy	Haake Viscometer 2rpm/20rpm	-	≥1.5	≥1.5	≥1.0
Thickness	Alpha-Step (Veeco Dektak' 6M)	μm	≥6.0	≥8.0	≥5.0
Hardness	Pencil (Mitsubishi, ISO15184)	-	≥H	≥H	≥H
Transmittance	UV-Vis	%	-	-	98%
Haze	Photospectrometer	-	-	-	< 1
Resistance	Model : MC P-HT450 (Ring Type)	After coating	$10^{10} \sim 10^{12}$	$10^{10} \sim 10^{12}$	$10^{10} \sim 10^{12}$
		After boiling	$10^{10} \sim 10^{12}$	$10^{10} \sim 10^{12}$	$10^{10} \sim 10^{12}$
		After drying	$10^{10} \sim 10^{12}$	$10^{10} \sim 10^{12}$	$10^{10} \sim 10^{12}$
Light leakage	Visual inspection on light	-	-	Pass	-
Storage & Safety	For Safety and Handling, Read the MSDS	-	3 Months (1~5°C)	3 Months (1~5°C)	3 Months (RT)