



Silicone Material Solution for Display Applications



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Momentive's silicone offers high performance materials solutions for current and future display technology. The material portfolio for display industry includes electrode coating, optical bonding/potting/coatings, formed in place gasket(FIPG) sealants, adhesives, potting compounds and thermal interface materials.

Typical Applications:

- ITO/silver electrode coatings
- Optical bonding
- OLED potting
- Formed in place gasket(FIPG)
- Thermal interface materials
- Assembly adhesives

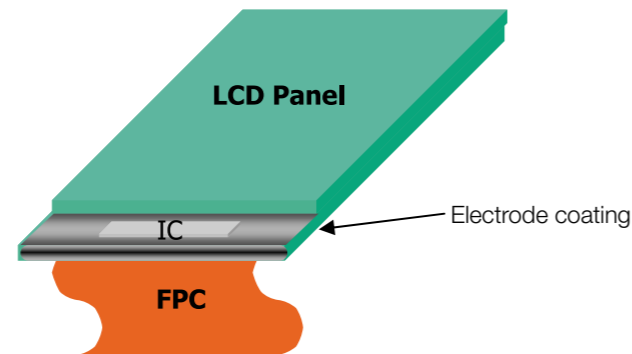
Material Solutions:

- Room temperature cure or UV cure encapsulants
- UV cure or heat cure optical clear adhesives
- Optical clear high purity heat cure adhesives
- TI controlled room temperature cure adhesives
- Thermal conductive adhesives/gel/grease
- Fast cure/high purity adhesives

ITO/Silver Electrode Coatings

The protection and longevity of sensitive circuits and components is important in display panel. Momentive's silicone offers short tack free times to drive productivity, primerless adhesion to many substrates and are available in standard and repairable grades. These silicones help to protect delicate display electrodes against moisture and corrosion, adding to system reliability.

- Insulating protective coatings provided protection to fine pitch patterns of FPD/touch panel electrodes and Driver ICs
- Conformal coatings to moisture proof electronics parts
- Provide reliability and durability to the end products

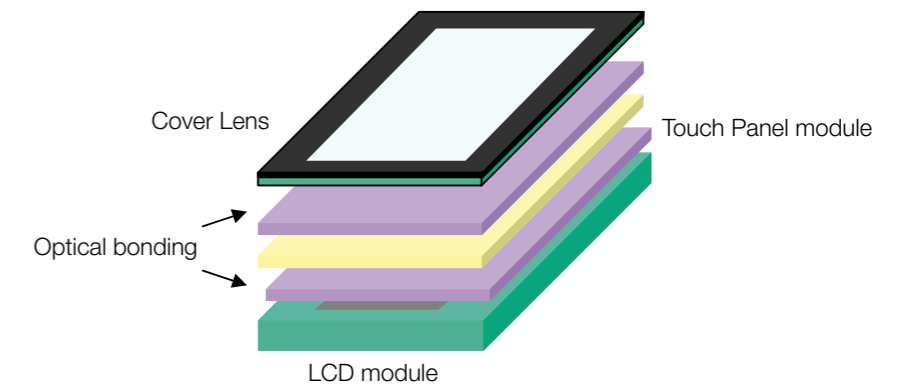


| Properties | ECS0600 | ECS0601 | XE11-C0602 | ECS0605-WL | ECS0609FR | ECS0560-B |
|----------------------------|---|--------------------------------------|---|--|---|---|
| Features | Fast tack free, Repairability, Low ionic impurities | Fast tack free, Low ionic impurities | Fast tack free, Repairability, Low ionic impurities | Slow tack free, good for repair process, Low ionic | UL94V-0, Low volatile, Low ionic impurities | Low viscosity, Fast tack free, Low ionic impurities |
| Color | Translucent/White/Black | Translucent/White/Black | White/Black | White | Gray | Black |
| Viscosity (23°C) | Pa.s | 5 | 1.4 | 1.3 | 5 | 18 |
| Tack Free Time | min | 7 | 7 | 7 | 18 | 7 |
| Specific Gravity (23°C) | | 1.03 | 1.01 | 1.01 | 1.02 | 1.22 |
| Hardness (Shore A) | | 20 | 24 | 27 | 20 | 28 |
| Tensile Strength | MPa | 1.2 | 0.8 | 1.1 | 0.8 | 2.4 |
| Elongation | % | 300 | 150 | 180 | 220 | 250 |
| Volatile Siloxane (D3-D10) | wt% | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Adhesive Strength | MPa | | 0.3 | 0.3 | 0.3 | 1.2 |
| Dielectric Strength | KV/mm | 20 | 20 | 20 | 21 | 20 |
| Volume Resistivity | ohm.cm | 4.0x10 ¹⁵ | 2.0x10 ¹⁵ | 1.0x10 ¹⁵ | 1.0x10 ¹⁵ | 1.0x10 ¹³ |
| Dielectric Constant | (60Hz) | 2.8 | 2.6 | 2.7 | 2.6 | 3.1 |

Typical property data values should not be used as specifications

Optical Bonding

Momentive's family of optical silicones material feature outstanding optical bonding process and makes displays more readable in direct sunlight or in bright ambient lighting conditions. Our silicones deliver high light transmittance and display protection to effectively reduce surface reflection and increase reliability on using display.



- Better readability by applying silicone in the interlayer of display/touch screen modules
- Better vibration and shock proof to protect display/touch screen modules
- Better reliability under harsh environments to sustain high quality performance

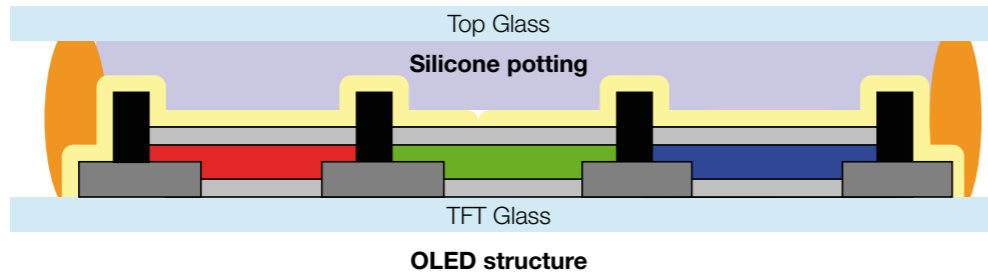
| Properties | OP2131 | OP2431 | UVA2500 | UV Gel 100 | OP2012 |
|---------------------------|-------------|------------------------|------------------------|------------------------|------------------------|
| Type | 1 part | 1 part | 2 part | 2 part | 2 part |
| Appearance | transparent | transparent | transparent | transparent | transparent |
| Mixing rate (A:B weight) | - | - | 100:10 | 100:10 | 100:100 |
| Viscosity (mixed at 23°C) | Pa.s | 2.8 | 17 | 0.25 | 1 |
| Curing condition | C/h | 3000mJ/cm ² | 3000mJ/cm ² | 1200mJ/cm ² | 1200mJ/cm ² |
| Pot Life | | >3 days | >3 days | >3 days | >4 hours |
| Hardness | | 20 (E type) | 19 (A type) | 25 (E type) | Gel |
| Lap shear strength* | MPa | 0.5 | 1 | 0.1 | 0.05 |
| Shrinkage | % | < 0.2 | < 0.2 | < 0.2 | < 0.2 |
| Dielectric strength | KV/mm | - | - | 21 | 34 |
| Volume resistance | ohm.cm | - | - | 2X10 ¹⁵ | 3X10 ¹⁴ |
| Dielectric Constant | (60Hz) | 2.6 | 2.6 | 2.8 | 2.9 |

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OLED Potting

The major concern at OLED industry is the limited lifetime of organic illuminant materials which are damaged by moisture, some chemical agent attack. Momentive's potting silicone provides excellent protection to organic illuminant materials and device against circumstance.

- Protecting illuminants with passivation layer from the damages of moisture, ionic agent and physical impact.
- Reducing structure stress from OLED modules
- Better reliability under harsh environments to sustain high quality performance



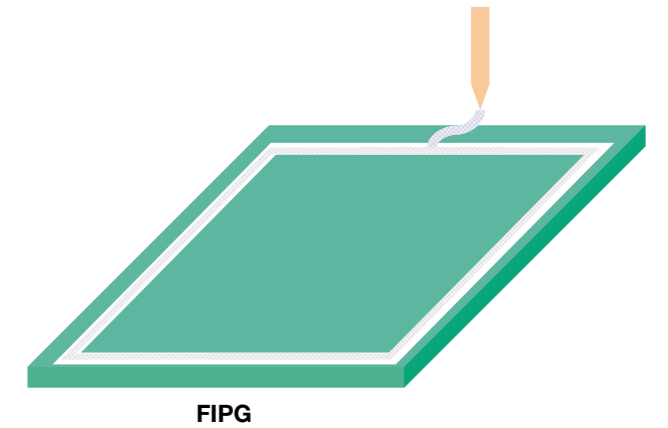
| Properties | | XE13-C5308 | XE13-C5309 |
|---------------------------|--------------|-------------|-------------|
| Type | | 1 part | 1 part |
| Appearance | | Transparent | Translucent |
| Mixing rate | (A:B weight) | - | - |
| Viscosity (mixed at 23°C) | Pa.s | 6 | 282 |
| Curing condition | C/h | 100/1 | 100/1.5 |
| Pot life | Hour | > 24 | > 24 |
| Hardness | (JIS A) | 18 | 44 |
| Lap shear strength* | Mpa | 0.3 | 2.7 |
| Impurity | ppm | < 1 | < 1 |
| Weight loss | % | 0.33 | 0.22 |

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Formed in Place Gasket (FIPG)

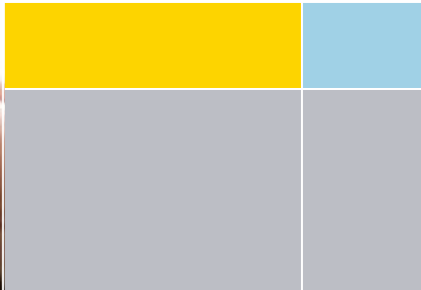
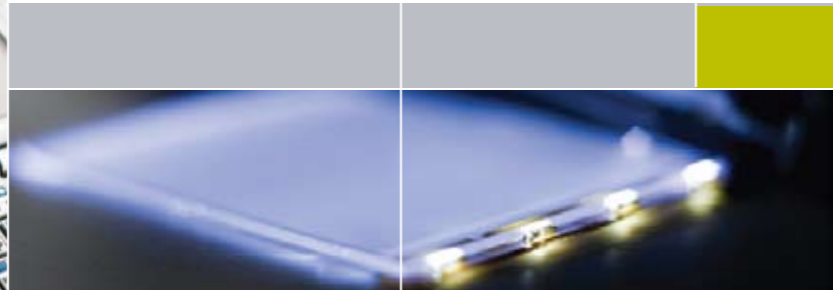
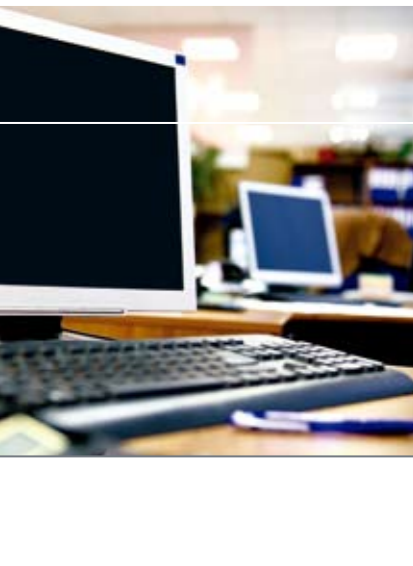
FPD backlight units used to apply tape on the bezel to support display panel with heavy manpower consumption. Momentive's FIPG silicones is ideally provided display panel support and light shielding with huge cost saving and reliability performance.

- Better reliability than conventional tape process
- Huge cost saving and productivity by automatic dispensing system
- Better repairability than conventional tape



| Properties | | XE11-C1331 | XE11-C3452 | XE11-C1106 |
|----------------------------|--------|---|--|--|
| Features | | Fast tack free, 1part RT cure, excellent adhesion | Fast tack free, strongadhesion, good repairability | Fast tack free, excellent adhesion, good heat resistance |
| Appearance | | Translucent paste | Translucent paste | White paste |
| Viscosity (23°C) | Pa.s | 48 | 41 | 81 |
| Tack Free Time | min | 5 | 5 | 5 |
| Specific Gravity (23°C) | | 1.04 | 1.04 | 1.35 |
| Hardness (Shore A) | | 24 | 23 | 39 |
| Tensile Strength | MPa | 1.0 | 1.7 | 2 |
| Elongation | % | 220 | 310 | 160 |
| Adhesive Strength | MPa | 1.0 | 1.1 | 1.5 |
| Volatile Resistivity | ohm.cm | 1.0x10 ¹⁵ | 1.0x10 ¹⁵ | 1.0x10 ¹⁵ |
| Dielectric Constant (60Hz) | | 2.9 | 2.7 | 3.3 |

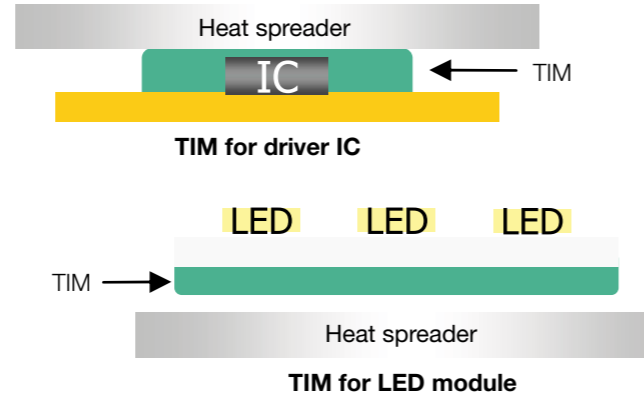
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Thermal Interface Materials

Thermal management for backlight units will reduce junction temperature of backlight units. Junction temperature increases may lead to reduced brightness and shortness of light source. Our TIMs help solve heat dissipation issues.

- Better reliability than conventional fabricated thermal pad process.
- Liquid-dispensed alternatives provide process, performance, and cost benefits.
- Increased processing capacity of BLU creating heat dissipation issues.



| Properties | TIA0260 | TIA0220 | XE11-B5320 | TIA130G | TIA221G | TIG210BXS |
|-------------------------|--|--|------------------------------------|---|---|--|
| Features | High thermal conductivity, strong adhesion | High thermal conductivity, strong adhesion | Fast tack free time, UL recognized | High thermal conductivity, tacky adhesion | High thermal conductivity, tacky adhesion, fast/RT cure | Low oil bleed, high temperature resistance |
| Type | 1Part/RT cure | 1Part/RT cure | 1Part/RT cure | 1Part/RT cure | 2Part/RT cure | Grease |
| Color | Light gray | Gray | White | Gray | Gray | Gray paste |
| Viscosity (23°C) | Pa.s 180 | 300 | Paste | 110 | 71 | Paste |
| Tack Free Time | min 10 | 10 | 5 | - | - | - |
| Specific Gravity (23°C) | 3.01 | 2.87 | 2.59 | 3.04 | 2.81 | 2.90 |
| Hardness | 92(type A) | 88(type A) | 80(type A) | 45(type E) | 40(type E) | - |
| Thermal conductivity | W/m.K 2.6 | 2.2 | 1.3 | 3.0 | 2.1 | 2.1 |
| Tensile Strength | MPa 6.5 | 5.2 | 3.6 | - | - | - |
| Elongation | % 20 | 40 | 40 | - | - | - |
| CTE | ppm/ 100 | 110 | 120 | 120 | 140 | - |
| Adhesive Strength | MPa 2.6 | 4.2 | 1.3 | - | - | - |
| Volume Resistivity | Mohm. 7.0x10 ⁶ | 1.0x10 ⁷ | 2.0x10 ⁷ | 2.5x10 ³ | 4.8x10 ⁵ | 1.0x10 ⁶ |

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FPD Assembly Adhesives

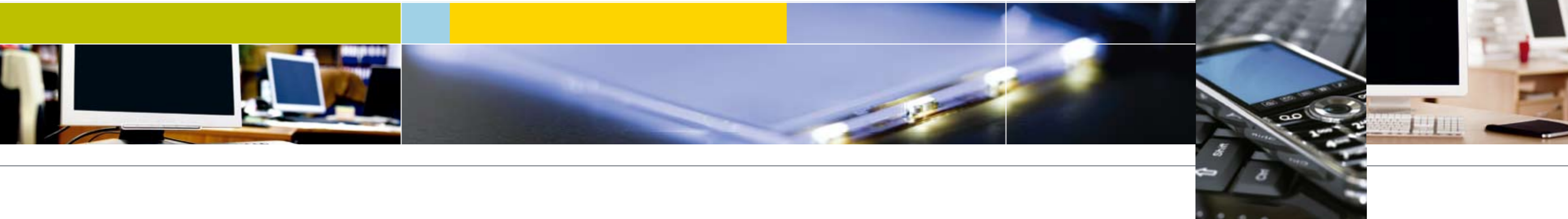
For FPD assembly application, silicones provide adhesion to many substrates, an array of grades are available to environment friendly, heat resistance, flame retardancy, low volatility for sensitive components, and moisture protection.

- Environment friendly grades reduce the concern on environment impact.
- Lower volatility increase the application possibility in many industry



| Properties | TN3085 | TN3005 | TN3305 | TN3705 |
|----------------------------|---|--|--|-------------------------------|
| Features | Fast tack free, strong adhesion, flameretardancy & thermal conductive | Fast tack free, strong adhesion, paste | Fast tack free, strong adhesion, paste | Fast tack free, low viscosity |
| Type | 1 part | 1 part | 1 part | 1 part |
| Color | White | White, Gray, Black | | |
| Viscosity (23°C) | Pa.s Paste | Paste | 47 | 1.9 |
| Tack Free Time | min 7 | 6 | 9 | 7 |
| Specific Gravity (23°C) | 1.03 | 1.01 | 1.01 | 1.02 |
| Hardness (Shore A) | 46 | 22 | 14 | 13 |
| Tensile Strength | MPa 2.3 | 1.8 | 1.5 | 0.4 |
| Elongation | % 150 | 330 | 400 | 130 |
| Adhesive Strength | MPa 1.3 | 1.2 | 1 | 0.2 |
| Volatile Siloxane (D3-D10) | ppm 100 | 100 | 100 | 100 |

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Customer Service Centers

Worldwide Hotline

T +1 800 295 2392 / +1 607 786 8131
F +1 607 786 8309

North America

cs-na.silicones@momentive.com

Silicones – Fluids, UA, Silianes, Specialty Coatings, RTV and Elastomers

T +1 800 523 5862 / +1 800 334 4674
F +1 304 746 1654 / +1 304 746 1623

Consumer Sealants/ Construction Sealants and Adhesives

T +1 877 943 7325
F +1 304 746 1654

Latin America

cs-la.silicones@momentive.com

South America

T +55 11 4534 9650
F +55 11 4534 9660

Mexico and Central America

T +52 55 2169 7670
F +52 55 2169 7699

Europe, Middle East, Africa and India

cs-eur.silicones@momentive.com

T +00 800 4321 1000 / +40 21 3111848

Pacific

cs-ap.silicones@momentive.com

China

T +800 820 0202 / +86 21 3860 4892

Japan

T +0120 975 400 / +81 276 20 6182
F +81 276 31 6259

Korea

T +82 2 6201 4600
F +82 2 6201 4601

Malaysia

T +60 3 9206 1555
F +60 3 9206 1533

Thailand

T +66 2207 3456
F +66 2207 3488

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22 Corporate Woods Boulevard
Albany, NY 12211 USA

+1 800 295 2392
+1 607 786 8131
momentive.com

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