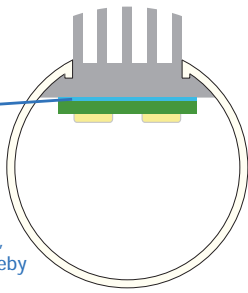


Tube-type LED Lighting & Street Lamps

Thermal Gels, Curable Compounds, Greases

Minimizing thermal resistance in the package through the use of heat sinks and effective thermal interface materials is important for long and reliable service life of LEDs. Momentive offers a selection of room / low temperature cure TIMs and thermal greases to serve as the thermal interface between aluminum or FR-4 bases and heat sinks. These repairable materials wet-out the thermal surfaces, can be used in reduced bond lines and, because they are liquid-dispensed, allow for only the necessary amounts to be used, thereby creating opportunities for material cost and productivity benefits.




Typical Properties	TIA222G	TIG400BX	TIG300BX	TIG210BX	TIA225G	
Features	High thermal conductivity, tacky adhesion, fast heat cure or RT cure	High thermally conductive, low-bleed grease	High thermally conductive, low-bleed grease	Thermally conductive low bleed grease	liquid Dispensed Thermal Pad RT Cure	
Type	2 Part RT Cure	Non-Curing	Non-Curing	Non-Curing	2 Part RT Cure	
Property (uncured)	Flowable	Paste	Paste	Paste	Non-Flowable	
Color	Gray	Gray	Gray	Gray	Gray	
Mixing Ratio ((A):(B) by weight)	100:100	-	-	-	100:100	
Viscosity (23°C)	Pa·s	20	350	200	250	90
Cure Condition (room temp)	h	24	-	-	-	24
Thermal Conductivity	W/m·K	2.2	4.0	3.0	2.1	2.5
Thermal Resistance (BLT)	mm²·K/W	-	17 (55µm)	20 (45µm)	26 (50µm)	-
Volume Resistivity	MΩ·m	4.8x10 ⁶	3x10 ³	5x10 ³	1x10 ⁶	4.8x10 ⁶
Volatile Siloxane (D4-D10)	ppm	<200	30	30	<100	<200

Typical property values should not be used as specifications



Other Electronic Solutions from Momentive Performance Materials

 <p>Thermal Management 12-page brochure provides detailed information on silicone materials used for thermal management applications in electronics and microelectronics. Includes SilCool* greases adhesives, encapsulation and potting gels, and curable compounds.</p>	 <p>LED Packaging Provides opto-electronic solutions for LED Packages and Assemblies. Includes InvisiSil* LED encapsulants, Glob Top, Lens fabrication materials, Die Attach adhesives, and Dot Matrix assembly materials.</p>	 <p>Assembly & Device Comprehensive package of adhesion, sealing, coating and encapsulation / potting solutions for a wide range of silicone applications in electric and electronic devices and component assemblies.</p>
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Silicone Materials for LED Lighting Applications

Silicone Materials for LED Lighting Applications

From high-performance LED chip packaging encapsulants to thermal management materials and adhesives for lighting assemblies, Momentive provides a broad range of innovative silicone solutions to be considered for LED Lighting applications.

Typical Applications:

- Residential LED light bulbs
- LED light rails
- Street lamps
- Automotive lighting
- LCD backlight units
- Traffic signals

Potential Material Solutions:

- LED encapsulants
- Room temperature cure adhesives
- Thermally conductive gels, gap fillers
- Thermally conductive low bleed greases
- Thermally conductive curable compounds

LED Packaging

InvisiSil* LED Encapsulants

InvisiSil silicone encapsulants can help deliver high refractive index and light transmittance to effectively transmit light emitted from LEDs. Their long-term resistance to yellowing and delamination can help contribute to durability and reliability of devices, making them excellent candidates to consider for a wide variety of LED packages.

Typical Properties	XE14-C2042	IVS4546	IVS4622	IVS4752
Type	2 Part Heat Cure	2 Part Heat Cure	2 Part Heat Cure	2 Part Heat Cure
Appearance, Color	Transparent Rubber	Transparent Rubber	Transparent Rubber	Transparent Rubber
Mixing Ratio ((A):(B) by weight)	100:100	100:100	100:100	100:100
Viscosity (23°C)	Pa·s	4.9	4.2	2.4
Refractive Index (n _D ²⁵)	1.41	1.41	1.41	1.41
Cure Condition	°C/h	150/1 ¹	150/1 ¹	150/1 ¹
Penetration	-	-	-	-
Hardness (Type A)	43	49	55	72
Elongation	%	170	130	70
Adhesive Strength (PPA)	MPa	3.0	3.2	3.1

¹Step cure (80°C@90min-120min, 150°C 1h) recommended.

Typical property values should not be used as specifications

Lens Fabrication Materials

Momentive provides moldable silicone materials that can help promote high transparency and mechanical strength, making them excellent candidates to consider for injection molding systems that maximize the benefits of LIM processing.

Typical Properties	IVSM4500	LSR7080
Type	2 Part Heat Cure	2 Part Heat Cure
Appearance, Color	Transparent Resin	Transparent Rubber
Mixing Ratio ((A):(B) by weight)	100:100	100:100
Viscosity (23°C)	Pa·s	30
Pot Life (23°C)	h	24
Refractive Index (n _D ²⁵)	1.42	1.41
Transmittance (1mm: 400nm, 80nm) %	99, 99	94, 94
Cure Condition	°C/h	150/1
Hardness (Type D)	50	20
Young's Modulus	MPa	80
CTE	1/K	2.2x10 ⁻⁴
Shrinkage	%	2.5

Typical property values should not be used as specifications

Residential Lighting

Globe Cap Adhesives

Momentive's condensation cure adhesives cure at room temperature to typically form a strong adhesive bond to most substrates used in Globe Caps in LED lamps. The short tack-free times of these materials can contribute to faster process speeds in high volume applications, and can provide the additional benefits of a low volatile siloxane formulation.

Typical Properties	TN3088	TN3005	TN3305
Features	Fast tack-free, strong adhesion, flame retardancy & thermally conductive	Fast tack-free, strong adhesion, paste	Fast tack-free, strong adhesion, flowable
Type	1 Part	1 Part	1 Part
Color	White	White, Clear	White, Clear
Viscosity (23°C)	Pa·s	Paste	Paste
Tack Free Time	min	10	7
Hardness (Type A)	75	22	14
Tensile Strength	MPa	2.9	1.8
Adhesive Strength	MPa	2.0	1.2
Volatile Siloxane (D ₄ -D ₁₀)	ppm	100	100
Flammability Rating	V-0	HB	HB

Typical property values should not be used as specifications

Thermal Gels, Curable Compounds, Greases

Momentive offers a selection of room / low temperature cure TIMs and thermal greases to serve as the thermal interface between LEDs, aluminum or FR-4 bases, and light bulb housings. These repairable materials wet-out the thermal surfaces and can be used in reduced bond lines to help minimize thermal resistance in the assembly.

Typical Properties	TIG300BX	TIG210BX	TIA225G
Features	High thermally conductive, low-bleed grease	Thermally conductive low bleed grease	Liquid Dispensed Thermal Pad, RT Cure
Type	Non-Curing	Non-Curing	2 Part RT Cure
Color	Gray	Gray	Gray
Mixing Ratio (A:B by weight & volume)	-	-	100 : 100
Viscosity (23°C)	Pa·s	200	250
Cure Condition	h	-	70C x 30 min
Thermal Conductivity	W/m·K	3.0	2.1
Hardness (Type E)	-	-	40
Volume Resistivity	MΩ·m	5x10 ³	1x10 ⁶
Volatile Siloxane (D ₄ -D ₁₀)	ppm	30	<100

Typical property values should not be used as specifications

Thermally Conductive Gels for Driver Heat Dissipation

Removal of heat from the Driver is a key factor in extending the service life of LED bulbs and power supplies. Momentive's liquid-dispensed thermally conductive materials typically conform to complex Driver configurations and cure to form a thermal path to the outer casing. These materials are available in a variety of thermal conductivity levels, viscosities and curing profiles to help meet the specific needs of various designs.

Key Features:

- Good thermal conductivity
- Can be cured at room temperature
- Good flowability - conforms to complex shapes
- Easy to use 1:1 mix ratio by both weight & volume
- Fast cure
- Soft TIM - provides stress relief for delicate components

Typical Properties	TIA222G	TIA216G	TIA207GN
Features	High thermal conductivity, tacky adhesion, fast heat cure or RT cure	High thermal conductivity, tacky adhesion, fast heat cure or RT cure	Low viscosity, tacky adhesion, fast/RT cure
Type	2P Heat Cure	2P Heat Cure	2P Heat Cure
Color	Gray	Gray	Black
Mixing Ratio (A:B by weight & volume)	100:100	100:100	100:100
Workable Life (23°C)	h	4	0.5
Viscosity (23°C)	Pa·s	20	8
Cure Condition (room temp)	h	24	4
Cure Condition (heated)	°C/h	70/0.5	70/0.5
Thermal Conductivity	W/m·K	2.2	1.6
Hardness (Type E)	45	45	40
Volume Resistivity	MΩ·m	4.8x10 ⁶	4.8x10 ⁶
Dielectric Strength	kV/mm	20	18
Flammability Rating	V-0	V-0	V-0
UL RTI Rating	150	150	150

Typical property values should not be used as specifications

*InvisiSil is a trademark of Momentive Performance Materials Inc.