

# LOCTITE 3609

January 2014

## PRODUCT DESCRIPTION

LOCTITE 3609 provides the following product characteristics:

<b>Technology</b>	Epoxy
Chemical Type	Epoxy
Appearance (uncured)	Dark, red viscous gel <sup>LMS</sup>
Components	One component - requires no mixing
<b>Cure</b>	Heat cure
<b>Application</b>	Surface mount adhesive
Key Substrates	SMD components to PCB
Other Application Areas	Small parts bonding
Dispense Method	Syringe
Dispense Speed	Medium 15,000 -25,000 dots/h
Wet Strength	High

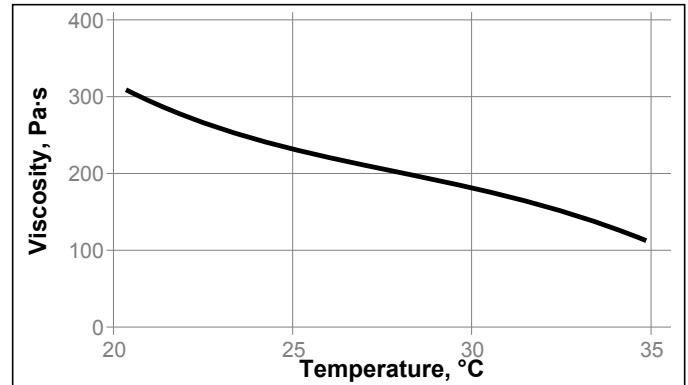
LOCTITE 3609 is designed for the bonding of surface mounted devices to printed circuit boards prior to wave soldering. Particularly suited for applications where medium to high dispense speeds, high dot profile, high wet strength and good electrical characteristics are required. LOCTITE 3609 has been used successfully in lead free processes with water and alcohol based fluxes under conditions outlined in the Environmental Resistance section.

## TYPICAL PROPERTIES OF UNCURED MATERIAL

Specific Gravity @ 25 °C	1.2
Particle Size, µm	<150
Flash Point - See SDS	
Yield Point, 25 °C, Pa	250 to 700 <sup>LMS</sup>
Cone & Plate Rheometer:	
Haake PK 100, M10/PK 1 2° Cone	
Casson Viscosity @ 25 °C, Pa·s	0.16 to 2.0
Cone & Plate Rheometer:	
Haake PK 100, M10/PK 1 2° Cone	

## VISCOSITY VS. TEMPERATURE

The following graph shows a typical temperature-viscosity curve as measured using a Haake rotoviscometer PK100, M10/PK1 2° Cone system at a shear rate of 2 s<sup>-1</sup> which is representative of the shear rate in the dispense nozzle. Increased cabin or nozzle temperature in the 30°C to 35°C range may aid dispense performance at higher dispense speeds.

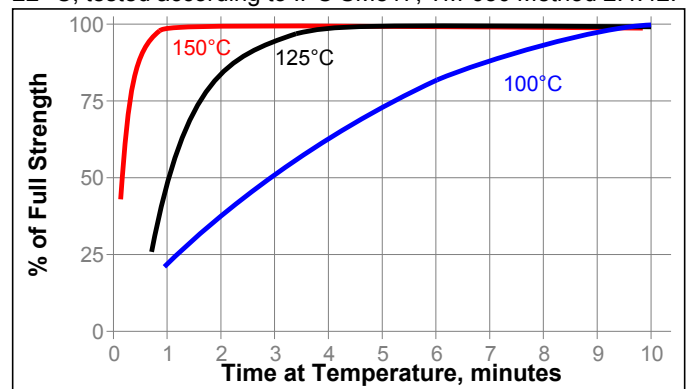


## TYPICAL CURING PERFORMANCE

Recommended conditions for curing are exposure to heat above 100 °C (typically 90-120 seconds @ 150 °C). Rate of cure and final strength will depend on the residence time at the cure temperature.

## Cure Speed vs. Time, Temperature

The following graph shows the rate of torque strength developed with time at different temperatures. These times are defined from the moment the adhesive reaches cure temperature. In practice, total oven time may be longer to allow for heat up period. Strength is measured on 1206 capacitors @ 22 °C, tested according to IPC SM817, TM-650 Method 2.4.42.



## TYPICAL PROPERTIES OF CURED MATERIAL

Cured for 30 minutes @ 150 °C

### Physical Properties:

Coefficient of Thermal Expansion, ISO 11359-2, K <sup>-1</sup>	145×10 <sup>-6</sup>
Coefficient of Thermal Conductivity, ISO 8302, W/(m·K)	0.4
Glass Transition Temperature, ASTM D 4065, °C	73
Specific Heat, kJ/(kg·K)	0.3
Density, BS 5350-B1 @ 25 °C, g/cm <sup>3</sup>	1.4

**Electrical Properties:**

Surface Resistivity, IEC 60093, $\Omega$	$2 \times 10^{15}$
Volume Resistivity, IEC 60093, $\Omega \cdot \text{cm}$	$2 \times 10^{15}$
Surface Insulation Resistance, $\Omega$ :	
SN 59651:	
Initial	$0.1 \times 10^9$
Aged for 4 days @ 40 °C, 93 % RH	$10 \times 10^9$
Aged for 21 days @ 40 °C, 93 % RH	$1 \times 10^9$
Electrolytic Corrosion, DIN 53489	AN-1.2
Dielectric Constant / Dissipation Factor, IEC 60250:	
1 kHz	3.7 / 0.009
10 kHz	3.3 / 0.03
1,000 kHz	3.2 / 0.03
10,000 kHz	3.1 / 0.03

**TYPICAL PERFORMANCE OF CURED MATERIAL**

**Adhesive Properties**

Cured for 10 minutes @ 110 °C

Push-off Strength:

C-1206 on bare FR4 board	N	$\geq 20$ <sup>LMS</sup>
	(lb)	( $\geq 4.5$ )

Cured for 5 minutes @ 125 °C

Pull-off Strength, Siemens norm SN59651:

C-1206 on bare FR4 board	N	40 to 80
	(lb)	(9 to 18)

Torque Strength, IPC SM817, TM-650 Method 2.4.42:

C-1206 on bare FR4 board	N·mm	30 to 70
	(in.oz)	(4 to 10)

Cured for 30 minutes @ 150 °C

Lap Shear Strength, ISO 4587:

Steel (grit blasted)	N/mm <sup>2</sup>	$\geq 10$ <sup>LMS</sup>
	(psi)	( $\geq 1,450$ )

Bond strength achieved in practice will vary considerably depending on the SMD component type, adhesive dot size and the type, grade and degree of cure of the solder mask/resist.

**TYPICAL ENVIRONMENTAL RESISTANCE**

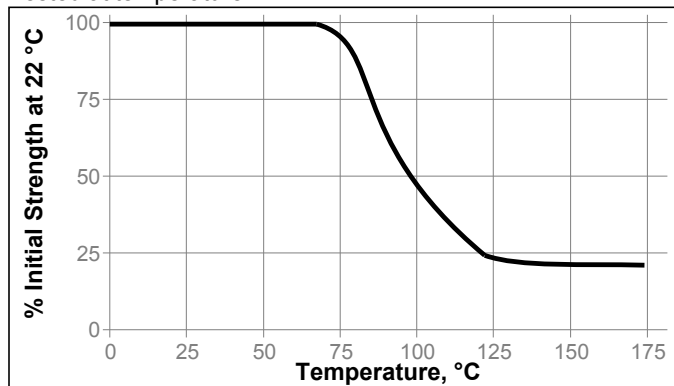
Cured for 30 minutes @ 150 °C

Lap Shear Strength, ISO 4587:

Mild steel (grit blasted)

**Hot Strength**

Tested at temperature



**Chemical/Solvent Resistance**

Aged under conditions indicated and tested @ 22 °C.

Environment	°C	% of initial strength		
		100 h	500 h	1000 h
Air	22	100	100	95
Air	150	85	70	70
Heat/humidity 98% RH	40	110	110	100

**Resistance to Hot Solder Dip**

Cured for 90 seconds @ 150 °C

Hot Solder Dip, IPC SM817, TM-650 Method 2.4.42.1, Pass/Fail:

R-1206 on bare FR4 board:

Supported 60 seconds above solder bath @ 260°C and dipped for 10 seconds	Pass
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**Resistance to Process Conditions**

Cured for 90 seconds @ 150 °C

Torque Strength, IPC SM817, TM-650 Method 2.4.42, % of initial strength retained:

C-1206 on bare FR4 board:

Aged 30 seconds preheat to 100°C and 3 seconds @ 260°C with flux and wave solder	100
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**Resistance to Lead Free Solder**

LOCTITE 3609 can be used in lead free wave solder with both water based and alcohol based fluxes

**Lead Free Solder Test Conditions**

Flux Types	Multicore MF200 (alcohol based) and Multicore MF300 (water based)
Wave Condition	100°C pre-heat with dual wave at 260°C
Components	C1608 bonded with twin dot 0.8mm SOD 80 bonded with single dot 1.1mm
Result	No component loss in the wave

**GENERAL INFORMATION**

For safe handling information on this product, consult the Safety Data Sheet (SDS).

**Directions for use:**

- LOCTITE 3609 is supplied de-aerated in a range of ready-to-use syringes which fit straight into a variety of air pressure/time dispensing systems commonly available.
- After storage in a refrigerator the adhesive must be allowed to equilibrate to room temperature before use, typically 2 to 4 hours.
- Avoid cross contamination with other adhesive residues by ensuring dispense nozzels, adapters etc. are thoroughly cleaned.
- Do not leave dirty nozzles on dispensing equipment while not in use or soaking in solvents for long periods of time.
- The quantity of adhesive dispensed will depend on the dispense pressure, time, nozzle size and temperature.
- These parameters will vary depending on the type of dispensing system used and should be optimised accordingly.
- Dispensing temperature should ideally be controlled at a value between 30 °C to 35 °C for optimum results, however higher dispense temperatures are possible.
- LOCTITE 3609 can also be dispensed using positive displacement pump systems.
- The product is not recommended for dispensing by pin transfer.
- Uncured adhesive can be cleaned from the board with isopropanol, MEK or ester blends such as LOCTITE® 7360™.

**Loctite Material Specification<sup>LMS</sup>**

LMS dated February 04, 2004. Test reports for each batch are available for the indicated properties. LMS test reports include selected QC test parameters considered appropriate to specifications for customer use. Additionally, comprehensive controls are in place to assure product quality and consistency. Special customer specification requirements may be coordinated through Henkel Quality.

**Storage**

Store product in the unopened container in a dry location. Storage information may be indicated on the product container labeling.

**Optimal Storage: 2 °C to 8 °C. Storage below 2 °C or greater than 8 °C can adversely affect product properties.** Material removed from containers may be contaminated during use. Do not return product to the original container. Henkel Corporation cannot assume responsibility for product which has been contaminated or stored under conditions other than those previously indicated. If additional information is required, please contact your local Technical Service Center or Customer Service Representative.

**Conversions**

(°C x 1.8) + 32 = °F  
 kV/mm x 25.4 = V/mil  
 mm / 25.4 = inches  
 µm / 25.4 = mil  
 N x 0.225 = lb  
 N/mm x 5.71 = lb/in  
 N/mm<sup>2</sup> x 145 = psi  
 MPa x 145 = psi  
 N·m x 8.851 = lb·in  
 N·m x 0.738 = lb·ft  
 N·mm x 0.142 = oz·in  
 mPa·s = cP

**Note:**

The information provided in this Technical Data Sheet (TDS) including the recommendations for use and application of the product are based on our knowledge and experience of the product as at the date of this TDS. The product can have a variety of different applications as well as differing application and working conditions in your environment that are beyond our control. Henkel is, therefore, not liable for the suitability of our product for the production processes and conditions in respect of which you use them, as well as the intended applications and results. We strongly recommend that you carry out your own prior trials to confirm such suitability of our product.

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## Reference 1.4