

LOCTITE ABLESTIK QMI3555

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PRODUCT DESCRIPTION

LOCTITE ABLESTIK QMI3555 provides the following product characteristics:

Technology	Silver Glass
Appearance	Silver
Cure	Firing
Product Benefits	• Wide processing window • Low temperature profile • Resinless vehicle system • Enhanced resistance to temperature cycle degradation • Low stress on die • Bonds to aluminum nitride substrates • Reworkable at less than 350°C
Application	Die attach

LOCTITE ABLESTIK QMI3555 is formulated using a Polymodal Metal Flake distribution technology which utilizes a combination of specifically selected silver flakes that, in conjunction with a unique glass, maximizes adhesion to gold while simultaneously enhancing rheological properties of the paste. It is a No-Dry paste that possesses rheological properties which optimize dispensability during die attach.

LOCTITE ABLESTIK QMI3555 incorporates a patented silver/vanadium glass at a metal to glass ratio of 6.5:1 by weight. The paste is completely resinless and fires into a film that provides high thermal and electrical conductivity as well as excellent initial adhesion. It is extremely resistant to degradation during temperature cycling from -65°C to + 150°C.

A thin bondline combined with its excellent thermal properties make QMI3555 attractive for use in high power devices. Because of its wide processing range, one common low temperature firing profile can be used for both solder and glass sealed packages with nearly all die sizes.

TYPICAL PROPERTIES OF UNCURED MATERIAL

Viscosity , mPa·s (cP)	35,000
Thixotropic Index (1/20 rpm)	10
Shelf Life on a jar roller (1-4 rpm) @ 8 to 28°C (from date of shipment), days	365

RECOMMENDED FIRING PROFILE

The firing process is performed in a continuous belt furnace that ramps from ambient to a peak temperature isothermal dwell followed by cool down.

Both the heating ramp and time at isothermal dwell are key for obtaining optimum performance of silver / glass. The paste requires an oxidizing atmosphere and clean, dry air (dew point of -4Q°C or < 13Oppm water is recommended).

QMI 3555 can be fired at temperatures between 300°C and 450°C on bare ceramic. On gold plated parts, the minimum peak should be 325°C. The minimum dwell time should at least be 14 minutes above 300°C when the peak is <325°C. Higher peak temperatures require less dwell time. The material is completely resinless and contains only low boiling solvents that are involved during the early stages of the firing process

The following table present the maximum ramp rates and ranges for several die sizes. The ramp rates in the table apply to any time interval between the temperature ranges. They should not be taken just as the average ramp rate. For example, the <26°C/min. ramp rates between 120 - 200°C for <600 mils sq. means at any point between 120 -200°(the ramp must not exceed 26°C/min.

Maximum Ramp Rates (°C/minute):

< 5 x 5 mm die size:	
@ 40 to 120°C	<34
@ 120 to 200°C	<44
@ 200 to 280°C	<65
@ >280°C	<65
< 7.62 x 7.62 mm die size:	
@ 40 to 120°C	<28
@ 120 to 200°C	<38
@ 200 to 280°C	<60
@ >280°C	<65
< 10 x 10 mm die size:	
@ 40 to 120°C	<24
@ 120 to 200°C	<32
@ 200 to 280°C	<55
@ >280°C	<60
< 12.7 x 12.7 mm die size:	
@ 40 to 120°C	<20
@ 120 to 200°C	<28
@ 200 to 280°C	<50
@ >280°C	<50
< 15 x 15 mm die size:	
@ 40 to 120°C	<14
@ 120 to 200°C	<26
@ 200 to 280°C	<40
@ >280°C	<40
< 17.8 x 17.8 mm die size:	
@ 40 to 120°C	<8
@ 120 to 200°C	<22
@ 200 to 280°C	<34
@ >280°C	<40
< 20 x 20 mm die size:	
@ 40 to 120°C	<6
@ 120 to 200°C	<18
@ 200 to 280°C	<24
@ >280°C	<40

Although the speed of cool down is relatively unimportant for most applications, it can become critical for larger than .500" sq. die on heat sink package applications; a modified profile may be required. Consult your Henkel Electronics technical service engineer for more information.

A low-mass thermocouple wire (<15 mil thick) should be used in order to detect any undesired rapid rise in temperature. Preferably, the actual package should be used as the thermal mass with the thermal junction pressing on the head space to ensure the package actually sees the minimum 300°C dwell. Also, the thermocouple package should not be sealed as the cap or lid will mask off any temperature spikes in the critical temperature range (ambient to 200°C).

TYPICAL PROPERTIES OF CURED MATERIAL

Physical Properties

Extractable Ionic Content, in fired film by Ion Chromatography:

Chloride (Cl ⁻)	<10
Sodium (Na ⁺)	<20
Potassium (K ⁺)	<20
Fluoride (F ⁻)	<10
Thermal Conductivity, W/(m-K)	>80
RGA (H ₂ O), ppm	<2,000

Electrical Properties

Volume Resistivity, ohm-cm	<1.50×10 ⁻⁰⁵
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GENERAL INFORMATION

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

Not for product specifications

The technical data contained herein are intended as reference only. Please contact your local quality department for assistance and recommendations on specifications for this product.

DIRECTIONS FOR USE

This material is typically dispensed using automated or semi-automated equipment that deposits an array of dots from a multineedle tool, a star pattern from a stamping type tool or an appropriate pattern drawn by a single needle in a motion that resembles writing with a pen. For single or multineedle, the minimum inside diameter recommended is .023 inches (20 gauge).

For a needle leading to a "star pattern" head, .033 inches (18 gauge) minimum is recommended. The dispensed paste should provide a thick deposit in the central region of the pattern so that during die placement, material flows outward past the periphery of the chip to form a continuous fillet along the side of the die.

The shape and uniformity of the dispensed fillet are important since this zone acts as the evaporative site for organic removal during organic burn out (OBO). The fillet should not touch the sides of the cavity walls as this can cause low adhesion.

The recommended minimum bondlines presented in the accompanying table should be employed to give optimum performance after firing and temperature cycling. If the die is rectangular, the largest side should be used to determine the

minimum bondline required.

Minimum Recommended Bondline Thickness:

Die Size (mm)	Minimum Wet Bondline(mm)	Minimum Fired Bondline(mm)
5 x 5	0.0635	0.0533
7.62 x 7.62	0.0762	0.0584
10 x 10	0.0889	0.0686
12.7 x 12.7	0.102	0.0787
15 x 15	0.114	0.0889
17.8 x 17.8	0.127	0.0991
20 x 20	0.14	0.109

Staging time (time after the die is placed and before the parts are fired) should be less than 8 hours.

For best results, the die should be placed as planar as possible. All four corners of the die should be measured for bondline thickness and planarity control. Because this material is a resin-less paste, the die should be placed using semi-automated or automated equipment, providing one downward Z axis motion to obtain the desired wet bondline.

Machine controlled scrubbing can give acceptable results, but manual scrubbing (X or Y motion) or adjusting the die after placement is unnecessary and is not recommended.

CLEANING

Recommended cleaning solvents include Acetone and Isopropyl alcohol.

Storage

Each production batch of silver / glass is continuously rolled until shipment. During transit, the resinless silver/glass paste separates and the solid particles cart agglomerate.

Upon receipt, the paste must be immediately placed on a jar roller and continuously rolled for a minimum of 16 hours before opening the jar.

Prior to use, the paste should be spatulated with a gentle stirring (folding motion reaching the bottom of the jar) to confirm homogeneity. If the paste is homogeneous, (no solvent 01;1. top or thick solid felt in the bottom of the jar), it can be poured into a syringe and used immediately. If the paste is not homogeneous, vigorous hand stirring should be used followed by a minimum of six hours of jar rolling.

Because this material contains low boiling point solvents which can evaporate from open containers, jars should be left open and exposed to the atmosphere for only the minimum time required to spatulate and fill the syringes. Excessive solvent loss can result in an increase in the solids composition which in turn can result in the formation of a fired film that possesses sub-optimum properties.

Refrigeration as a means of storage and shelf life extension is unnecessary and not recommended since very low temperatures can cause solvents to separate.

Conversions

$(^{\circ}\text{C} \times 1.8) + 32 = ^{\circ}\text{F}$
 $\text{kV/mm} \times 25.4 = \text{V/mil}$
 $\text{mm} / 25.4 = \text{inches}$
 $\text{N} \times 0.225 = \text{lb}$
 $\text{N/mm} \times 5.71 = \text{lb/in}$
 $\text{psi} \times 145 = \text{N/mm}^2$
 $\text{MPa} = \text{N/mm}^2$
 $\text{N}\cdot\text{m} \times 8.851 = \text{lb}\cdot\text{in}$
 $\text{N}\cdot\text{m} \times 0.738 = \text{lb}\cdot\text{ft}$
 $\text{N}\cdot\text{mm} \times 0.142 = \text{oz}\cdot\text{in}$
 $\text{mPa}\cdot\text{s} = \text{cP}$

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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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