

1 DESCRIPTION

The DM6030Hk/F954 is a silver-loaded epoxy adhesive with high thermal and electrical conductivity. A unique, patented organic system enables high filler loading of Ag powder/flake combinations. This technology provides a highly conductive polymer matrix when cured, which yields excellent thermal transfer properties. Unlike typical epoxy systems, DM6030Hk/F954 can be shipped and stored at room temperature. DM6030Hk/F954 is lead (Pb) free and RoHS compliant.

2 APPLICATIONS

- Power semiconductors
- Laser diodes
- Power LEDs
- RF power devices
- GaAs devices
- MMICs
- Power hybrids
- Solder replacement

3 KEY FEATURES

- **Unmatched** thermal conductivity - **60 W/m²K**
- **Electrical resistivity as low as 8 μΩ-cm**
- **Replaces solder – eliminates Pb metal and plating requirements**
- **Excellent rheology for dispensing and screen printing**
- Room temperature shipping & storage in jars – **no dry ice necessary**

4 TYPICAL PROPERTIES

Parameter	F954	Unit	Note / Condition	
PASTE PROPERTIES (before curing)				
Viscosity	31,000	cP	25 °C, 10 rpm, Brookfield RVT viscometer, TC spindle	
Thixotropic index	2.4	--	25 °C, 10 rpm / 50 rpm	
Shelf life	12	month	Syringes, - 40 °C	
	6	month	Jars, 25 °C	
Density	4.5	g/cc	Calculated	
CURED PROPERTIES (after 10 °C/minute ramp and 200 °C, 30 minute cure)				
Bulk thermal conductivity	60	W/m ² K	Laser Flash, ASTM E1461-07	
Volume electrical resistivity	8	μΩ-cm		
Rth	0.025	Kcm ² /W	300-mil Si to 400-mil Si (Laser Flash, ASTM E1461-07)	
Shear adhesion	3,200	psi	250-mil Si die to Al ₂ O ₃	
	22	MPa	6.35-mm Si die to Al ₂ O ₃	
Coefficient of Thermal Expansion (CTE)	26	ppm/°C	DMA	
Flexural modulus	600,000	psi	ASTM D790	
	4,135	MPa		
Glass Transition Temperature (Tg)	92	°C	DMA	
Ionic impurities	Cl ⁻	70	ppm	MIL-STD-883H, METHOD 5011.5
	Na ⁺	5	ppm	
	K ⁺	1	ppm	
Silver content	93	%	By weight	
Density	6.7	g/cc	By weight	
SYRINGE PROPERTIES				
Syringe potlife	24	hours		
Syringe thaw time	30-60	minutes		

5 STORAGE AND HANDLING

DM6030Hk/F954 is available packaged in frozen syringes and shipped at -40°C or below. For more information please refer to the document *SYRINGE-PACKAGED ADHESIVE PASTES*.

DM6030Hk/F954 is also available packaged in jars without dry ice. Storing jars on a jar roller, such as Diemat's model 8010, at 1 to 5 rpm is recommended. Failure to roll the jars adequately could result in non-homogeneity and inconsistent dispensing. If not jar-rolled, gentle stirring is recommended before use. If the paste is homogeneous (no solvent on top or thick solid felt in bottom of the jar), it can be poured into a syringe and used immediately.

Curing Profile

For smaller die (<0.250 inches), no prebake is necessary. Larger die require this predrying step before the cure cycle. Simply place attached materials into a ventilated, forced-air convection oven at room temperature, and set for your desired peak temperature. If using a belt furnace or other type of oven, ramp rates should be controlled for optimal results. The following options for ramp rate, time and temperature guidelines are recommended for components smaller than 0.400 in. (10 mm) square attach area. Recommended profiles are die size related and are shown on the following figures and tables:

Figure 1:
Curing Profile for die size up to 250 mils per side

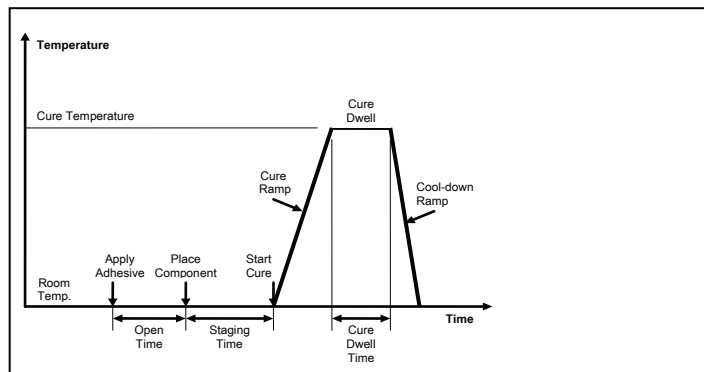


Table 1:
Curing Parameters for die size up to 250 mils per side

Ramp Rate	Cure Temp.	Dwell
5-10 °C / minute	225 °C	15 minutes
	200 °C	30 minutes
	175 °C	45 minutes
	150 °C	4 hours

Note: Use only one cure temperature/time combination

Figure 2:
Curing Profile with pre-bake for die size from 250 to 400 mils per side

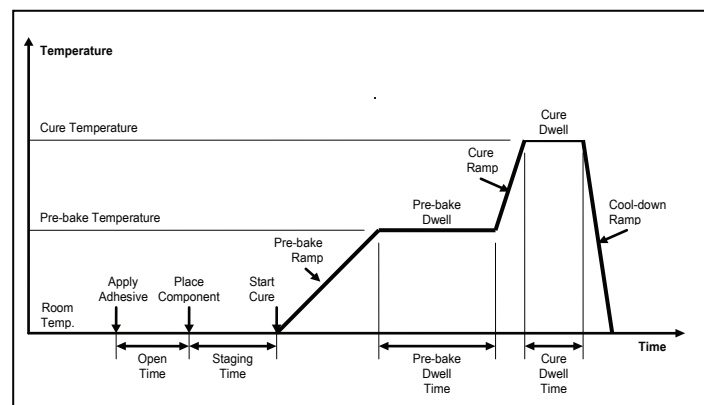


Table 2:
Curing Parameters with pre-bake for die size from 250 to 400 mils per side

Pre-bake Ramp Rate	Pre-bake Temp.	Pre-bake Dwell	Cure Ramp Rate	Cure Temp.	Cure Dwell
5-10 °C / minute	125 °C	30 min.	5-10 °C / minute	225 °C	15 min.
	110 °C	60 min.		200 °C	30 min.
	100 °C	75 min.		175 °C	45 min.
				150 °C	4 hr.

Note: Use only one cure temperature/time combination

Application

The DM6030Hk/F954 rheology has been designed for use in automated high-speed dispensing equipment without tailing or dripping. DM6030Hk/F954 should be uniform and essentially free of air bubbles prior to use. A 22 gage needle (16 mil or 0.41 mm ID) is recommended to dispense DM6030Hk/F954. Needles smaller than 25 gage (10 mil or 0.25 mm ID) may not produce uniform dispense weights. The material should be dispensed in an "X" pattern with sufficient quantity to produce fillets halfway up the side of the attached component. Deposition weights will vary according to component size. Typical dispense quantities are 75 µL per square inch of die area (12 µL per square cm of die area). Components should be pressed all the way into the DM6030Hk/F954 material wet deposit such that a **1.3 – 1.9 mil wet bondline** exists with fillet formation around the perimeter. Final cured bondline thickness should be approximately **0.8 to 1.2 mil**. The open time can be important in the attachment of small components. Open times for very small components (less than 2 x 2 mm or 80 x 80 mils) should not exceed 30 minutes.

7 ORDERING INFORMATION

Ordering Number	Key Product Characteristics
DM6030Hk/F954	Very high thermal conductivity; Low electrical resistivity
<ul style="list-style-type: none"> Specify container type and size when ordering. Available in syringes and jars. Standard syringe sizes are 3, 5, and 10 cc, and may hold volumes in increments of 0.5 cc from 0.5 cc to 100% full. Standard jar sizes are 50, 100, and 200 grams. 	

8 MORE INFORMATION

For more information on DM6030Hk/F954 and other Diemat products, contact:

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