Hysol®

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Technical Data Sheet

FP4401

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PRODUCT DESCRIPTION

FP4401 is a low flow, high purity liquid epoxy encapsulant. This material has a high glass transition temperature and low coefficient of thermal expansion which gives improved thermal cycling characteristics on ceramic. It is also suitable for use on other substrates. Performance in 85°/85% R.H. with bias and resistance to chlorinated cleaning solvents are excellent. Compared to silicone encapsulants, it provides equivalent electrical performance and enhanced mechanical protection. FP4401 is supplied as a frozen product which requires storage at –40°C to maximize shelf life.

TYPICAL APPLICATIONS

Semiconductor encapsulation.

PROPERTIES OF UNCURED MATERIAL

Color	Black
Filler Content, % (ITM3A)	75
Specific Gravity @25°C, (77°F)	1.78
Shelf Life @-40°C (-40°F), months	9
	Typical Value
Viscosity @ 25°C, (77°F) (ITM2A) Brookfield RVF	
Spindle 7, Speed 2, P	3609
Spindle 7, Speed 20, P	1118

PHYSICAL PROPERTIES, CURED MATERIAL

Color	Black
Coefficient of Thermal Expansion, in/in/°C (ASTM D3386)	
(40°-120°C)	$<22 \times 10^{-6}$
Specific Gravity (ASTM D792)	1.80
Linear Shrinkage, %	
3 hrs @ 170°C	0.568
1 hr @ 120°C & 4 hrs @ 160°C	0.302
Glass Transition, (Tg), °C, (ITM65B))	160
Flammability (94UL)	94HB
Outgassing, % (NASA SP4-0022A)	
TWL	0.15
CVM	0.00
Extractable Ionic Content (ITM107B)	
Chloride (Cl-), ppm	20
Potassium (K+), ppm	20
Sodium	20

Cured Electrical Properties

	25°C	
	K	**D**
1kHz	3.20	0.007
10kHz	3.15	0.007
100kHz	3.10	0.007
Volume Resistivity		1.0×10^{14}
Surface Resistivity		1.3×10^{14}

K = Dielectric constant by ASTM D150
D = Dissipation Factor by ASTM D150
Vol. Res.= Volume Resistivity in ohm-cm by ASTM D257
Surf.Res.= Surface Resistivity in ohm by ASTM D257

Handling

Pot Life @ 25°C, 77°F, hours (200 gram mass), (ITM10T), time to double in viscosity	24
Gel Time @ 121°C, (250°F), minutes, (ITM10N)	17

Frozen packages must be thawed before use. Warm at room temperature until no longer cool to the touch (normally 20-60 minutes). Do not thaw in an oven or water bath. For best results use an 18 gauge needle or larger. FP4401 should be dispensed onto a substrate warmed to approximately 90°C. This will help minimize air entrapment under bonding wire.

GENERAL INFORMATION

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

CURE SCHEDULE

Recommended Cure	3 hours @ 170°C or 6 hours @ 150°C

Designed for robust packages which are not highly sensitive to stress

Alternate Cure (Low Stress)	2 hour @ 125°C plus 4 hours @ 150°C

(Designed for packages which are effected by high levels of stress.) This cure will give optimum properties.

Curing below 140°C is not recommended. User should gel devices immediately after dispensing to prevent moisture degradation of ultimate cure properties. Monitor ovens to insure adequate temperature control. Use suggested cure schedules as general guidelines; other cure schedules may yield satisfactory results.

Note

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