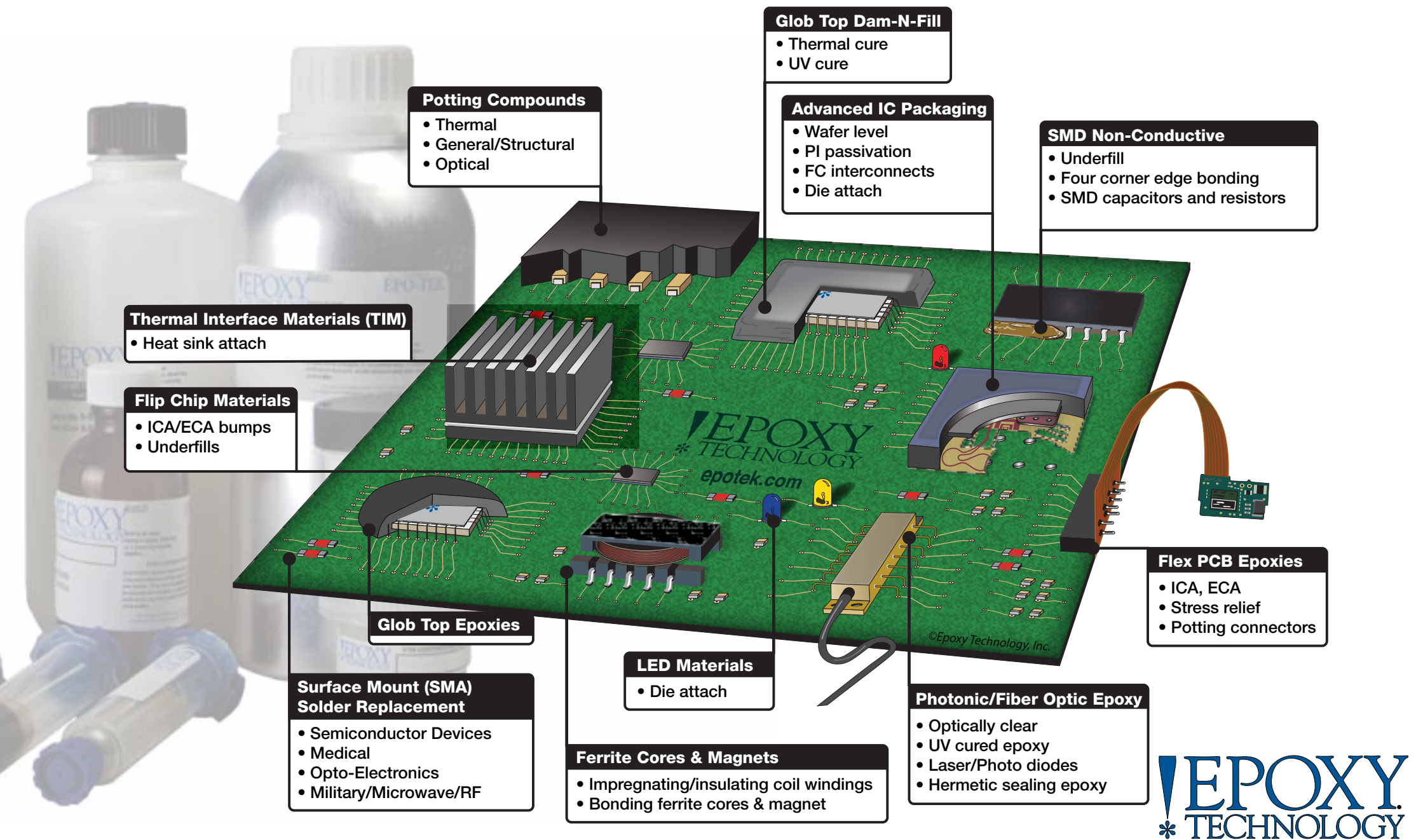
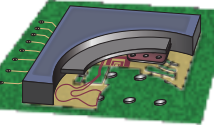

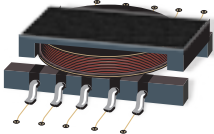
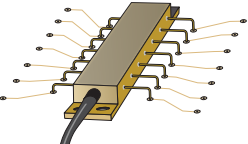
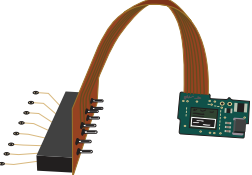
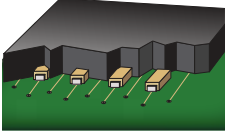
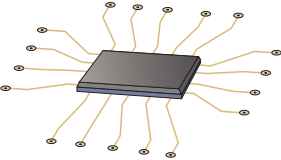
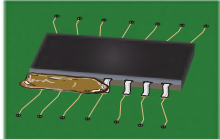
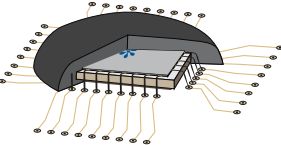
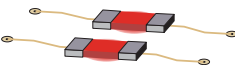
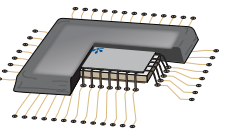
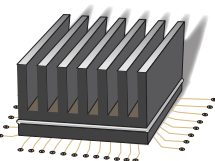


# EPO-TEK® Adhesives Applications



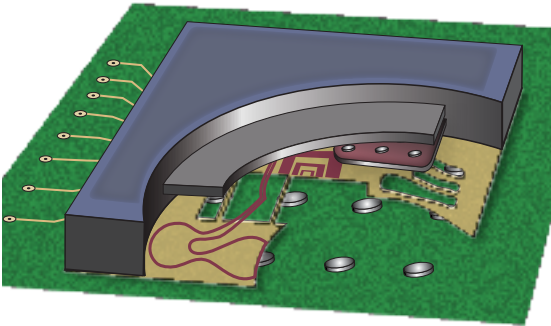
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**Advanced IC Packaging** materials provide many benefits including: **low stress die attach adhesives**, **wafer passivation materials** and **encapsulation products**, enabling wafer level and 3D chip stacking. The semiconductor industry accomplishes increased functionality via MEMs devices, flipchip processes and wafer level assembly.

**EPO-TEK®** adhesives are used in several areas including:

- Wafer level assemblies for MEMs, CCD/CMOS image sensors and standard IC packaging.
- Wafer level passivation coatings for high temp SiN and SiC processes, dielectric to isolate I/O connections, thermal dissipation from the top surface of the die, and as a wafer back side coating for 3D stacking.
- Flip Chip connections to electrically bridge the IC to the PCB/substrate in package, or directly onto the PCB via FCOB.
- Advanced die attach materials are used for high power, low stress, high I/O pin count and moisture resistant packages.



WAFER LEVEL

ELECTRICALLY

EPO-TEK	NO. of COMPONENTS	COLOR Before/ After CURE (thin film)	CURE TEMPERATURE (minimal)	VISCOSITY @ 23°C	GLASS TRANSITION TEMPERATURE (Tg)	DIE SHEAR STRENGTH @ RT (80mil x 80mil)	INDEX OF REFRACTION (Nd)	SPECTRAL TRANSMISSION	TGA DEGRADATION TEMPERATURE	CTE Below Tg/ Above Tg (in/in/°C)	POT LIFE (@ room temp.)	SHELF LIFE (@ room temp. unless noted)	
WAFER LEVEL ASSEMBLY	353ND	Two	Amber/Dark Red	150°C – 1 min 80°C – 30 min	3,000-5,000 cPs @ 50 rpm	≥90°C	≥15 kg/5,100 psi	1.5694	>50% @ 550 nm >98% @ 800-1000 nm >95% @ 1100-1600 nm	412°C	54 x 10 <sup>-6</sup> 206 x 10 <sup>-6</sup>	≤3 hours	1 year
	377	Two	Amber/Dark Amber	150°C – 1 hour	150-300 cPs @ 100 rpm	≥95°C	≥10 kg/3,400 psi	1.5195	>99% @ 600 nm >95% @ 1000-1500 nm	375°C	57 x 10 <sup>-6</sup> 210 x 10 <sup>-6</sup>	24 hours	1 year
WAFER PASSIVATION COATING	TV1002	One	Black/Black	150°C – 1 hour + 275°C – 1 hour	350,000-550,000 cPs @ 0.5 rpm	≥200°C	3.8 kg/1,292 psi	N/A	N/A	519°C	46 x 10 <sup>-6</sup> 139 x 10 <sup>-6</sup>	28 day dry time	1 year
	TV1003	One	Ivory/Ivory	150°C – 1 hour + 275°C – 1 hour	325,000-525,000 cPs @ 0.5 rpm	≥200°C	1.4 kg/476 psi	N/A	N/A	541°C	28 x 10 <sup>-6</sup> 36 x 10 <sup>-6</sup>	28 day dry time	1 year
	TV1003-LV	One	Ivory/Ivory	150°C – 1 hour + 275°C – 1 hour	136,000 cPs @ 0.5 rpm	241°C	<1 kg/340 psi	N/A	N/A	541°C	28 x 10 <sup>-6</sup> 36 x 10 <sup>-6</sup>	28 day dry time	1 year
FLIP CHIP	E2101	Two	Silver/Silver	175°C – 15 min 150°C – 1 hour	15,000-18,000 cPs @ 20 rpm	≥90°C	≥5 kg/1,700 psi	N/A	N/A	401°C	48 x 10 <sup>-6</sup> 192 x 10 <sup>-6</sup>	5 days	1 year
	EJ2189	Two	Silver/Silver	150°C – 15 min 23°C – 3 days	55,000-90,000 cPs @ 1 rpm	≥30°C	≥9 kg/3,060 psi	N/A	N/A	316°C	53 x 10 <sup>-6</sup> 107 x 10 <sup>-6</sup>	4 hours	1 year
ADVANCED DIE ATTACH	EK1000	One	Silver/Silver	200°C – 30 min 150°C – 1 hour + 200°C – 1 hour (post-cure)	1,800-3,600 cPs @ 100 rpm	>80°C	>10 kg/3,400 psi	N/A	N/A	357°C	38 x 10 <sup>-6</sup> 94 x 10 <sup>-6</sup>	2 weeks	1 year @ -40°C
	EK2000	Two	Silver/Silver	200°C – 30 min 150°C – 1 hour + 200°C – 1 hour (post-cure)	1,686 cPs @ 100 rpm	104°C	>10 kg/3,400 psi	N/A	N/A	357°C	38 x 10 <sup>-6</sup> 94 x 10 <sup>-6</sup>	2 weeks	1 year, refrigerated upon arrival

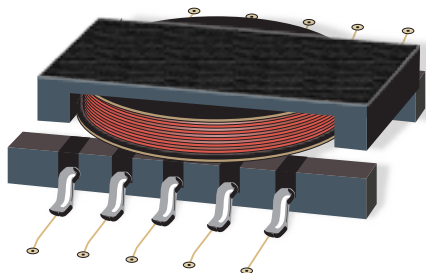
N/A - not applicable, as these are filled systems



For downloading Data Sheets and MSDS, visit the Technical Info section of our website - [www.epotek.com](http://www.epotek.com), or email our Technical Services Group at: [techserv@epotek.com](mailto:techserv@epotek.com)

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# Ferrite Cores & Magnet Applications

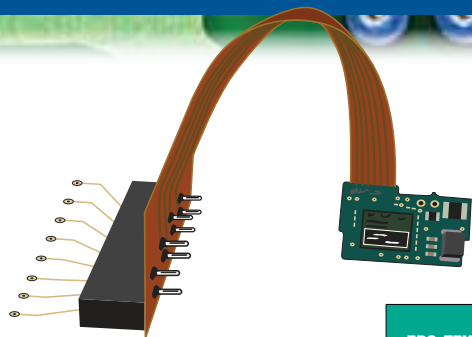


**Ferrite Cores & Magnet Applications** are SMD style power devices that utilize **EPO-TEK®** adhesives in two areas: one is a **dielectric epoxy** for bonding and insulating the copper (Cu) coil winding and the other for creating a **strong adhesive bond** in ferrite (magnets) cores. Many times, the same structural grade type of material can be used in both of these areas, however lower modulus is required to avoid any ferrite cracking. Other desired properties include: ease of automation, high temperature resistance, high Tg, fast cure and easily dispensed.

SMD power devices can consist of: power IC semiconductors, transformer casings, inductor coils and motor products for the power electronics industry, excluding wind and solar markets.

	EPO-TEK	NO. of COMPONENTS	COLOR Before/After CURE (thin film)	CURE TEMPERATURE (minimal)	VISCOSITY @ 23°C	GLASS TRANSITION TEMPERATURE (Tg)	DIE SHEAR STRENGTH @ RT (80mil x 80mil)	INDEX OF REFRACTION (Nd)	SPECTRAL TRANSMISSION	TGA DEGRADATION TEMPERATURE	CTE Below Tg/ Above Tg (in/in/°C)	POT LIFE (@ room temp.)	SHELF LIFE (@ room temp. unless noted)
FERRITE CORES	353ND	Two	Amber/Dark Red	150°C – 1 min 80°C – 30 min	3,000-5,000 cPs @ 50 rpm	≥90°C	≥15 kg/5,100 psi	1.5694	>50% @ 550 nm >98% @ 800-1000 nm >95% @ 1100-1600 nm	412°C	54 x 10 <sup>-6</sup> 206 x 10 <sup>-6</sup>	≤3 hours	1 year
	353ND-T	Two	Tan/Dark Red	150°C – 1 min 80°C – 30 min	9,000-15,000 cPs @ 20 rpm	≥90°C	≥15 kg/5,100 psi	N/A	N/A	409°C	43 x 10 <sup>-6</sup> 231 x 10 <sup>-6</sup>	3 hours	1 year
	930-4	Two	Ivory/Amber	150°C – 10 min 80°C – 6 hours	12,000-17,000 cPs @ 20 rpm	≥90°C	≥15 kg/5,100 psi	N/A	N/A	425°C	27 x 10 <sup>-6</sup> 136 x 10 <sup>-6</sup>	1 day	1 year
	T7109	Two	White/White	150°C – 10 min 80°C – 8 hours	14,000-20,000 cPs @ 20 rpm	≥45°C	≥15 kg/5,100 psi	N/A	N/A	377°C	46 x 10 <sup>-6</sup> 239 x 10 <sup>-6</sup>	4 hours	1 year
CU COIL WINDINGS	353ND	Two	Amber/Dark Red	150°C – 1 min 80°C – 30 min	3,000-5,000 cPs @ 50 rpm	≥90°C	≥15 kg/5,100 psi	1.5694	>50% @ 550 nm >98% @ 800-1000 nm >95% @ 1100-1600 nm	412°C	54 x 10 <sup>-6</sup> 206 x 10 <sup>-6</sup>	≤3 hours	1 year
	360	Two	Amber/Dark Amber	150°C – 1 min 100°C – 10 min	350-550 cPs @ 100 rpm	≥90°C	≥10 kg/3,400 psi	1.5345	>97% @ 700-1600 nm >88% @ 600 nm >51% @ 500 nm	375°C	39 x 10 <sup>-6</sup> 175 x 10 <sup>-6</sup>	6 hours	1 year
	377	Two	Amber/Dark Amber	150°C – 1 hour	150-300 cPs @ 100 rpm	≥95°C	≥10 kg/3,400 psi	1.5195	>99% @ 600 nm >95% @ 1000-1500 nm	375°C	57 x 10 <sup>-6</sup> 210 x 10 <sup>-6</sup>	24 hours	1 year
PLASTIC IC PACKAGING	OD1001	One	Cream/Amber Cream	125°C – 1 hour	1,000-1,500 cPs @ 100 rpm	>35°C	≥15 kg/5,100 psi	1.5413	<50% @ 300-1200 nm	355°C	66 x 10 <sup>-6</sup> 211 x 10 <sup>-6</sup>	28 days	1 year @ -40°C
	TD1001	One	White/Ivory	125°C – 1 hour	10,000-22,000 cPs @ 5 rpm	≥40°C	≥15 kg/5,100 psi	N/A	N/A	436°C	57 x 10 <sup>-6</sup> 213 x 10 <sup>-6</sup>	28 days	1 year @ -40°C
	TV2001	Two	Yellow/Brown	160°C – 5 min 80°C – 90 min	10,000-20,000 cPs @ 20 rpm	≥35°C	≥15 kg/5,100 psi	N/A	N/A	466°C	67 x 10 <sup>-6</sup> 189 x 10 <sup>-6</sup>	2 days	1 year
TRANSFORMER POTTING	T905-BN3	Two	Grey/Grey	80°C – 2 hours	2,000-7,000 cPs @ 50 rpm	≥40°C	≥10 kg/3,400 psi	N/A	N/A	347°C	37 x 10 <sup>-6</sup> 151 x 10 <sup>-6</sup>	3 hours	1 year
	T905-BN4	Two	White/White	80°C – 1 hour 23°C – 1 day	12,000-18,000 cPs @ 20 rpm	≥50°C	>5 kg/1,700 psi	N/A	N/A	350°C	24 x 10 <sup>-6</sup> 120 x 10 <sup>-6</sup>	1 hour	1 year
GENERAL POTTING	301-2	Two	Clear/Colorless	80°C – 3 hours 23°C – 2 days	225-425 cPs @ 100 rpm	>80°C	>15 kg/5,100 psi	1.5318	>99% @ 400-1200 nm >98% @ 1200-1600 nm	360°C	61 x 10 <sup>-6</sup> 180 x 10 <sup>-6</sup>	8 hours	1 year
	730 UNF	Two	Yellow/Yellow	100°C – 30 min 23°C – 24 hours	8,000-12,000 cPs @ 20 rpm	≥50°C	≥10 kg/3,400 psi	1.5275	>95% @ 480-1640 nm	343°C	61 x 10 <sup>-6</sup> 192 x 10 <sup>-6</sup>	1 hour	1 year
	T7110	Two	Grey/Grey	150°C – 15 min 23°C – 3 days	1,400-2,200 cPs @ 100 rpm	≥40°C	≥10 kg/3,400 psi	N/A	N/A	314°C	31 x 10 <sup>-6</sup> 142 x 10 <sup>-6</sup>	3.5 hours	1 year
	T905-1	Two	Grey/Grey	80°C – 1 hour 23°C – 1 day	6,000-13,000 cPs @ 20 rpm	≥40°C	≥15 kg/5,100 psi	N/A	N/A	346°C	25 x 10 <sup>-6</sup> 130 x 10 <sup>-6</sup>	30 min	1 year

N/A - not applicable, as these are filled systems



**Flex PCB Epoxy** (F-PCBs) use epoxy adhesive for electrical connections, structural bonding, stress relief, potting and protection as well as IC glob tops. **EPO-TEK®** adhesives are used for many reasons, including: curing at temperatures below a thermoplastic substrate melt temperature ( $T_m$ ); as an alternative to solder where there are temperature or stress limitations, and for applications that require a flexible epoxy; found in smart cards, RFIDs, LCD connections, OLEDs, solar cells, keyboard membranes, medical devices and ink jetting.

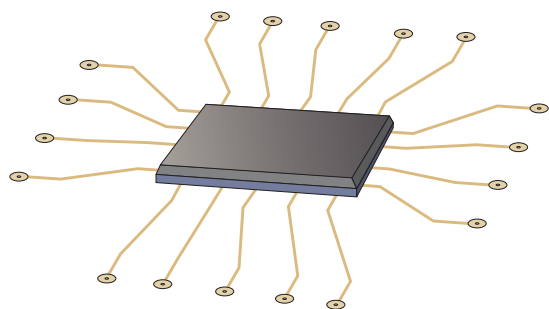
	EPO-TEK	NO. of COMPONENTS	COLOR Before/ After CURE (thin film)	CURE TEMPERATURE (minimal)	VISCOSITY @ 23°C	GLASS TRANSITION TEMPERATURE (Tg)	DIE SHEAR STRENGTH @ RT (80mil x 80mil)	INDEX OF REFRACTION (Nd)	SPECTRAL TRANSMISSION	TGA DEGRADATION TEMPERATURE	CTE Below Tg/ Above Tg (in/in/°C)	POT LIFE (@ room temp.)	SHELF LIFE (@ room temp. unless noted)	
LCD/OLED/ DISPLAYS	ITO	EJ2189	Two	Silver/Silver	150°C – 15 min 23°C – 3 days	55,000-90,000 cPs @ 1 rpm	≥30°C	≥9 kg/3,060 psi	N/A	N/A	316°C	53 x 10 <sup>-6</sup> 107 x 10 <sup>-6</sup>	4 hours	1 year
		H20E	Two	Silver/Silver	175°C – 45 seconds 80°C – 3 hours	2,200-3,200 cPs @ 100 rpm	≥80°C	>5 kg/1,700 psi	N/A	N/A	425°C	31 x 10 <sup>-6</sup> 158 x 10 <sup>-6</sup>	2.5 days	1 year
GLOB TOP LCD TO KAPTON	0G116-31	One	White/White	100mW/cm <sup>2</sup> for >2 min @ 320-500 nm	20,000-30,000 cPs @ 10 rpm	≥115°C	≥10 kg/3,400 psi	1.5662	>96% @ 660-1640 nm >92% @ 500 nm	409°C	41 x 10 <sup>-6</sup> 170 x 10 <sup>-6</sup>	N/A	1 year	
	T7109-19	Two	Grey/Grey	80°C – 2 hours 23°C – 2 days	40,000-70,000 cPs @ 5 rpm	40°C	5 kg/1,700 psi	N/A	N/A	338°C	59 x 10 <sup>-6</sup> 216 x 10 <sup>-6</sup>	2 hours	1 year	
RFID	DIE ATTACH	EJ2189	Two	Silver/Silver	150°C – 15 min 23°C – 3 days	55,000-90,000 cPs @ 1 rpm	≥30°C	≥9 kg/3,060 psi	N/A	316°C	53 x 10 <sup>-6</sup> 107 x 10 <sup>-6</sup>	4 hours	1 year	
SOLAR CELLS	ELECTRICAL CONNECTIONS	EV2002	Two	Silver/Silver	120°C – 15 min	24,000-46,000 cPs @ 5 rpm	≥50°C	≥5 kg/1,700 psi	N/A	N/A	402°C	37 x 10 <sup>-6</sup> 219 x 10 <sup>-6</sup>	4 hours	1 year
		H20E	Two	Silver/Silver	175°C – 45 seconds 80°C – 3 hours	2,200-3,200 cPs @ 100 rpm	≥80°C	>5 kg/1,700 psi	N/A	N/A	425°C	31 x 10 <sup>-6</sup> 158 x 10 <sup>-6</sup>	2.5 days	1 year
IMPLANTABLE MEDICAL DEVICES	ELECTRICAL CONNECTIONS AU/KAPTON	H20E	Two	Silver/Silver	175°C – 45 seconds 80°C – 3 hours	2,200-3,200 cPs @ 100 rpm	≥80°C	>5 kg/1,700 psi	N/A	N/A	425°C	31 x 10 <sup>-6</sup> 158 x 10 <sup>-6</sup>	2.5 days	1 year
		301	Two	Clear/Colorless	65°C – 2 hours 23°C – 24 hours	100-200 cPs @ 100 rpm	≥65°C	>10 kg/3,400 psi	1.5190	>99% @ 380-980 nm >97% @ 980-1640 nm	430°C	39 x 10 <sup>-6</sup> 98 x 10 <sup>-6</sup>	1-2 hours	1 year
		302-3M	Two	Clear/Colorless	65°C – 3 hours 23°C – 24 hours	800-1,600 cPs @ 100 rpm	≥55°C	≥10 kg/3,400 psi	1.5446	>95% @ 460-1620 nm	351°C	56 x 10 <sup>-6</sup> 193 x 10 <sup>-6</sup>	1 hour	1 year
INK JETTING INDUSTRY	ELECTRICAL BRIDGE FPCB TO AU/PZT PADS	353RD	Two	Amber/Dark Red	150°C – 1 min 80°C – 30 min	3,000-5,000 cPs @ 50 rpm	≥90°C	≥15 kg/5,100 psi	1.5694	>50% @ 550 nm >98% @ 800-1000 nm >95% @ 1100-1600 nm	412°C	54 x 10 <sup>-6</sup> 206 x 10 <sup>-6</sup>	≤3 hours	1 year
		E2101	Two	Silver/Silver	175°C – 15 min 150°C – 1 hour	15,000-18,000 cPs @ 20 rpm	≥90°C	≥5 kg/1,700 psi	N/A	N/A	401°C	48 x 10 <sup>-6</sup> 192 x 10 <sup>-6</sup>	5 days	1 year
	STRUCTURAL KAPTON TO PIEZO CERAMIC	353ND	Two	Amber/Dark Red	150°C – 1 min 80°C – 30 min	3,000-5,000 cPs @ 50 rpm	≥90°C	≥15 kg/5,100 psi	1.5694	>50% @ 550 nm >98% @ 800-1000 nm >95% @ 1100-1600 nm	412°C	54 x 10 <sup>-6</sup> 206 x 10 <sup>-6</sup>	≤3 hours	1 year

N/A - not applicable, as these are filled systems



For downloading Data Sheets and MSDS, visit the Technical Info section of our website - [www.epotek.com](http://www.epotek.com), or email our Technical Services Group at: [techserv@epotek.com](mailto:techserv@epotek.com)

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**Flip Chip Applications** are provided in two types: **electrically insulating underfills** and **electrically conductive interconnect epoxies**. **EPO-TEK® underfill materials** provide extra strength and support to devices for holding electrical connections in place and decreasing the number of part failures. They can also be used for edge bonding to provide added stability to larger arrays; wicking between the ever smaller pin connections found on today's flip chip devices through capillary forces; or providing thermal conductivity for effective heat dissipation.

**EPO-TEK electrically conductive epoxies** are used as solder replacements to make electrical connections such as electrical pin/ball contacts for flip chips or BGA's in flip chip devices. These materials can be dispensed or printed to form dot sizes as small as 4 mils and do not require the very high temperatures of solder reflow.

UNFILLED

EDGE BOND

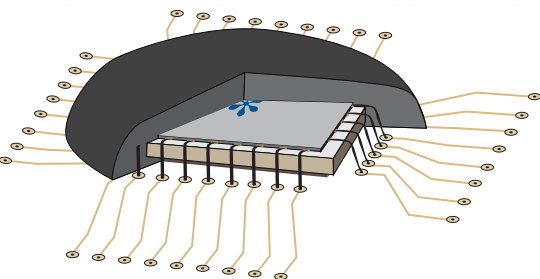
EPO-TEK	NO. of COMPONENTS	COLOR Before/ After CURE (thin film)	CURE TEMPERATURE (minimal)	VISCOSITY @ 23°C	GLASS TRANSITION TEMPERATURE (Tg)	DIE SHEAR STRENGTH @ RT (80mil x 80mil)	INDEX OF REFRACTION (Nd)	SPECTRAL TRANSMISSION	TGA DEGRADATION TEMPERATURE	CTE Below Tg/ Above Tg (in/in/°C)	POT LIFE (@ room temp.)	SHELF LIFE (@ room temp. unless noted)
353ND-T	Two	Tan/Dark Red	150°C – 1 min 80°C – 30 min	9,000-15,000 cPs @ 20 rpm	≥90°C	≥15 kg/5,100 psi	N/A	N/A	409°C	43 x 10 <sup>-6</sup> 231 x 10 <sup>-6</sup>	3 hours	1 year
0E188	Two	Off-White/ Off-White	150°C – 1 min 80°C – 30 min	20,000-30,000 cPs @ 10 rpm	≥90°C	≥15 kg/5,100 psi	N/A	N/A	417°C	19 x 10 <sup>-6</sup> 68 x 10 <sup>-6</sup>	1.5 hours	1 year
0G116-31	One	White/White	100mW/cm <sup>2</sup> for >2 min @ 320-500 nm	20,000-30,000 cPs @ 10 rpm	≥115°C	≥10 kg/3,400 psi	1.5662	>96% @ 660-1640 nm >92% @ 500 nm	409°C	41 x 10 <sup>-6</sup> 170 x 10 <sup>-6</sup>	N/A	1 year
301-2	Two	Clear/ Colorless	80°C – 3 hours 23°C – 2 days	225-425 cPs @ 100 rpm	≥80°C	≥15 kg/5,100 psi	1.5318	>99% @ 400-1200 nm >98% @ 1200-1600 nm	360°C	61 x 10 <sup>-6</sup> 180 x 10 <sup>-6</sup>	8 hours	1 year
330	Two	Amber/ Dark Amber	150°C – 1 min 80°C – 30 min	350-550 cPs @ 100 rpm	≥90°C	≥10 kg/3,400 psi	1.5345	>97% @ 700-1600 nm >88% @ 600 nm >51% @ 500 nm	369°C	39 x 10 <sup>-6</sup> 175 x 10 <sup>-6</sup>	6 hours	1 year
353ND	Two	Amber/ Dark Red	150°C – 1 min 80°C – 30 min	3,000-5,000 cPs @ 50 rpm	≥90°C	≥15 kg/5,100 psi	1.5694	>50% @ 550 nm >98% @ 800-1000 nm >95% @ 1100-1600 nm	412°C	54 x 10 <sup>-6</sup> 206 x 10 <sup>-6</sup>	≤3 hours	1 year
0E121	Two	Light Yellow/ Yellow	90°C – 1 hour 23°C – 2 days	300-500 cPs @ 100 rpm	≥55°C	≥15 kg/5,100 psi	1.5271	>94% @ 380-1640 nm	350°C	43 x 10 <sup>-6</sup> 158 x 10 <sup>-6</sup>	5 hours	1 year
U300-2	Two	Amber/ Dark Amber	150°C – 1 hour 80°C – 3 hours	3,700-6,700 cPs @ 20 rpm	≥115°C	N/A	N/A	N/A	425°C	55 x 10 <sup>-6</sup> 184 x 10 <sup>-6</sup>	2 days	1 year

CAPILLARY UNDERFILL

FILLED

DIE ATTACH		Thermally Conductive TCA										
930-4	Two	Ivory/Amber	150°C – 10 min 80°C – 6 hours	12,000-17,000 cPs @ 20 rpm	≥90°C	≥15 kg/5,100 psi	N/A	N/A	425°C	27 x 10 <sup>-6</sup> 136 x 10 <sup>-6</sup>	1 day	1 year
T7109	Two	White/White	150°C – 10 min 80°C – 8 hours	14,000-20,000 cPs @ 20 rpm	≥45°C	≥15 kg/5,100 psi	N/A	N/A	377°C	46 x 10 <sup>-6</sup> 239 x 10 <sup>-6</sup>	4 hours	1 year
DIE ATTACH		Electrically Conductive ECA										
H20E	Two	Silver/Silver	175°C – 45 seconds 80°C – 3 hours	2,200-3,200 cPs @ 100 rpm	≥80°C	>5 kg/1,700 psi	N/A	N/A	425°C	31 x 10 <sup>-6</sup> 158 x 10 <sup>-6</sup>	2.5 days	1 year

N/A - not applicable, as these are filled systems



**Glob Top** hemisphere is an epoxy placed over a chip to **encapsulate** and protect fragile die and wire bonds. The epoxy provides **mechanical reinforcement and shields** against contaminants and residues, which could disrupt circuit operations.

**EPO-TEK®** Glob Tops come in a variety of colors and cures to fit any design requirements. Black colored Glob Tops can be used for security, as well as encapsulation. The black color conceals critical chip design and part numbers from competitors. Clear and colorless Glob Tops are common in optical sensors and other applications where optical properties of the epoxy are critical. Additionally, **EPO-TEK** Glob Tops are available in a wide array of curing profiles including: room temperature curing, heat curable or UV curing products.

	EPO-TEK	NO. of COMPONENTS	COLOR Before/After CURE (thin film)	CURE TEMPERATURE (minimal)	VISCOSITY @ 23°C	GLASS TRANSITION TEMPERATURE (Tg)	DIE SHEAR STRENGTH @ RT (80mil x 80mil)	INDEX OF REFRACTION (Nd)	SPECTRAL TRANSMISSION	TGA DEGRADATION TEMPERATURE	CTE Below Tg/ Above Tg (in/in/°C)	POT LIFE (@ room temp.)	SHELF LIFE (@ room temp. unless noted)
BLACK	H70E-2	Two	Black/Black	175°C – 1 min 80°C – 90 min	9,000-15,000 cPs @ 20 rpm	≥80°C	>5 kg/1,700 psi	N/A	N/A	447°C	20 x 10 <sup>-6</sup> 112 x 10 <sup>-6</sup>	2 days	1 year
	T7139	Two	Black/Black	150°C – 30 min 125°C – 60 min	5,000-7,000 cPs @ 50 rpm	≥90°C	>10 kg/3,400 psi	N/A	N/A	438°C	30 x 10 <sup>-6</sup> 76 x 10 <sup>-6</sup>	1 day	1 year
CLEAR	301	Two	Clear/Colorless	65°C – 1 hour 23°C – 24 hours	100-200 cPs @ 100 rpm	≥65°C	>10 kg/3,400 psi	1.5190	>99% @ 380-980 nm >97% @ 980-1640 nm	430°C	39 x 10 <sup>-6</sup> 98 x 10 <sup>-6</sup>	1-2 hours	1 year
	301-2	Two	Clear/Colorless	80°C – 3 hours 23°C – 2 days	225-425 cPs @ 100 rpm	≥80°C	>15 kg/5,100 psi	1.5318	>99% @ 400-1200 nm >98% @ 1200-1600 nm	360°C	61 x 10 <sup>-6</sup> 180 x 10 <sup>-6</sup>	8 hours	1 year
	301-2FL	Two	Clear/Colorless	80°C – 3 hours 23°C – 3 days	100-200 cPs @ 100 rpm	≥45°C	>10 kg/3,400 psi	1.5115	>99% @ 400-1000 nm >97% @ 1000-1600 nm	325°C	56 x 10 <sup>-6</sup> 211 x 10 <sup>-6</sup>	10 hours	1 year
	310M-2	Two	Clear/Colorless	65°C – 2 hours 23°C – 24 hours	250-325 cPs @ 100 rpm	≤30°C	5 kg/1,700 psi	1.4947	>98% @ 380-1660 nm	331°C	67 x 10 <sup>-6</sup> 201 x 10 <sup>-6</sup>	1.5 hours	1 year
SOFT	310M-2	Two	Clear/Colorless	65°C – 2 hours 23°C – 24 hours	250-325 cPs @ 100 rpm	≤30°C	5 kg/1,700 psi	1.4947	>98% @ 380-1660 nm	331°C	67 x 10 <sup>-6</sup> 201 x 10 <sup>-6</sup>	1.5 hours	1 year
	T7109-19	Two	Grey/Grey	80°C – 2 hours 23°C – 24 hours	40,000-70,000 cPs @ 5 rpm	<40°C	5 kg/1,700 psi	N/A	N/A	338°C	59 x 10 <sup>-6</sup> 216 x 10 <sup>-6</sup>	2 hours	1 year
UV	0G116-31	One	White/White	100mW/cm <sup>2</sup> for >2 min @ 320-500 nm	20,000-30,000 cPs @ 10 rpm	≥115°C	≥10 kg/3,400 psi	1.5662	>96% @ 660-1640 nm >92% @ 500 nm	409°C	41 x 10 <sup>-6</sup> 170 x 10 <sup>-6</sup>	N/A	1 year
	0G133-8	One	Cloudy Colorless/ Cloudy Colorless	100mW/cm <sup>2</sup> for 2-3 min @ 320-500 nm	1,000-1,500 cPs @ 100 rpm	≤10°C	3.2 kg/1,088 psi	1.5050	>90% @ 640 nm >95% @ 900 nm	353°C	43 x 10 <sup>-6</sup> 222 x 10 <sup>-6</sup>	N/A	1 year
	0G142-87	One	Clear/Colorless	100mW/cm <sup>2</sup> for >2 min @ 320-500 nm	250-600 cPs @ 100 rpm	≥100°C	20 kg/6,800 psi	1.4928	>97% @ 580-1680 nm	384°C	50 x 10 <sup>-6</sup> 162 x 10 <sup>-6</sup>	N/A	1 year refrigerated
	0G142-112	One	Clear/Colorless	100mW/cm <sup>2</sup> for >2 min @ 320-500 nm	1,200-1,700 cPs @ 100 rpm	≥90°C	25 kg/8,500 psi	1.5395	>97% @ 500-1660 nm	384°C	55 x 10 <sup>-6</sup> 158 x 10 <sup>-6</sup>	N/A	1 year refrigerated

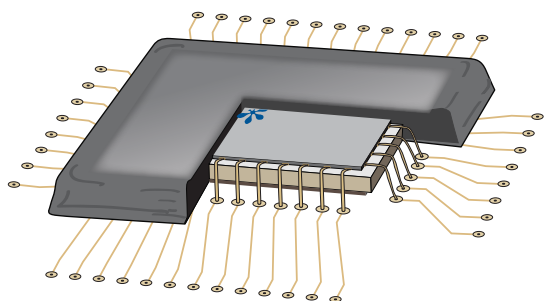
N/A - not applicable, as these are filled systems



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# Glob Top Dam-N-Fill Applications

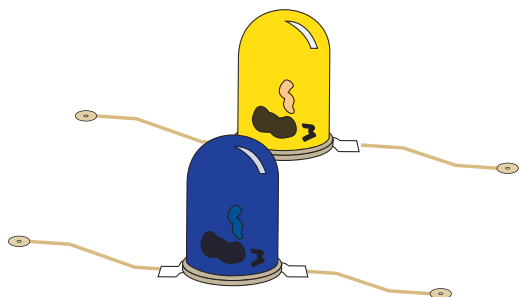


**Glob Top Dam-N-Fill** is a semiconductor technique that **protects fragile die and wire bonds**. This technique uses a two step process. First, a thixotropic barrier epoxy is applied around a chip (*dam*), then the cavity is filled with a low viscosity, optically clear epoxy (*fill*). **EPO-TEK®** Dam-N-Fill adhesives are often preferred when the encapsulation material needs to have specific optical transmission properties, as well as protection from environmental factors. This method is a space saver on Printed Circuit Boards (PCBs) by optimizing space that is wasted by leads. It also reduces cost by eliminating the need for Surface Mounted Device (SMD) package chips.

	EPO-TEK	NO. of COMPONENTS	COLOR Before/After CURE (thin film)	CURE TEMPERATURE (minimal)	VISCOSITY @ 23°C	GLASS TRANSITION TEMPERATURE (Tg)	DIE SHEAR STRENGTH @ RT (80mil x 80mil)	INDEX OF REFRACTION (Nd)	SPECTRAL TRANSMISSION	TGA DEGRADATION TEMPERATURE	CTE Below Tg/ Above Tg (in/in/°C)	POT LIFE (@ room temp.)	SHELF LIFE (@ room temp. unless noted)	
DAM	EPOXY	353ND-T	Two	Tan/Dark Red	150°C – 1 min 80°C – 30 min	9,000-15,000 cPs @ 20 rpm	≥90°C	≥15 kg/5,100 psi	N/A	N/A	409°C	43 x 10 <sup>-6</sup> 231 x 10 <sup>-6</sup>	3 hours	1 year
		730	Two	Tan/Tan	100°C – 30 min 80°C – 2 hours 23°C – 24 hours	80,000-120,000 cPs @ 2.5 rpm	≥55°C	≥10 kg/3,400 psi	N/A	N/A	364°C	66 x 10 <sup>-6</sup> 248 x 10 <sup>-6</sup>	1 hour	1 year
		H70E-2	Two	Black/Black	175°C – 1 min 80°C – 90 min	9,000-15,000 cPs @ 20 rpm	≥80°C	≥5 kg/1,700 psi	N/A	N/A	447°C	20 x 10 <sup>-6</sup> 112 x 10 <sup>-6</sup>	2 days	1 year
UV	EPOXY	0G116-31	One	White/White	100mW/cm <sup>2</sup> for >2 min @ 320-500 nm	20,000-30,000 cPs @ 10 rpm	≥115°C	≥10 kg/3,400 psi	1.5662	>96% @ 660-1640 nm >92% @ 500 nm	409°C	41 x 10 <sup>-6</sup> 170 x 10 <sup>-6</sup>	N/A	1 year
		0G198-55	One	Cloudy/Cloudy	100mW/cm <sup>2</sup> for >2 min @ 320-500 nm	1,765 cPs @ 100 rpm	131°C	20.5 kg/6,970 psi	1.5034	> 97% @ 520-1680 nm	354°C	N/A	N/A	1 year refrigerated
FILL	EPOXY	301	Two	Clear/Colorless	65°C – 1 hour 23°C – 24 hours	100-200 cPs @ 100 rpm	≥65°C	>10 kg/3,400 psi	1.5190	>99% @ 380-980 nm 97% @ 980-1640 nm	430°C	39 x 10 <sup>-6</sup> 98 x 10 <sup>-6</sup>	1-2 hours	1 year
		301-2	Two	Clear/Colorless	80°C – 3 hours 23°C – 2 days	225-425 cPs @ 100 rpm	≥80°C	>15 kg/5,100 psi	1.5318	>99% @ 400-1200 nm 98% @ 1200-1600 nm	360°C	61 x 10 <sup>-6</sup> 180 x 10 <sup>-6</sup>	8 hours	1 year
		310M	Two	Clear/Colorless	65°C – 2 hours 23°C – 24 hours	450-850 cPs @ 100 rpm	≤30°C	≥2 kg/680 psi	1.4969	> 97% @ 400-1300 nm > 90% @ 1400-2200 nm	397°C	78 x 10 <sup>-6</sup> 222 x 10 <sup>-6</sup>	2 hours	1 year
		310M-2	Two	Clear/Colorless	65°C – 2 hours 23°C – 24 hours	250-325 cPs @ 100 rpm	≤30°C	5 kg/1,700 psi	1.4947	>98% @ 380-1660 nm	331°C	67 x 10 <sup>-6</sup> 201 x 10 <sup>-6</sup>	1.5 hours	1 year
		377	Two	Amber/Dark Amber	150°C – 1 hour	150-300 cPs @ 100 rpm	≥95°C	≥10 kg/3,400 psi	1.5195	>99% @ 600 nm >95% @ 1000-1500 nm	375°C	57 x 10 <sup>-6</sup> 210 x 10 <sup>-6</sup>	24 hours	1 year
UV	EPOXY	0G142-87	One	Clear/Colorless	100mW/cm <sup>2</sup> for >2 min @ 320-500 nm	250-600 cPs @ 100 rpm	≥100°C	>20 kg/6,800 psi	1.4928	>97% @ 580-1660 nm	384°C	50 x 10 <sup>-6</sup> 162 x 10 <sup>-6</sup>	N/A	1 year refrigerated
		0G142-112	One	Clear/Colorless	100mW/cm <sup>2</sup> for >2 min @ 320-500 nm	1,200-1,700 cPs @ 100 rpm	≥90°C	25 kg/8,500 psi	1.5395	>97% @ 500-1660 nm	384°C	55 x 10 <sup>-6</sup> 158 x 10 <sup>-6</sup>	N/A	1 year refrigerated

N/A - not applicable, as these are filled systems





**LED Applications** use epoxy materials for **high thermal** and **electrical conductivity** as well as **reflectivity** to maximize efficiency and performance in die attach applications.

**EPO-TEK®** high thermal and electrical conductivity, low thermal resistance, die attach adhesives (ECAs) are ideal for thermal management in **LOW POWER(LP)** and **HIGH POWER(HP)** LEDs. These specialty adhesives are easy to use and provide a shiny background for increased reflectivity along with high quality and proven reliability in even the most demanding applications.

EPO-TEK	NO. of COMPONENTS	COLOR Before/ After CURE (thin film)	CURE TEMPERATURE (minimal)	VISCOSITY @ 23°C	GLASS TRANSITION TEMPERATURE (Tg)	DIE SHEAR STRENGTH @ RT (80mil x 80mil)	INDEX OF REFRACTION (Nd)	SPECTRAL TRANSMISSION	TGA DEGRADATION TEMPERATURE	CTE Below Tg/ Above Tg (in/in/°C)	POT LIFE (@ room temp.)	SHELF LIFE (@ room temp. unless noted)
<b>EK1000</b>	One	Silver/Silver	200°C – 30 min 150°C – 1 hour + 200°C – 1 hour (post-cure)	1,800-3,600 cPs @ 100 rpm	>80°C	>10 kg/3,400 psi	N/A	N/A	357°C	38 x 10 <sup>-6</sup> 94 x 10 <sup>-6</sup>	2 weeks	1 year @ -40°C
<b>EK2000</b>	Two	Silver/Silver	200°C – 30 min 150°C – 1 hour + 200°C – 1 hour (post-cure)	1,686 cPs @ 100 rpm	104°C	>10 kg/3,400 psi	N/A	N/A	357°C	38 x 10 <sup>-6</sup> 94 x 10 <sup>-6</sup>	2 weeks	1 year, refrigerated upon arrival
<b>H20E</b>	Two	Silver/Silver	175°C – 45 seconds 80°C – 3 hours	2,200-3,200 cPs @ 100 rpm	≥80°C	>5 kg/1,700 psi	N/A	N/A	425°C	31 x 10 <sup>-6</sup> 158 x 10 <sup>-6</sup>	2.5 days	1 year
<b>H20E-HC</b>	Two	Silver/Silver	175°C – 30 min 150°C – 1 hour	3,500-6,000 cPs @ 50 rpm	N/A	≥5 kg/1,700 psi	N/A	N/A	372°C	53 x 10 <sup>-6</sup> 80 x 10 <sup>-6</sup>	2.5 days	1 year

N/A - not applicable, as these are filled systems

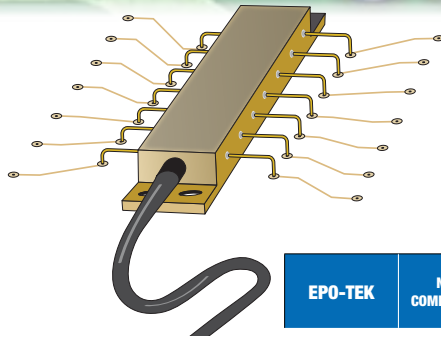
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# Photonic/Fiber Optic Epoxy Applications



**Photonic/Fiber Optic** epoxy adhesives are commonly used for adhering various substrates and providing protective coatings in several fiber optic applications. **EPO-TEK®** materials are frequently found in **bundling optical fibers**, as well as **bonding components** in optoelectronic devices for telecommunication, aircraft, satellites, and scientific instrumentation. They provide optical transparency, thermal management, electrical conductivity and structural integrity, while resisting several types of sterilization, as well as passing 85%RH/85°C and Telcordia testing. In addition, several products have passed USP Class VI Bio-Compatibility Testing for use in medical devices such as endoscopes and pacemakers.

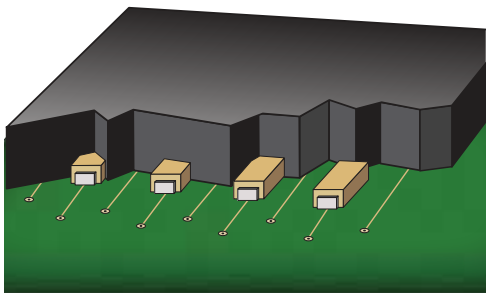
OPTICAL PHOTO DIODE

DIE ATTACH

OPTICAL

EPO-TEK	NO. of COMPONENTS	COLOR Before/ After CURE (thin film)	CURE TEMPERATURE (minimal)	VISCOSITY @ 23°C	GLASS TRANSITION TEMPERATURE (Tg)	DIE SHEAR STRENGTH @ RT (80mil x 80mil)	INDEX OF REFRACTION (Nd)	SPECTRAL TRANSMISSION	TGA DEGRADATION TEMPERATURE	CTE Below Tg/ Above Tg (in/in/°C)	POT LIFE (@ room temp.)	SHELF LIFE (@ room temp. unless noted)
EJ2189	Two	Silver/Silver	150°C – 15 min 23°C – 3 days	55,000-90,000 cPs @ 1 rpm	≥30°C	≥9 kg/3,060 psi	N/A	N/A	316°C	53 x 10 <sup>-6</sup> 107 x 10 <sup>-6</sup>	4 hours	1 year
EK1000	One	Silver/Silver	200°C – 30 min 150°C – 1 hour + 200°C – 1 hour (post-cure)	1,800-3,600 cPs @ 100 rpm	>80°C	>10 kg/3,400 psi	N/A	N/A	357°C	38 x 10 <sup>-6</sup> 94 x 10 <sup>-6</sup>	2 weeks	1 year @ -40°C
EK2000	Two	Silver/Silver	200°C – 30 min 150°C – 1 hour + 200°C – 1 hour (post-cure)	1,686 cPs @ 100 rpm	104°C	>10 kg/3,400 psi	N/A	N/A	357°C	38 x 10 <sup>-6</sup> 94 x 10 <sup>-6</sup>	2 weeks	1 year, refrigerated upon arrival
H20E	Two	Silver/Silver	175°C – 45 seconds 80°C – 3 hours	2,200-3,200 cPs @ 100 rpm	≥80°C	>5 kg/1,700 psi	N/A	N/A	425°C	31 x 10 <sup>-6</sup> 158 x 10 <sup>-6</sup>	2.5 days	1 year
H37-MP	One	Silver/Silver	150°C – 1 hour	22,000-26,000 cPs @ 10 rpm	≥90°C	≥10 kg/3,400 psi	N/A	N/A	358°C	52 x 10 <sup>-6</sup> 148 x 10 <sup>-6</sup>	28 days	1 year @ -40°C
930-4	Two	Ivory/Amber	150°C – 10 min 80°C – 6 hours	12,000-17,000 cPs @ 20 rpm	≥90°C	≥15 kg/5,100 psi	N/A	N/A	425°C	27 x 10 <sup>-6</sup> 136 x 10 <sup>-6</sup>	1 day	1 year
T7109	Two	White/White	150°C – 10 min 80°C – 8 hours	14,000-20,000 cPs @ 20 rpm	≥45°C	≥15 kg/5,100 psi	N/A	N/A	377°C	46 x 10 <sup>-6</sup> 239 x 10 <sup>-6</sup>	4 hours	1 year
T7109-19	Two	Grey/Grey	80°C – 2 hours 23°C – 24 hours	40,000-70,000 cPs @ 5 rpm	<40°C	5 kg/1,700 psi	N/A	N/A	338°C	59 x 10 <sup>-6</sup> 216 x 10 <sup>-6</sup>	2 hours	1 year
301	Two	Clear/Colorless	65°C – 1 hour 23°C – 24 hours	100-200 cPs @ 100 rpm	≥65°C	≥10 kg/3,400 psi	1.5190	>99% @ 380-980 nm >97% @ 980-1640 nm	430°C	39 x 10 <sup>-6</sup> 98 x 10 <sup>-6</sup>	1-2 hours	1 year
301-2	Two	Clear/Colorless	80°C – 3 hours 23°C – 2 days	225-425 cPs @ 100 rpm	≥80°C	≥15 kg/5,100 psi	1.5318	>99% @ 400-1200 nm >98% @ 1200-1600 nm	360°C	61 x 10 <sup>-6</sup> 180 x 10 <sup>-6</sup>	8 hours	1 year
301-2FL	Two	Clear/Colorless	80°C – 3 hours 23°C – 3 days	100-200 cPs @ 100 rpm	≥45°C	≥10 kg/3,400 psi	1.5115	>99% @ 400-1000 nm >97% @ 1000-1600 nm	325°C	56 x 10 <sup>-6</sup> 211 x 10 <sup>-6</sup>	10 hours	1 year
302-3M	Two	Clear/Colorless	65°C – 3 hours 23°C – 24 hours	800-1,600 cPs @ 100 rpm	≥55°C	≥10 kg/3,400 psi	1.5446	>95% @ 460-1620 nm	351°C	56 x 10 <sup>-6</sup> 193 x 10 <sup>-6</sup>	1 hour	1 year
353ND	Two	Amber/Dark Red	150°C – 1 min 80°C – 30 min	3,000-5,000 cPs @ 50 rpm	≥90°C	≥15 kg/5,100 psi	1.5694	>50% @ 550 nm >98% @ 800-1000 nm >95% @ 1100-1600 nm	412°C	54 x 10 <sup>-6</sup> 206 x 10 <sup>-6</sup>	≤3 hours	1 year
354-T	Two	Tan/Dark Red	150°C – 10 min 120°C – 30 min 80°C – 2 hours	11,000-20,000 cPs @ 20 rpm	≥95°C	≥10 kg/3,400 psi	N/A	N/A	485°C	51 x 10 <sup>-6</sup> 179 x 10 <sup>-6</sup>	3 days	6 months
360	Two	Amber/Dark Amber	150°C – 1 min 100°C – 10 min	350-550 cPs @ 100 rpm	≥90°C	≥10 kg/3,400 psi	1.5345	>97% @ 700-1600 nm >88% @ 600 nm >51% @ 500 nm	375°C	39 x 10 <sup>-6</sup> 175 x 10 <sup>-6</sup>	6 hours	1 year
377	Two	Amber/Dark Amber	150°C – 1 hour	150-300 cPs @ 100 rpm	≥95°C	≥10 kg/3,400 psi	1.5195	>99% @ 600 nm >95% @ 1000-1500 nm	375°C	57 x 10 <sup>-6</sup> 210 x 10 <sup>-6</sup>	24 hours	1 year
06116-31	One	White/White	100mW/cm <sup>2</sup> for >2 min @ 320-500 nm	20,000-30,000 cPs @ 10 rpm	≥115°C	≥10 kg/3,400 psi	1.5662	>96% @ 660-1640 nm >92% @ 500 nm	409°C	41 x 10 <sup>-6</sup> 170 x 10 <sup>-6</sup>	N/A	1 year
06142-95	One	Clear/Colorless	100mW/cm <sup>2</sup> for >2 min @ 320-500 nm	534 cPs @ 100 rpm	N/M	15.2 kg/5,168 psi	1.4946	>97% @ 580-1680 nm	358°C	50 x 10 <sup>-6</sup> 162 x 10 <sup>-6</sup>	N/A	1 year refrigerated

N/A - not applicable, as these are filled systems N/M - not measured



**Potting Compound Applications** are an effective way to encapsulate parts and protect sensitive devices from environmental factors such as high temperatures, humidity and chemicals. Epoxy Technology provides these materials in two types: **optically clear** (without filler) and **thermally conductive** (containing filler).

**EPO-TEK®** optically clear potting compounds are low viscosity products with a low-exothermic chemistry, to allow for great flow around components as well as excellent self-leveling properties. These materials create a clear, void-free encapsulation for high visibility of encapsulated parts, even in larger volume applications.

**EPO-TEK** thermally conductive potting compounds incorporate a filler material to dissipate heat away from sensitive elements. An added benefit of filled systems is that they provide increased security for proprietary components beneath the potting.

	EPO-TEK	NO. of COMPONENTS	COLOR Before/After CURE (thin film)	CURE TEMPERATURE (minimal)	VISCOSITY @ 23°C	GLASS TRANSITION TEMPERATURE (Tg)	DIE SHEAR STRENGTH @ RT (80mil x 80mil)	INDEX OF REFRACTION (Nd)	SPECTRAL TRANSMISSION	TGA DEGRADATION TEMPERATURE	CTE Below Tg/ Above Tg (in/in/°C)	POT LIFE (@ room temp.)	SHELF LIFE (@ room temp. unless noted)
OPTICAL	301-2	Two	Clear/Colorless	80°C – 3 hours 23°C – 2 days	225-425 cPs @ 100 rpm	≥80°C	≥15 kg/5,100 psi	1.5318	>99% @ 400-1200 nm >98% @ 1200-1600 nm	360°C	61 x 10 <sup>-6</sup> 180 x 10 <sup>-6</sup>	8 hours	1 year
	301-2FL	Two	Clear/Colorless	80°C – 3 hours 23°C – 3 days	100-200 cPs @ 100 rpm	≥45°C	≥10 kg/3,400 psi	1.5115	>99% @ 400-1000 nm >97% @ 1000-1600 nm	325°C	56 x 10 <sup>-6</sup> 211 x 10 <sup>-6</sup>	10 hours	1 year
	377	Two	Amber/Dark Amber	150°C – 1 hour	150-300 cPs @ 100 rpm	≥95°C	≥10 kg/3,400 psi	1.5195	> 99% @ 600 nm > 95% @ 1000-1500 nm	375°C	57 x 10 <sup>-6</sup> 210 x 10 <sup>-6</sup>	24 hours	1 year
THERMAL	H77	Two	Grey/Grey	150°C – 1 hour	6,000-12,000 cPs @ 20 rpm	≥80°C	≥5 kg/1,700 psi	N/A	N/A	405°C	33 x 10 <sup>-6</sup> 130 x 10 <sup>-6</sup>	6 hours	1 year
	H77S	Two	Grey/Dark Grey	150°C – 1 hour	950-1,500 cPs @ 20 rpm	≥80°C	≥15 kg/5,100 psi	N/A	N/A	432°C	39 x 10 <sup>-6</sup> 98 x 10 <sup>-6</sup>	8 hours	1 year
	T7110	Two	Grey/Grey	150°C – 15 min 23°C – 3 days	1,400-2,200 cPs @ 100 rpm	≥40°C	≥10 kg/3,400 psi	N/A	N/A	314°C	31 x 10 <sup>-6</sup> 142 x 10 <sup>-6</sup>	3.5 hours	1 year
	T905-BN3	Two	Grey/Grey	80°C – 2 hours	2,000-7,000 cPs @ 50 rpm	≥40°C	≥10 kg/3,400 psi	N/A	N/A	347°C	37 x 10 <sup>-6</sup> 151 x 10 <sup>-6</sup>	3 hours	1 year
SMALL VOLUME	301	Two	Clear/Colorless	65°C – 1 hour 23°C – 24 hours	100-200 cPs @ 100 rpm	≥65°C	≥10 kg/3,400 psi	1.5190	>99% @ 380-980 nm >97% @ 980-1640 nm	430°C	39 x 10 <sup>-6</sup> 98 x 10 <sup>-6</sup>	1-2 hours	1 year
	302-3M	Two	Clear/Colorless	65°C – 3 hours 23°C – 24 hours	800-1,600 cPs @ 100 rpm	≥55°C	≥10 kg/3,400 psi	1.5446	>95% @ 460-1620 nm	351°C	56 x 10 <sup>-6</sup> 193 x 10 <sup>-6</sup>	1 hour	1 year
	509FM-1	Two	Black/Black	60°C – 2 hours 23°C – 1 day	400-1,000 cPs @ 100 rpm	≥40°C	≥10 kg/3,400 psi	N/A	<5% @ 400-2500 nm	365°C	55 x 10 <sup>-6</sup> 191 x 10 <sup>-6</sup>	20 min	1 year
	H70E	Two	Grey/Grey	175°C – 1 min 80°C – 90 min	4,000-7,000 cPs @ 50 rpm	≥80°C	≥10 kg/3,400 psi	N/A	N/A	451°C	15 x 10 <sup>-6</sup> 64 x 10 <sup>-6</sup>	56 hours	1 year
	H70S	Two	Grey/Grey	175°C – 1 min 80°C – 90 min	1,300-1,800 cPs @ 100 rpm	≥50°C	≥10 kg/3,400 psi	N/A	N/A	400°C	40 x 10 <sup>-6</sup> 190 x 10 <sup>-6</sup>	3 days	1 year

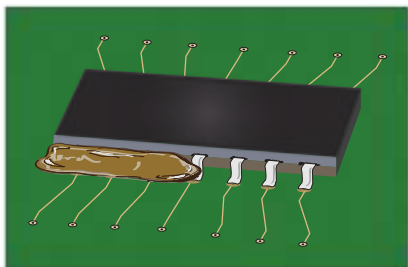
N/A - not applicable, as these are filled systems



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# SMD Non-Conductive Epoxy Applications



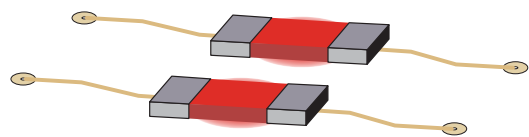
## SMD Non-Conductive Epoxy Applications

refers to electrically insulating adhesives and are used at the PCB level for gluing SMDs to the PCB. **EPO-TEK®** SMD epoxies ensure component placement onto the PCBs during solder reflow, structural integrity for high reliability circuits that are subjected to severe conditions such as: constant acceleration/G-shocks found in military, avionics or aerospace applications. The adhesive can act as a **dielectric dam** or solder mask, and is sometimes referred to as the **underfill**.

In some cases, the material may be cured in the same step as the electrically conductive adhesive (ECA). Ideally, the SMD epoxy and ECA use a matching chemistry, so that curing kinetics and thermo-mechanical stresses are minimized on the PCB.

EPO-TEK	NO. of COMPONENTS	COLOR Before/After CURE (thin film)	CURE TEMPERATURE (minimal)	VISCOSITY @ 23°C	GLASS TRANSITION TEMPERATURE (T <sub>g</sub> )	DIE SHEAR STRENGTH @ RT (80mil x 80mil)	INDEX OF REFRACTION (N <sub>d</sub> )	SPECTRAL TRANSMISSION	TGA DEGRADATION TEMPERATURE	CTE Below T <sub>g</sub> / Above T <sub>g</sub> (in/in/°C)	POT LIFE (@ room temp.)	SHELF LIFE (@ room temp. unless noted)		
SMD CAPACITORS AND RESISTORS	H61	One	Grey/Grey	150°C – 30 min 120°C – 1 hour	40,000-60,000 cPs @ 5 rpm	≥110°C	≥20 kg/6,800 psi	N/A	N/A	425°C	17 x 10 <sup>-6</sup> 95 x 10 <sup>-6</sup>	25 days	6 months refrigerated	
	H62	One	Black/Black	150°C – 30 min 120°C – 1 hour	17,000-27,000 cPs @ 10 rpm	≥110°C	≥15 kg/5,100 psi	N/A	N/A	436°C	48 x 10 <sup>-6</sup> 119 x 10 <sup>-6</sup>	15 days	1 year refrigerated	
	H65-175MP	One	Ivory/Ivory	180°C – 1 hour	80,000-120,000 cPs @ 2.5 rpm	≥100°C	≥20 kg/6,800 psi	N/A	N/A	397°C	38 x 10 <sup>-6</sup> 136 x 10 <sup>-6</sup>	28 days	1 year @ -40°C	
	H67-MP	One	Ivory/Ivory	150°C – 1 hour	300,000-400,000 cPs @ 1 rpm	≥90°C	≥20 kg/6,800 psi	N/A	N/A	350°C	16 x 10 <sup>-6</sup> 68 x 10 <sup>-6</sup>	28 days	1 year @ -40°C	
	H70E	Two	Grey/Grey	175°C – 1 min 80°C – 90 min	4,000-7,000 cPs @ 50 rpm	≥80°C	≥10 kg/3,400 psi	N/A	N/A	451°C	15 x 10 <sup>-6</sup> 64 x 10 <sup>-6</sup>	56 hours	1 year	
	H70E-4	Two	Dark Grey/ Dark Brown	120°C – 15 min 50°C – 12 hours	20,000-40,000 cPs @ 10 rpm	≥80°C	≥5 kg/1,700 psi	N/A	N/A	432°C	17 x 10 <sup>-6</sup> 77 x 10 <sup>-6</sup>	2.5 days	1 year	
	H74	Two	Grey/Dark Grey	150°C – 5 min 100°C – 20 min	45,000-65,000 cPs @ 5 rpm	≥100°C	≥15 kg/5,100 psi	N/A	N/A	425°C	21 x 10 <sup>-6</sup> 95 x 10 <sup>-6</sup>	2 hours	1 year	
FOUR CORNER EDGE BONDING	UV CURED	OG116-31	One	White/White	100mW/cm <sup>2</sup> for >2 min @ 320-500 nm	20,000-30,000 cPs @ 10 rpm	≥115°C	≥10 kg/3,400 psi	1.5662	>96% @ 660-1640 nm >92% @ 500 nm	409°C	41 x 10 <sup>-6</sup> 170 x 10 <sup>-6</sup>	N/A	1 year
		OG133-8	One	Cloudy colorless/ Cloudy colorless	100mW/cm <sup>2</sup> for 2-3 min @ 320-500 nm	1,000-1,500 cPs @ 100 rpm	≤10°C	3.2 kg/1,088 psi	1.5050	>90% @ 640 nm >95% @ 900 nm	353°C	43 x 10 <sup>-6</sup> 222 x 10 <sup>-6</sup>	N/A	1 year
	THERMAL CURED	323LP	Two	Yellow/ Dark Yellow	90°C – 30 min	3,500-5,000 cPs @ 50 rpm	>100°C	>20 kg/6,800 psi	1.5703	>94% @ 820-1620 nm >90% @ 640-800 nm	413°C	31 x 10 <sup>-6</sup> 132 x 10 <sup>-6</sup>	24 hours	1 year
		OD2002	Two	Cloudy/Ivory	150°C – 5 min 100°C – 30 min	24,000-42,000 cPs @ 2.5 rpm	>140°C	>10 kg/3,400 psi	1.5728	>98% @ 800-1640 nm 69% @ 600 nm	443°C	45 x 10 <sup>-6</sup> 187 x 10 <sup>-6</sup>	4 hours	1 year
UNDERFILL	353ND-T	Two	Tan/Dark Red	150°C – 1 min 80°C – 30 min	9,000-15,000 cPs @ 20 rpm	≥90°C	≥15 kg/5,100 psi	N/A	N/A	409°C	43 x 10 <sup>-6</sup> 231 x 10 <sup>-6</sup>	3 hours	1 year	
	730	Two	Tan/Tan	100°C – 30 min 80°C – 2 hours 23°C – 24 hours	80,000-120,000 cPs @ 2.5 rpm	≥55°C	≥10 kg/3,400 psi	N/A	N/A	364°C	66 x 10 <sup>-6</sup> 248 x 10 <sup>-6</sup>	1 hour	1 year	
	GE116-78	One	Orange/Orange	150°C – 5 min 120°C – 15 min	224,400 cPs @ 1 rpm	79°C	≥9.3 kg/3,162 psi	N/A	N/A	339°C	57 x 10 <sup>-6</sup> 132 x 10 <sup>-6</sup>	28 days	1 year @ -40°C	
	H74F	Two	Dark Grey/ Dark Grey	150°C – 5 min 80°C – 2 hours	45,000-75,000 cPs @ 5 rpm	≥90°C	≥15 kg/5,100 psi	N/A	N/A	486°C	33 x 10 <sup>-6</sup> 108 x 10 <sup>-6</sup>	3 hours	1 year	

N/A - not applicable, as these are filled systems



**Surface Mount Adhesives / Solder Replacement (SMA)** generally refer to **silver-filled, electrically conductive epoxies** only. At the level 2 and 3 electronic packaging hierarchy, most SMDs are soldered to the PCB/substrate via the historical SMT process.

**EPO-TEK®** silver epoxies are used instead of solder joining, for several reasons, including:

- Component miniaturization achieved by dispensing silver epoxies “dots” of 75um with 125um pitch without bridging.
- A “cold solder” solution for double-sided PCBs in the form of an SMA to protect the joints during 2<sup>nd</sup> solder reflow cycle.
- Lower stress due to silver epoxy joints having a lower modulus than SAC solder, which is much more brittle and prone to fatigue.

As a result of removing the lead from traditional solder pastes, reflow temperatures have increased from 180°C to 260°C, potentially causing damage to sensitive components. Therefore, more electronic packaging is done with silver epoxy for a lower cost, and a lower stress solution.

EPO-TEK	NO. of COMPONENTS	COLOR Before/ After CURE (thin film)	CURE TEMPERATURE (minimal)	VISCOSITY @ 23°C	GLASS TRANSITION TEMPERATURE (Tg)	DIE SHEAR STRENGTH @ RT (80mil x 80mil)	INDEX OF REFRACTION (Nd)	SPECTRAL TRANSMISSION	TGA DEGRADATION TEMPERATURE	CTE Below Tg/ Above Tg (in/in/°C)	POT LIFE (@ room temp.)	SHELF LIFE (@ room temp. unless noted)
<b>SEMICONDUCTOR DEVICES</b>												
<b>Adhesives replace BGA solder balls, and solder ball arrays, as well as for wafer level and PCB level flip chips</b>												
E2101	Two	Silver/Silver	175°C – 15 min 150°C – 1 hour	15,000-18,000 cPs @ 20 rpm	≥90°C	≥5 kg/1,700 psi	N/A	N/A	401°C	48 x 10 <sup>-6</sup> 192 x 10 <sup>-6</sup>	5 days	1 year
<b>MEDICAL</b>												
<b>Adhesives to replace Au/Sn eutectic soldering process &gt;300°C</b>												
H20E	Two	Silver/Silver	175°C – 45 seconds 80°C – 3 hours	2,200-3,200 cPs @ 100 rpm	≥80°C	>5 kg/1,700 psi	N/A	N/A	425°C	31 x 10 <sup>-6</sup> 158 x 10 <sup>-6</sup>	2.5 days	1 year
H81A	Two	Brown/Brown	150°C – 1 hour	250,000-300,000 cPs @ 0.5 rpm	≥100°C	>5 kg/1,700 psi	N/A	N/A	412°C	N/A	2 days	1 year
<b>MILITARY MICROWAVE RF</b>												
<b>Adhesive replaces solder joining of SMD caps and resistors bonded to ceramic PCBs</b>												
H20E	Two	Silver/Silver	175°C – 45 seconds 80°C – 3 hours	2,200-3,200 cPs @ 100 rpm	≥80°C	>5 kg/1,700 psi	N/A	N/A	425°C	31 x 10 <sup>-6</sup> 158 x 10 <sup>-6</sup>	2.5 days	1 year
H21D	Two	Silver/Silver	150°C – 5 min 120°C – 15 min 80°C – 90 min	14,000-20,400 cPs @ 20 rpm	≥100°C	≥5 kg/1,700 psi	N/A	N/A	457°C	26 x 10 <sup>-6</sup> 124 x 10 <sup>-6</sup>	15 hours	1 year
H35-175MP*	One	Bright Silver/Silver	180°C – 1 hour 165°C – 1.5 hours	22,000-28,000 cPs @ 10 rpm	≥100°C	≥10 kg/3,400 psi	N/A	N/A	372°C	31 x 10 <sup>-6</sup> 97 x 10 <sup>-6</sup>	28 days	1 year @ -40°C
H37-MP*	One	Silver/Silver	150°C – 1 hour	22,000-26,000 cPs @ 10 rpm	≥90°C	≥10 kg/3,400 psi	N/A	N/A	358°C	52 x 10 <sup>-6</sup> 148 x 10 <sup>-6</sup>	28 days	1 year @ -40°C

\* Military Grade

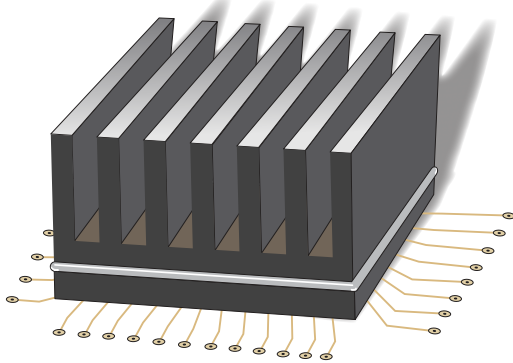
N/A - not applicable, as these are filled systems



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# Thermal Interface Material (TIM) Applications



**Thermal Interface Material (TIM)** provide a **thermally conductive, void-free** bond for attaching heat sinks. These materials eliminate air gaps in heat sink attach which leads to improved thermal management properties. **EPO-TEK®** thermal interface materials are ideal for use in today's high heat/high power applications including: photovoltaics, lasers and laser diodes, LED and high power RF amplifiers. These materials can also be used for heater attach applications in LCD and avionics.

Because interfaces and other geometry factors play such a large role in determining the actual thermal resistance of an adhesive in a device, a high bulk thermal conductivity value for an adhesive is important, *but may not* always be a sufficient predictor of low resistance. To achieve the most efficient thermal transfer in an actual device, low thermal resistance is required.

EPO-TEK	NO. of COMPONENTS	COLOR Before/After CURE (thin film)	CURE TEMPERATURE (minimal)	VISCOSITY @ 23°C	GLASS TRANSITION TEMPERATURE (Tg)	DIE SHEAR STRENGTH @ RT (80mil x 80mil)	Thermal Conductivity (W/mK)	TGA DEGRADATION TEMPERATURE	CTE Below Tg/ Above Tg (in/in/°C)	POT LIFE (@ room temp.)	SHELF LIFE (@ room temp. unless noted)	
<b>ELECTRICAL</b>	<b>EK1000</b>	One	Silver/Silver	200°C – 30 min 150°C – 1 hour + 200°C – 1 hour (post-cure)	1,800-3,600 cPs @ 100 rpm	>80°C	>10 kg/3,400 psi	12.6 (150°C/1hr cure) 26.3 (200°C/1hr post-cure)	357°C	38 x 10 <sup>-6</sup> 94 x 10 <sup>-6</sup>	2 weeks	1 year @ -40°C
	<b>EK2000</b>	Two	Silver/Silver	200°C – 30 min 150°C – 1 hour + 200°C – 1 hour (post-cure)	1,686 cPs @ 100 rpm	104°C	>10 kg/3,400 psi	12.6 (150°C/1hr cure) 26.3 (200°C/1hr post-cure)	357°C	38 x 10 <sup>-6</sup> 94 x 10 <sup>-6</sup>	2 weeks	1 year, refrigerated upon arrival
	<b>H20E</b>	Two	Silver/Silver	175°C – 45 seconds 80°C – 3 hours	2,200-3,200 cPs @ 100 rpm	≥80°C	>5 kg/1,700 psi	2.5	425°C	31 x 10 <sup>-6</sup> 158 x 10 <sup>-6</sup>	2.5 days	1 year
	<b>H20E-HC</b>	Two	Silver/Silver	175°C – 30 min 150°C – 1 hour	3,500-6,000 cPs @ 50 rpm	N/A	≥5 kg/1,700 psi	10.9 (150°C/1hr cure) 23 (200°C/1hr post-cure)	372°C	53 x 10 <sup>-6</sup> 80 x 10 <sup>-6</sup>	2.5 days	1 year
<b>HIGH PERFORMANCE</b>	<b>930</b>	Two	White/Amber	150°C – 10 min 80°C – 6 hours	> 819,200 cPs	≥90°C	≥5 kg/1,700 psi	4.57	350°C	16 x 10 <sup>-6</sup> 81 x 10 <sup>-6</sup>	6 hours	1 year
	<b>930-4</b>	Two	Ivory/Amber	150°C – 10 min 80°C – 6 hours	12,000-17,000 cPs @ 20 rpm	≥90°C	≥15 kg/5,100 psi	1.67	425°C	27 x 10 <sup>-6</sup> 136 x 10 <sup>-6</sup>	1 day	1 year
	<b>T7109</b>	Two	White/White	150°C – 10 min 80°C – 8 hours	14,000-20,000 cPs @ 20 rpm	≥45°C	≥15 kg/5,100 psi	0.7 (40 mil) 1.5 (3 mil)	377°C	46 x 10 <sup>-6</sup> 239 x 10 <sup>-6</sup>	4 hours	1 year
	<b>T7109-19</b>	Two	Grey/Grey	80°C – 2 hours 23°C – 2 days	40,000-70,000 cPs @ 5 rpm	<40°C	5 kg/1,700 psi	1.3	338°C	59 x 10 <sup>-6</sup> 216 x 10 <sup>-6</sup>	2 hours	1 year
	<b>T905-BN3</b>	Two	Grey/Grey	80°C – 2 hours	2,000-7,000 cPs @ 50 rpm	≥40°C	≥10 kg/3,400 psi	2.02	347°C	37 x 10 <sup>-6</sup> 151 x 10 <sup>-6</sup>	3 hours	1 year
<b>STANDARD</b>	<b>H70E</b>	Two	Grey/Grey	175°C – 1 min 80°C – 90 min	4,000-7,000 cPs @ 50 rpm	≥80°C	≥10 kg/3,400 psi	0.9	451°C	15 x 10 <sup>-6</sup> 64 x 10 <sup>-6</sup>	56 hours	1 year
	<b>H77</b>	Two	Grey/Grey	150°C – 1 hour	6,000-12,000 cPs @ 20 rpm	≥80°C	≥5 kg/1,700 psi	0.66	405°C	33 x 10 <sup>-6</sup> 130 x 10 <sup>-6</sup>	6 hours	1 year
	<b>T7110</b>	Two	Grey/Grey	150°C – 15 min 23°C – 3 days	1,400-2,200 cPs @ 100 rpm	≥40°C	≥10 kg/3,400 psi	1.0	314°C	31 x 10 <sup>-6</sup> 142 x 10 <sup>-6</sup>	3.5 hours	1 year



## About Us

Since 1966, Epoxy Technology Inc. (EPO-TEK®) has manufactured high quality specialty adhesives for advanced industries worldwide.

All Epoxy Technology products are tested thoroughly and consistently in our state-of-the-art laboratories to ensure product reliability. Epoxy Technology is very proud of its recognized quality program, including comprehensive ISO 9001 and MIL-STD 883/5011 certifications as well as RoHS Compliance and Green Partnership. As leaders in the industry, superior product quality, exceptional customer service and unsurpassed technical assistance are the foundation of our business.

EPO-TEK produces a full range of premium epoxy adhesives and coatings for several markets including:

- Semiconductor
- Aerospace
- Optoelectronic
- Photovoltaic
- Medical
- Military
- Automotive
- Electronics Assembly



Please consult our *Application Experts* at Epoxy Technology to find the most suitable adhesives for specific technical challenges at: [techserv@epotek.com](mailto:techserv@epotek.com).



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