



**Flip Chip Materials** 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 (60mil 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.)
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>	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

CAPILLARY UNDERFILL

301-2	Two	Clear/ Colorless	80°C – 3 hours Room Temp – 2 days	225-425 cPs @ 100 rpm	>80°C	≥15 kg/5,100 psi	1.5318	>99% @ 400-1200 >98% @ 1200-1600	360°C	61 x 10 <sup>-6</sup> 180 x 10 <sup>-6</sup>	8 hour	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 – 60 min 80°C – 3 hours	4,751 cPs @ 20 rpm	127°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

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>	24 hours	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												
E4110-PFC	Two	Silver/Silver	150°C – 1 hour 120°C – 1 hour	50,000-60,000 cPs @ 5 rpm	≥40°C	≥5 kg/1,700 psi	N/A	N/A	337°C	48 x 10 <sup>-6</sup> 207 x 10 <sup>-6</sup>	2-3 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
H20E-PFC	Two	Silver/Silver	175°C – 45 seconds 80°C – 3 hours	3,000-4,000 cPs @ 100 rpm	≥80°C	≥5 kg/1,700 psi	N/A	N/A	407°C	21 x 10 <sup>-6</sup> 94 x 10 <sup>-6</sup>	3 days	1 year

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



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