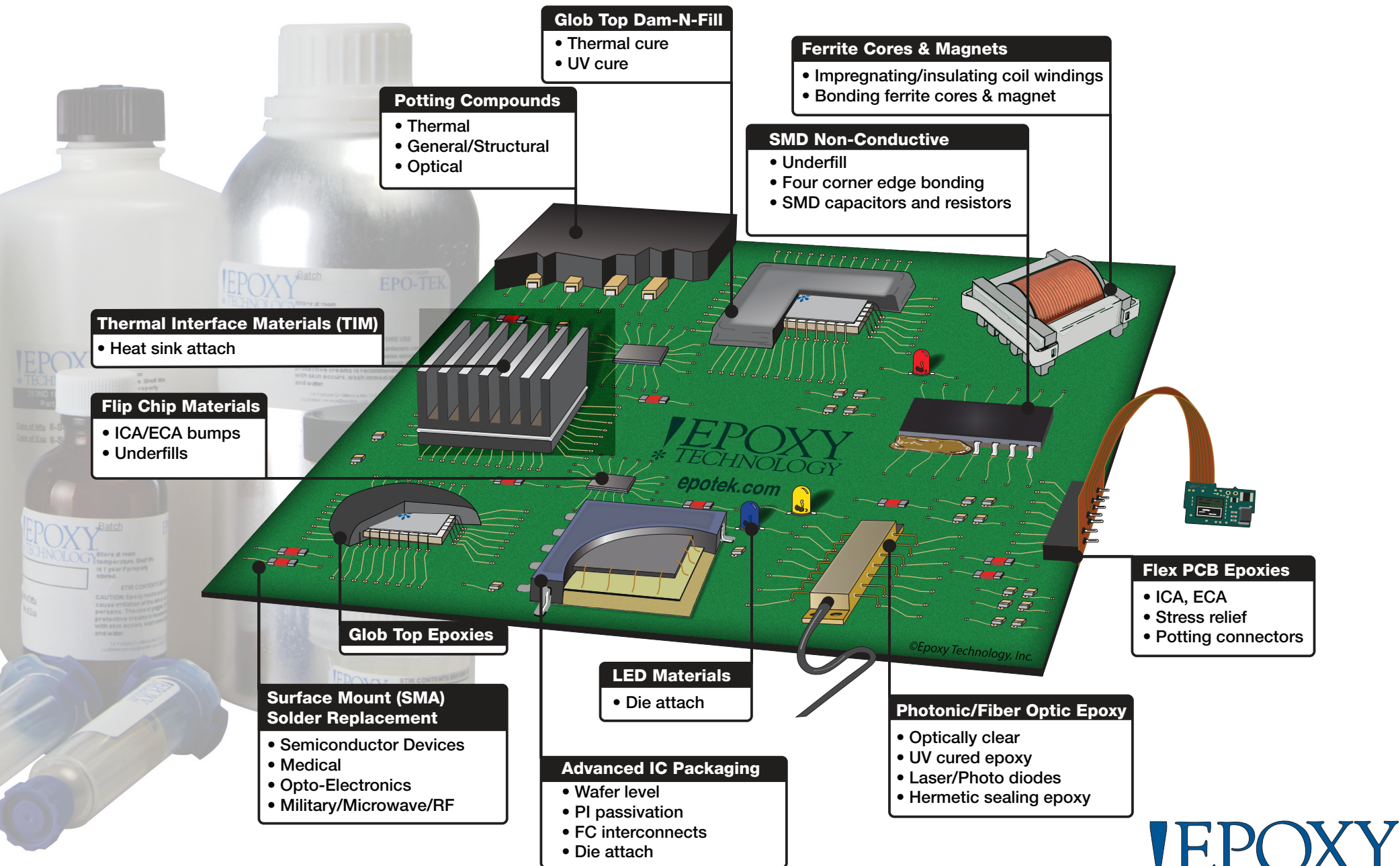


EPO-TEK® Adhesives Applications — PCB View



EPO-TEK® Specialty Adhesive Products + Advanced Packaging Techniques = Premium Adhesive Performance

Epoxy Technology Inc. is a global leader in formulating, manufacturing and packaging specialty adhesives. We have **Certified Packaging Centers of Excellence** in North America, Europe and Asia.

Our specialty formulated adhesives are packaged with meticulous attention to specifications in the following packaging options:

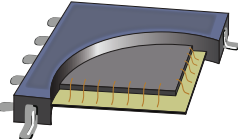
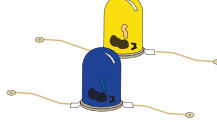
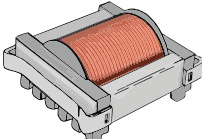
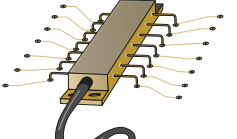
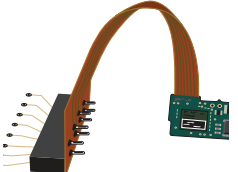
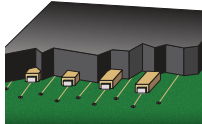
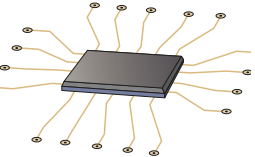
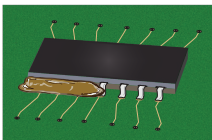
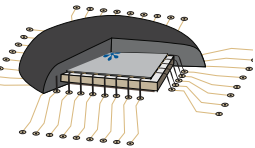
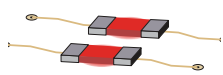
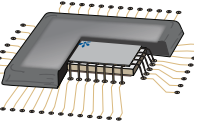
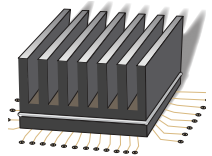
- Premixed and Frozen (PMF) Syringes
- Room Temperature Stabilized Syringes
- Bi-Packs
- Cartridges
- Bulk Jars/Bottles

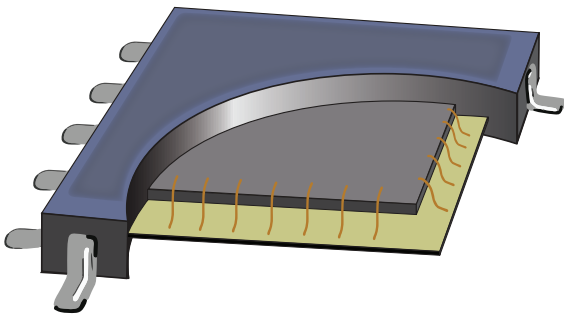
Why Use EPO-TEK® Specialty Packaged Adhesives?

- Increased Reliability/Consistency/Uniformity
 - Precise Mix Ratio, Lot to Lot
- Cost Effective
 - Time Saving in Preparation of Material, Increased Productivity
- Less Exposure to Chemical Hazards, Reduced Waste, and Lower Environmental Impact
- Ease of Use
 - Convenient, No Measuring, No Mixing, Ready to Use, Stress Free



Table of PCB 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.

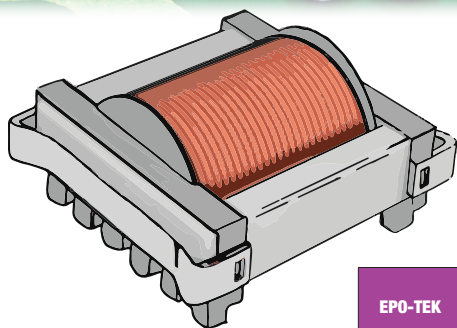
EPO-TEK® adhesives are used in several areas including:

- 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.

| | | EPO-TEK | 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 (No) | SPECTRAL TRANSMISSION | TGA DEGRADATION TEMPERATURE | CTE Below Tg/ Above Tg (in/in/°C) | POT LIFE (@ room temp.) | SHELF LIFE (@ room temp. unless noted) |
|--------------|---------------------|-------------|--------------------------------------|------------------------------------|-------------------------------|-----------------------------------|---|--------------------------|--|--|---|-------------------------|--|
| WAFAER LEVEL | ASSEMBLY | 353ND | Amber/Dark Red | 150°C – 1 min 80°C – 30 min | 3,000-5,000 cPs @ 50 rpm | ≥90°C | ≥15 kg/5,334 psi | 1.5694 | >50% @ 550 nm >98% @ 800-1000 nm >95% @ 1100-1600 nm | 412°C | 54 x 10 ⁻⁶ 206 x 10 ⁻⁶ | ≤3 hours | 1 year |
| | | 377 | Amber/Dark Amber | 150°C – 1 hour | 150-300 cPs @ 100 rpm | ≥95°C | ≥10 kg/3,556 psi | 1.5195 | >90% @ 600-1000 nm >98% @ 1000-6800 nm | 375°C | 57 x 10 ⁻⁶ 210 x 10 ⁻⁶ | 24 hours | 1 year |
| | COATING | TV1002 | 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 ⁻⁶ 139 x 10 ⁻⁶ | 28 day dry time | 1 year |
| TV1003 | | Ivory/Ivory | 150°C – 1 hour + 275°C – 1 hour | 325,000-525,000 cPs @ 0.5 rpm | ≥200°C | 1.4 kg/498 psi | N/A | N/A | 541°C | 28 x 10 ⁻⁶ 36 x 10 ⁻⁶ | 28 day dry time | 1 year | |
| TV1003-LV | | 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 ⁻⁶ 36 x 10 ⁻⁶ | 28 day dry time | 1 year | |
| ELECTRICALLY | FLIP CHIP | E2101 | Silver/Silver | 175°C – 15 min 150°C – 1 hour | 15,000-18,000 cPs @ 20 rpm | ≥90°C | ≥5 kg/1,778 psi | N/A | N/A | 401°C | 48 x 10 ⁻⁶ 192 x 10 ⁻⁶ | 5 days | 1 year |
| | | EJ2189LV | Silver/Silver | 150°C – 15 min 23°C – 3 days | 25,000-45,000 cPs @ 1 rpm | ≥40°C | ≥10 kg/3,556 psi | N/A | N/A | 340°C | 52 x 10 ⁻⁶ 89 x 10 ⁻⁶ | 4 hours | 1 year |
| ELECTRICALLY | ADVANCED DIE ATTACH | EK1000-1 | Silver/Silver | 200°C – 30 min 150°C – 1 hour | 13,000-21,000 cPs @ 10 rpm | ≥80°C | >10 kg/3,556 psi | N/A | N/A | 372°C | 41 x 10 ⁻⁶ 162 x 10 ⁻⁶ | 2 weeks | 1 year @ -40°C |
| | | H20E | Silver/Silver | 150°C – 5 min 80°C – 3 hours | 2,200-3,200 cPs @ 100 rpm | ≥80°C | >10 kg/3,556 psi | N/A | N/A | 425°C | 31 x 10 ⁻⁶ 158 x 10 ⁻⁶ | 2.5 days | 1 year |

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

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.

FERRITE CORES

| EPO-TEK | 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 | Amber/Dark Red | 150°C – 1 min 80°C – 30 min | 3,000-5,000 cPs @ 50 rpm | ≥90°C | ≥15 kg/5,334 psi | 1.5694 | >50% @ 550 nm >98% @ 800-1000 nm >95% @ 1100-1600 nm | 412°C | 54 x 10 ⁻⁶ 206 x 10 ⁻⁶ | ≤3 hours | 1 year |
| 353ND-T | Tan/Dark Red | 150°C – 1 min 80°C – 30 min | 9,000-15,000 cPs @ 20 rpm | ≥90°C | ≥15 kg/5,334 psi | N/A | N/A | 409°C | 43 x 10 ⁻⁶ 231 x 10 ⁻⁶ | 3 hours | 1 year |
| 930-4 | Ivory/Amber | 150°C – 10 min 80°C – 6 hours | 12,000-17,000 cPs @ 20 rpm | ≥90°C | ≥15 kg/5,334 psi | N/A | N/A | 425°C | 27 x 10 ⁻⁶ 136 x 10 ⁻⁶ | 1 day | 1 year |
| T7109 | White/White | 150°C – 10 min 80°C – 8 hours | 14,000-20,000 cPs @ 20 rpm | ≥45°C | ≥15 kg/5,334 psi | N/A | N/A | 377°C | 46 x 10 ⁻⁶ 239 x 10 ⁻⁶ | 4 hours | 1 year |

CU COIL WINDINGS

| | | | | | | | | | | | |
|-------|------------------|---------------------------------|--------------------------|-------|------------------|--------|--|-------|---|----------|--------|
| 353ND | Amber/Dark Red | 150°C – 1 min 80°C – 30 min | 3,000-5,000 cPs @ 50 rpm | ≥90°C | ≥15 kg/5,334 psi | 1.5694 | >50% @ 550 nm >98% @ 800-1000 nm >95% @ 1100-1600 nm | 412°C | 54 x 10 ⁻⁶ 206 x 10 ⁻⁶ | ≤3 hours | 1 year |
| 360 | Amber/Dark Amber | 150°C – 1 min 100°C – 10 min | 350-550 cPs @ 100 rpm | ≥90°C | ≥10 kg/5,556 psi | 1.5345 | >97% @ 700-1600 nm >88% @ 600 nm >51% @ 500 nm | 375°C | 39 x 10 ⁻⁶ 175 x 10 ⁻⁶ | 6 hours | 1 year |
| 377 | Amber/Dark Amber | 150°C – 1 hour | 150-300 cPs @ 100 rpm | ≥95°C | ≥10 kg/5,556 psi | 1.5195 | >99% @ 600 nm >95% @ 1000-1500 nm | 375°C | 57 x 10 ⁻⁶ 210 x 10 ⁻⁶ | 24 hours | 1 year |

PLASTIC IC PACKAGING

| | | | | | | | | | | | |
|--------|-------------------|--------------------------------|----------------------------|-------|------------------|--------|--------------------|-------|---|---------|----------------|
| OD1001 | Cream/Amber Cream | 125°C – 1 hour | 1,000-1,500 cPs @ 100 rpm | >35°C | ≥15 kg/5,334 psi | 1.5413 | <50% @ 300-1200 nm | 355°C | 66 x 10 ⁻⁶ 211 x 10 ⁻⁶ | 28 days | 1 year @ -40°C |
| TD1001 | White/Ivory | 125°C – 1 hour | 10,000-22,000 cPs @ 5 rpm | ≥40°C | ≥15 kg/5,334 psi | N/A | N/A | 436°C | 57 x 10 ⁻⁶ 213 x 10 ⁻⁶ | 28 days | 1 year @ -40°C |
| TV2001 | Yellow/Brown | 160°C – 5 min 80°C – 90 min | 10,000-20,000 cPs @ 20 rpm | ≥15°C | ≥15 kg/5,334 psi | N/A | N/A | 466°C | 67 x 10 ⁻⁶ 189 x 10 ⁻⁶ | 2 days | 1 year |

TRANSFORMER POTTING

| | | | | | | | | | | | |
|----------|-------------|-------------------------------|----------------------------|-------|------------------|-----|-----|-------|---|---------|--------|
| T905-BN3 | Grey/Grey | 80°C – 2 hours | 2,000-7,000 cPs @ 50 rpm | ≥40°C | ≥10 kg/5,556 psi | N/A | N/A | 347°C | 37 x 10 ⁻⁶ 151 x 10 ⁻⁶ | 3 hours | 1 year |
| T905-BN4 | White/White | 80°C – 1 hour 23°C – 1 day | 12,000-18,000 cPs @ 20 rpm | ≥50°C | ≥5 kg/1,778 psi | N/A | N/A | 350°C | 24 x 10 ⁻⁶ 120 x 10 ⁻⁶ | 1 hour | 1 year |

GENERAL POTTING

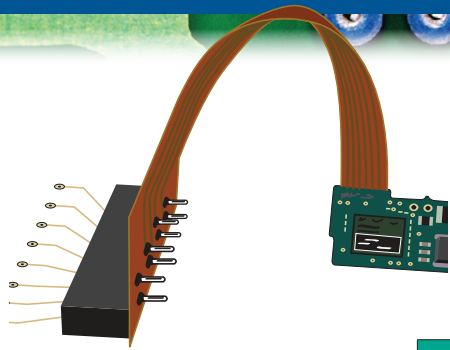
| | | | | | | | | | | | |
|---------|-----------------|-----------------------------------|---------------------------|-------|------------------|--------|--|-------|---|-----------|--------|
| 301-2 | Clear/Colorless | 80°C – 3 hours 23°C – 2 days | 225-425 cPs @ 100 rpm | >80°C | ≥15 kg/5,334 psi | 1.5318 | >94% @ 300 nm >99% @ 400-1200 nm >98% @ 1200-1600 nm | 360°C | 61 x 10 ⁻⁶ 180 x 10 ⁻⁶ | 8 hours | 1 year |
| 730-110 | Yellow/Yellow | 80°C – 2 hours 23°C – 24 hours | 8,000-12,000 cPs @ 20 rpm | ≥50°C | ≥10 kg/5,556 psi | 1.5275 | >95% @ 480-1640 nm | 343°C | 61 x 10 ⁻⁶ 192 x 10 ⁻⁶ | 1 hour | 1 year |
| T7110 | Grey/Grey | 150°C – 10 min 23°C – 3 days | 1,400-2,200 cPs @ 100 rpm | ≥40°C | ≥10 kg/5,556 psi | N/A | N/A | 314°C | 31 x 10 ⁻⁶ 142 x 10 ⁻⁶ | 3.5 hours | 1 year |
| T905-1 | Grey/Grey | 80°C – 1 hour 23°C – 1 day | 6,000-13,000 cPs @ 20 rpm | ≥40°C | ≥15 kg/5,334 psi | N/A | N/A | 346°C | 25 x 10 ⁻⁶ 130 x 10 ⁻⁶ | 30 min | 1 year |

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



For downloading Data Sheets and SDS, visit the Technical Info section of our website - www.epotek.com

For ordering information contact Epoxy Technology Inc. • customerservice@epotek.com, phone 978-667-3805



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.

LCD/OLED/
DISPLAYS

RFID

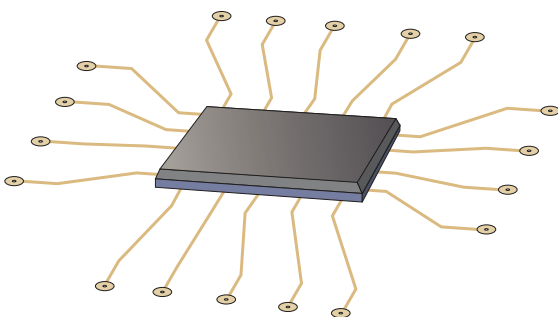
ELECTRICAL
CONNECTIONS

IMPLANTABLE
MEDICAL DEVICES

INK JETTING
INDUSTRY

| EPO-TEK | COLOR Before/ After CURE (thin film) | CURE TEMPERATURE (minimal) | VISCOSITY @ 23°C | GLASS TRANSITION TEMPERATURE (T _g) | DIE SHEAR STRENGTH @ RT (80mil x 80mil) | INDEX OF REFRACTION (n _d) | SPECTRAL TRANSMISSION | TGA DEGRADATION TEMPERATURE | CTE Below T _g / Above T _g (in/in/°C) | POT LIFE (@ room temp.) | SHELF LIFE (@ room temp. unless noted) | |
|--|--|----------------------------------|---|--|--|---|-----------------------|--|--|---|--|--------|
| ITO | EJ2189LV | Silver/Silver | 150°C – 15 min 23°C – 3 days | 25,000-45,000 cPs @ 1 rpm | ≥40°C | ≥10 kg/3,556 psi | N/A | N/A | 340°C | 52 x 10 ⁻⁶ 89 x 10 ⁻⁶ | 4 hours | 1 year |
| | H20E | Silver/Silver | 150°C – 5 min 80°C – 3 hours | 2,200-3,200 cPs @ 100 rpm | ≥80°C | ≥10 kg/3,556 psi | N/A | N/A | 425°C | 31 x 10 ⁻⁶ 158 x 10 ⁻⁶ | 2.5 days | 1 year |
| GLOB TOP LCD TO KAPTON | 0G116-31 | White/White | 100mW/cm ² for >30 sec @ 240-365 nm | 20,000-30,000 cPs @ 10 rpm | ≥115°C | ≥10 kg/3,556 psi | 1.5665 | >96% @ 660-1640 nm >92% @ 500 nm | 409°C | 41 x 10 ⁻⁶ 170 x 10 ⁻⁶ | N/A | 1 year |
| | T7109-19 | Grey/Grey | 80°C – 2 hours 23°C – 2 days | 40,000-70,000 cPs @ 5 rpm | ≥40°C | 5 kg/1,778 psi | N/A | N/A | 338°C | 59 x 10 ⁻⁶ 216 x 10 ⁻⁶ | 2 hours | 1 year |
| DIE ATTACH | EJ2189LV | Silver/Silver | 150°C – 15 min 23°C – 3 days | 25,000-45,000 cPs @ 1 rpm | ≥40°C | ≥10 kg/3,556 psi | N/A | N/A | 340°C | 52 x 10 ⁻⁶ 89 x 10 ⁻⁶ | 4 hours | 1 year |
| ELECTRICAL CONNECTIONS | H20E | Silver/Silver | 150°C – 5 min 80°C – 3 hours | 2,200-3,200 cPs @ 100 rpm | ≥80°C | ≥10 kg/3,556 psi | N/A | N/A | 425°C | 31 x 10 ⁻⁶ 158 x 10 ⁻⁶ | 2.5 days | 1 year |
| ELECTRICAL CONNECTIONS AU/KAPTON | MED-H20E | Silver/Silver | 150°C – 1.5 hours | 2,200-3,200 cPs @ 100 rpm | ≥80°C | ≥10 kg/3,556 psi | N/A | N/A | 432°C | 58 x 10 ⁻⁶ 278 x 10 ⁻⁶ | 2.5 days | 1 year |
| STRUCTURAL AND PROTECTION | MED-301 | Clear/ Colorless | 65°C – 1 hour | 100-200 cPs @ 100 rpm | ≥65°C | ≥15 kg/5,334 psi | 1.5193 | ≥98% @ 360-1660 nm ≥95% @ 1680-2060 nm | 335°C | 59 x 10 ⁻⁶ 134 x 10 ⁻⁶ | 1-2 hours | 1 year |
| | MED-302-3M | Clear/ Colorless | 80°C – 2 hours | 800-1,600 cPs @ 100 rpm | ≥55°C | ≥10 kg/3,556 psi | 1.5458 | ≥97% @ 360-1620 nm | 379°C | 56 x 10 ⁻⁶ 193 x 10 ⁻⁶ | <1 hour | 1 year |
| | MED-353ND | Amber/ Dark Red | 150°C – 1.5 hours | 3,000-5,000 cPs @ 50 rpm | ≥90°C | ≥10 kg/3,556 psi | 1.5701 | ≥89% @ 860-1600 nm | 413°C | 51 x 10 ⁻⁶ 178 x 10 ⁻⁶ | ≤3 hours | 1 year |
| ELECTRICAL BRIDGE F-PCB TO AU/PZT PADS | E2101 | Silver/Silver | 175°C – 15 min 150°C – 1 hour | 15,000-18,000 cPs @ 20 rpm | ≥90°C | ≥5 kg/1,778 psi | N/A | N/A | 401°C | 48 x 10 ⁻⁶ 192 x 10 ⁻⁶ | 5 days | 1 year |
| STRUCTURAL KAPTON TO PIEZO CERAMIC | 353ND | Amber/ Dark Red | 150°C – 1 min 80°C – 30 min | 3,000-5,000 cPs @ 50 rpm | ≥90°C | ≥15 kg/5,334 psi | 1.5694 | >50% @ 550 nm >98% @ 800-1000 nm >95% @ 1100-1600 nm | 412°C | 54 x 10 ⁻⁶ 206 x 10 ⁻⁶ | ≤3 hours | 1 year |

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

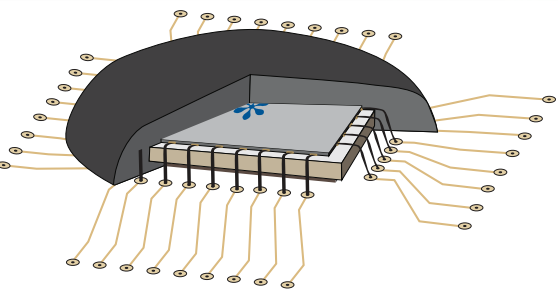


Flip Chip Applications are provided in two types: **electrically insulating underfills** and **electrically conductive interconnect epoxies**. **EPO-TEK® underfill materials** provide extra strength and support to devices for holding electrical connections in place and decreasing the number of part failures. 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.

| | | EPO-TEK | 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. unless noted) | | |
|--|-----------|---|--------------------------------------|------------------------------------|----------------------------------|-----------------------------------|---|--|-------------------------------------|---|---|---|--|--------|--|
| UNFILLED | EDGE BOND | 353ND-T | Tan/Dark Red | 150°C – 1 min 80°C – 30 min | 9,000-15,000 cPs @ 20 rpm | ≥90°C | ≥15 kg/5,334 psi | N/A | N/A | 409°C | 43 x 10 ⁻⁶ 231 x 10 ⁻⁶ | 3 hours | 1 year | | |
| | | 0E188 | Off-White/ Off-White | 150°C – 1 min 80°C – 30 min | 20,000-30,000 cPs @ 10 rpm | ≥90°C | ≥15 kg/5,334 psi | N/A | N/A | 420°C | 19 x 10 ⁻⁶ 68 x 10 ⁻⁶ | 1.5 hours | 1 year | | |
| | | 0G116-31 | White/White | 100mW/cm² for >30 sec @ 240-365 nm | 20,000-30,000 cPs @ 10 rpm | ≥115°C | ≥10 kg/3,556 psi | 1.5665 | >96% @ 660-1640 nm >92% @ 500 nm | 409°C | 41 x 10 ⁻⁶ 170 x 10 ⁻⁶ | N/A | 1 year | | |
| | 301-2 | Clear/ Colorless | 80°C – 3 hours 23°C – 2 days | 225-425 cPs @ 100 rpm | ≥80°C | ≥15 kg/5,334 psi | 1.5318 | >94% @ 300 nm >99% @ 400-1200 nm >98% @ 1200-1600 nm | 360°C | 61 x 10 ⁻⁶ 180 x 10 ⁻⁶ | 8 hours | 1 year | | | |
| | 330 | Amber/ Dark Amber | 150°C – 1 min 80°C – 30 min | 350-550 cPs @ 100 rpm | ≥90°C | ≥10 kg/3,556 psi | 1.5345 | >97% @ 700-1600 nm >88% @ 600 nm >51% @ 500 nm | 369°C | 65 x 10 ⁻⁶ 162 x 10 ⁻⁶ | 6 hours | 1 year | | | |
| | 353ND | Amber/ Dark Red | 150°C – 1 min 80°C – 30 min | 3,000-5,000 cPs @ 50 rpm | ≥90°C | ≥15 kg/5,334 psi | 1.5694 | >50% @ 550 nm >98% @ 800-1000 nm >95% @ 1100-1600 nm | 412°C | 54 x 10 ⁻⁶ 206 x 10 ⁻⁶ | ≤3 hours | 1 year | | | |
| | 0E121 | Light Yellow/ Yellow | 90°C – 1 hour 23°C – 2 days | 300-500 cPs @ 100 rpm | ≥55°C | ≥15 kg/5,334 psi | 1.5271 | >94% @ 380-1640 nm | 350°C | 43 x 10 ⁻⁶ 158 x 10 ⁻⁶ | 5 hours | 1 year | | | |
| | U300-2 | Amber/ Dark Amber | 150°C – 1 hour 80°C – 3 hours | 3,700-6,700 cPs @ 20 rpm | ≥115°C | ≥20 kg/7,112 psi | 1.5746 | >97% @ 600-2100 nm | 425°C | 55 x 10 ⁻⁶ 184 x 10 ⁻⁶ | 2 days | 1 year | | | |
| | FILLED | Thermally Conductive TCA Underfill | | | | | | | | | | | | | |
| | | DIE ATTACH | 930-4 | Ivory/Amber | 150°C – 10 min 80°C – 6 hours | 12,000-17,000 cPs @ 20 rpm | ≥90°C | ≥15 kg/5,334 psi | N/A | N/A | 425°C | 27 x 10 ⁻⁶ 136 x 10 ⁻⁶ | 1 day | 1 year | |
| T7109 | | | White/White | 150°C – 10 min 80°C – 8 hours | 14,000-20,000 cPs @ 20 rpm | ≥45°C | ≥15 kg/5,334 psi | N/A | N/A | 377°C | 46 x 10 ⁻⁶ 239 x 10 ⁻⁶ | 4 hours | 1 year | | |
| Electrically Conductive ECA Inter Connect | | | | | | | | | | | | | | | |
| DIE ATTACH | H20E | Silver/Silver | 150°C – 5 min 80°C – 3 hours | 2,200-3,200 cPs @ 100 rpm | ≥80°C | ≥10 kg/3,556 psi | N/A | N/A | 425°C | 31 x 10 ⁻⁶ 158 x 10 ⁻⁶ | 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 | 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 | TJ2139-LH-Black | 200°C - 5 min 180°C - 15 min | 25,000-35,000 cPs @ 10 rpm | ≥100°C | >30 kg/10,668 psi | N/A | <1% @ 300-2150 nm | 411°C | 45 x 10 ⁻⁶ 137 x 10 ⁻⁶ | 2.5 days | 1 year |
| | H70E-2 | 175°C - 1 min 80°C - 90 min | 9,000-15,000 cPs @ 20 rpm | ≥80°C | >5 kg/1,778 psi | N/A | N/A | 447°C | 20 x 10 ⁻⁶ 112 x 10 ⁻⁶ | 2 days | 1 year |
| | T7139 | 150°C - 30 min 125°C - 60 min | 5,000-7,000 cPs @ 50 rpm | ≥90°C | >10 kg/3,556 psi | N/A | N/A | 438°C | 30 x 10 ⁻⁶ 76 x 10 ⁻⁶ | 1 day | 1 year |
| CLEAR | 301 | 65°C - 1 hour 23°C - 24 hours | 100-200 cPs @ 100 rpm | ≥65°C | >10 kg/3,556 psi | 1.5190 | >99% @ 382-980 nm >97% @ 980-1640 nm >95% @ 1640-2040 nm | 430°C | 39 x 10 ⁻⁶ 98 x 10 ⁻⁶ | 1-2 hours | 1 year |
| | 301-2 | 80°C - 3 hours 23°C - 2 days | 225-425 cPs @ 100 rpm | ≥80°C | >15 kg/5,334 psi | 1.5318 | >94% @ 300 nm >99% @ 400-1200 nm >98% @ 1200-1600 nm | 360°C | 61 x 10 ⁻⁶ 180 x 10 ⁻⁶ | 8 hours | 1 year |
| | 301-2FL | 80°C - 3 hours 23°C - 3 days | 100-200 cPs @ 100 rpm | ≥45°C | >10 kg/3,556 psi | 1.5115 | >99% @ 400-1000 nm >97% @ 1000-1600 nm | 325°C | 56 x 10 ⁻⁶ 211 x 10 ⁻⁶ | 10 hours | 1 year |
| | 310M-2 | 65°C - 2 hours 23°C - 24 hours | 250-325 cPs @ 100 rpm | ≤30°C | 5 kg/1,778 psi | 1.4947 | >98% @ 380-1660 nm | 331°C | 67 x 10 ⁻⁶ 201 x 10 ⁻⁶ | 1.5 hours | 1 year |
| SOFT | 310M-2 | 65°C - 2 hours 23°C - 24 hours | 250-325 cPs @ 100 rpm | ≤30°C | 5 kg/1,778 psi | 1.4947 | >98% @ 380-1660 nm | 331°C | 67 x 10 ⁻⁶ 201 x 10 ⁻⁶ | 1.5 hours | 1 year |
| | T7109-19 | 80°C - 2 hours 23°C - 2 days | 40,000-70,000 cPs @ 5 rpm | ≥40°C | 5 kg/1,778 psi | N/A | N/A | 338°C | 59 x 10 ⁻⁶ 216 x 10 ⁻⁶ | 2 hours | 1 year |
| UV | 0G116-31 | 100mW/cm ² for >30 sec @ 240-365 nm | 20,000-30,000 cPs @ 10 rpm | ≥115°C | >10 kg/3,556 psi | 1.5662 | >96% @ 660-1640 nm >92% @ 500 nm | 409°C | 41 x 10 ⁻⁶ 170 x 10 ⁻⁶ | N/A | 1 year |
| | 0G133-8 | 100mW/cm ² for >90 sec @ 240-365 nm | 1,000-1,500 cPs @ 100 rpm | ≤10°C | ≥3.2 kg/1,138 psi | 1.5050 | >90% @ 580-800 nm >95% @ 820-1660 nm | 353°C | 43 x 10 ⁻⁶ 222 x 10 ⁻⁶ | N/A | 1 year |
| | 0G675 | 100mW/cm ² for >2 sec @ 240-365 nm | 2,000-5,000 cPs @ 100 rpm | ≥-5°C | N/A | 1.479 | >98% @ 400-1660 nm | 365°C | 41 x 10 ⁻⁶ 201 x 10 ⁻⁶ | N/A | 1 year |
| | 0G198-55 | 100mW/cm ² for >30 sec @ 240-365 nm | 1,200-2,000 cPs @ 100 rpm | ≥120°C | ≥20 kg/7,112 psi | 1.5196 | >97% @ 560-1680 nm | 354°C | 72 x 10 ⁻⁶ 120 x 10 ⁻⁶ | N/A | 1 year refrigerated |

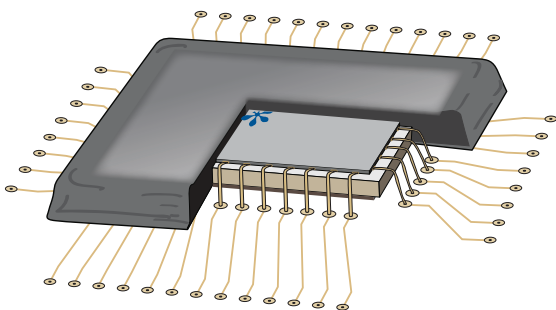
N/A - not applicable, as these are filled systems



For downloading Data Sheets and SDS, visit the Technical Info section of our website - www.epotek.com

For ordering information contact Epoxy Technology Inc. • customerservice@epotek.com, phone 978-667-3805

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.

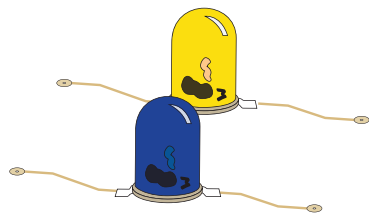
| | EPO-TEK | COLOR Before/After CURE (thin film) | CURE TEMPERATURE (minimal) | VISCOSITY @ 23°C | GLASS TRANSITION TEMPERATURE (Tg) | DIE SHEAR STRENGTH @ RT (80mil x 80mil) | INDEX OF REFRACTION (Nd) | SPECTRAL TRANSMISSION | TGA DEGRADATION TEMPERATURE | CTE Below Tg/ Above Tg (in/in/°C) | POT LIFE (@ room temp.) | SHELF LIFE (@ room temp. unless noted) | |
|------|-----------|-------------------------------------|--|---|-----------------------------------|---|--------------------------|-------------------------------------|--|---|---|--|--------|
| DAM | EPOXY | 353ND-T | Tan/Dark Red | 150°C – 1 min 80°C – 30 min | 9,000-15,000 cPs @ 20 rpm | ≥90°C | N/A | N/A | 409°C | 43 x 10 ⁻⁶ 231 x 10 ⁻⁶ | 3 hours | 1 year | |
| | | 730 | 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/3,556 psi | N/A | N/A | 364°C | 66 x 10 ⁻⁶ 248 x 10 ⁻⁶ | 1 hour | 1 year |
| | | H70E-2 | Black/Black | 175°C – 1 min 80°C – 90 min | 9,000-15,000 cPs @ 20 rpm | ≥80°C | ≥5 kg/1,778 psi | N/A | N/A | 447°C | 20 x 10 ⁻⁶ 112 x 10 ⁻⁶ | 2 days | 1 year |
| UV | 0G116-31 | White/White | 100mW/cm ² for >30 sec @ 240-365 nm | 20,000-30,000 cPs @ 10 rpm | ≥115°C | ≥10 kg/3,556 psi | 1.5665 | >96% @ 660-1640 nm >92% @ 500 nm | 409°C | 41 x 10 ⁻⁶ 170 x 10 ⁻⁶ | N/A | 1 year | |
| | 0G198-55 | Cloudy/Cloudy | 100mW/cm ² for >30 sec @ 240-365 nm | 1,200-2,000 cPs @ 100 rpm | ≥120°C | 20 kg/7,112 psi | 1.5023 | > 97% @ 560-1680 nm | 354°C | 72 x 10 ⁻⁶ 120 x 10 ⁻⁶ | N/A | 1 year refrigerated | |
| FILL | EPOXY | 301 | Clear/Colorless | 65°C – 1 hour 23°C – 24 hours | 100-200 cPs @ 100 rpm | ≥65°C | ≥10 kg/3,556 psi | 1.5190 | >99% @ 382-980 nm 97% @ 980-1640 nm 95% @ 1640-2040 nm | 430°C | 39 x 10 ⁻⁶ 98 x 10 ⁻⁶ | 1-2 hours | 1 year |
| | | 301-2 | Clear/Colorless | 80°C – 3 hours 23°C – 2 days | 225-425 cPs @ 100 rpm | ≥80°C | >15 kg/5,334 psi | 1.5318 | >94% @ 300 nm 99% @ 400-1200 nm 98% @ 120-1600 nm | 360°C | 61 x 10 ⁻⁶ 180 x 10 ⁻⁶ | 8 hours | 1 year |
| | | 301-2FL | Clear/Colorless | 80°C – 3 hours 23°C – 3 days | 100-200 cPs @ 100 rpm | ≥45°C | ≥10 kg/3,556 psi | 1.5102 | ≥97% @ 1000-1600 nm ≥99% @ 400-6800 nm | 325°C | 56 x 10 ⁻⁶ 211 x 10 ⁻⁶ | 10 hours | 1 year |
| | | 310M-2 | Clear/Colorless | 65°C – 2 hours 23°C – 24 hours | 250-325 cPs @ 100 rpm | ≤30°C | 5 kg/1,778 psi | 1.4947 | >98% @ 380-1660 nm | 331°C | 67 x 10 ⁻⁶ 201 x 10 ⁻⁶ | 1.5 hours | 1 year |
| | | 377 | Amber/Dark Amber | 150°C – 1 hour | 150-300 cPs @ 100 rpm | ≥95°C | ≥10 kg/3,556 psi | 1.5195 | >90% @ 600-1000 nm >98% @ 1000-6800 nm | 375°C | 57 x 10 ⁻⁶ 210 x 10 ⁻⁶ | 24 hours | 1 year |
| UV | 0G142-87 | Clear/Colorless | 100mW/cm ² for >30 sec @ 240-365 nm | 250-600 cPs @ 100 rpm | ≥100°C | ≥25 kg/8,890 psi | 1.4925 | >97% @ 580-1660 nm | 384°C | 50 x 10 ⁻⁶ 162 x 10 ⁻⁶ | N/A | 1 year refrigerated | |
| | 0G142-112 | Clear/Colorless | 100mW/cm ² for >30 sec @ 240-365 nm | 1,200-1,700 cPs @ 100 rpm | ≥90°C | ≥20 kg/7,112 psi | 1.5374 | >97% @ 500-1660 nm | 384°C | 55 x 10 ⁻⁶ 158 x 10 ⁻⁶ | N/A | 1 year refrigerated | |

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



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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.

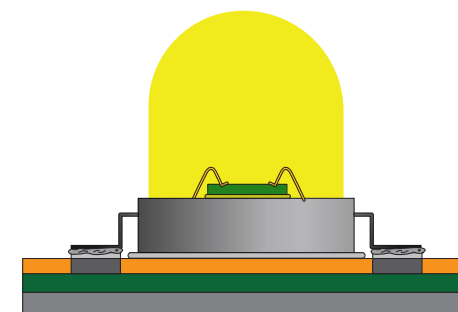
ELECTRICALLY
CONDUCTIVE

| EPO-TEK | COLOR Before/ After CURE (thin film) | CURE TEMPERATURE (minimal) | VISCOSITY @ 23°C | GLASS TRANSITION TEMPERATURE (Tg) | DIE SHEAR STRENGTH @ RT (80mil x 80mil) | TGA DEGRADATION TEMPERATURE | CTE Below Tg/ Above Tg (in/in/°C) | POT LIFE (@ room temp.) | SHELF LIFE (@ room temp. unless noted) |
|----------|--|----------------------------------|-------------------------------|---|--|-----------------------------------|---|----------------------------|--|
| EK1000 | Silver/Silver | 200°C – 30 min 150°C – 1 hour | 1,800-3,600 cPs @ 100 rpm | ≥80°C | >10 kg/3,556 psi | 357°C | 38 x 10 ⁻⁶ 94 x 10 ⁻⁶ | 2 weeks | 1 year @ -40°C |
| EK1000-1 | Silver/Silver | 200°C – 30 min 150°C – 1 hour | 13,000-21,000 cPs @ 10 rpm | ≥80°C | >10 kg/3,556 psi | 372°C | 41 x 10 ⁻⁶ 162 x 10 ⁻⁶ | 2 weeks | 1 year, refrigerated upon arrival |
| H20E | Silver/Silver | 150°C – 5 min 80°C – 3 hours | 2,200-3,200 cPs @ 100 rpm | ≥80°C | >10 kg/3,556 psi | 425°C | 31 x 10 ⁻⁶ 158 x 10 ⁻⁶ | 2.5 days | 1 year |
| H20E-HC | Silver/Silver | 175°C – 30 min 150°C – 1 hour | 3,500-6,000 cPs @ 50 rpm | N/A | ≥5 kg/1,778 psi | 372°C | 53 x 10 ⁻⁶ 80 x 10 ⁻⁶ | 2.5 days | 1 year |

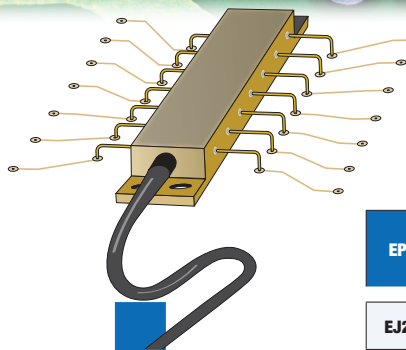
THERMALLY
CONDUCTIVE

| | | | | | | | | | |
|-------|-------------|----------------------------------|-------------------------------|-------|------------------|-------|---|----------|--------|
| H70E | Gray/Gray | 175°C – 1 min 80°C – 90 min | 4,000-7,000 cPs @ 50 rpm | ≥80°C | >10 kg/3,556 psi | 451°C | 15 x 10 ⁻⁶ 64 x 10 ⁻⁶ | 56 hours | 1 year |
| 930-4 | Ivory/Amber | 150°C – 10 min 80°C – 6 hours | 12,000-17,000 cPs @ 20 rpm | ≥90°C | >15 kg/5,334 psi | 425°C | 27 x 10 ⁻⁶ 136 x 10 ⁻⁶ | 1 day | 1 year |
| 930 | White/Amber | 150°C – 10 min 80°C – 6 hour | >819,200 cPs | ≥90°C | ≥5 kg/1,778 psi | 350°C | 16 x 10 ⁻⁶ 81 x 10 ⁻⁶ | 6 hours | 1 year |

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



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.

HIGH-POWER LASER

THERMAL INTERFACE MATERIAL

OPTICAL

EPOXY

UV

| EPO-TEK | 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) |
|----------|--------------------------------------|--|----------------------------|-----------------------------------|---|--------------------------|--|-----------------------------|---|-------------------------|--|
| EJ2189LV | Silver/Silver | 150°C – 15 min 23°C – 3 days | 25,000-45,000 cPs @ 1 rpm | ≥40°C | ≥9 kg/3,060 psi | N/A | N/A | 340°C | 52 x 10 ⁻⁶ 89 x 10 ⁻⁶ | 4 hours | 1 year |
| EK1000-1 | Silver/Silver | 200°C – 30 min 150°C – 1 hour | 13,000-21,000 cPs @ 10 rpm | ≥80°C | >10 kg/3,556 psi | N/A | N/A | 372°C | 41 x 10 ⁻⁶ 162 x 10 ⁻⁶ | 2 weeks | 1 year @ -40°C |
| EK1000 | Silver/Silver | 200°C – 30 min 150°C – 1 hour | 1,800-3,600 cPs @ 100 rpm | ≥80°C | >10 kg/3,556 psi | N/A | N/A | 357°C | 38 x 10 ⁻⁶ 94 x 10 ⁻⁶ | 2 weeks | 1 year, @ -40°C |
| H20E | Silver/Silver | 150°C – 5 mins 80°C – 3 hours | 2,200-3,200 cPs @ 100 rpm | ≥80°C | >10 kg/3,556 psi | N/A | N/A | 425°C | 31 x 10 ⁻⁶ 158 x 10 ⁻⁶ | 2.5 days | 1 year |
| H37-MP | Silver/Silver | 150°C – 1 hour | 22,000-26,000 cPs @ 10 rpm | ≥90°C | >10 kg/3,556 psi | N/A | N/A | 358°C | 52 x 10 ⁻⁶ 148 x 10 ⁻⁶ | 28 days | 1 year @ -40°C |
| 930-4 | Ivory/Amber | 150°C – 10 min 80°C – 6 hours | 12,000-17,000 cPs @ 20 rpm | ≥90°C | ≥15 kg/5,334 psi | N/A | N/A | 425°C | 27 x 10 ⁻⁶ 136 x 10 ⁻⁶ | 1 day | 1 year |
| T7109 | White/White | 150°C – 10 min 80°C – 8 hours | 14,000-20,000 cPs @ 20 rpm | ≥45°C | ≥15 kg/5,334 psi | N/A | N/A | 377°C | 46 x 10 ⁻⁶ 239 x 10 ⁻⁶ | 4 hours | 1 year |
| T7109-19 | Grey/Grey | 80°C – 2 hours 23°C – 2 days | 40,000-70,000 cPs @ 5 rpm | <40°C | ≥5 kg/1,778 psi | N/A | N/A | 338°C | 59 x 10 ⁻⁶ 216 x 10 ⁻⁶ | 2 hours | 1 year |
| 301 | Clear/Colorless | 65°C – 1 hour 23°C – 24 hours | 100-200 cPs @ 100 rpm | ≥65°C | >10 kg/3,556 psi | 1.5190 | >99% @ 382-980 nm >97% @ 980-1640 nm >95% @ 1640-2040 nm | 430°C | 39 x 10 ⁻⁶ 98 x 10 ⁻⁶ | 1-2 hours | 1 year |
| 301-2 | Clear/Colorless | 80°C – 3 hours 23°C – 2 days | 225-425 cPs @ 100 rpm | ≥80°C | ≥15 kg/5,334 psi | 1.5318 | >94% @ 300 nm >99% @ 400-1200 nm >98% @ 1200-1600 nm | 360°C | 61 x 10 ⁻⁶ 180 x 10 ⁻⁶ | 8 hours | 1 year |
| 301-2FL | Clear/Colorless | 80°C – 3 hours 23°C – 3 days | 100-200 cPs @ 100 rpm | ≥45°C | >10 kg/3,556 psi | 1.5102 | >99% @ 400-1000 nm >97% @ 1000-1600 nm | 325°C | 56 x 10 ⁻⁶ 211 x 10 ⁻⁶ | 10 hours | 1 year |
| 302-3M | Clear/Colorless | 65°C – 3 hours 23°C – 24 hours | 800-1,600 cPs @ 100 rpm | ≥55°C | >10 kg/3,556 psi | 1.5446 | >95% @ 460-1620 nm | 351°C | 56 x 10 ⁻⁶ 193 x 10 ⁻⁶ | 1 hour | 1 year |
| 353ND | Amber/Dark Red | 150°C – 1 min 80°C – 30 min | 3,000-5,000 cPs @ 50 rpm | ≥90°C | ≥15 kg/5,334 psi | 1.5694 | >50% @ 550 nm >98% @ 800-1000 nm >95% @ 1100-1600 nm | 412°C | 54 x 10 ⁻⁶ 206 x 10 ⁻⁶ | ≤3 hours | 1 year |
| 354-T | 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/3,556 psi | N/A | N/A | 485°C | 51 x 10 ⁻⁶ 179 x 10 ⁻⁶ | 3 days | 6 months |
| 360 | Amber/Dark Amber | 150°C – 1 min 100°C – 10 min | 350-550 cPs @ 100 rpm | ≥90°C | >10 kg/3,556 psi | 1.5345 | >97% @ 700-1600 nm >88% @ 600 nm >51% @ 500 nm | 375°C | 39 x 10 ⁻⁶ 175 x 10 ⁻⁶ | 6 hours | 1 year |
| 377 | Amber/Dark Amber | 150°C – 1 hour | 150-300 cPs @ 100 rpm | ≥95°C | >10 kg/3,556 psi | 1.5195 | >90% @ 600-1000 nm >95% @ 1000-6800 nm | 375°C | 57 x 10 ⁻⁶ 210 x 10 ⁻⁶ | 24 hours | 1 year |
| OG116-31 | White/White | 100mW/cm ² for >30 secs @ 240-365 nm | 20,000-30,000 cPs @ 10 rpm | ≥115°C | >10 kg/3,556 psi | 1.5665 | >96% @ 660-1640 nm >92% @ 500 nm | 409°C | 41 x 10 ⁻⁶ 170 x 10 ⁻⁶ | N/A | 1 year |
| OG142-95 | Clear/Colorless | 100mW/cm ² for >2 mins @ 240-365 nm | 534 cPs @ 100 rpm | N/M | 15.2 kg/5,168 psi | 1.4924 | >97% @ 580-1680 nm | 358°C | 50 x 10 ⁻⁶ 162 x 10 ⁻⁶ | 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 | COLOR Before/After CURE (thin film) | CURE TEMPERATURE (minimal) | VISCOSITY @ 23°C | GLASS TRANSITION TEMPERATURE (T _g) | DIE SHEAR STRENGTH @ RT (80mil x 80mil) | INDEX OF REFRACTION (Nd) | SPECTRAL TRANSMISSION | TGA DEGRADATION TEMPERATURE | CTE Below T _g / Above T _g (in/in/°C) | POT LIFE (@ room temp.) | SHELF LIFE (@ room temp. unless noted) | |
|--------------|-------------------------------------|----------------------------|-----------------------------------|--|---|--------------------------|-----------------------|--|--|---|--|-----------|
| OPTICAL | 301-2 | Clear/Colorless | 80°C – 3 hours 23°C – 2 days | 225-425 cPs @ 100 rpm | ≥80°C | ≥15 kg/5,334 psi | 1.5318 | >94% @ 300 nm >99% @ 400-1200 nm >98% @ 1200-1600 nm | 360°C | 61 x 10 ⁻⁶ 180 x 10 ⁻⁶ | 8 hours | 1 year |
| | 301-2FL | Clear/Colorless | 80°C – 3 hours 23°C – 3 days | 100-200 cPs @ 100 rpm | ≥45°C | ≥10 kg/3,556 psi | 1.5102 | >99% @ 400-1000 nm >97% @ 1000-1600 nm | 325°C | 56 x 10 ⁻⁶ 211 x 10 ⁻⁶ | 10 hours | 1 year |
| | 320NC-2 | Black/Black | 70°C – 1 hours 23°C – 24 hours | 1,500-3,000 cPs @ 100 rpm | ≥50°C | ≥10 kg/3,556 psi | N/A | <1% @ 300-2,500 nm | 340°C | 20 x 10 ⁻⁶ 82 x 10 ⁻⁶ | 30 min | 1 year |
| | 377 | Amber/Dark Amber | 150°C – 1 hour | 150-300 cPs @ 100 rpm | ≥95°C | ≥10 kg/3,556 psi | 1.5195 | > 90% @ 600-1000 nm > 98% @ 1000-6800 nm | 375°C | 57 x 10 ⁻⁶ 210 x 10 ⁻⁶ | 24 hours | 1 year |
| THERMAL | 920-FL | Grey/Grey | 150°C – 1 hour | 8,000-12,000 cPs @ 20 rpm | ≥90°C | ≥20 kg/7,112 psi | N/A | N/A | 362°C | 21 x 10 ⁻⁶ 97 x 10 ⁻⁶ | 7 hours | 1 year |
| | H77 | Grey/Grey | 150°C – 1 hour | 6,000-12,000 cPs @ 20 rpm | ≥80°C | ≥5 kg/1,778 psi | N/A | N/A | 405°C | 33 x 10 ⁻⁶ 130 x 10 ⁻⁶ | 6 hours | 1 year |
| | H77S | Grey/Dark Grey | 150°C – 1 hour | 950-1,500 cPs @ 20 rpm | ≥80°C | ≥15 kg/5,334 psi | N/A | N/A | 432°C | 39 x 10 ⁻⁶ 98 x 10 ⁻⁶ | 8 hours | 1 year |
| | T7110 | Grey/Grey | 150°C – 15 min 23°C – 3 days | 1,400-2,200 cPs @ 100 rpm | ≥40°C | ≥10 kg/3,556 psi | N/A | N/A | 314°C | 31 x 10 ⁻⁶ 142 x 10 ⁻⁶ | 3.5 hours | 1 year |
| | T905-BN3 | Grey/Grey | 80°C – 2 hours | 2,000-7,000 cPs @ 50 rpm | ≥40°C | ≥10 kg/3,556 psi | N/A | N/A | 347°C | 37 x 10 ⁻⁶ 151 x 10 ⁻⁶ | 3 hours | 1 year |
| SMALL VOLUME | 301 | Clear/Colorless | 65°C – 1 hour 23°C – 24 hours | 100-200 cPs @ 100 rpm | ≥65°C | ≥10 kg/3,556 psi | 1.5190 | >99% @ 382-980 nm >97% @ 980-1640 nm >95% @ 1640-2040 nm | 430°C | 39 x 10 ⁻⁶ 98 x 10 ⁻⁶ | 1-2 hours | 1 year |
| | 302-3M | Clear/Colorless | 65°C – 3 hours 23°C – 24 hours | 800-1,600 cPs @ 100 rpm | ≥55°C | ≥10 kg/3,556 psi | 1.5446 | >95% @ 460-1620 nm | 351°C | 56 x 10 ⁻⁶ 193 x 10 ⁻⁶ | 1 hour | 1 year |
| | 509FM-1 | Black/Black | 60°C – 2 hours 23°C – 1 day | 400-1,000 cPs @ 100 rpm | ≥40°C | ≥10 kg/3,556 psi | N/A | <5% @ 400-2500 nm | 365°C | 55 x 10 ⁻⁶ 191 x 10 ⁻⁶ | 20 min | 1 year |
| | H70E | Grey/Grey | 175°C – 1 min 80°C – 90 min | 4,000-7,000 cPs @ 50 rpm | ≥80°C | ≥10 kg/3,556 psi | N/A | N/A | 451°C | 15 x 10 ⁻⁶ 64 x 10 ⁻⁶ | 56 hours | 1 year |
| | H70S | Grey/Grey | 175°C – 1 min 80°C – 90 min | 1,300-1,800 cPs @ 100 rpm | ≥50°C | ≥10 kg/3,556 psi | N/A | N/A | 400°C | 40 x 10 ⁻⁶ 190 x 10 ⁻⁶ | 3 days | 1 year |
| GENERAL | 730-110 | Clear/Colorless | 80°C – 2 hours 23°C – 24 hours | 8,000-12,000 cPs @ 20 rpm | ≥50°C | ≥10 kg/3,556 psi | 1.5275 | >95% @ 480-1,640 nm | 343°C | 61 x 10 ⁻⁶ 192 x 10 ⁻⁶ | 1 hour | 1 year |
| | 302 | Clear/Colorless | 23°C – 2 hours | 5,000-10,000 cPs @ 20 rpm | ≥40°C | ≥5 kg/1,778 psi | 1.5442 | >75% @ 340-420 nm >85% @ 440-900 nm >88% @ 900-1,600 nm | 261°C | 52 x 10 ⁻⁶ 191 x 10 ⁻⁶ | 10 min | 10 months |

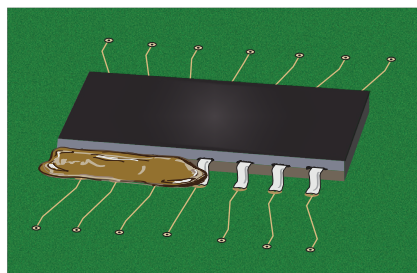
N/A - not applicable, as these are filled systems



For downloading Data Sheets and SDS, visit the Technical Info section of our website - www.epotek.com

For ordering information contact Epoxy Technology Inc. • customerservice@epotek.com, phone 978-667-3805

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 | COLOR Before/After CURE (thin film) | CURE TEMPERATURE (minimal) | VISCOSITY @ 23°C | GLASS TRANSITION TEMPERATURE (T _g) | DIE SHEAR STRENGTH @ RT (80mil x 80mil) | INDEX OF REFRACTION (Nd) | SPECTRAL TRANSMISSION | TGA DEGRADATION TEMPERATURE | CTE Below T _g / Above T _g | POT LIFE (@ room temp.) | SHELF LIFE (@ room temp. unless noted) | | |
|------------------------------|-------------------------------------|----------------------------|-----------------------------------|--|---|--------------------------|-----------------------|-----------------------------|---|---|---|-----------------------|----------|
| SMD CAPACITORS AND RESISTORS | H61 | Grey/Grey | 150°C – 30 min 120°C – 1 hour | 40,000-60,000 cPs @ 5 rpm | ≥110°C | ≥20 kg/7,112 psi | N/A | N/A | 425°C | 17 x 10 ⁻⁶ 95 x 10 ⁻⁶ | 25 days | 6 months refrigerated | |
| | H62 | Black/Black | 150°C – 30 min 120°C – 1 hour | 17,000-27,000 cPs @ 10 rpm | ≥110°C | ≥15 kg/5,334 psi | N/A | <1% @ 300-2500 nm | 436°C | 48 x 10 ⁻⁶ 119 x 10 ⁻⁶ | 15 days | 6 months @ -40°C | |
| | H65-175MP | Ivory/Ivory | 180°C – 1 hour | 80,000-120,000 cPs @ 2.5 rpm | ≥110°C | ≥20 kg/7,112 psi | N/A | N/A | 397°C | 38 x 10 ⁻⁶ 136 x 10 ⁻⁶ | 28 days | 1 year @ -40°C | |
| | H67-MP | Ivory/Ivory | 150°C – 1 hour | 300,000-400,000 cPs @ 1 rpm | ≥90°C | ≥20 kg/7,112 psi | N/A | N/A | 350°C | 16 x 10 ⁻⁶ 68 x 10 ⁻⁶ | 28 days | 1 year @ -40°C | |
| | H70E | 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 ⁻⁶ 64 x 10 ⁻⁶ | 56 hours | 1 year | |
| | H70E-4 | 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 ⁻⁶ 77 x 10 ⁻⁶ | 2.5 days | 1 year | |
| | H74 | Grey/Dark Grey | 150°C – 5 min 100°C – 20 min | 45,000-65,000 cPs @ 5 rpm | ≥100°C | ≥15 kg/5,334 psi | N/A | N/A | 425°C | 21 x 10 ⁻⁶ 95 x 10 ⁻⁶ | 2 hours | 1 year | |
| FOUR CORNER EDGE BONDING | UV CURED | 0G116-31 | White/White | 100mW/cm ² for >30 sec @ 240-365 nm | 20,000-30,000 cPs @ 10 rpm | ≥115°C | ≥10 kg/3,556 psi | 1.5665 | >96% @ 660-1640 nm >92% @ 500 nm | 409°C | 41 x 10 ⁻⁶ 170 x 10 ⁻⁶ | N/A | 1 year |
| | | 0G198-55 | Cloudy/Cloudy | 100mW/cm ² for >30 sec @ 240-365 nm | 1,200-2,000 cPs @ 100 rpm | ≥120°C | ≥20 kg/7,112 psi | 1.5023 | >97% @ 560-1680 nm | 354°C | 72 x 10 ⁻⁶ 120 x 10 ⁻⁶ | N/A | 1 year |
| | THERMAL CURED | 323LP-T | Yellow/ Dark Yellow | 90°C – 30 min | 22,451 cPs @ 10 rpm | 118°C | ≥20 kg/7,112 psi | N/A | N/A | 419°C | 54 x 10 ⁻⁶ 190 x 10 ⁻⁶ | 24 hours | 6 months |
| | | 0D2002 | Cloudy/Ivory | 150°C – 5 min 100°C – 30 min | 24,000-42,000 cPs @ 2.5 rpm | >140°C | >10 kg/3,556 psi | 1.5728 | >98% @ 800-1640 nm | 443°C | 45 x 10 ⁻⁶ 187 x 10 ⁻⁶ | 4 hours | 1 year |
| UNDERFILL | 353ND-T | Tan/Dark Red | 150°C – 1 min 80°C – 30 min | 9,000-15,000 cPs @ 20 rpm | ≥90°C | ≥15 kg/5,334 psi | N/A | N/A | 409°C | 43 x 10 ⁻⁶ 231 x 10 ⁻⁶ | 3 hours | 1 year | |
| | H74F | Dark Grey/ Dark Grey | 150°C – 5 min 80°C – 2 hours | 45,000-75,000 cPs @ 5 rpm | ≥90°C | ≥15 kg/5,334 psi | N/A | N/A | 486°C | 33 x 10 ⁻⁶ 108 x 10 ⁻⁶ | 3 hours | 1 year | |

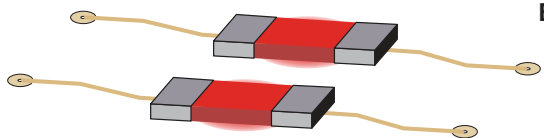
N/A - not applicable, as these are filled systems

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 2nd 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 | COLOR Before/After CURE (thin film) | CURE TEMPERATURE (minimal) | VISCOSITY @ 23°C | GLASS TRANSITION TEMPERATURE (Tg) | DIE SHEAR STRENGTH @ RT (80mil x 80mil) | TGA DEGRADATION TEMPERATURE | CTE Below Tg/ Above Tg (in/in/°C) | POT LIFE (@ room temp.) | SHelf LIFE (@ room temp. unless noted) |
|---------|-------------------------------------|----------------------------|------------------|-----------------------------------|---|-----------------------------|-----------------------------------|-------------------------|--|
|---------|-------------------------------------|----------------------------|------------------|-----------------------------------|---|-----------------------------|-----------------------------------|-------------------------|--|

SEMICONDUCTOR DEVICES

Adhesives replace BGA solder balls, and solder ball arrays, as well as for wafer level and PCB level flip chips

| | | | | | | | | | |
|--------------|---------------|----------------------------------|----------------------------|-------|-----------------|-------|---|--------|--------|
| E2101 | Silver/Silver | 175°C – 15 min 150°C – 1 hour | 15,000-18,000 cPs @ 20 rpm | ≥90°C | ≥5 kg/1,778 psi | 401°C | 48 x 10 ⁻⁶ 192 x 10 ⁻⁶ | 5 days | 1 year |
|--------------|---------------|----------------------------------|----------------------------|-------|-----------------|-------|---|--------|--------|

Adhesives to replace Au/Sn eutectic soldering process >300°C

| | | | | | | | | | |
|-----------------|---------------|------------------|---------------------------|-------|------------------|-------|---|----------|--------|
| MED-H20E | Silver/Silver | 150°C – 1.5 hour | 2,200-3,200 cPs @ 100 rpm | ≥80°C | ≥10 kg/3,556 psi | 432°C | 58 x 10 ⁻⁶ 278 x 10 ⁻⁶ | 2.5 days | 1 year |
| MED-H20S | Silver/Silver | 100°C – 1 hour | 1,800-2,800 cPs @ 100 rpm | ≥80°C | ≥10 kg/3,556 psi | 400°C | 58 x 10 ⁻⁶ 200 x 10 ⁻⁶ | 3 days | 1 year |

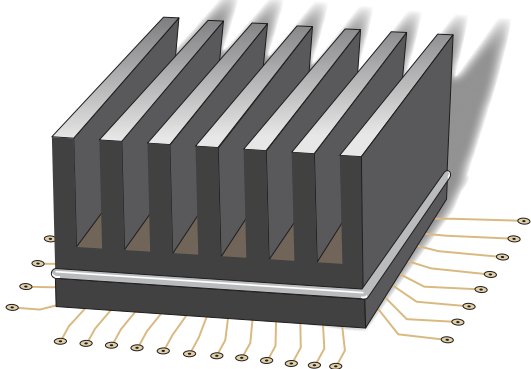
MILITARY MICROWAVE RF

Adhesive replaces solder joining of SMD caps and resistors bonded to ceramic PCBs

| | | | | | | | | | |
|-------------------|----------------------|-------------------------------------|-------------------------------|--------|------------------|-------|---|----------|----------------|
| EK1000† | Silver/Silver | 200°C – 30 min 150°C – 1 hour | 1,800-3,600 cPs @ 100 rpm | ≥80°C | >10 kg/3,556 psi | 357°C | 38 x 10 ⁻⁶ 94 x 10 ⁻⁶ | 2 weeks | 1 year @ -40°C |
| H20E† | Silver/Silver | 150°C – 5 min 80°C – 3 hours | 2,200-3,200 cPs @ 100 rpm | ≥80°C | ≥5 kg/1,778 psi | 425°C | 31 x 10 ⁻⁶ 158 x 10 ⁻⁶ | 2.5 days | 1 year |
| H20E-PFC | Silver/Silver | 150°C – 5 mins 80°C – 3 hours | 3,000-4,000 cPs @ 100 rpm | ≥80°C | ≥5 kg/1,778 psi | 407°C | 48 x 10 ⁻⁶ 106 x 10 ⁻⁶ | 3 days | 1 year |
| H35-175MP* | Bright Silver/Silver | 180°C – 1 hour 165°C – 1.5 hours | 22,000-28,000 cPs @ 10 rpm | ≥100°C | ≥10 kg/3,556 psi | 372°C | 31 x 10 ⁻⁶ 97 x 10 ⁻⁶ | 28 days | 1 year @ -40°C |
| H37-MP* | Silver/Silver | 150°C – 1 hour | 22,000-26,000 cPs @ 10 rpm | ≥90°C | ≥10 kg/3,556 psi | 358°C | 52 x 10 ⁻⁶ 148 x 10 ⁻⁶ | 28 days | 1 year @ -40°C |
| H81A | Gold | 150°C – 1 hour | 250,000-300,000 cPs @ 0.5 rpm | ≥100°C | >5 kg/1,778 psi | 412°C | N/A | 2 days | 1 year |

† H20E and EK1000 are available in MP grade * Military Grade N/A - not applicable, as these are filled systems

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 | COLOR Before/After CURE (thin film) | CURE TEMPERATURE (minimal) | VISCOSITY @ 23°C | GLASS TRANSITION TEMPERATURE (T _g) | DIE SHEAR STRENGTH @ RT (80mil x 80mil) | Thermal Conductivity (W/mK) | TGA DEGRADATION TEMPERATURE | CTE Below T _g / Above T _g (in/in/°C) | POT LIFE (@ room temp.) | SHELF LIFE (@ room temp. unless noted) |
|------------------|-------------------------------------|----------------------------------|----------------------------|--|---|---|-----------------------------|--|-------------------------|--|
| ELECTRICAL | EK1000 | 200°C – 30 min 150°C – 1 hour | 1,800-3,600 cPs @ 100 rpm | ≥80°C | >10 kg/3,556 psi | 12.6 (150°C/1hr cure) 26.3 (200°C/1hr post-cure) | 357°C | 38 x 10 ⁻⁶ 94 x 10 ⁻⁶ | 2 weeks | 1 year @ -40°C |
| | EK1000-1 | 200°C – 30 min 150°C – 1 hour | 13,000-21,000 cPs @ 10 rpm | ≥80°C | >10 kg/3,556 psi | 12.1 (150°C/1hr cure) 22.7 (200°C/1hr post-cure) | 372°C | 41 x 10 ⁻⁶ 162 x 10 ⁻⁶ | 2 weeks | 1 year @ -40°C |
| | H20E | 150°C – 5 min 80°C – 3 hours | 2,200-3,200 cPs @ 100 rpm | ≥80°C | >10 kg/3,556 psi | 2.5 | 425°C | 31 x 10 ⁻⁶ 158 x 10 ⁻⁶ | 2.5 days | 1 year |
| | H20E-HC | 175°C – 30 min 150°C – 1 hour | 3,500-6,000 cPs @ 50 rpm | N/A | ≥5 kg/1,778 psi | 10.9 (150°C/1hr cure) 23 (200°C/1hr post-cure) | 372°C | 53 x 10 ⁻⁶ 80 x 10 ⁻⁶ | 2.5 days | 1 year |
| HIGH PERFORMANCE | 930 | 150°C – 10 min 80°C – 6 hours | > 819,200 cPs | ≥90°C | ≥5 kg/1,778 psi | 4.57 | 350°C | 16 x 10 ⁻⁶ 81 x 10 ⁻⁶ | 6 hours | 1 year |
| | 930-4 | 150°C – 10 min 80°C – 6 hours | 12,000-17,000 cPs @ 20 rpm | ≥90°C | ≥15 kg/5,334 psi | 1.67 | 425°C | 27 x 10 ⁻⁶ 136 x 10 ⁻⁶ | 1 day | 1 year |
| | T7109 | 150°C – 10 min 80°C – 8 hours | 14,000-20,000 cPs @ 20 rpm | ≥45°C | ≥15 kg/5,334 psi | 0.7 (40 mil) 1.5 (3 mil) | 377°C | 46 x 10 ⁻⁶ 239 x 10 ⁻⁶ | 4 hours | 1 year |
| | T7109-19 | 80°C – 2 hours 23°C – 2 days | 40,000-70,000 cPs @ 5 rpm | ≥40°C | 5 kg/1,778 psi | 1.3 | 338°C | 59 x 10 ⁻⁶ 216 x 10 ⁻⁶ | 2 hours | 1 year |
| | T905-BN3 | 80°C – 2 hours | 2,000-7,000 cPs @ 50 rpm | ≥40°C | >10 kg/3,556 psi | 2.02 | 347°C | 37 x 10 ⁻⁶ 151 x 10 ⁻⁶ | 3 hours | 1 year |
| STANDARD | H70E | 175°C – 1 min 80°C – 90 min | 4,000-7,000 cPs @ 50 rpm | ≥80°C | >10 kg/3,556 psi | 0.9 | 451°C | 15 x 10 ⁻⁶ 64 x 10 ⁻⁶ | 56 hours | 1 year |
| | H77 | 150°C – 1 hour | 6,000-12,000 cPs @ 20 rpm | ≥80°C | ≥5 kg/1,778 psi | 0.66 | 405°C | 33 x 10 ⁻⁶ 130 x 10 ⁻⁶ | 6 hours | 1 year |
| | T7110 | 150°C – 10 min 23°C – 3 days | 1,400-2,200 cPs @ 100 rpm | ≥40°C | >10 kg/3,556 psi | 1.0 | 314°C | 31 x 10 ⁻⁶ 142 x 10 ⁻⁶ | 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 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 your specific technical challenges at: techserv@epotek.com.



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