

# Electrically Conductive Adhesives

for Current-carrying Connections in Microelectronics,  
Power Engineering and Electrical Engineering

## Product Brochure

**intertronics**

adhesives, coatings, sealants & equipment  
for your manufacturing and technology applications

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# Electrically Conductive Adhesives for Current-carrying Connections in Microelectronics, Power Engineering and Electrical Engineering



Electrically conductive adhesives are employed in integrated circuit packaging in order to provide a permanent mechanical connection for joining components and at the same time enabling electrical contact of the components. In many cases, adhesive bonding is therefore an alternative to the usual joining techniques, such as soldering or sintering.

## What is Electrical Conductivity with Adhesives?

Electrically conductive adhesives are characterized by their specific volume resistivity, which serves as a measure of their lateral conductivity. Typically, the volume resistivity of silver-filled adhesives is of the order of magnitude of  $10^{-4} \Omega \cdot \text{cm}$ . For special applications, however, it can be more useful to consider the conductivity in the z-direction. For applications with lower requirements for the conductivity, less expensive fillers are used.

## Applications for Electrically Conducting Adhesives

For many years conductive adhesives have offered proven methods for providing con-tact between components. Such applications can be found in both small batch sizes and in mass volumes.

Electrically conducting adhesives find use in the following fields:

- Microelectronics:  
chip assembly, circuit board assembly
- Automotive electronics:  
providing contact between various current-carrying components
- Smart Cards:  
providing contact between the chip module and the RFID antenna
- Photovoltaics:  
providing contact between cell connectors
- Electrical engineering:  
shielding of electromagnetic fields
- Dissipation of electrostatic charge

## Advantages of the Adhesive

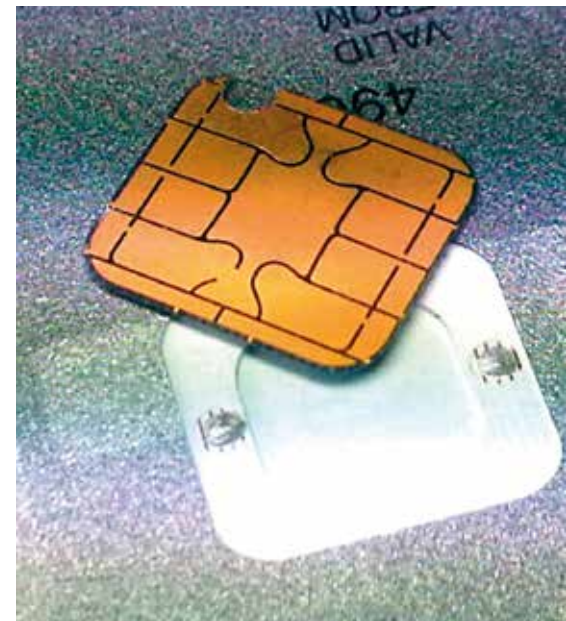
In contrast to welding or soldering, electrically conductive adhesives can bond difficult material combinations without altering the surface or the structural conditions.

According to the properties of the product the adhesive can be applied by dispensing, jetting, silk-screen printing or stamping.

As the adhesives are cured at moderate temperatures or even at room temperature, the components are subjected to far less thermal stress than is the case with soldering.

# Next Generation Electrically Conductive Adhesives

Electrically conductive adhesives are typically based upon epoxy resins, which are available as two components or pre-mixed and deep-frozen as a single-component variant. In order to unfold their optimal conductivity, these products must be cured at a temperature of at least 100 °C. The following overview shows a number of innovative products including such ones which can be cured at room temperature and/or are characterized by excellent flexibility, together with proven standard conductive adhesives.



| Processing                             | Cold-curing |        | Hot-curing   |                    |
|--|-------------|--------|--|--------------------|
| Components                             | 1K          | 2K     | 1K   | 2K                 |
| Electronics applications high-strength | –           | EC 244 | EC 101 L frozen<br>EC 151 L frozen<br>EC 112 L frozen<br>EC 242 frozen | EC 101<br>EC 151 L |
| Electronics applications flexible      | PU 1000     | –      | –  | EC 201             |
| Solar industry                         | –           | –      | SB 1227 frozen<br>SB 1242 frozen                                       | SB 1227<br>SB 1242 |
| Electromagnetic shielding              | –           | –      | –  | EC 262-2           |

# Variants and Customer-specific Developments

Are you missing a product with certain features? Many of these adhesives are also available with modified rheological properties or alternative cost-effective fillers. We also develop custom-tailored products according to your specifications. Just ask us.

**Polytec PT**

Polymere Technologien

# Electrically Conductive Adhesives

| Product code    | Processing properties |                   |            |                  |                                | Thermal properties       |                          |                        | Mechanical properties |                    |                  |                 |                     |
|-----------------|-----------------------|-------------------|------------|------------------|--------------------------------|--------------------------|--------------------------|------------------------|-----------------------|--------------------|------------------|-----------------|---------------------|
| Parameter       | Mix ratio by weight   | Specific gravity  | Viscosity  | Pot life @ 23 °C | Cure schedule                  | Spec. volume resistivity | Max. cont. service temp. | Glass transition temp. | Shore hardness        | Lap shear strength | Tensile strength | Young's modulus | Elongation at break |
| Method          | –                     | PT TM 201         | PT TM 202* | PT TM 702        | –                              | PT TM 401                | PT TM 302                | PT TM 501              | PT TM 601             | PT TM 604          | PT TM 605        | PT TM 605       | PT TM 605           |
| Unit            | –                     | g/cm <sup>3</sup> | Pa s       | –                | examples                       | Ω · cm                   | °C                       | °C                     | –                     | MPa (Al/Al)        | MPa              | GPa             | %                   |
| EC 101          | 1:1                   | 2.8               | 10         | 48 h             | 120 °C, 15 min<br>180 °C, 40 s | 1·4 · 10 <sup>-4</sup>   | 200                      | 80                     | D85                   | 8                  | 34               | 7.0             | 0.5                 |
| EC 101-L-frozen | –                     | 2.7               | 8.0        | 48 h             | 120 °C, 15 min<br>180 °C, 40 s | 1·4 · 10 <sup>-4</sup>   | 200                      | 80                     | D85                   | 8                  | 34               | 7.0             | 0.5                 |
| EC 112-L-frozen | –                     | 3.0               | 7.5        | 48 h             | 120 °C, 15 min<br>180 °C, 40 s | 1·3 · 10 <sup>-4</sup>   | 200                      | 75                     | D82                   | 8                  | 29               | 4.7             | 0.7                 |
| EC 151 L        | 1:1                   | 2.8               | 4.8        | 48 h             | 120 °C, 15 min<br>180 °C, 40 s | 1·4 · 10 <sup>-4</sup>   | 200                      | 75                     | D80                   | n.a.               | 32               | 7.0             | 0.5                 |
| EC 151-L-frozen | –                     | 2.8               | 4.8        | 48 h             | 120 °C, 15 min<br>180 °C, 40 s | 1·4 · 10 <sup>-4</sup>   | 200                      | 75                     | D80                   | n.a.               | 32               | 7.0             | 0.5                 |
| EC 201          | 1:1                   | 2.7               | 12         | 5 h              | 150 °C, 30 min                 | 2 · 10 <sup>-4</sup>     | 150                      | <23                    | D55                   | n.a.               | 10               | 1.0             | 8.0                 |
| EC 242-frozen   | –                     | 5.3               | 20         | 24 h             | 150 °C, 30 min                 | 5 · 10 <sup>-5</sup>     | 230                      | 110                    | D85                   | 7                  | 34               | 9.0             | 0.4                 |
| EC 244          | 10:1                  | 3.0               | 9.0        | 15 min           | 23 °C, 24 h<br>50 °C, 60 min   | 1·6 · 10 <sup>-3</sup>   | 150                      | 45                     | D80                   | 8                  | 25               | 4.2             | 0.7                 |
| PU 1000         | –                     | 1.7               | 15         | –                | 23 °C, 4 h***                  | 1·4 · 10 <sup>-4</sup>   | n.a.                     | <23                    | D32                   | n.a.               | 8                | 0.2             | 1.2                 |
| EC 262-2        | 1:1                   | 1.2               | 25         | 6 h              | 120 °C, 4 h<br>150 °C, 30 min  | 4 Ω/sq****               | 180                      | 70                     | D75                   | 8                  | 6                | 0.6             | 3.0                 |
| SB 1227-frozen  | –                     | 3.0               | 10**       | 48 h             | 150 °C, 2 min<br>180 °C, 30 s  | 4 · 10 <sup>-4</sup>     | 200                      | 70                     | D85                   | 9                  | 54               | 8.6             | 1.6                 |
| SB 1242-frozen  | –                     | 2.0               | 30**       | 48 h             | 150 °C, 3 min<br>180 °C, 30 s  | 1 · 10 <sup>-2</sup>     | 180                      | 55                     | D85                   | 13                 | 45               | 3.4             | 5.1                 |

\* Dynamic viscosity at 23 °C, plate-plate, gap 0.5 mm, shear rate up to 84 s<sup>-1</sup>, \*\* shear rate up to 50 s<sup>-1</sup>

\*\*\* Curing time depends on substrate and film thickness, \*\*\*\* Sheet resistance

The above listed information are typical data and do not constitute specifications.

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