Heraeus developed the mAgic ASP043-sinter paste series for die attach on Direct Copper Bonded (DCB) substrates.

**Key benefits of this material are:**

- Increase of life time up to 10 times compared to solder
- Improved thermal conductivity compared to solder
  - Allows more power at the same die size
  - Lower thermo-mechanical stress
- Operation temperature up to 250 °C
  - Simplified cooling possible (system cost reduction)
- Comparable process costs to solder process
  - No flux cleaning
  - No splattering
- Low process pressure compared to other sintering pastes
  - Simplified application process
  - Increase of yield
  - Increase in UPH

The ASP043-series provides a wide process window. The material demonstrates a stencil life time of > 8h. It can be processed at sinter pressure of 10 MPa up to 20 MPa at process temperature of 230 °C. The specific thermal conductivity ranges from 100 W/m-K to 200 W/m-K, depending on the applied process pressure which results in different compression of the Ag particles. The higher the sinter pressure the higher the thermal conductivity of the sinter layer.

The applied sinter pressure does not affect the reliability.
The data given here is valid. We reserve the right to make technical alterations.

### Processing

#### Items
- Process
- Equipment
- Parameter

#### Process Flow
- Stencil Printing
  - Conventional printing equipment
- Drying
  - Drying in air
  - 10 min at 120 °C
- Die Placement
  - Die placer with heated tooling
  - Die placement temperature
  - 120 °C
  - Placement time
  - 50 ms
- Sintering
  - Sinter press
  - Sinter pressure
  - 10 – 20 MPa
  - Sinter temperature
  - 230 °C
  - Sinter time
  - 1 – 2 minutes in air

### Technical Data of mAgic sinter materials

<table>
<thead>
<tr>
<th>Physical Properties</th>
<th>Solder Paste (20 MPa)</th>
<th>Solder Paste (10 MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life Time (x times Solder)</td>
<td>1</td>
<td>up to 10</td>
</tr>
<tr>
<td>Thermal Conductivity (W/m · K)</td>
<td>~ 50</td>
<td>~ 200</td>
</tr>
<tr>
<td>Electrical Resistivity (m · cm)</td>
<td>0.01 – 0.03</td>
<td>&lt; 0.008</td>
</tr>
<tr>
<td>CTE (ppm/K)</td>
<td>25 – 30</td>
<td>19</td>
</tr>
<tr>
<td>E-Modulus (GPa)</td>
<td>~ 25 at 25°C</td>
<td>~ 30</td>
</tr>
</tbody>
</table>

Comparison of thermal performance of a DCB package assembled with sinter paste and solder.

**Die Temperature**

<table>
<thead>
<tr>
<th>Sinter Paste</th>
<th>Solder Paste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sinter Pressure</td>
<td>20 MPa</td>
</tr>
<tr>
<td>Temperatur</td>
<td>Fläche Max. 49.5</td>
</tr>
<tr>
<td>Fläche Max. 84.8</td>
<td>23.3</td>
</tr>
<tr>
<td>Fläche Max. 144</td>
<td>145</td>
</tr>
</tbody>
</table>

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