Key benefits

Die protection to enable Cu wire bonding with high yield.
Pre-applied sinter paste & adhesive dot to simplify the assembly.

Best performance:
- Die current capability increases > 50% vs. aluminium wire.
- > 50x longer lifetime vs. solder die attach and Al-wire on system level.
- Enables higher junction temperatures of more than 200°C
- Superior robustness vs. other solutions (e.g. clips).

Maximised profitability:
- Significant reduction of power derating or reduction of chip size.

One component material solution

DTS® is one component consisting of:
- Copper foil with functional surfaces
- Pre-applied/ Pre-dried sinter paste
- Die fixation adhesive dots
- Matched Cu bonding material

*Picture: substrate layout by courtesy of Fraunhofer IISB

(1) Development Product Information Sheet, preliminary values
DTS® is customized to the die(1):

**Bond substrate and functional surface**

<table>
<thead>
<tr>
<th>Core material</th>
<th>Cu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional surfaces (optional)</td>
<td>Ni/Pd/Au, Ni/Au, NiAg</td>
</tr>
<tr>
<td>Thermal conductivity</td>
<td>max 390 W/mK</td>
</tr>
<tr>
<td>Tensile strength ($R_m$)</td>
<td>200 - 400 N/mm²</td>
</tr>
<tr>
<td>Hardness, adjustable by special treatment</td>
<td>40 - 200 HV</td>
</tr>
</tbody>
</table>

**Pre-applied Ag-sinter layer**

<table>
<thead>
<tr>
<th>Sinter paste type</th>
<th>ASP 034-04; ASP 338-14; ASP 338-2B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sinter pressure</td>
<td>10 - 30 MPa</td>
</tr>
<tr>
<td>Sinter temperature</td>
<td>230 - 280°C</td>
</tr>
<tr>
<td>Sinter time</td>
<td>1 - 5 min</td>
</tr>
<tr>
<td>Thermal conductivity</td>
<td>&gt;150 W/mK</td>
</tr>
<tr>
<td>Cleaning</td>
<td>Not needed</td>
</tr>
</tbody>
</table>

Process parameters depend on customer design etc. – we can support you to find optimal process for your application

**Pre-applied die fixation adhesive**

<table>
<thead>
<tr>
<th>Adhesive type</th>
<th>B-stage(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Die placement conditions</td>
<td>80 - 150°C</td>
</tr>
<tr>
<td>Cleaning</td>
<td>Not needed</td>
</tr>
</tbody>
</table>

(1) Development Product Information Sheet, preliminary values

(2) The adhesive is not sticky at room temperature. It is activated by heat (>80°C during placement) and additional heat (during sintering) removes the majority of adhesive constituents

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**DTS® Design Rules(1)**

**Bond substrate**

<table>
<thead>
<tr>
<th>Thickness</th>
<th>30 - 200µm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspect ratio: width</td>
<td>min. 1 : 3</td>
</tr>
<tr>
<td>Aspect ratio: length</td>
<td>max 10:1</td>
</tr>
<tr>
<td>Min radius</td>
<td>50µm</td>
</tr>
</tbody>
</table>

**Pre-applied Ag-sinter layer**

| Typical bond line thickness (BLT) | typ. 25 - 35 µm after pressure sintering |
| Distance between Cu edge and sinter paste | (0.0 mm for full-cut DTS) |

**Pre-applied die fixation adhesive**

| Adhesive dot size | 1 or 2 dots, diameter ≈ 0.9 mm |
| Adhesive height | Adapted to sinter paste thickness (higher than dried sinter paste) |
| Position | At the border of the die (preferred on unused die area / no wire bonding on PAA position); proposal will be made based on die design |

**Package**

| Package form | Semiconductor die wafer frame packed in vacuum sealed moisture barrier bags |
| Wafer size | 12” outside, 8” inside |
| Pick and place | DTS® are singulated and ready for pick and place |
| Typical # of parts on one wafer | DTS® 3.5 x 3.5 mm: approx. 1,200 pcs DTS® 5 x 7 mm: approx. 600 pcs DTS® 10 x 10 mm: approx. 200 pcs |

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(1) Development Product Information Sheet, preliminary values

(2) The adhesive is not sticky at room temperature. It is activated by heat (>80°C during placement) and additional heat (during sintering) removes the majority of adhesive constituents
## Handling and Storage

### Shipping

**Temperature**\(^{(1)}\): 5 - 40°C  
**Humidity**: Keep packed at dry place

### Storage conditions

**Temperature**\(^{(1)}\): 15 - 25°C  
**Humidity**: Keep originally packed at dry place

### Shelf life

Originally packed: 6 month after shipment date\(^{(1)}\)

### Processing

Open the original package in clean room only.

**Floor life**: Total processing time after opening max. 2 days

Not used DTS\(^{®}\) parts should be put back in the moisture barrier bag and should be stored in nitrogen atmosphere, max. storage time 2 weeks

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**MSDS for relevant constituents of the DTS\(^{®}\) (sinter paste, adhesive) are available upon request.**

Heraeus and Danfoss cooperate in the field of Danfoss BondBuffer technology. Heraeus DTS\(^{®}\) may be used under certain Danfoss and Heraeus IP rights. Details are set forth in a declaration to customers.

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The descriptions and engineering data shown here have been compiled by Heraeus using commonly-accepted procedures, in cooperation with modern testing equipment, and have been compiled as according to the latest factual knowledge in our possession. The information was up-to-date on the date this document was printed (latest versions can always be supplied upon request). Although the data is considered accurate, we cannot guarantee accuracy. The data is supplied on the condition that the user shall conduct tests to determine materials suitability for particular application. The descriptions and engineering data shown here have not been compiled as according to the latest factual knowledge in our possession. The information was up-to-date on the date this document was printed (latest versions can always be supplied upon request). Although the data is considered accurate, we cannot guarantee accuracy. The data is supplied on the condition that the user shall conduct tests to determine materials suitability for particular application.  

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(3) Aging tests are still running