High Conductivity TC1050* Heat Spreader
For Telecommunication, Avionics and Aerospace

Description
TC1050 heat spreader consists of a TPG* core encapsulated within a structural shell. The TPG provides a highly conductive path while the encapsulation material provides the structure (strength, stiffness, and coefficient of thermal expansion). Common Encapsulation Materials include:

- Aluminum (TC1050.AL)
- Copper (TC1050.CU)
- Other available encapsulations and systems include Kovar, WCu, MoCu, AlSiC, stainless steel, Ni, carbon fiber, etc.

Key Features
- Thermal conductivity 5x of aluminum and 3x of copper
- Low thermal interface resistance
- Lighter than aluminum
- Adjustable coefficient of thermal expansion
- Wide operating temperature range
- Mechanical load bearing
- Hermeticity higher than 10^-8 atm.cc/s
- Vibration and shock resistance
- Machinable
- Platable
- Size up to 4 ft² (0.37 m²)

Potential Applications
- Heat spreader in electronic packaging
- Thermal cores for PWB’s
- Finned heat sinks
- Avionic thermal cores
- Satellite traveling wave tube (TWT) mounts
- Electronic chassis
- Cold plates in radar systems

Typical Property Comparison of Heat Spreader Materials

<table>
<thead>
<tr>
<th>Material</th>
<th>In-Plane TC (W/m-K)</th>
<th>Thru-Plane TC (W/m-K)</th>
<th>In-Plane CTE (ppm/°C)</th>
<th>Specific Gravity</th>
<th>Specific In-Plane TC(1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td>218</td>
<td>218</td>
<td>23</td>
<td>2.7</td>
<td>81</td>
</tr>
<tr>
<td>Copper</td>
<td>400</td>
<td>400</td>
<td>17</td>
<td>8.9</td>
<td>45</td>
</tr>
<tr>
<td>AlSiC-12</td>
<td>180</td>
<td>180</td>
<td>11</td>
<td>2.9</td>
<td>62</td>
</tr>
<tr>
<td>CuW</td>
<td>185</td>
<td>185</td>
<td>8.3</td>
<td>15.2</td>
<td>12</td>
</tr>
<tr>
<td>CVD Diamond</td>
<td>1100-1800</td>
<td>1100-1800</td>
<td>1-2</td>
<td>3.5</td>
<td>310-510</td>
</tr>
<tr>
<td>TPG Graphite</td>
<td>1500+</td>
<td>10</td>
<td>-1</td>
<td>2.3</td>
<td>650</td>
</tr>
</tbody>
</table>

Typical properties are average data and are not to be used as or to develop specifications.
(1) In-plane thermal conductivity divided by specific gravity.

Comparison of Heat Spreader Performance

IR image with 45 Watt heat loading and 20 degrees Celsius cooling

Examples of TC1050 Heat Spreaders and Cross-Section View

Illustration of TC1050 Manufacturing Process

1. Assembling
2. Bonding
3. Machining

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