Furukawa Electric has developed a high quality heat sink with built-in micro heat pipe (μHP) for high density mounting and downsizing of electronic products. The micro heat pipe's excellent thermal performance accelerates the commercialization in many applications. Furukawa's leading edge technology supplied over 1,000,000 micro heat pipe heat sinks monthly.

**NECESSITY OF μHP-HS**

- **Increased Thermal Density**
- **Difficult to Cool by Conventional Way**
- **μHP-HS is the Solution**

**FEATURES**

- **Excellent Performance**
  - Quick Thermal Response
  - Compact and Light Weight

- **High Quality**
  - Long Product Life
  - Used in Space Ship
  - Made in JAPAN, USA and TAIWAN
  - fast delivery

**Large Capacity**

- Low Cost

**Improved Performance and Downsizing of Electronic Devices**

**Heat Out (condensing)section**

In a state of highly reduced pressure

**Heat Out**

**ESTIMATED LIFE OF Cu/water μHP (Based on Accelerated Test)**
Super Conductor of Heat - Micro Heat Pipe

Micro heat pipe is a small metal pipe with a capillary structure (wick) on the inner wall. The micro heat pipe is a vacuum inside with a small quantity of working fluid. When a section of the micro heat pipe is heated, the heat is quickly transferred to a lower temperature section of the micro heat pipe in the following way.

1. The working fluid evaporates at the heated section. (absorption of latent heat)
2. The vapor moves to the lower temperature section. (discharge of latent heat)
3. The vapor condenses in the lower temperature section. (discharge of latent heat)
4. The condensed working fluid flows back to the heated section through capillary action.

The micro heat pipe is a super conductor of heat for micro device cooling. The micro heat pipe offers increased downsizing and improved performance for all electronic devices.

FURUKAWA’S Heat Pipe Technology

Furukawa has been offering heat pipe products to many fields for more than 20 years. Furukawa has been keeping top share of heat pipe products, supported by its technology and reliability.

- Main Use
  - Power Electronics
  - Electric Train
  - Air Conditioning (Rood Heating)
  - Aerospace etc.

<table>
<thead>
<tr>
<th>Low</th>
<th>Thermal Density of Electronic Devices</th>
<th>High</th>
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<tbody>
<tr>
<td>Natural air cooling</td>
<td>Forced air cooling</td>
<td>Liquid cooling</td>
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<td>Conventional Technology</td>
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<tr>
<td>Desktop PC (MPU)</td>
<td>Super Computer, Multipurpose Computer (MPU)</td>
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<td>Laptop PC (MPU)</td>
<td>Tester Module (LSI)</td>
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<td>Game Machine (MPU)</td>
<td>Duplicator (Heat Roller, etc.)</td>
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<td>Video Camera (CCD)</td>
<td>Telecommunication Equipment (LSI, IC)</td>
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<td>PC for Factory Automation (MPU)</td>
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</table>
APPLICATION EXAMPLES OF HP-HS

- Application to Laptop PC

  Heat diffusion to bottom surface
  Basic type

  Heat diffusion to keyboard side
  Uniform temp. on keyboard

  Using 2 HP
  For large heat generation

  Heat diffusion to panel side
  With thermal joint

  Combination with fan
  (for PCI chip and PC card)
  Reduce fan and its wattage

  Combination with radiating fin
  Direct radiation to ambience

  Combination with fan (CPU cooling)
  Downsizing of fan, Noiseless

- Application to Desktop PC

  Promote radiation from fan (Type V)
  Improvement of fin efficiency, Light weight

  Heat dissipation from both case and fan
  Saving electric power and low noise of fan

  Promote radiation from fan (Type H)
  Low pressure loss and increasing the efficiency of fan
Furukawa's Micro Heat Pipe Heat Sinks, supported by heat pipe technology and cooling technology which have been cultivated for more than 20 years, is already in use in various electronic applications. Please contact Furukawa for a thermal solution for your application.

For Telecommunication and Others

- Telecommunication Convertor
  - Realize narrow pitch of circuit board
- Satellite communication device
  - Fanless
- Opt-electronic Device
  - Heat diffusion to chassis
- Evaluating System for semi-conductors
  - Realize air cooling
- Server
  - for large heat generation
- Video Camera
  - Replacing thermal wiring
- Workstation
  - realize low noise

HP-HS can also apply to many other uses, not only above examples. Duplicator, Game machine, Automobile, Small size motor, Medical, Dies, others.
Furukawa’s Micro Heat Pipe Heat Sinks are manufactured in compliance with each customer’s specific design. Furukawa welcomes the opportunity to assist in your thermal design solution using the latest cooling technologies. Various inspections in the volume production guarantee the highest quality in Furukawa’s products.

### HP Standard Dimensions

<table>
<thead>
<tr>
<th>Designation</th>
<th>O.D. (unit:mm)</th>
<th>Length</th>
<th>Minimum Radius</th>
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*Other sizes except above is available as special order

### Thermal Radiation Parts

Various thermal radiation parts are available.

#### Plates
- Aluminum, Copper, Die cast etc.

#### Fins
- Off set fins
- Ladder fins
- Folded fins

Other fins in addition to above are available.

#### Others
- Fan, Peltier elements, Cold plate etc.

Actual thermal performance of HP-HS depends on its specification.
Furukawa has been supplying superior performance and high quality products, through a variety of tests and evaluations performed by our engineering staff. Furukawa utilizes the latest technologies, thermal evaluation, numerical analysis, etc, to assist in your development of new products and thermal solution.

**FURUKAWA'S THERMAL TECHNOLOGY SUPPORT**

**Evaluation of Reliability**

**Evaluation of Performance**

**Numerical Analysis**

Analysis of cooling effect by using **HP**

<table>
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<tr>
<th>No <strong>HP</strong> mounted</th>
<th><strong>HP</strong> mounted</th>
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