HALA

HEAT PIPE ASSEMBLIES
THERMAL MANAGEMENT

TUBULAR / FLATTENED HEAT PIPES & VAPOR CHAMBERS FOR HEAT TRANSFER & HEAT SPREADING

HEAT PIPE ASSEMBLIES
THERMAL MANAGEMENT

MAKING YOUR HEATPIPE MODULES MOST EFFICIENT AND THERMALLY BEST

TUBULAR-/ VAPOR CHAMBER PLANAR HEAT PIPES

HALA supplies 2 Phase Modules of two basic configurations: Tubular Heat Pipes and Vapor Chamber Planar Heat Pipes

HEAT PIPES

- Outer diameter: From 2.0 mm up to and over 50 mm
- Internal structures: sintered, mesh, groove or hybrid (sintered-groove)
- Cross section geometry: round, rectangular, flattened
- Flattnesses down to 0.4 mm
- Length: up to 70 cm
- Geometry: straight or multiple bends
- Bonding of heat pipes to the assembly: soldering, press fit, epoxy
- Heat pipe surface coating: nickel or tin plated

All copper/water heat pipes are designed to survive numerous freeze/thaw cycles without any degradation. Copper/water heat pipes are made of copper, use water as a working fluid and typically operate in the temperature range of 20 up to 150°C (and over).
The planar heat pipes are called Vapor Chambers (VC) which are used as heat spreaders.

Copper/water 2 phase systems can be combined with other components to form heat transfer modules:

- Extruded heat sinks
- Die cast heat sinks
- Fin Stack heat sinks
- Skived heat sinks

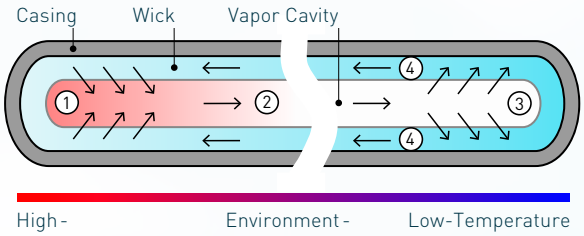
Connected by:

- Thermal Interface Materials

TUBULAR HEAT PIPES

VAPOR CHAMBER

HEAT PIPE THERMAL CYCLE



Heat pipe thermal cycle

1. Working fluid evaporates to vapor absorbing thermal energy.
2. Vapor migrates along cavity to lower temperature end.
3. Vapor condenses back to fluid and is absorbed by the wick, releasing thermal energy.
4. Working fluid flows back to the higher temperature end.

DIMENSION AND PERFORMANCE RANGE (mm)

Diameter	Recommended Overall Length Range	Recommended Bending Radius	Recommended Flattened Thickness
3	70 – 750	≥9	≥2.0
4	70 – 750	≥12	≥2 (e.g. 2.4)
5	70 – 750	≥15	≥2 (e.g. 3.0)
6	70 – 750	≥18	≥2.5 (e.g. 3.6)
6.35 (¼")	70 – 750	≥19	≥2.5 (e.g. 3.5)
8	70 – 750	≥24	≥3 (e.g. 4.0)
9.52 (⅜")	70 – 750	≥28.6	≥3 (e.g. 4.5)
10	70 – 750	≥30	≥3 (e.g. 5.0)
12	70 – 750	≥36	≥3 (e.g. 6.0)
12.7 (½")	70 – 750	≥38	≥3 (e.g. 6.3)
15.875 (⅝")	70 – 750	≥47	≥3 (e.g. 8.0)
19.05 (¾")	70 – 750	≥57	≥3 (e.g. 9.5)
25.4 (1")	70 – 750	≥76	≥3 (e.g. 12.0)

Qmax (W) Flattened Thickness	Pipe Diameter ø 3 mm	Pipe Diameter ø 4 mm	Pipe Diameter ø 5 mm	Pipe Diameter ø 6 mm	Pipe Diameter ø 8 mm
T = 2.0 mm	10 W	15 W	21 W	N/A	N/A
T = 2.5 mm	14 W	17 W	32 W	46 W	65 W
T = 3.0 mm	15 W	19 W	42 W	56 W	75 W
Rounded	16 W	20 W	46 W	60 W	85 W

Diameter: 3 / 4 / 5 / 6 / 6.35 (¼") / 8 / 9.52 (⅜") / 10 / 12 / 12.7 (½")
Tube Wall Thickness 0.9 mm / 0.5 mm / 0.3 mm / 0.2 mm
Diameter Tolerance ± 0.05 mm
Length Tolerance ± 0.5 to ±1.0 mm
Thickness Tolerance ± 0.05 mm
Width Tolerance ± 0.10 to ± 0.15 mm

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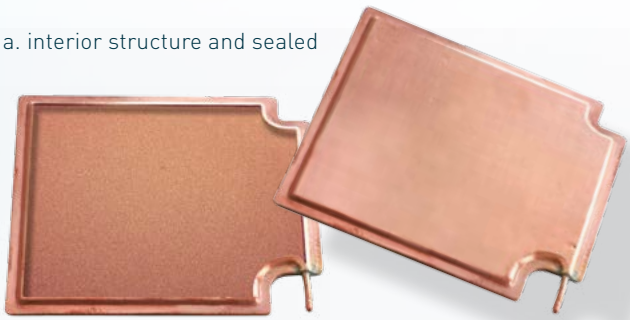
HEAT PIPE ASSEMBLIES CONFIGURATIONS

HALA HEATPIPES

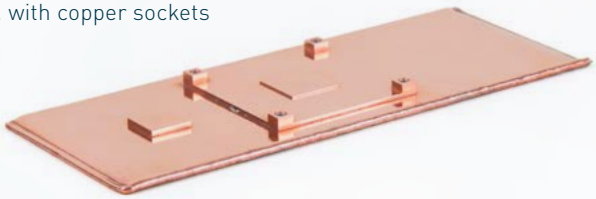
FLATTENED HEAT PIPES

VAPOR CHAMBER

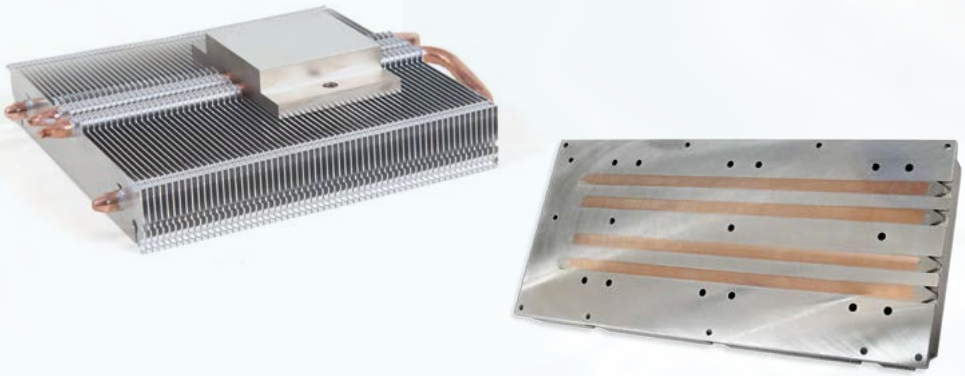
a. interior structure and sealed



b. with copper sockets



HEAT SPREADER



HEAT COLUMN

HEAT TRANSFER

All technical data and information are without warranty and believed to be reliable and accurate corresponding to the latest state of the art. Since the products are not provided to conform with mutually agreed specifications and their use and processing are unknown we cannot guarantee results, freedom from patent infringement, or their suitability for any application. Product testing by the applicant is recommended. We reserve the right of changes.

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HEAT PIPE ASSEMBLIES
APPLICATION CASES

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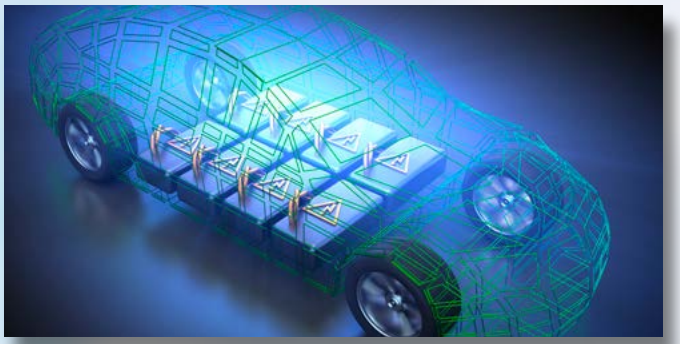
- ELECTRONICS COOLING
- LED COOLING
- AVIONICS / AIRBORNE ELECTRONICS
- DESKTOP / NOTEBOOK / SERVER
- HVAC ENERGY RECOVERY
- ANALYZERS AND METERS
- MEDICAL DEVICES
- MILITARY / AEROSPACE
- SAFETY TECHNOLOGY
- CAMERA & SURVEILLANCE SYSTEMS
- PHOTOVOLTAICS
- SENSOR CONTROL
- AUTOMOTIVE



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VAPOR CHAMBER VC
CHECKLIST

FILL IN YOUR DATA AND SEND BACK TO US

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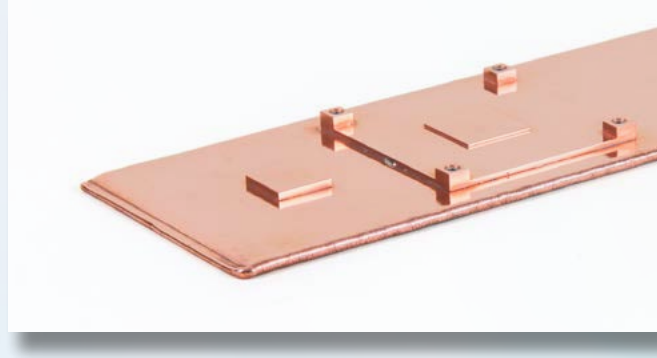

1/ NO. OF HEAT SOURCES	.....	No. of heat sources and hot spots to be cooled
2/ OPERATING POWER	Watts	Maximum total power demand
3/ DIMENSIONS OF HEAT SOURCES	(LxW)	Heat input area
4/ HEAT SOURCE LAYOUT	.....	Hot spots can be off-center, sketch of positions
5/ MAXIMUM VC DIMENSIONS	(LxW)	Max. allowable function length and width
6/ OPERATING ORIENTATION	°	Angle from horizontal (positive if downside evaporator)
7/ MAX. COMPONENT TEMPERATURE	°C	Maximum temperature requirement for multiple components
8/ AMBIENT TEMPERATURE	°C to °C	Operating temperature range
9/ STORAGE TEMPERATURE	°C to °C	Storage temperature range
10/ COOLING	.....	Heat sink with forced convection (flow rate), natural convection or liquid cooling
11/ SURFACE REQUIREMENTS	.....	Evenesses, roughness, plated, unplated, sealed, etc.
12/ NOTES	.....	Performance specifications, drawings, sketches, special requirements, etc.

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HEAT PIPE & HEAT PIPE ASSEMBLY CHECKLIST

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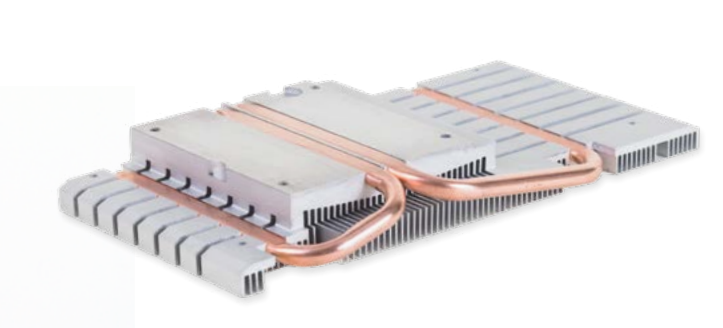

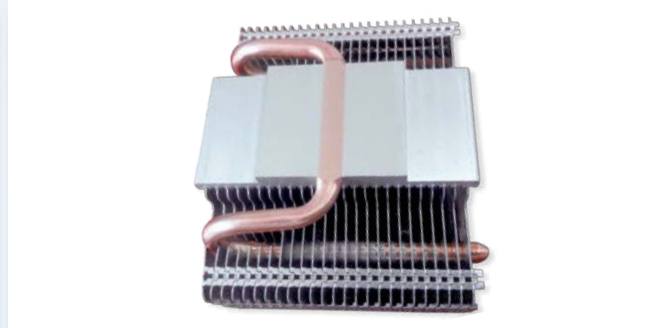

1/ OPERATING POWER	Watts	Maximum total power demand
2/ HEAT PIPE LENGTH	mm	Total length of heat pipe(s)
3/ EVAPORATOR DIMENSIONS	(LxWxT)	Heat input dimensions
4/ CONDENSOR DIMENSIONS	(LxWxT)	Heat outpout dimensions
5/ HEAT SINK DIMENSIONS	(LxWxT)	Available volume for the heat sink
6/ OPERATING ORIENTATION		Angle from horizontal between evaporator and condensor sections
7/ MAX. COMPONENT TEMPERATURE	°C	Maximum temperature requirement for multiple components
8/ AMBIENT TEMPERATURE	°C to °C	Operating temperature range
9/ STORAGE TEMPERATURE	°C to °C	Storage temperature range
10/ COOLING		Heat sink with forced convection (flow rate), natural convection or liquid cooling
11/ SURFACE REQUIREMENTS		Evenesses, roughness, plated, unplated, sealed, etc.
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