



THERMAL MANAGEMENT

Standard Product Catalog

Thermal Systems R&D, Design, Simulation



Thermal System R&D



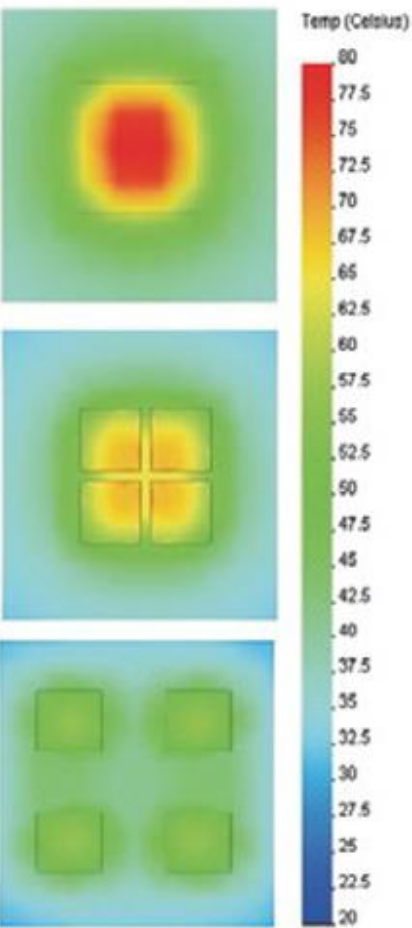
Thermal Analysis and Solutions



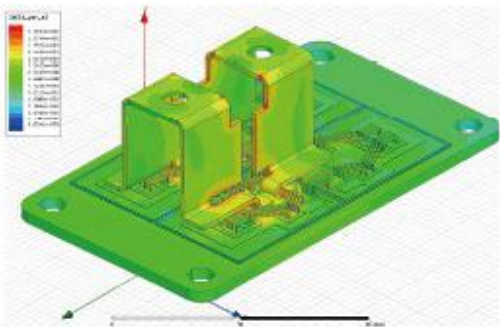
Thermal simulation and Production



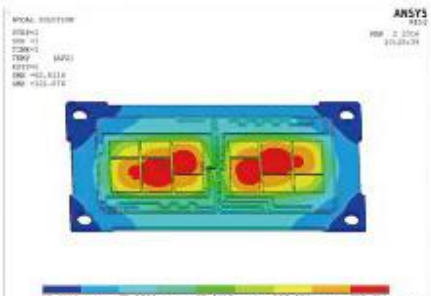
Thermal test and system test



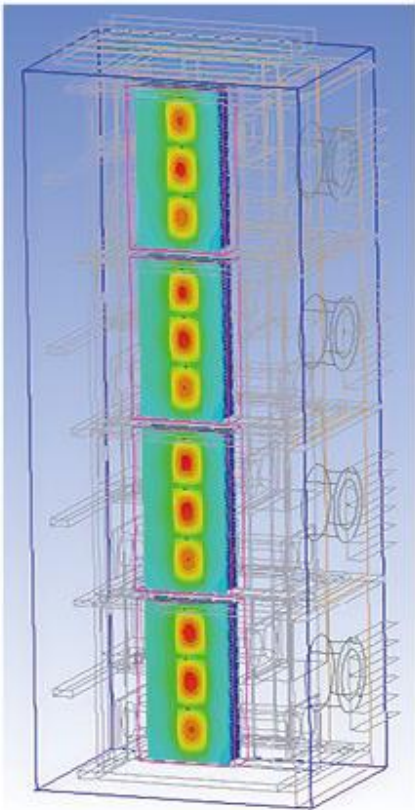
Heat Sink Design and Development



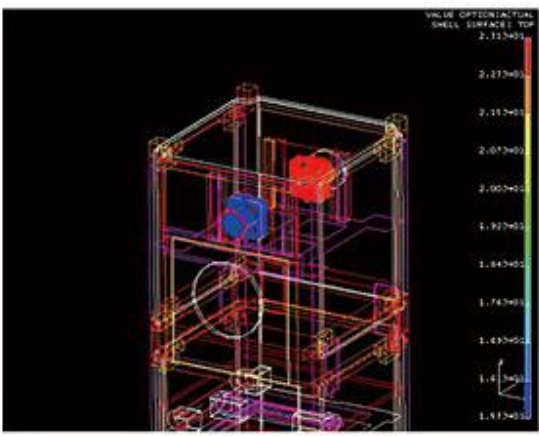
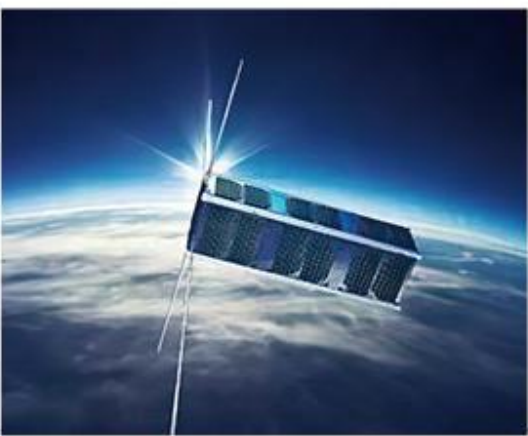
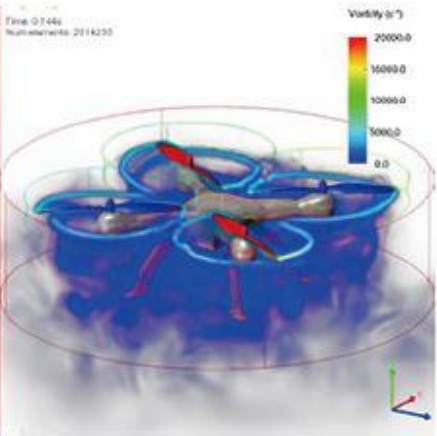
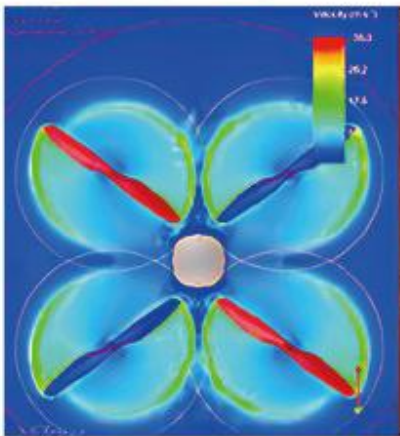
Testing and Evaluation of Thermal Management Systems



Thermoelectric System Design and Development

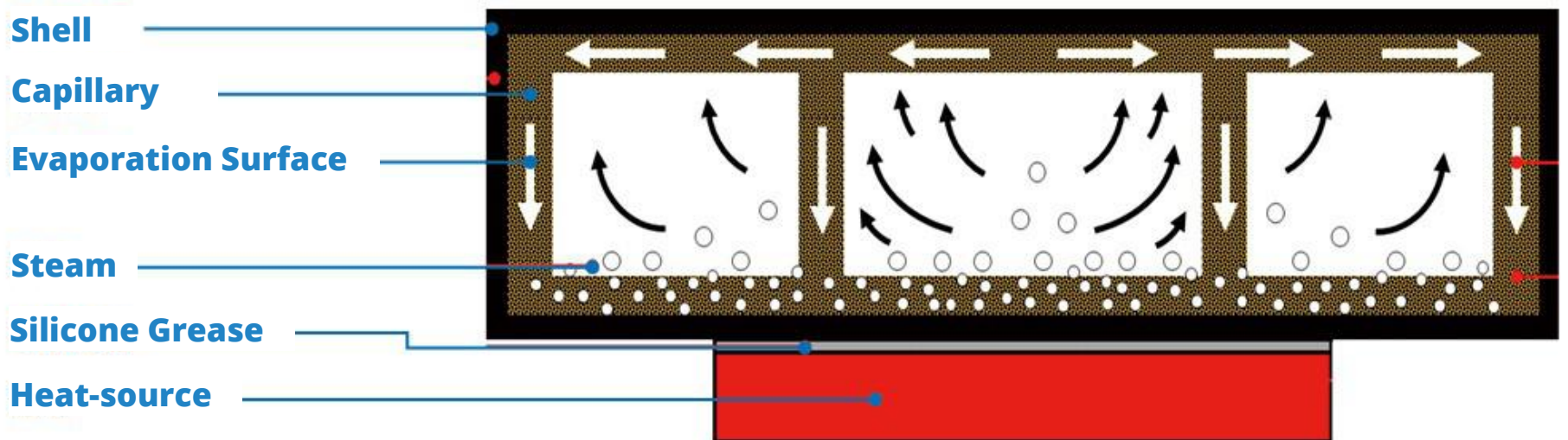


Applications I

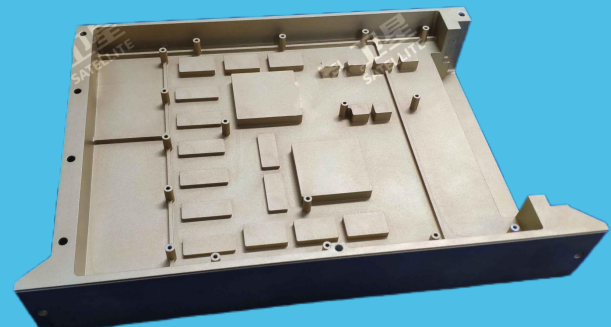
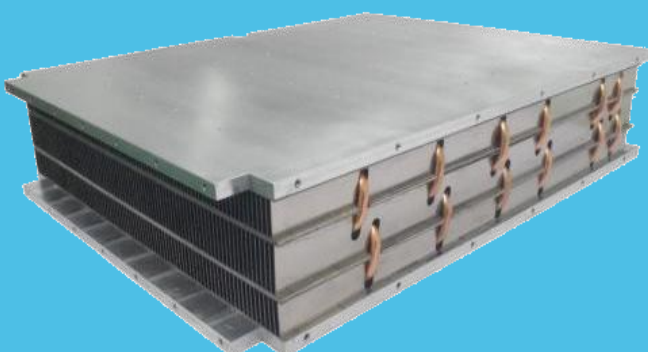


Vapor Chamber

The vapor chamber can transfer heat to the condensation surface, and also can warm the heat dissipation surface quickly. It has a good uniform temperature heat transfer effect, so suitable for the heat dissipation of electronic components, such as CPU, server, electronic chip or other heat-generating components.



Complete Custom-Made Solutions



Mechanical Performance

Thermal Conductivity	1000~3000W/m/K
Max. Heat Flux	$\geq 250\text{W/cm}^2$
Thermal Resistance	$\leq 0.1^\circ\text{C/W}$
Storage Temp.	$-60^\circ\text{C} \sim +120^\circ\text{C}$
Operation Temp.	$-55^\circ\text{C} \sim +120^\circ\text{C}$
Customized for above	200°C
Max. Dimension	1200mm×500mm
Minimum Thickness	1.5mm
Material	Aluminum, Copper, Titanium, Stainless steel
MTBF	≥ 30 Years.

GranStal's Capabilities

Capillary core sintering and precise working medium filling. Analysis of the actual thermal problem – in order to define the required solution. The design time cycles are decreasing in view of the competitive marketplace.

1) Coupling design with structure

- Large heat flux
- High power
- 3D heat transfer
- Complex shapes



2) Integrated design of heat conduction

- Versatile with high thermal performance
- Composite structure with energy storage plate

3) The base material can be selected

- Reliability – Long product life
- Ability to operate in any environmental conditions

Vapor Chamber



All-aluminum stereo heat exchanger fins



High-power multi-heat source



Radar electronic board



Integrated heat dissipation with structure

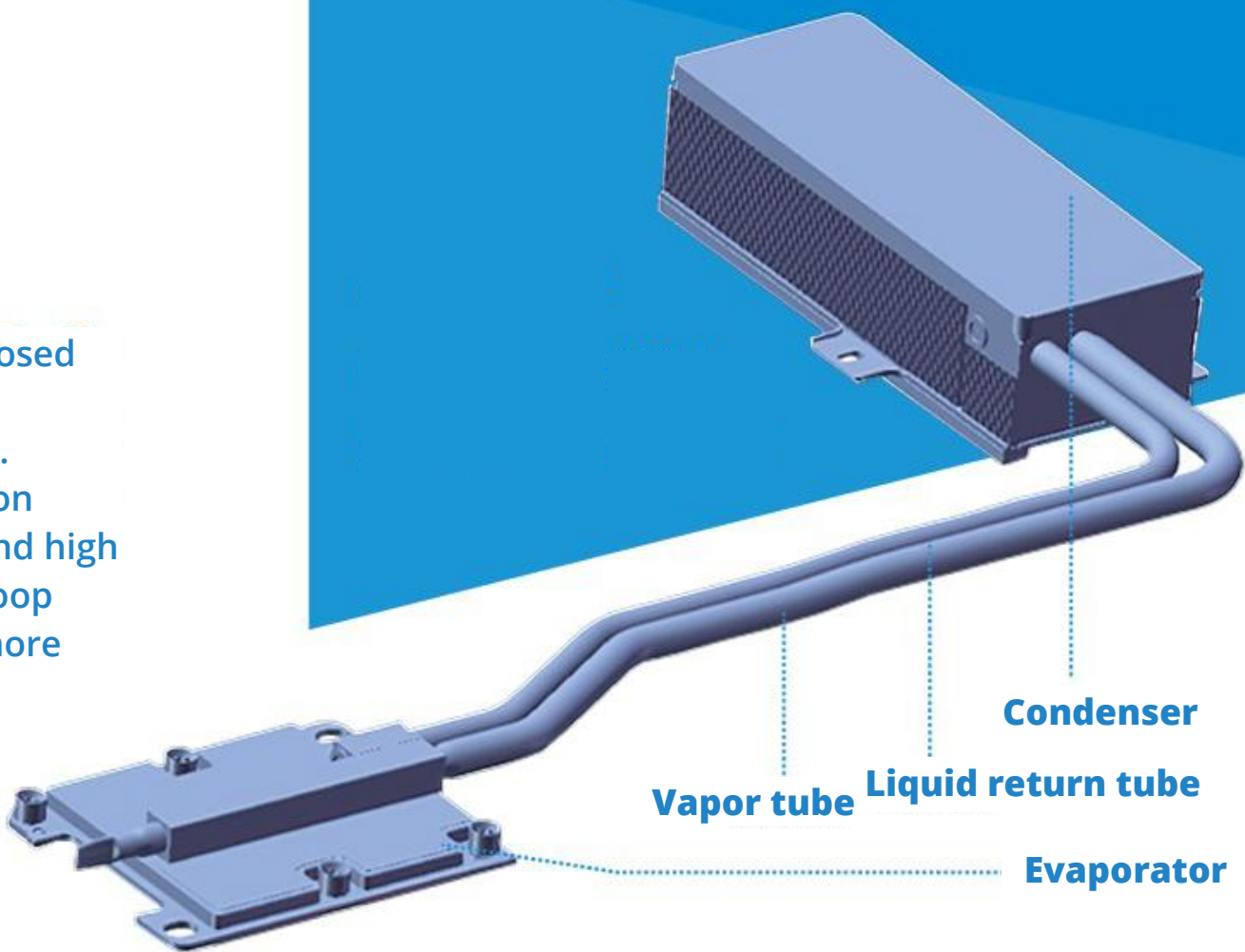
Thermo-syphon Cooling System

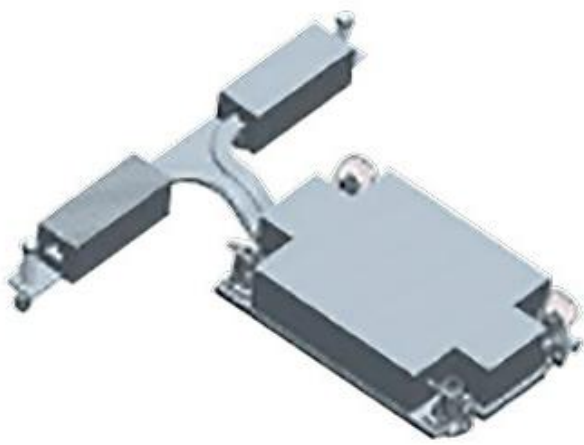
Performance and reliability

The loop thermo-syphon is composed with: evaporator, vapor tube(s), condenser and liquid return tube. Advantages of loop thermo-syphon technology is the long distance and high power heat transfer capability. Loop thermo-syphon handles two or more heat sources in one loop.

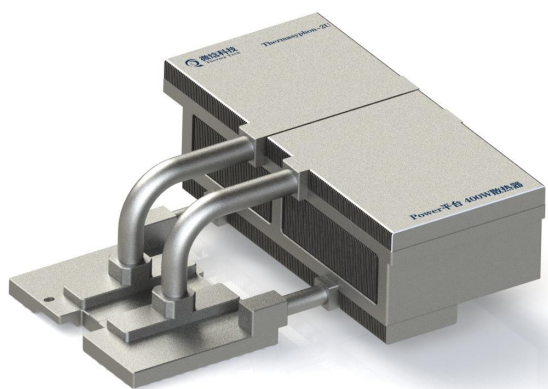
Application

For the heat dissipation of electronic components, such as CPU, server, electronic chip

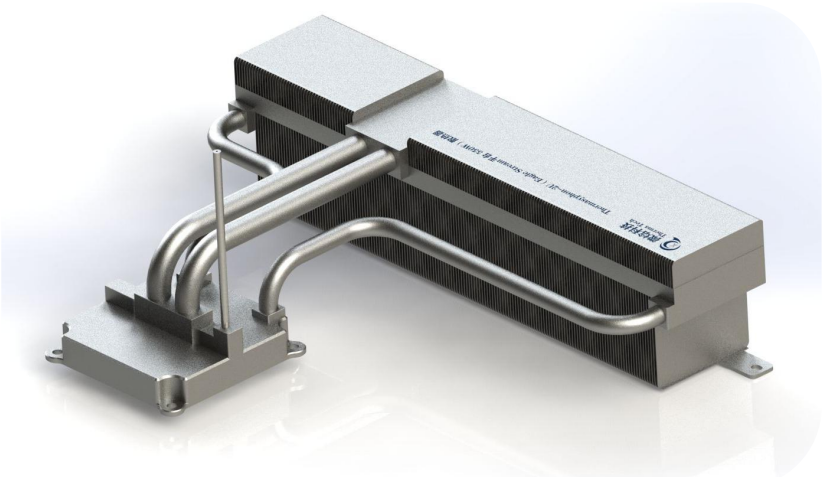


Comparison	Heat Pipe Cooling System	Thermo-syphon Cooling System
		
Server Structure	1U/2U	1U/2U
Q-Max	<270W	>270W
Working Medium	Water	Refrigerant
Heat Transfer Distance	Φ10 Heat Pipe, 400mm	> 500mm
Material	Aluminum alloy / Copper	Aluminum alloy
Layout Difficulty	Hard	Flexible

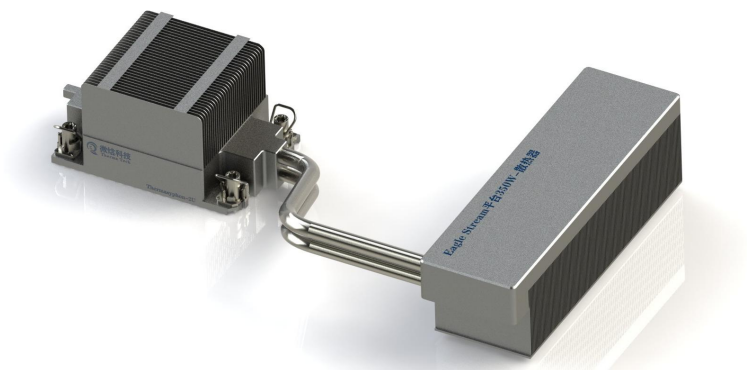
Thermo-syphon based Cooling System



**GS-400W2U Thermosyphon Heat Sink
(Power™ Platform)**



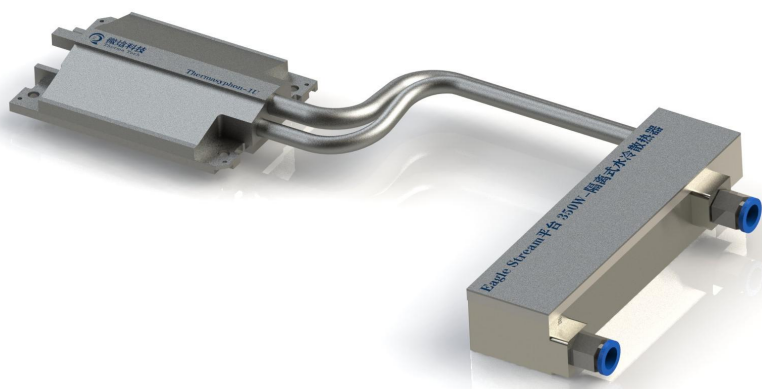
**GS-550W2U Thermaphon Heat Sink
(Eagle Stream™ Platform)**



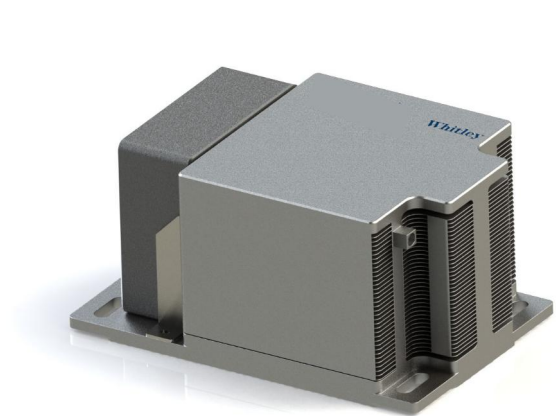
**GS-350W2U Thermaphon Heat Sink
(Eagle Stream™ Platform)**



**GS1U-300W Thermaphon Heat Sink
(Whitley™ Platform)**



**GS1U-350W Thermaphon Isolated Water-Heat Sink
(Eagle Stream™ Platform)**



**GS-3DVC-2U Heat Sink
(Whitley™ Platform)**

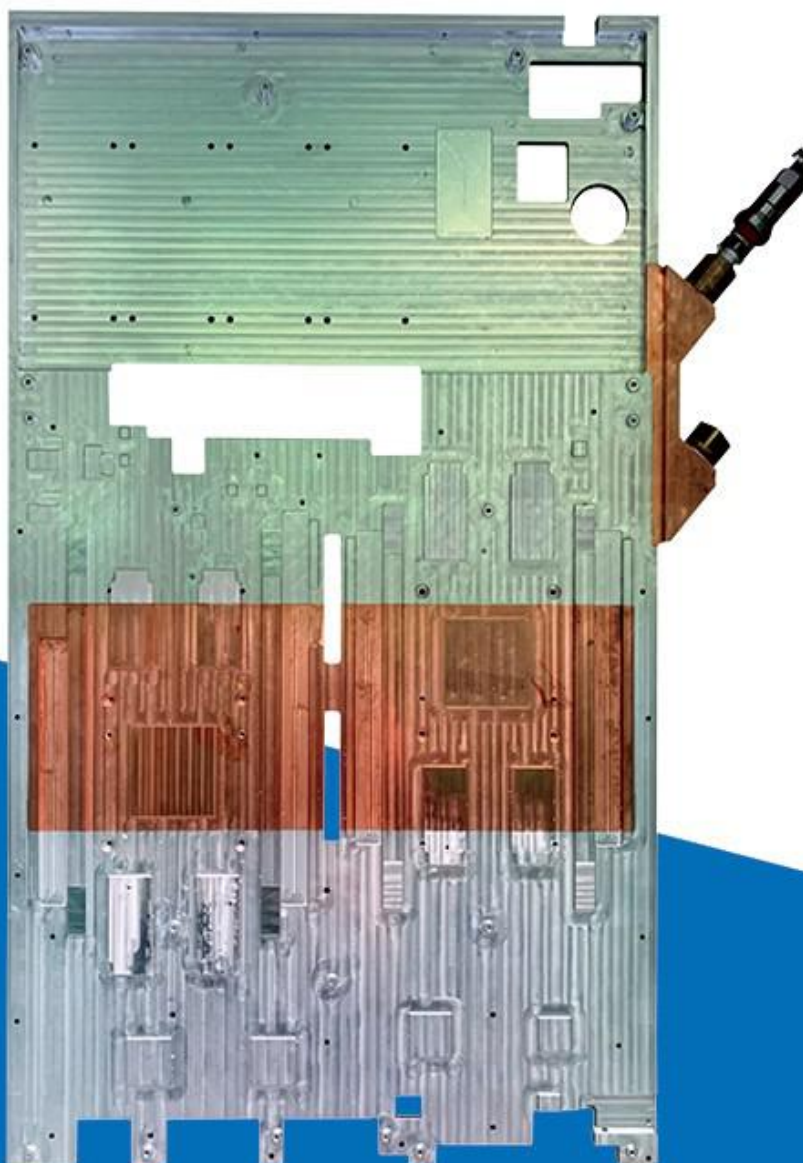


**GS-3DVC-2U-550W Heat Sink
(Eagle Stream™ Platform)
(35-Matte Aluminum-Roughness 0.1)**

Liquid Cooling Plates

Performance and reliability

The liquid cooling plate dissipates heat for electronic devices by circulating liquid. Vacuum diffusion welding, vacuum brazing, friction stir welding and electron beam welding can be selected for forming, and embedded copper pipes can also be used. Meet the heat dissipation requirements of IGBT/CPU/GPU/SVG/ resistor, power amplifier and other electronic devices.








Applications

Cold plates for Microprocessors, Power Electronics (Diode Modules, IGBT), Thermoelectric Modules, and Laser

Quality Standards		Key Features	
GJB 150A	[Military Equipment Laboratory Environmental Test Methods]	Operation Temp.	-55℃ ~+90℃
GJB 441	[Mechanical and electronic chassis, mounting and dimensions of the installation method]	Max. Heat Flux	200W/cm ²
GJB/Z 27	[Design Manual of Electronic Equipment Reliability Thermal]	Working Medium	Deionized Water
HB 6434	[Basic Requirements for Airborne Electronic Interfaces]	Operating Pressure	2.5MPa
HB 7390	[Civilian Aircraft Electronic Interface Requirements]	Environmental	GJB 150A-2009

Features & Advantages

Category		
Vacuum Brazing Inner Fin Structure	Aluminum alloy 6061, strengthened to T6 level after welding, temperature uniformity <5℃	
Porous Fin Structure	The weight is 1/3 lighter than that of the traditional type cooling plate	
Different kinds of fin structure	The surface heat transfer up to 12,000W/m²-℃	
Milling and Buried Fin Cooling Plate for Radar	Pressure diffusion welding cold plate, the pressure can reach 3.0MPa	
Milling Flow Channel Cooling Plate for Radar	Differential design of high and low drop of the liquid channel	

Heat Pipe Cooling System

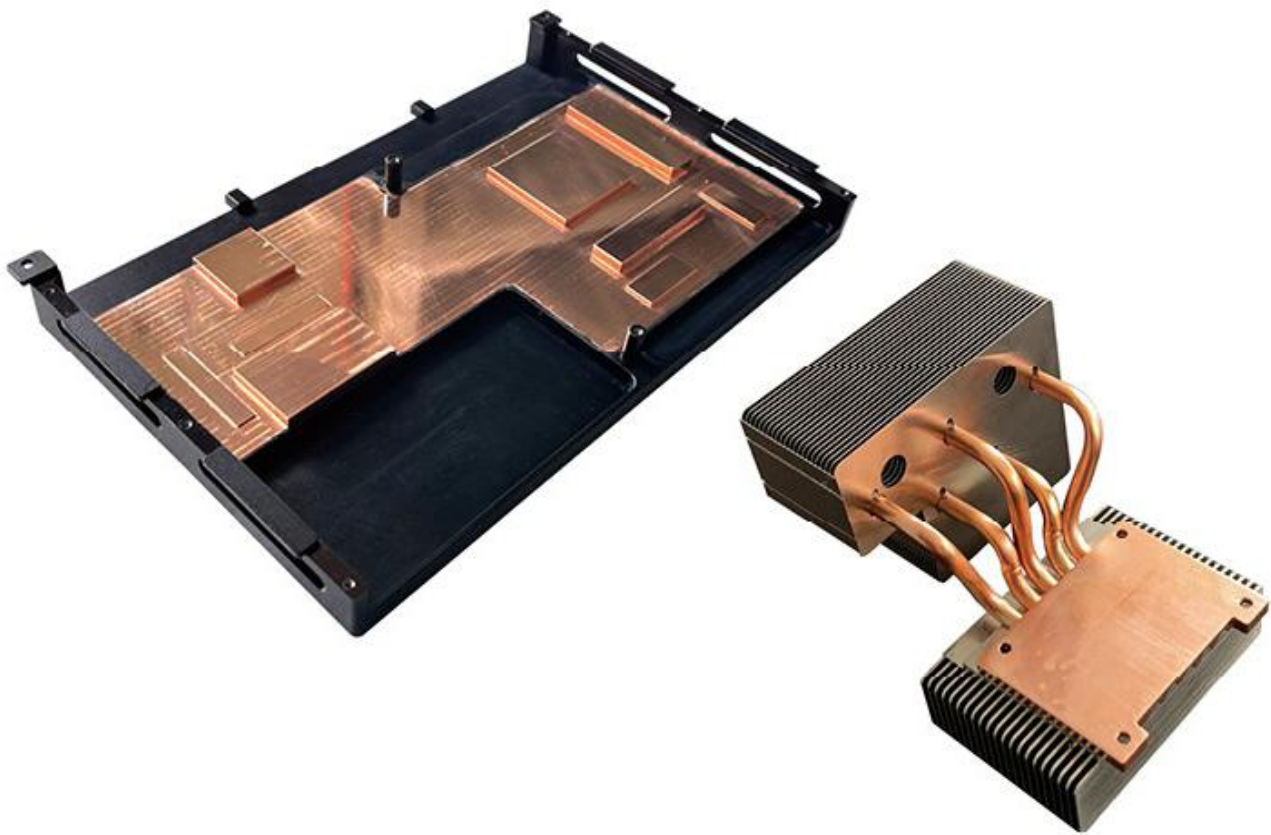
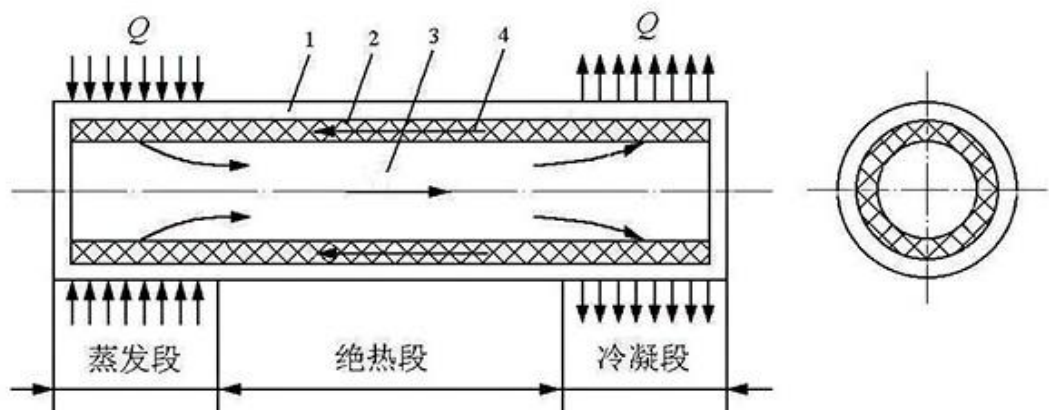
Performance and reliability

The Heat Pipes do not function as heat sinks or cold plates. They can be part of a complete cooling solution, designed to move the heat efficiently from the heat-generating device to another location where an air or liquid stream can take the heat away. Heat Pipes can be designed and manufactured in various shapes and sizes to fit the customer's specific needs and requirements.

Many thermal systems benefit from the addition of heat pipes, especially when heat sources are dense and/or remote to the final heat exchanger. Computer applications, such as processors, graphics cards and other chip-sets, have high thermally dissipated power in a small area. Fan heat sink combinations used in these applications can offer high-performance dissipation to the ambient, but much of the battle is to bring the heat to the heat exchanger with as little temperature change as possible. Heat pipes excel at this and can transport large heat loads from small areas with very little temperature difference.

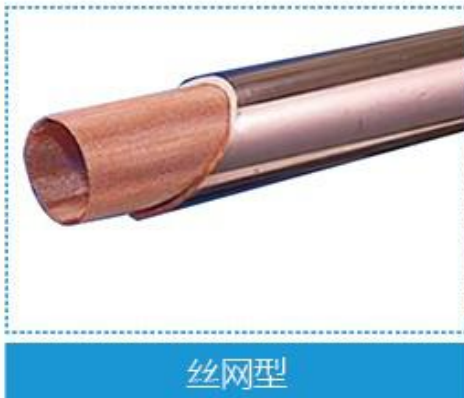
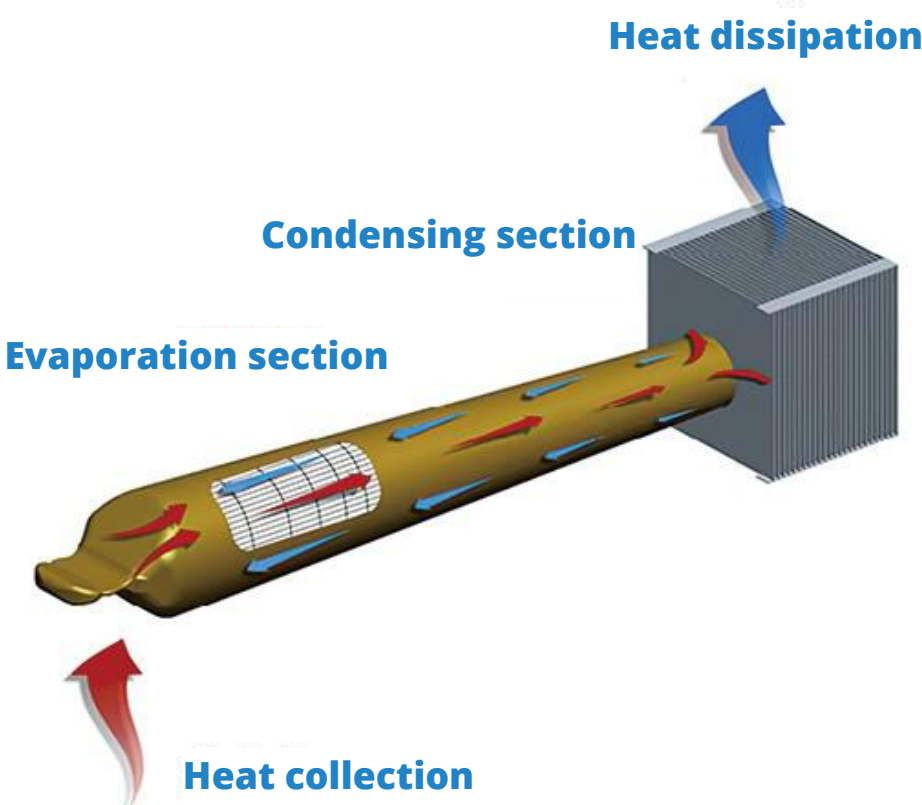
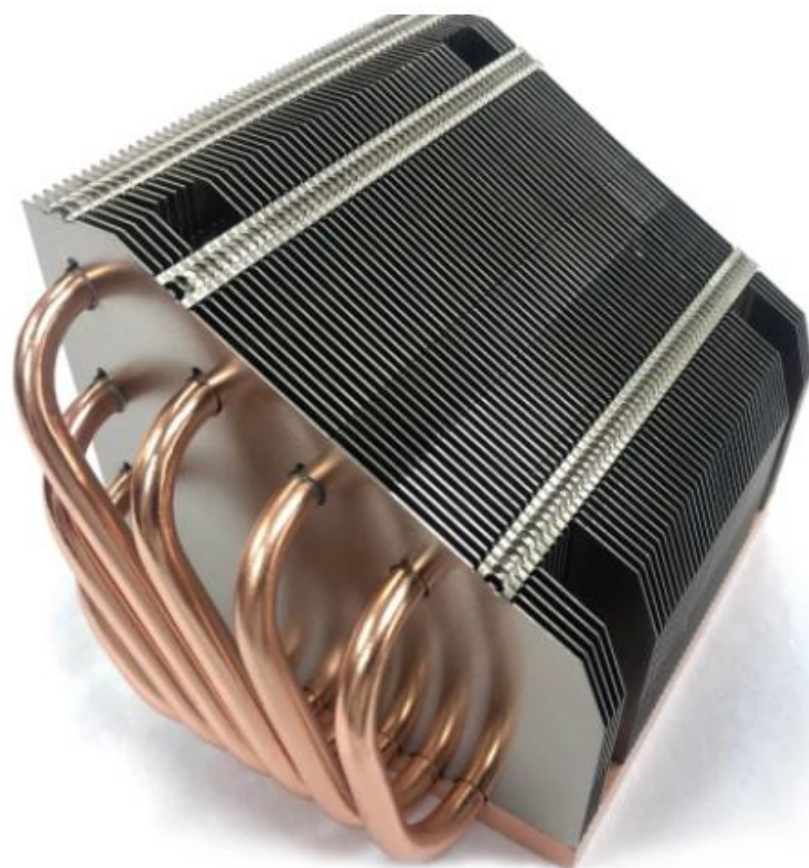
Heat Pipes Advantages

- Reduced volume and weight
- Uses no outside power for heat transfer
- Reliability – Long product life (more than 10 years)



Performance and Specification

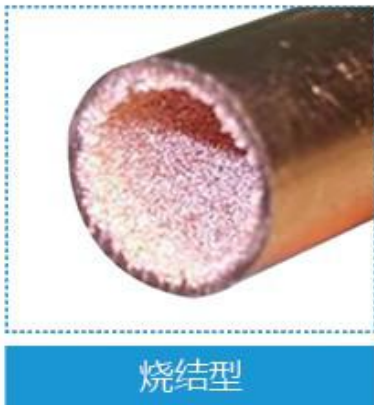
当量导热系数	1000~3000W/m/K
最大热流密度	≥ 250W/cm ²
传热热阻	≤ 0.1℃ /W
存储温度范围	-60℃ ~+120℃
工作温度范围	-55℃ ~+120℃ (特殊可达 200℃以上)
最大外形面积	1200mm×500mm
腔体最小厚度	1.5mm
壳体材料	铝、铜、钛、不锈钢等
使用寿命	大于 30 年



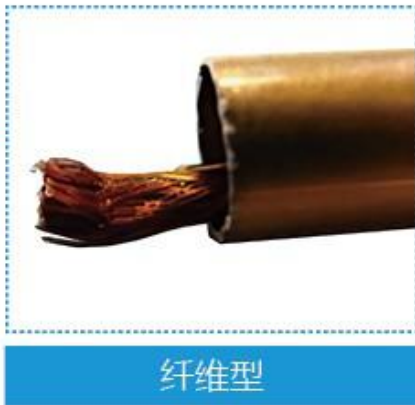
丝网型



沟槽型



烧结型



纤维型

Production Line





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