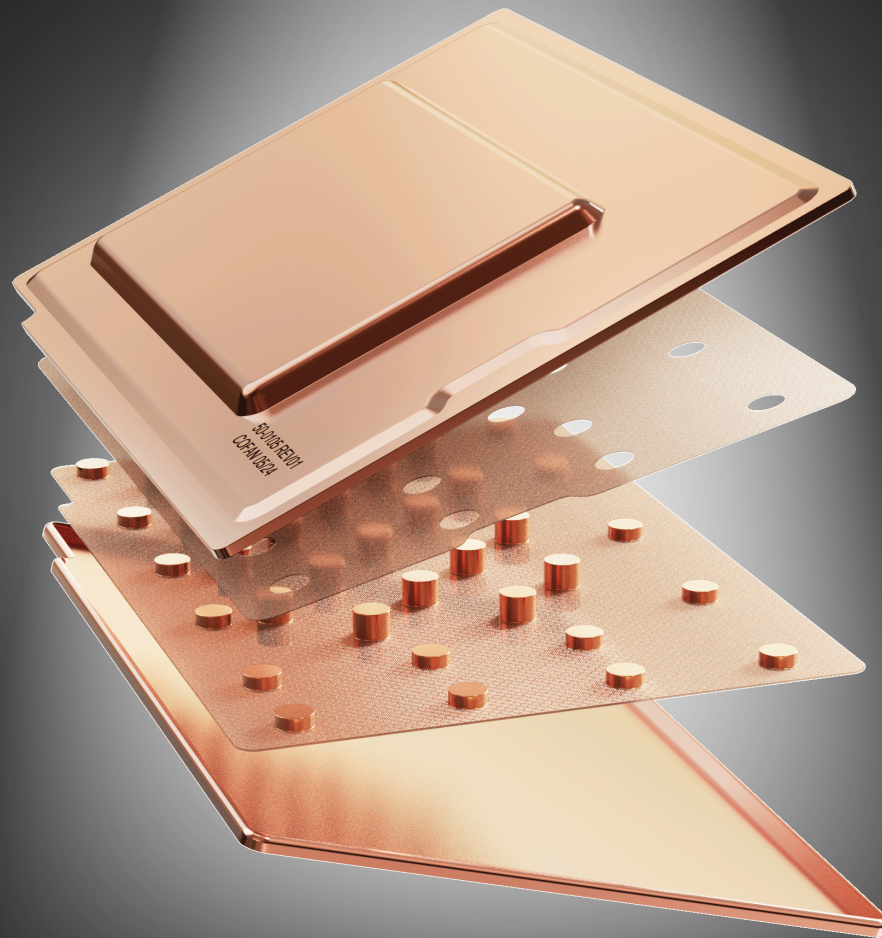


A THERMAL SOLUTION PROVIDER

VAPOR CHAMBER OVERVIEW

SIMULATION TO PROTOTYPE

PROTOTYPE TO PRODUCTION



VAPOR CHAMBER

Cofan's vapor chamber is a heat spreader used in electronics and other thermal management applications. It **efficiently distributes heat away** from its source to a larger surface area. The chamber, usually made of metal like copper, contains a wick structure that aids in transporting a small amount of liquid, typically water, inside a vacuum-sealed enclosure.

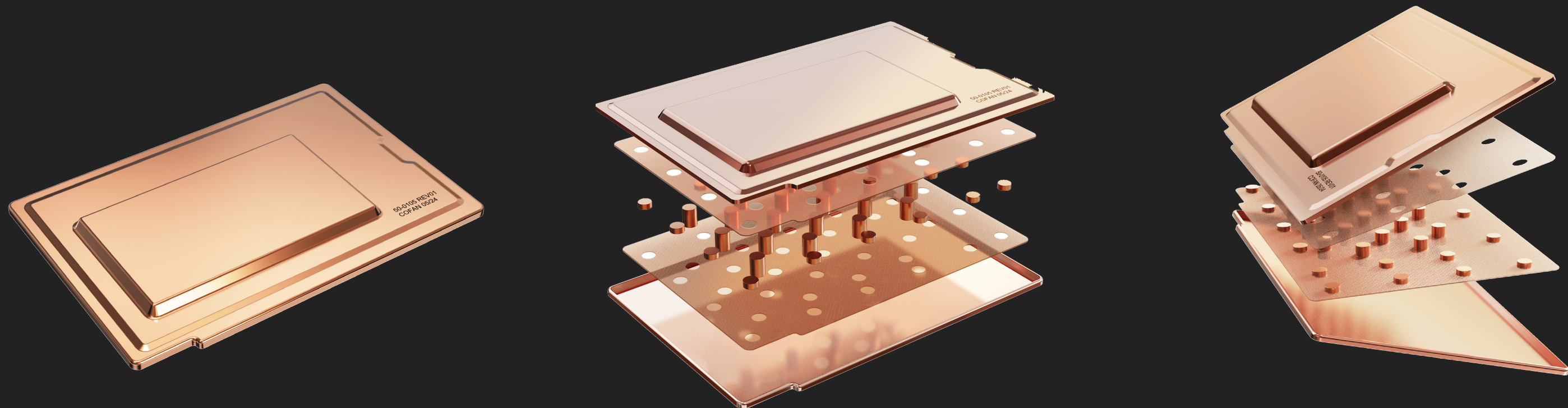
When heat is applied, the liquid vaporizes, moves to cooler areas, and condenses back into a liquid, releasing heat. The condensed liquid is then transported back to the heated area by the wick, repeating the cycle. This process offers **high thermal conductivity**, uniform temperature distribution, and prevention of hotspots, **improving the performance** and longevity of electronic components.

Benefits

- Elimination of hot spot
- Better fin efficiency and equilibrium temperature

Limitations

- Size: 350 mm x 350 mm
- Thickness: 0.5 mm – 5.0 mm
- Shape: Base on stamping and bending limitation



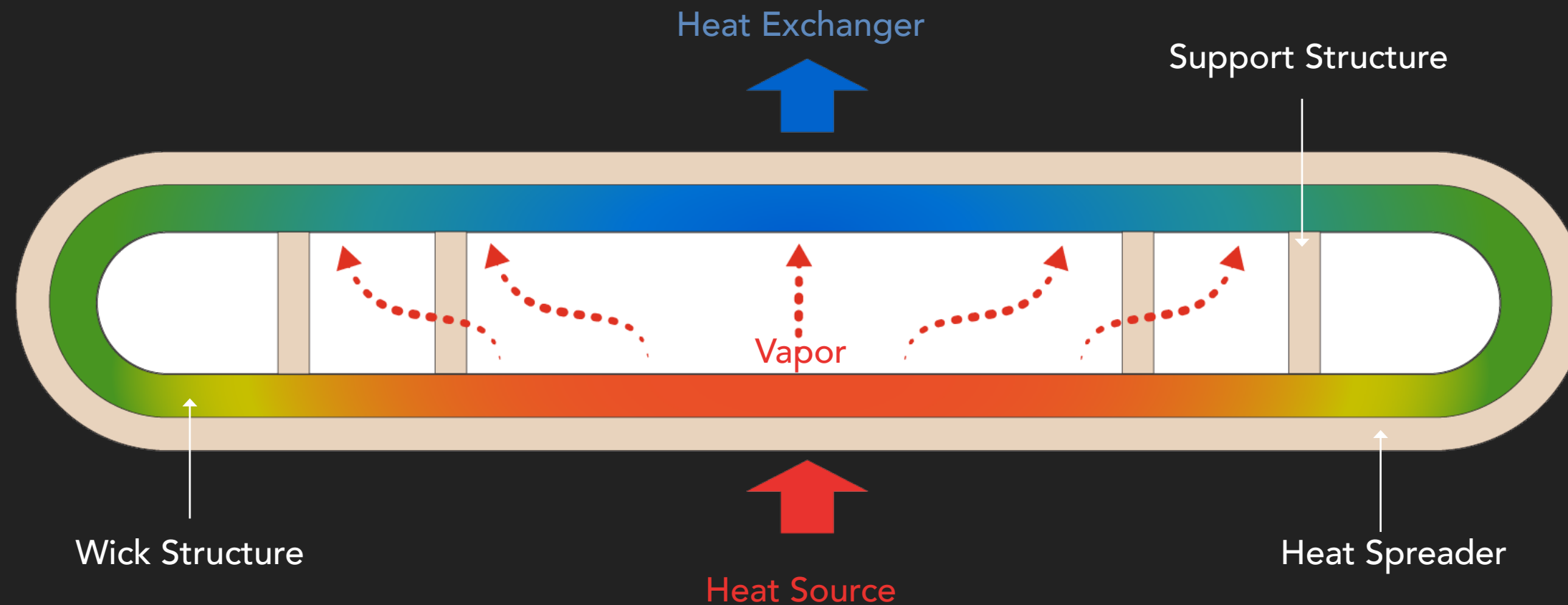
VAPOR CHAMBER STRUCTURE



Vapor Chamber's Structure

A vapor chamber is a **highly efficient heat spreader** used in various thermal management applications. Its structure is designed to utilize the principles of phase change and capillary action to effectively spread and dissipate heat across its surface.

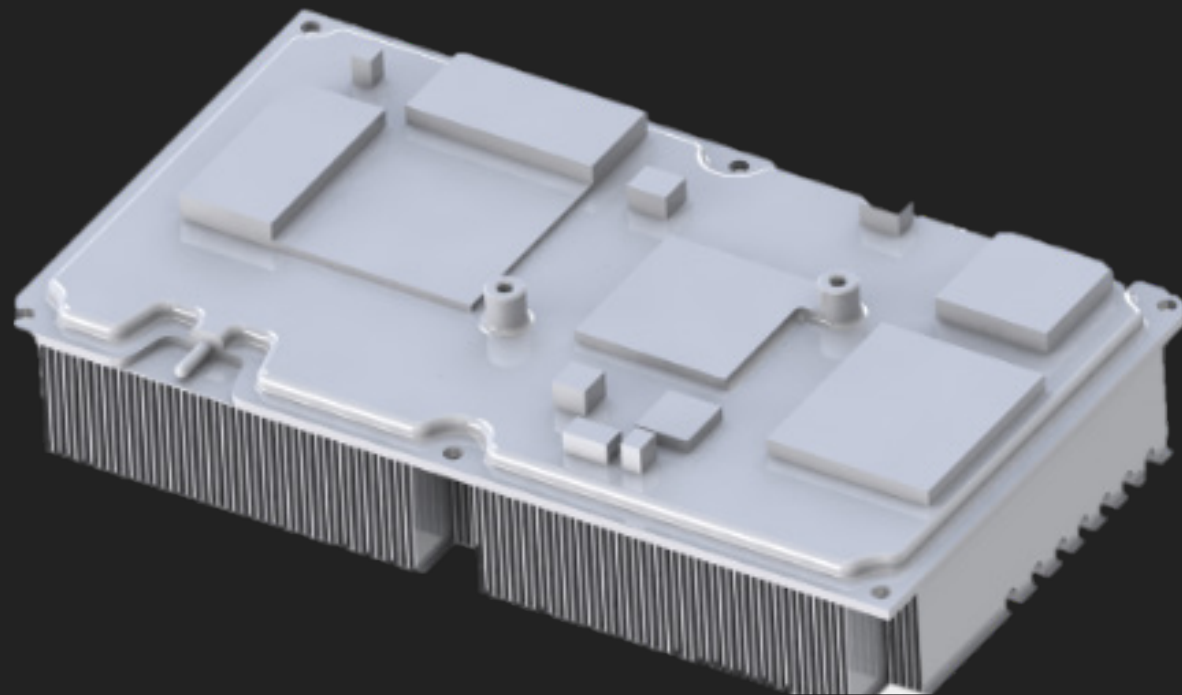
VAPOR CHAMBER INTRODUCTION



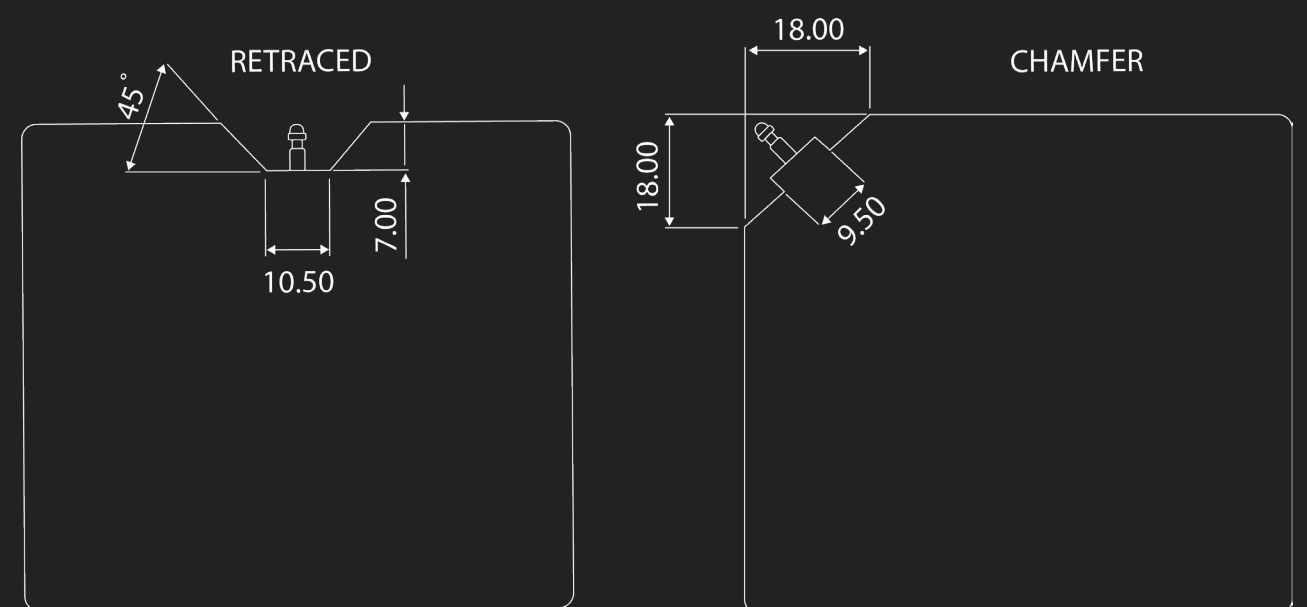
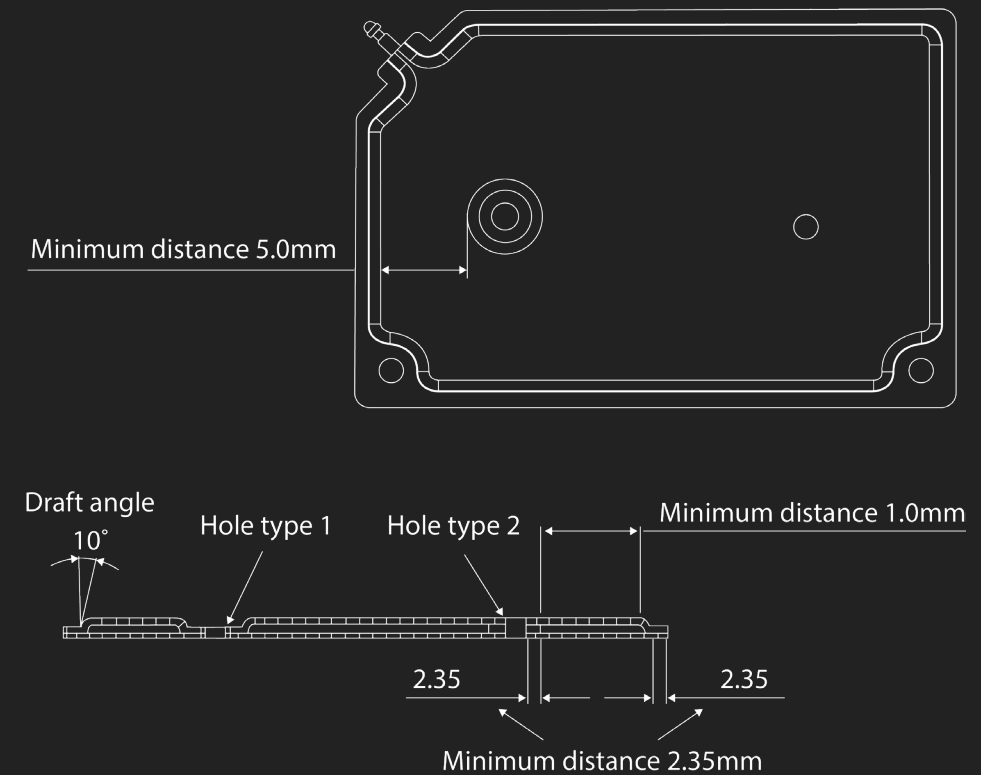
Vapor Chamber Technology

- Two phase flow heat transfer
- Heat turns working fluid from liquid to vapor which travel to heat exchanger side
- Heat exchanger cooling down vapor back to liquid and return back to heat source side by capillary action
- Suitable for high power density heat source

DESIGN CONSIDERATION



We offer **bespoke designs**, ensuring **quick turnaround times** at every stage, from prototyping to production. Our team is dedicated to delivering high-quality solutions tailored to suit specific applications from conception to realization of final products.



COFAN TECHNOLOGY ROADMAP

2024

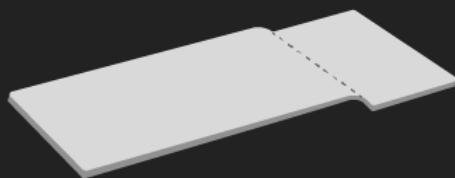
3D Vapor Chamber (upto 600 W/m.k)



3D vapor chambers are designed to handle heat loads typically ranging from 50 to 600 watts, depending on their size, design, and specific application.

2024

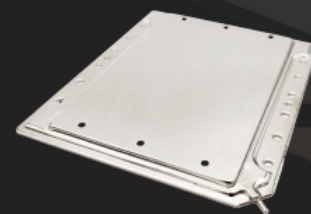
Bendable Vapor Chamber (upto 100 W/m.k)



Bendable vapor chambers, which are designed for flexibility in applications where rigid components cannot be used, generally handle heat loads ranging from about 10 to 100 watts.

2022

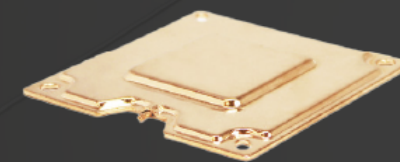
Ultra Thin Vapor Chamber (upto 50 W/m.k)



Ultra-thin vapor chambers handle lower heat loads, typically ranging from 5 to 50 watts, due to their reduced thermal capacity.

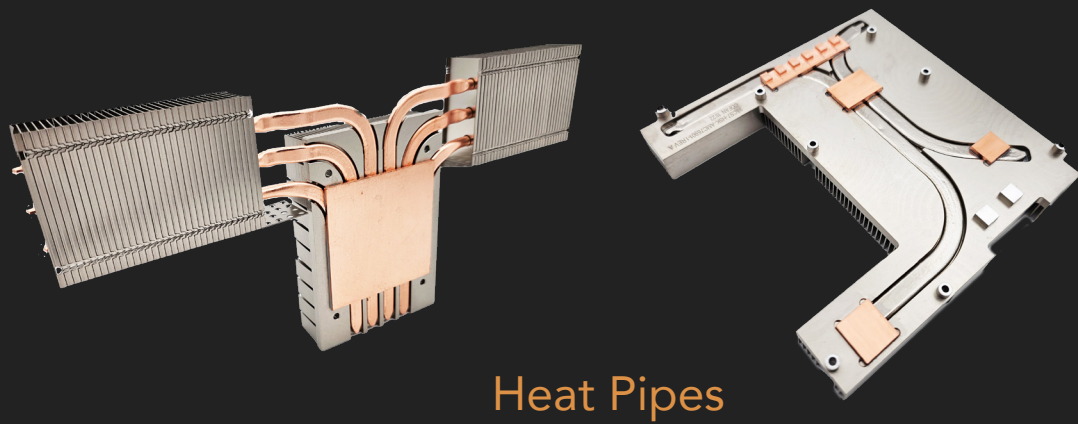
2021

Standard Vapor Chamber (upto 500 W/m.k)



A vapor chamber's heat handling capacity varies widely depending on its design and application. Generally, vapor chambers can manage heat loads ranging from 10 watt to 500 watts.

HEAT PIPE vs VAPOR CHAMBER

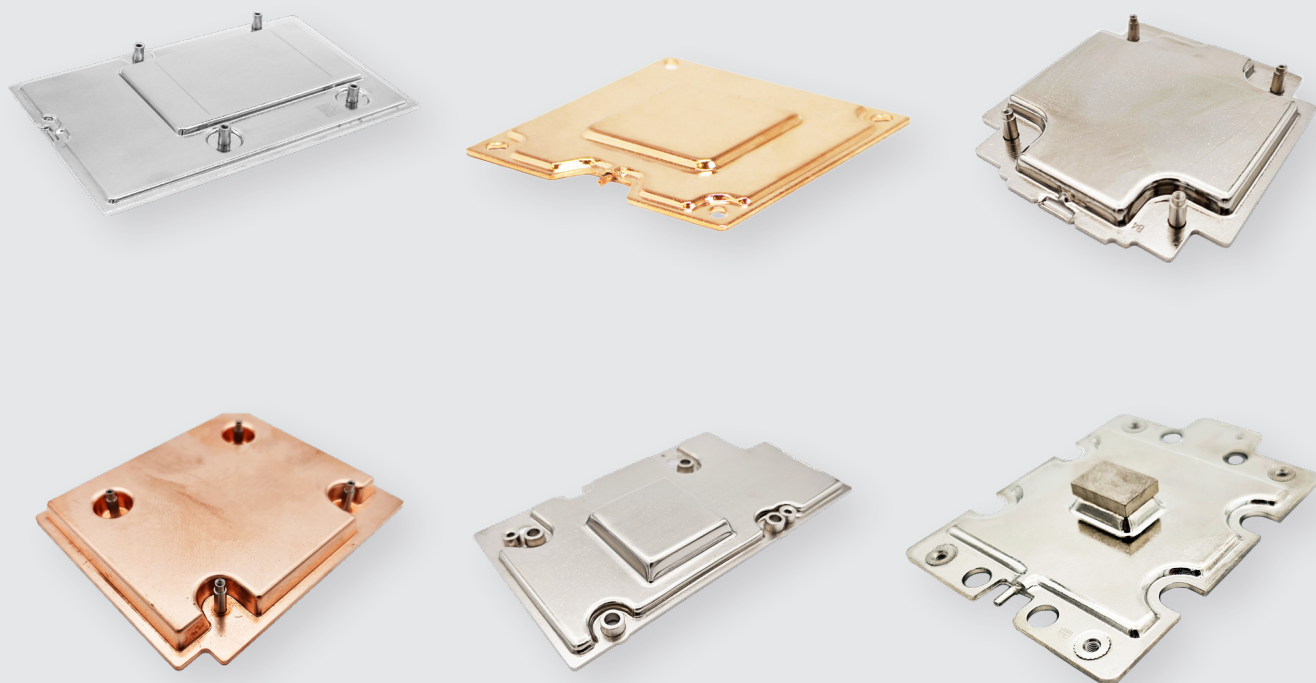


Heat Pipes		Vapor Chamber
Two Phase Flow-Linear Heat Transfer	Heat Transfer Theory	Two Phase Flow 2-D and 3-D Heat Transfer
1-D Heat Distribution	Heat Flow	2-D and 3-D Heat Distribution
Heat Spreading (PC, Military, Aerospace, 5G/6G, LED, Projector, Graphic, New Energy)	Application	Heat Spreading (PC, Military, Aerospace, 5G/6G, LED, Projector, Graphic, New Energy)
Good for Multi Heat Sources on Different Surface, Complicated Structure and Anti-gravity	Advantage	Good for Higher Power Density, Thin and Large Area Solution
D12>100W,D10>80W, D6>40W,D5>20W, D4>18W, D3>12W, D2>8W	Qmax	300*300*3(MM) >2000W, 200*200*3(MM) >800W,100*100*3(MM) >600W, 80*80*3(MM) >400W, 60*60*3(MM) >200W
T0.5 (20%), T0.6-1.2 (16%), T1.3-2.5 (13%), T2.5 (10%)	Performance After Bending (90°)	T6 (10%), T6-T3 (20%), T3 (25%)
Tube, Flattened or Bent	Shape	Complex Shape
Base Plate or Flattened / Machined	Mount with Heat Source	Direct Contact
Small Contact Area	Contact with Heat Source	Large Contact Area
Low Cost	Cost	High Cost

VAPOR CHAMBER TYPE

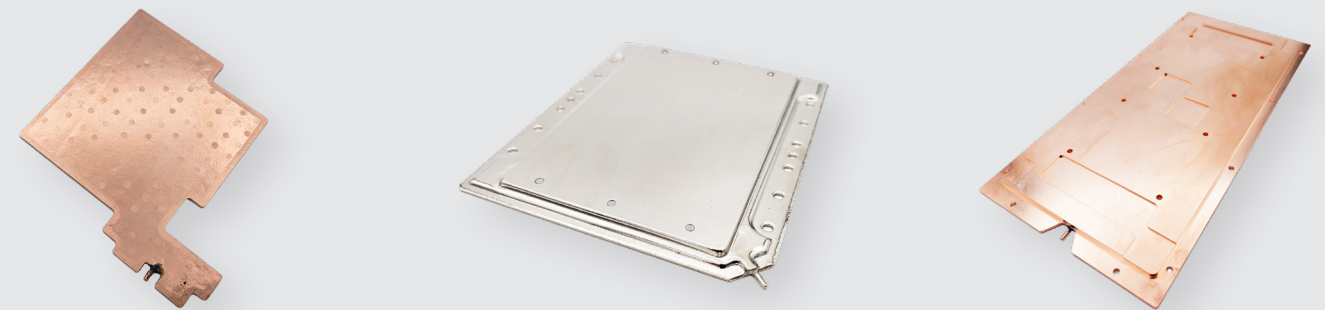
Standard

Two-piece vapor chambers feature separate evaporator and condenser sections, allowing flexible layouts and customization for specific cooling needs. They offer easy integration into various devices. One-piece vapor chambers are cost-effective, mass-produced cooling solutions, offering reliable heat dissipation for budget-friendly consumer electronics.



Ultra Thin Type

Ultra-thin vapor chambers, less than 1mm thick, are perfect for tight spaces, providing efficient heat transfer and high thermal conductivity in compact devices.



3D Type

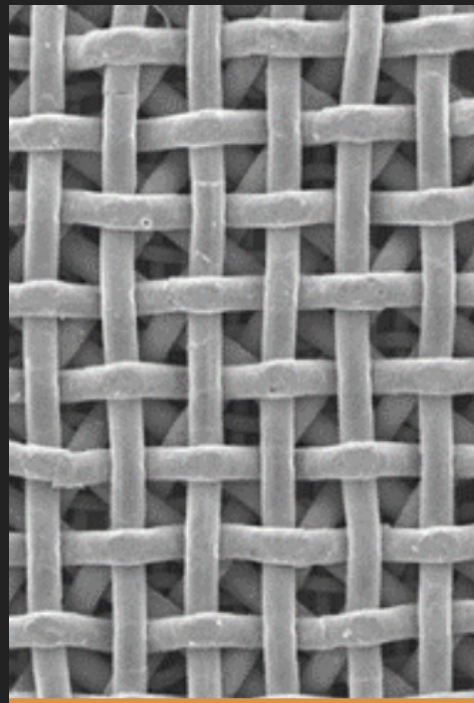
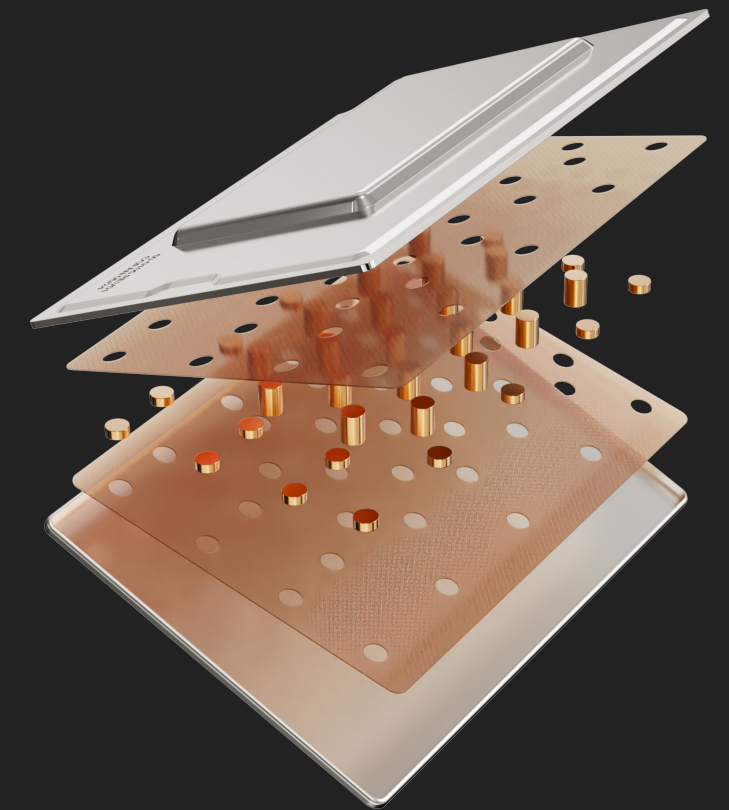
3D vapor chambers have complex structures that boost heat dissipation, making them ideal for high-power electronics and gaming systems.



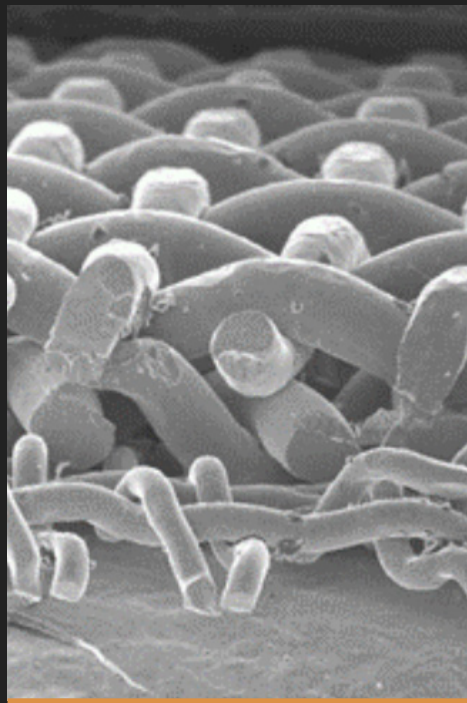
WICK STRUCTURE

Cofan's wick structure inside a vapor chamber is a crucial component that facilitates **the effective transfer of heat**. A vapor chamber is a type of heat spreader that operates on the principles of phase change, similar to heat pipes, but in a flat, planar form. The wick structure plays a significant role in its operation.

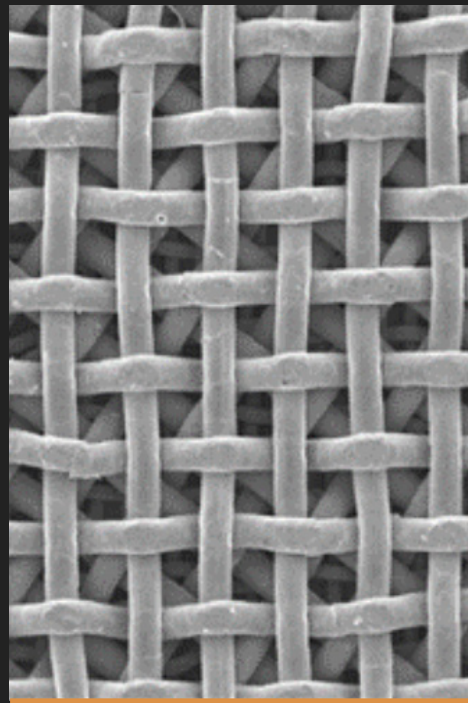
The wick structure in a vapor chamber is typically made from porous materials such as sintered metal powders, metal meshes, or grooves etched into the chamber walls. This structure is designed to provide a capillary action, which **helps to distribute the working fluid** (usually water) across the entire surface area of the vapor chamber.



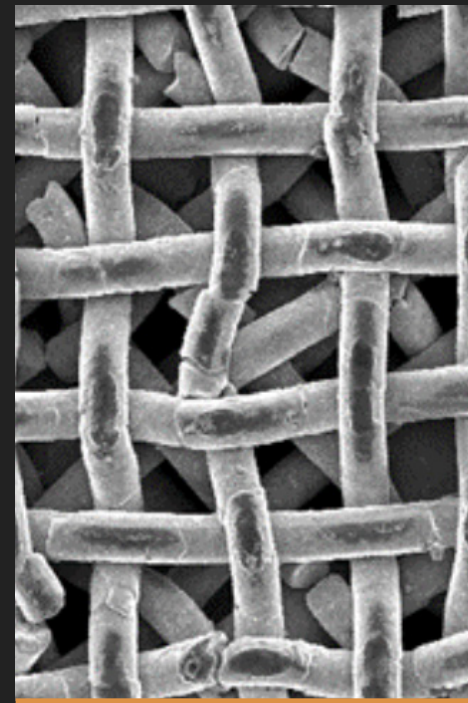
Top View



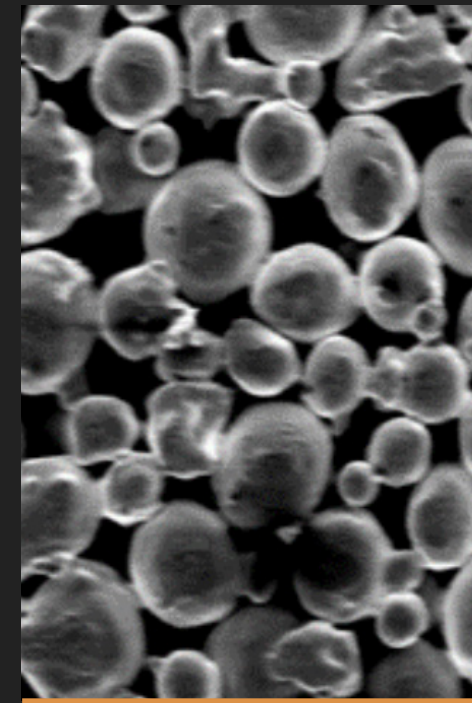
Side View



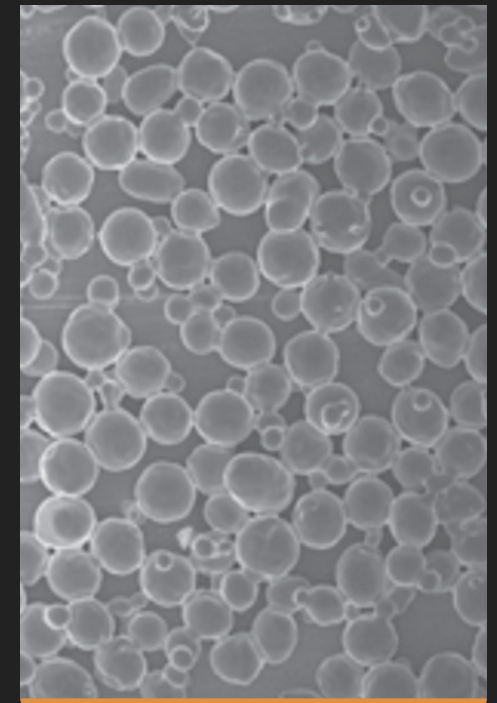
Low Density Type



High Density Type



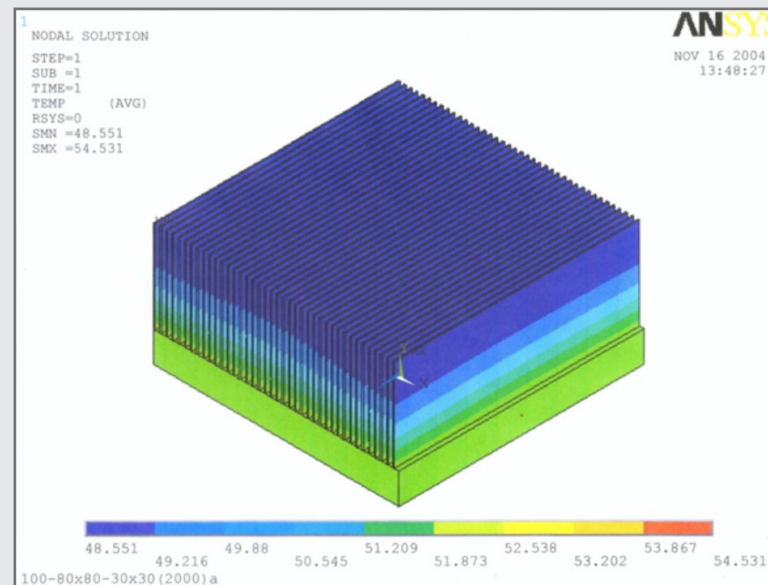
Sintered Type



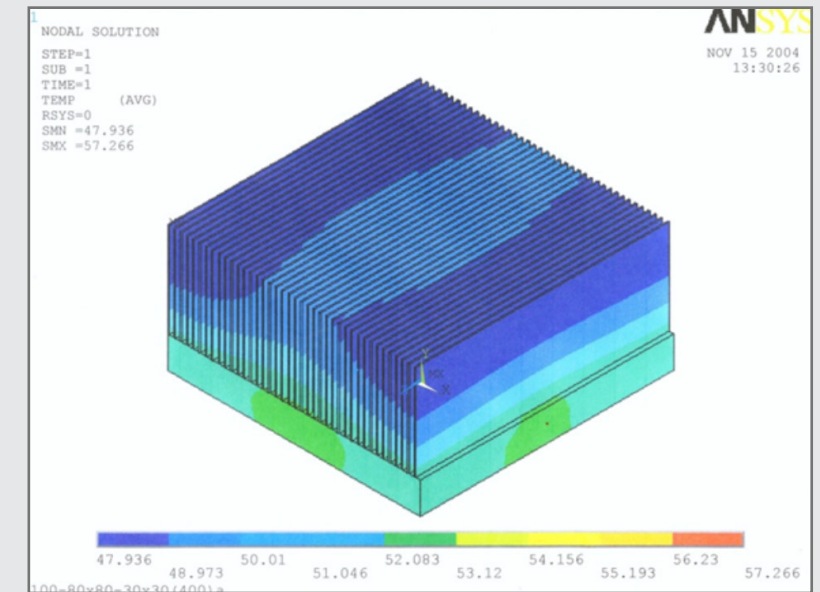
Hybrid Wick Structure

PERFORMANCE COMPARISON

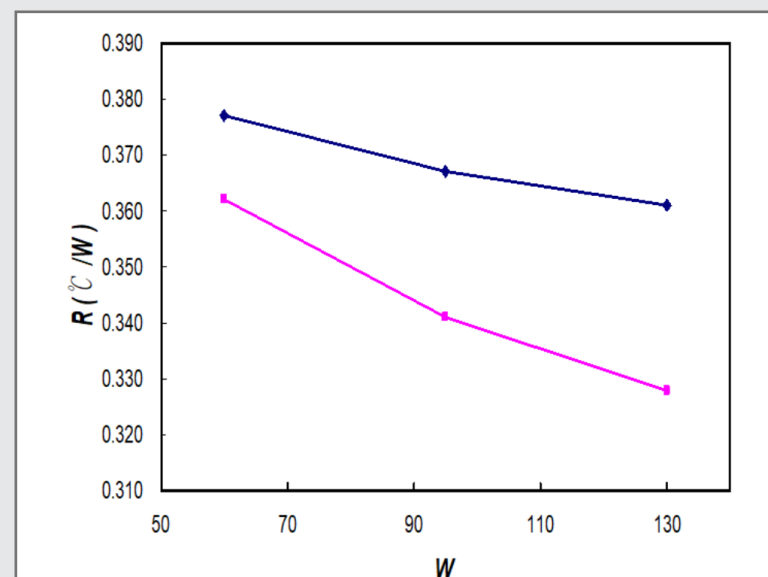
A heatsink with a vapor chamber typically outperforms a traditional copper heatsink, especially in applications requiring efficient heat spreading, reduced hotspots, and compact designs. Vapor chambers offer better **cooling efficiency**, especially for high-power electronics, though they may come at a higher cost compared to copper heatsinks.



Heat Sink with Copper



Heat Sink with Vapor Chamber



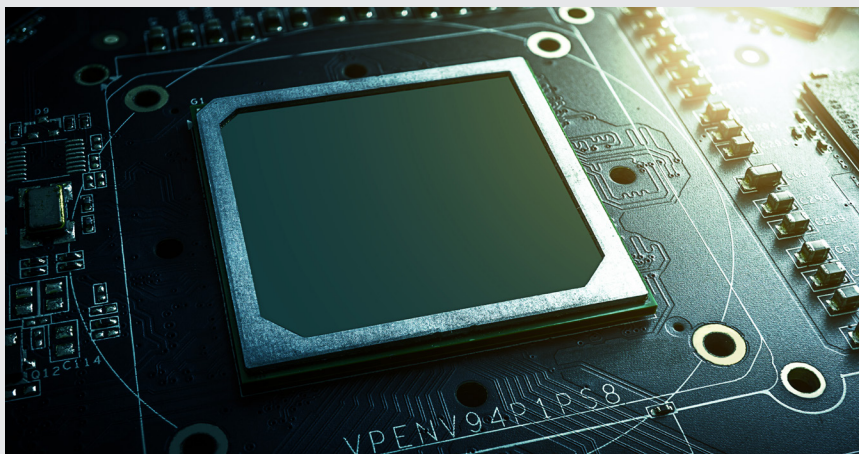
Heat Sink with Copper Base

Heat Sink with Vapor Chamber

VAPOR CHAMBER APPLICATIONS

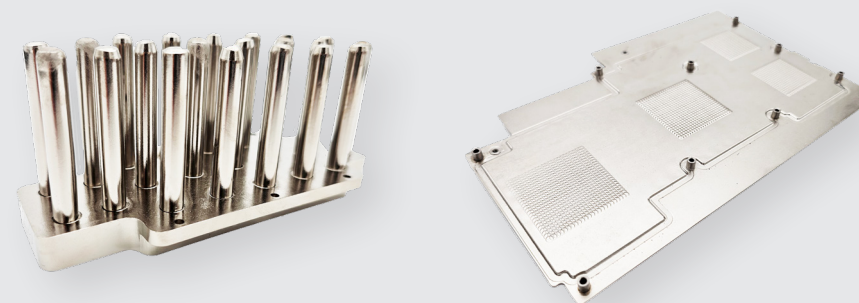
GPU/CPU

Vapor chambers efficiently spread heat across GPUs, significantly **enhance heat dissipation** to prevent thermal throttling, and improve device longevity and reliability by maintaining consistently lower operating temperatures.



Server

3D Vapor chambers ensure **CPUs and components** stay cool, enable higher server performance without overheating, and improve energy efficiency by reducing cooling needs.



Automotive

Vapor chambers in automobiles enhance **EV battery performance** and lifespan, prevent overheating of LED headlights, and ensure reliable operation of power electronics.



VAPOR CHAMBER APPLICATIONS

Laptop

Vapor chambers **manage heat from light sources** and internal components, effectively prevent overheating and image distortion, and ensure consistent performance and reliability during prolonged and intensive use.



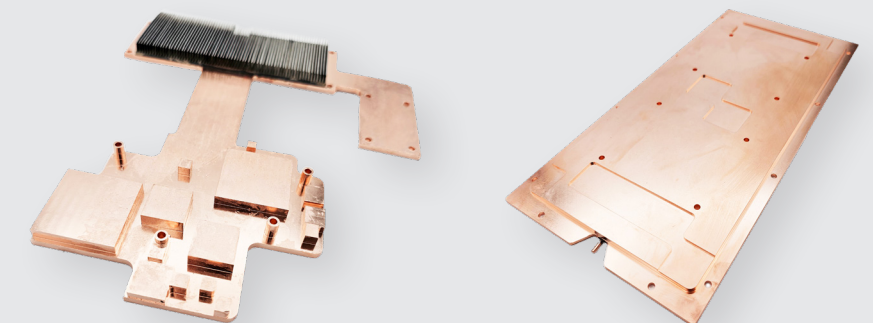
Medical

Vapor chambers efficiently **manage heat in medical devices** like MRI machines, CT scanners, and portable monitors. They offer uniform heat distribution, compact size, reliability, and quiet operation, enhancing performance and safety.

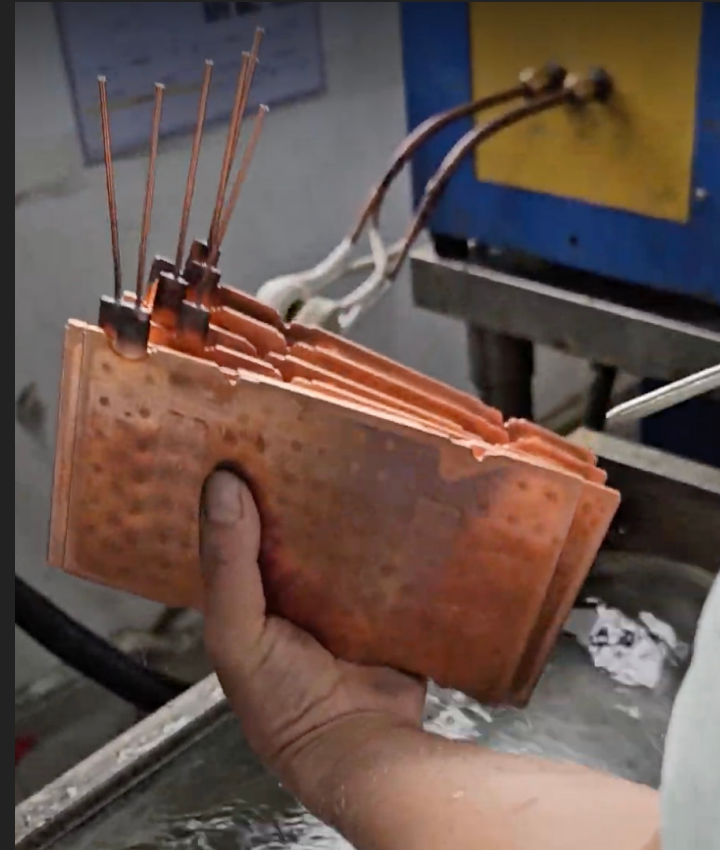
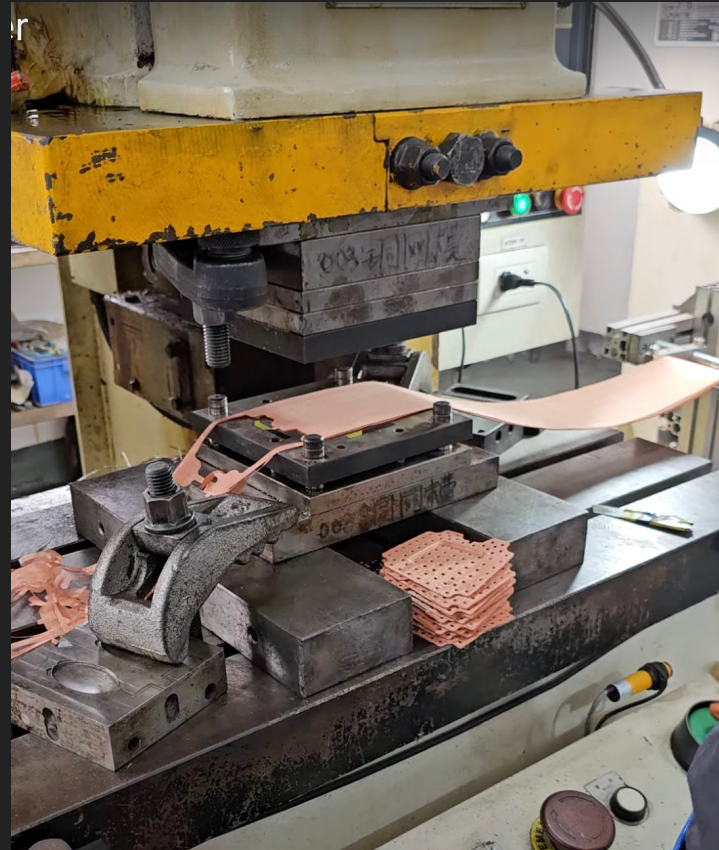


Military

Vapor chambers ensure **thermal stability in extreme conditions**, significantly enhance durability and performance of critical devices, and significantly reduce the risk of overheating and equipment failure.



MANUFACTURING PROCESSES



Manufacturing Processes

- Heat Spreader Forming
- Mesh Structure Forming
- Support Structure Positioning
- Diffusion Welding
- Filling Working Fluid
- Degassing Sealing
- Thermoforming
- Surface Treatment
- Leaking Test
- Performance Test
- Inspection
- Packing

MACHINES



Aging Oven



Bell-type Annealing Furnace



Continuous Sintering Furnace



Helium Gas Leak Detector



High Frequency Welding



Diffusion Welding



Function Testing



Furnace



Laser Machine



Leveling Machine

MACHINES



Mash Welder



Nitrogen Cabinet



Punching Machine



Resistance Welding



Sealing Machine



Vacuum Degassing Machine



Water Injection Machine



Wire Drawing Machine

CERTIFICATIONS

- ISO 9001:2015
- ISO 14001:2015
- ISO 45001:2020
- IATF 16949:2016
- Reach-SVCH Statement
- RoHS Compliance Certificate
- ITAR

ISO 9001:2015 COFAN Dongguan



ISO 9001:2015 COFAN Taiwan



ISO 14001:2015 COFAN Dongguan



ISO 14001:2015 COFAN Taiwan



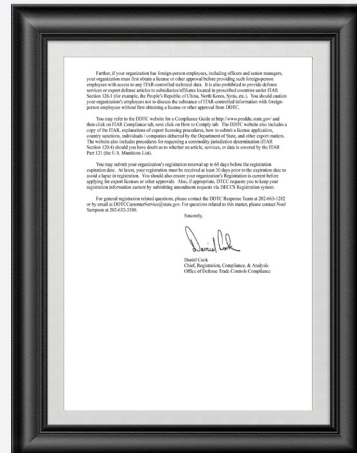
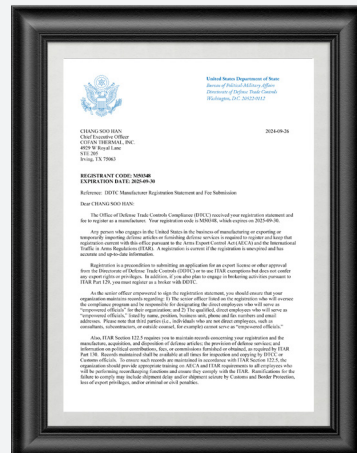
ISO 45001:2020 COFAN Dongguan



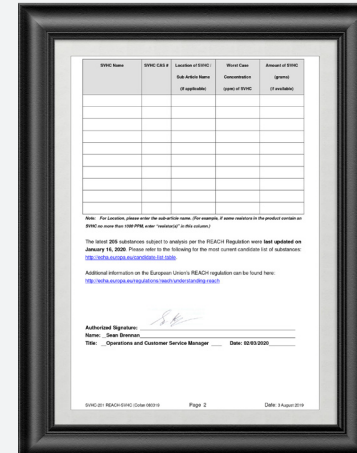
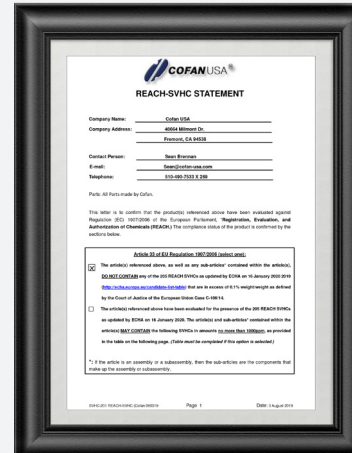
IATF 16949:2016 COFAN Taiwan



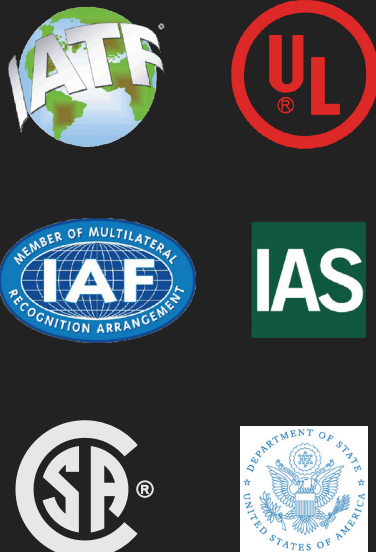
ITAR COFAN USA

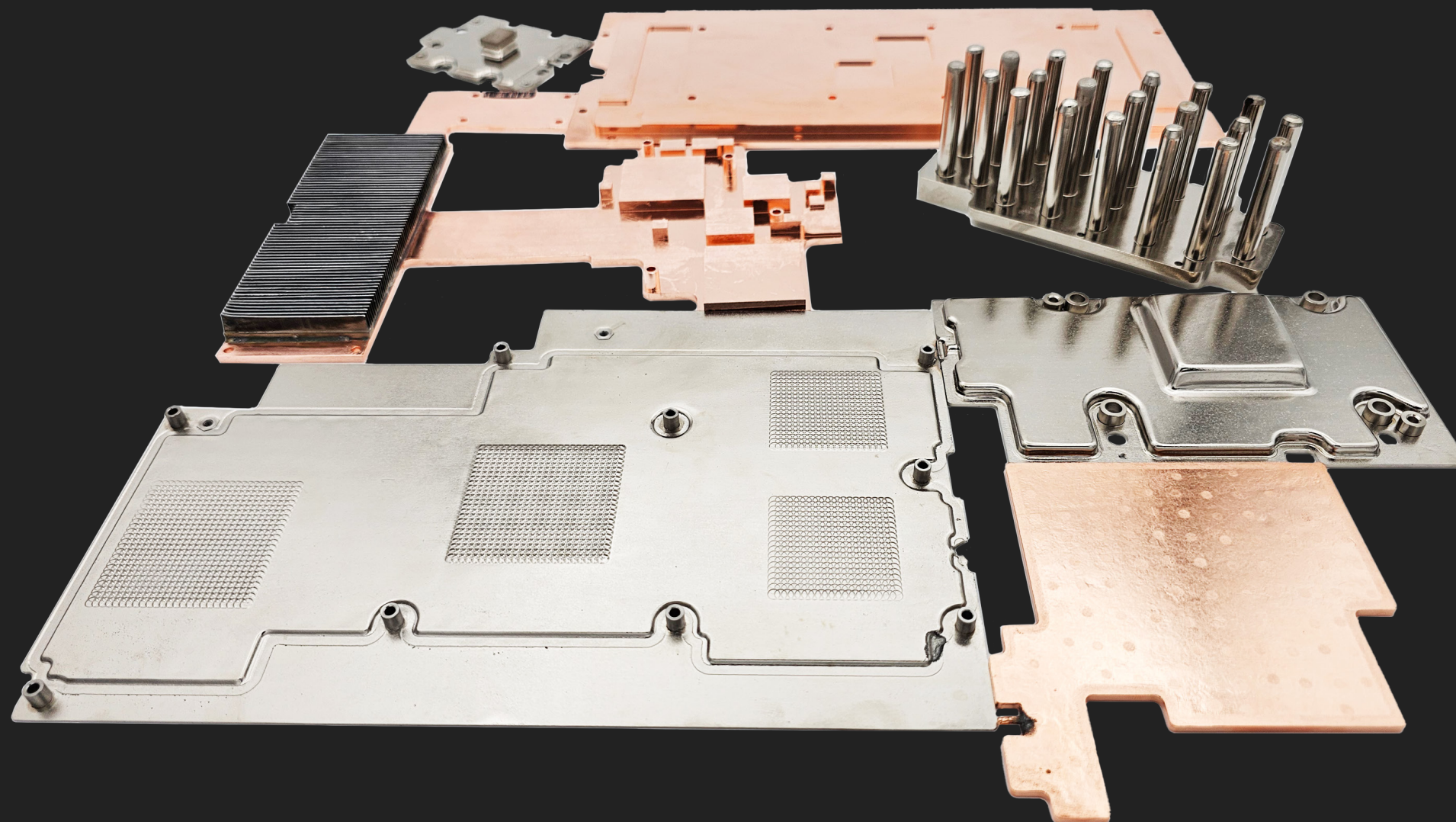


Reach-SVCH Statement



RoHS-Compliance Certificate Cofan Taiwan





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