## Company Honor

## Awarded the 2023 R&D 100 Award (Second time)

- . Awarded the title of 2022 State Specialized and Sophisticated "Small Giant" Enterprise
- 3. Awarded the title of Shenzhen 2021 Specialized and Sophisticated Enterprise
- . Awarded the title of Shenzhen 2022 **Famous Brand**
- . Awarded the 2021 R&D 100 Award (Second time)
- . Awarded the 2021 Edison Invention Award (Second time)
- . Awarded the 2021 CES Innovation Award (Second time)
- 3. Awarded the 2020 Edison Invention Award (First time)
- 9. Awarded the 2020 CES Innovation Awards (First time)
- 10. Awarded the 2018 R&D100 Award (The world's 100 most innovative technologies)
- 11. Awarded the title of the 2016 "State High-tech Enterprise"





















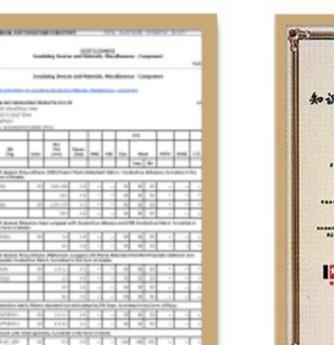


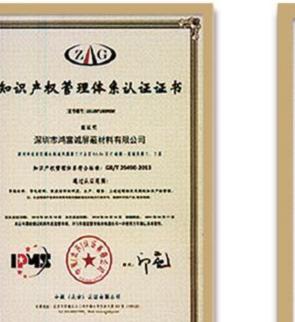


## Quality Assurance System

- 1. ISO9001 Quality Management System
- 2. QC080000 Hazardous Substance Processing **Management System**
- 3. ISO14001 Environmental Management System
- 4. OHSAS18001 Occupational Health and Safety Management System
- 5. IATF16949 Automotive Quality Management
- 6. UL Flame Retardant, RoHS, HSF
- . Intellectual Property Management System Certification
- 8. Registered Enterprise of Shenzhen Enterprise **Product Standard**











>> Guangdong Provincial Engineering Technology Research Center of Thermal Conductivity Materials for Electronic Devices

### http://www.hfcsz.com

Shenzhen HFC Co., Ltd.

Shenzhen Headquarter

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ADD: C Bldg 3rd Industrial Park, Fenghuang Fuyong Town, Bao'an District, Shenzhen, China

ADD: 5 Fushun Road, Bicheng Street, Bishan County, Chongqing, China

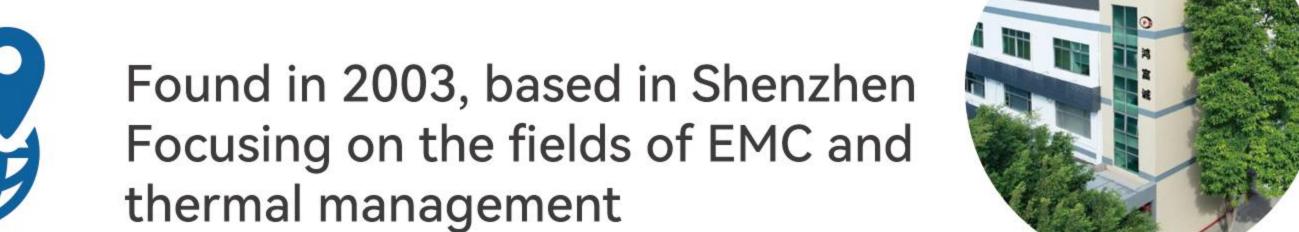
ADD: 5 Bldg Liuli New Industrial Park, Ganpu Town, Haiyan County



# Specialized in Cooling Systems Solution Design and Customization



Think on Your Side Carry on with You







Wave-absorbing Material



Company Profile

We have established wholly-owned subsidiaries in Chongqing, Zhejiang, and Wuhan, as well as offices in Taiwan, Suzhou, and other locations.

433 employees (Shenzhen: 283, Zhejiang: 58, Chongqing: 92)

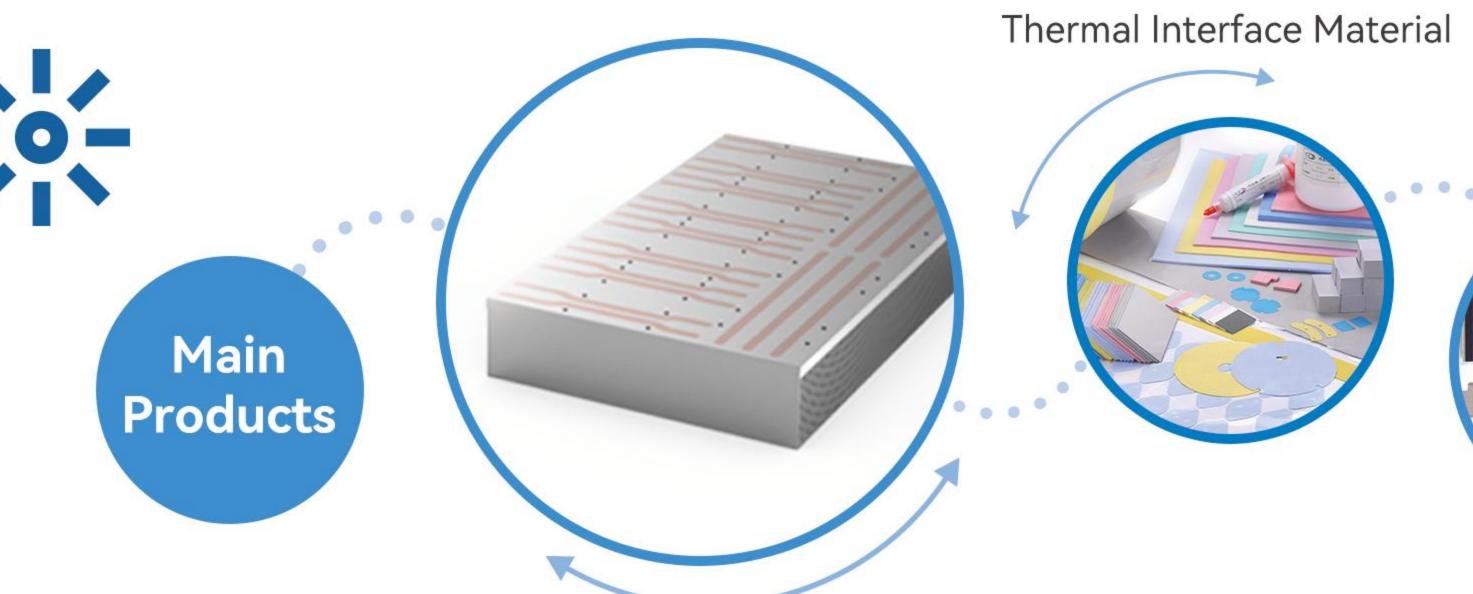


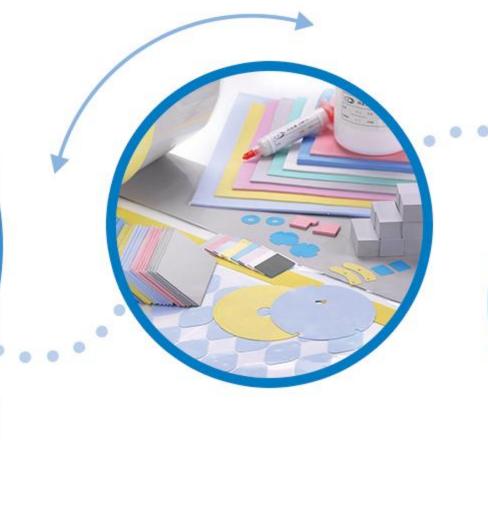
As a State high-tech enterprise, we focus on R&D, manufacture and sales of EMI shielding materials, thermal interface materials, carbon-based materials, wave-absorbing materials, and thermal management systems (heat dissipation devices) for electronic devices.

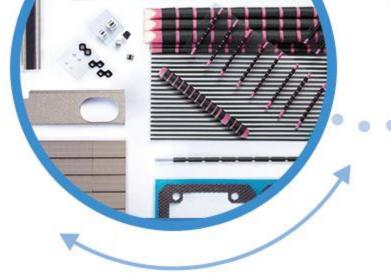


Adhering to the principle of Customer-Centric, we provide customers with optimal cooling solutions through professional thermodynamic analysis.

Common heat dissipation components: ultra-thin/standard uniform temperature plates, heat dissipation modules, finned/profiled heat sinks, water-cooled plates, and 3D phase-change superconductive heat sinks.







**EMI Shielding Material** 

Shenzhen HFC Co., Ltd.







## Technical Backgroud

### **Current status:**

With the dawn of the age of intelligence, people's demands for product features, safety, and size are growing, and the operating frequency of electronic components gets higher steadily. Chips are becoming smaller and more highly integrated, leading to concentrated chip heat and greater heat dissipation, consequently higher chip junction temperature. Elevated working temperature may reduce the service life and efficiency of components, making heat dissipation prominent and urgent.

- Dimensional flexibility, with high structural DOF.
- equalization range, with a relatively large overall volume.
- Comparatively low overall heat dissipation power
- Cost-effective.

Traditional profile/heat

Water-cooling solutions

Large system size

High energy consumption

There are potential water

leaks and electric leaks

The maintenance cost is high

and the water pump needs to

be replenished, maintained

and replaced regularly.

Maximum heat dissipation

efficiency

(due to water pump).

**3D Phase Change Heat** Sink Solution

Optimization of equipment

Good temperature

Low maintenance cost

equalization

High safety

## Application Area



Applications: Addressing pain points in the heat dissipation systems of high-power, high-heat, and high-heat flux electronic components for customers. The 3D phase-change superconductive heat sink is widely and flexibly applied to products with requirements for weight and space.

Such as: IGBTs, resistors, IT communication terminals, large CNC equipment, photovoltaic power generation, rail transportation, Active Power Filters (APF), MOS transistors, UPS power supplies, EPS power supplies, SVG, SVC, inverters, transformers, monocrystalline silicon, polycrystalline silicon, battery packs, new energy electronic controllers, charging piles, inverters, switch power supplies, military power supplies, laser power supplies, welding machines, communication transmitters, base stations, control cabinets, power regulators, thyristors, and other high-power, high-heat electronic components or devices.

## Product Introduction

## Ultra-thin vapor chamber (VC)

Flat VC technology effectively addresses the heat conduction and accumulation issues in terms of high-density integrated, heat-concentrated, and space-constrained products. It extends the product's lifespan, improves operational efficiency, and enables more compact and lightweight product design.

### Features and Advantages

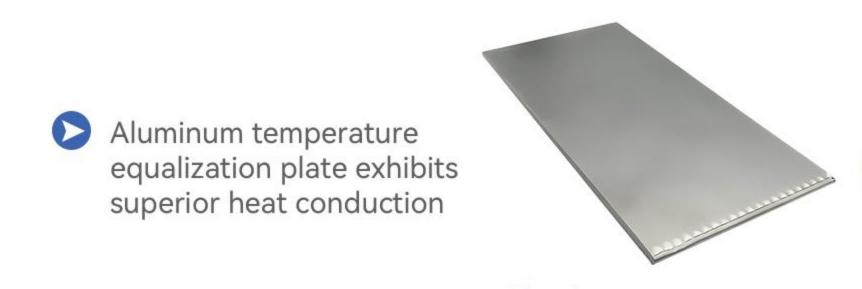
- Low starting temperature Long lifespan
  - Fast heat transfer speed No power dissipation Excellent temperature equalization performance

    - High structural and dimensional DOF for a lighter and thinner product











(T > 0.5mm)

## Profile heat sink

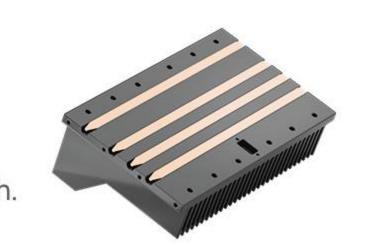
### Product Introduction

A plastic processing method, that is, apply external force to the metal billet placed inside a container (extrusion barrel), causing the material to flow out through specific die holes, and obtaining the desired cross-sectional shape and dimensions. The re-machined surface of the profile heat sink is anodized to improve the corrosion resistance, wear resistance and appearance of the profile.

Low cost, affordable prices

## Features and Advantages

- Fast forming speed
- Suitable for massively



superior heat conduction





## Shovel Tooth Heat Sink

Sheets are cut out from the plate at a certain angle which is then straightened by mechanical action, therefore an orderly gap structure is formed by repeated cutting. The shovel tooth structure can increase the heat dissipation performance by 8-15% compared with the insert heat sink.

### Features and Advantages

- The material thermal conductivity of the shovel tooth heat sink is higher, resulting in lower thermal resistance compared to aluminum extrusion.
- Small limitations of fin thickness and spacing height is small, offering great design flexibility, and doubling the heat dissipation area with the same volume.
- Strong heat dissipation capability makes it suitable for cooling high-power heating

### Low cost, relatively inexpensive, without the need for molding.





Pure aluminum shovel tooth heat sink

## ── Water Cooling Plate

### Product Introduction

The water cooling plate is made of copper and aluminum with high thermal conductivity. An internal water circulation system is installed inside the cold plate, and the heating element is directly fixed on the cold plate. The heat generated by the electronic component is dissipated by the flowing water in the circulation system.

In view of the ever-growing trend of miniaturization, precision and intelligence of all luminous

appliances, medical instruments, optoelectronics and other intelligent device industries,

such as copper heat pipes, copper substrates, aluminum fins and fans is adopted, which

structure space size, PCB motherboard chip location, quantity, power consumption size,

Wide application range, easy installation, extensively used in the core components of ICs

Due to the characteristics of liquid phase change and gas conduction in vacuum,

the heat generated by the heating element is absorbed by the heated surface,

and then conducted to the working liquid. The working liquid quickly absorbs the

heat and vaporizes. Following this, it flows into the internal cavity, converges into

the collection chamber, and then is transferred to the fins via the internal branch

pipe, heat exchange with air through air cooling takes place. Once the vaporized

of the heat sink back to the heat source. When the remaining gas flows into the

collection and discharge chamber, it is subjected to pressure equalization and

cooling. It repeats in cycles for rapid and efficient heat dissipation.

Sealed 3D structure with outstanding temperature control capability

Long distance heat transfer, high efficiency conduction, high uniform

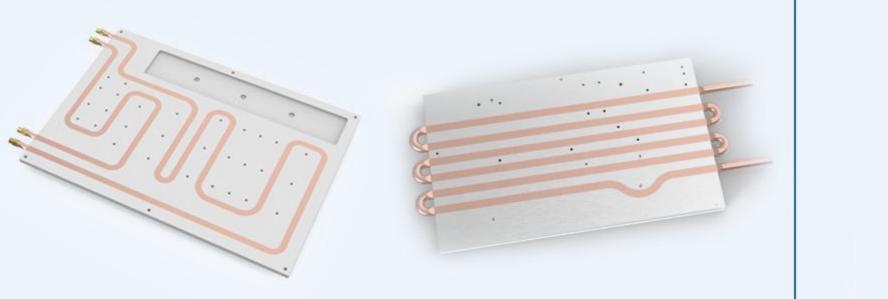
temperature performance, and high heat exchange efficiency

Insulating working fluid for higher safety and reliability

working liquid is cooled down and condenses into a liquid, it flows down the bottom

Integrated 3D Phase Change Superconducting Heat Sink

air passage direction, use environment, temperature and other factors.



### Features and Advantages

Strong heat-carrying capacity of the liquid working medium enabling directed heat flow

Product Introduction

Features and Advantages

Relatively low cost

Product Introduction

Features and Advantages

Resistant to 90 degrees of gravity

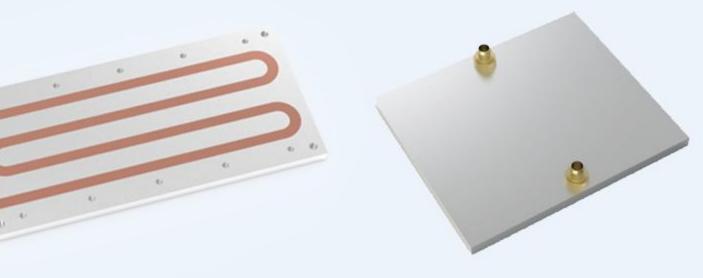
Precision structure, enabling flexible design

Compact size with excellent heat dissipation performance

Extremely powerful heat dissipation

Heat dissipating module

- Strong adaptability to high-temperature
- Flexible design, distributed heat
- The volume-specific heat capacity of the variations in heating elements.

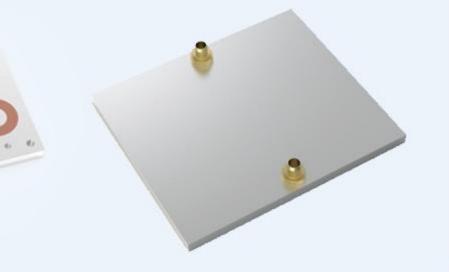


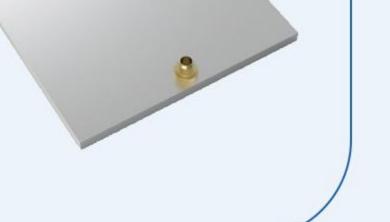
Super-low starting temperature, with normal operation at -40℃

Internal self-circulation, running with out power dissipation,

Compact structure, smaller volume, and lighter weight

and no circulation pump required





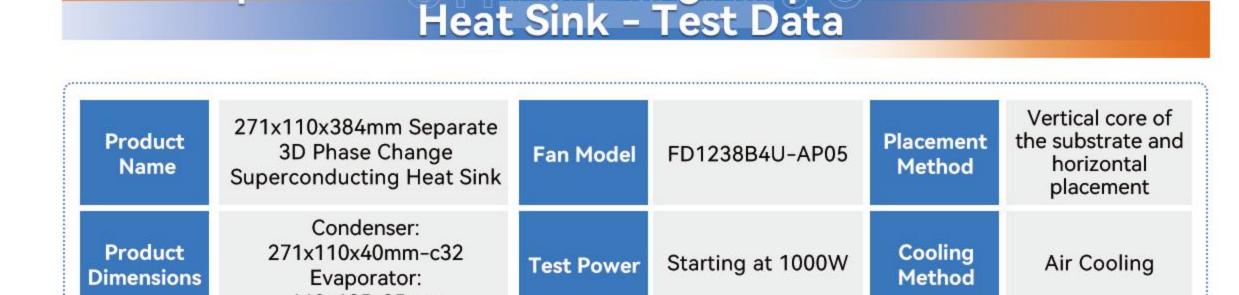
### Surface Treatment Electrophoresis, baking paint, spraying

**Product Dimensions** 

Temperature Equalization

Max. Operating Pressure

Heatsink Temperature Rise



Separate 3D Phase Change Superconductive

Performance Parameters

Substrate Size > 80x80mm

-25°C (-40°C) to 120°C

Available to be used vertically and

Natural convection, forced convection,

horizontally (gravity direction)

Cooling side overall temperature difference

200W ~ 15,000W

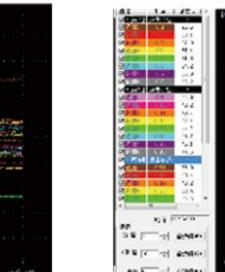
<0.05 ~ 0.3°C/W

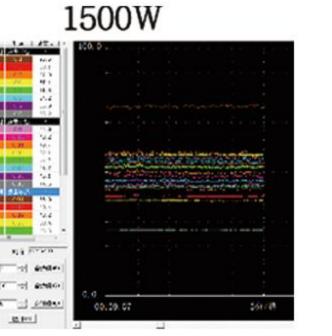
Separate 3D Phase Change Superconducting Heat Sink

	Fan Model:	FD1	238B4U-A	P05
	Test Power:	1200W	1400W	1500W
	T1 (Heating Block)	64	72.6	79.6
20 17	T2	47.1	52. 3	53. 1
19	Т3	51.2	56. 1	57.9
	T4	50.4	55.3	57.1
	T5	46.6	51.7	51.8
6	Т6	48.5	53.3	54. 2
5	T7	49.6	54.6	55.9
3	T8	49.1	53.8	55. 2
	Т9	40.4	44. 1	44.9
2	T10	41.9	45.8	48.2
	T11	44.1	48.3	49.7
	T12	46.4	50.4	52.1
15	T13	40.4	43.2	44.2
14	T14	42	45.4	46.7
13 9 10	T15	41.6	44.9	46. 1
10	T16	41.3	44.2	44.6
	T17	36.6	38.4	38.9
1111	T18	38	39.8	40.4
	T19	40.1	42.5	43.2
	T20	36. 5	37.8	38. 4
	Ambient Temperature	26. 5	26.7	26. 5
	ΔT cool	5. 5	7.6	8.3
	∆T (Temperature Rise)	37.5	45.9	53.1

### Test Curve

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Product Dimension: 120\*88\*58mm Fan: DB04028B12U\*2

Heat Source Area: 50\*50mm

Simulated Heating Power: 300W Ambient Temperature: 25°C

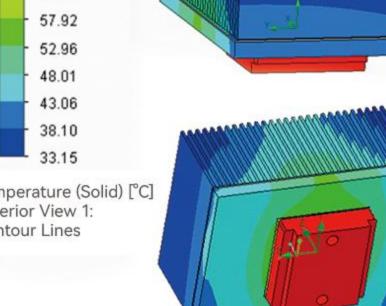
heat sink is 1.5mm, and the spacing between them is 2.5mm.

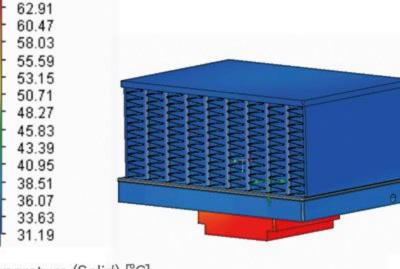
### Simulation results

### As can be seen from the figure on the right:

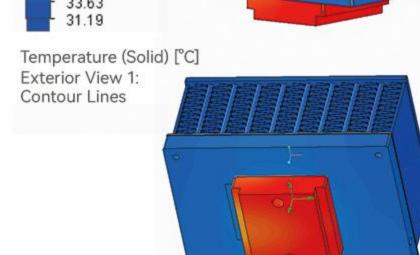
The maximum temperature of 3D phase change is 65.35°C, while the maximum temperature of aluminum extruded heat sink for the heat sour is 77.73°C, the former is 12.38°C lower than the sink is 66.7-26.1=40.6°C, which differs from the simulated result (65.35-25) 40.35°C by only 0.25°C, the two are almost the same.

From the right figure, it can be seen that the temperature difference on the substrate surface and fins of aluminum extruded heat sink is relatively large, while the temperature difference of 3D phase change superconducting heat sink is much better than that of aluminum extruded heat sink.



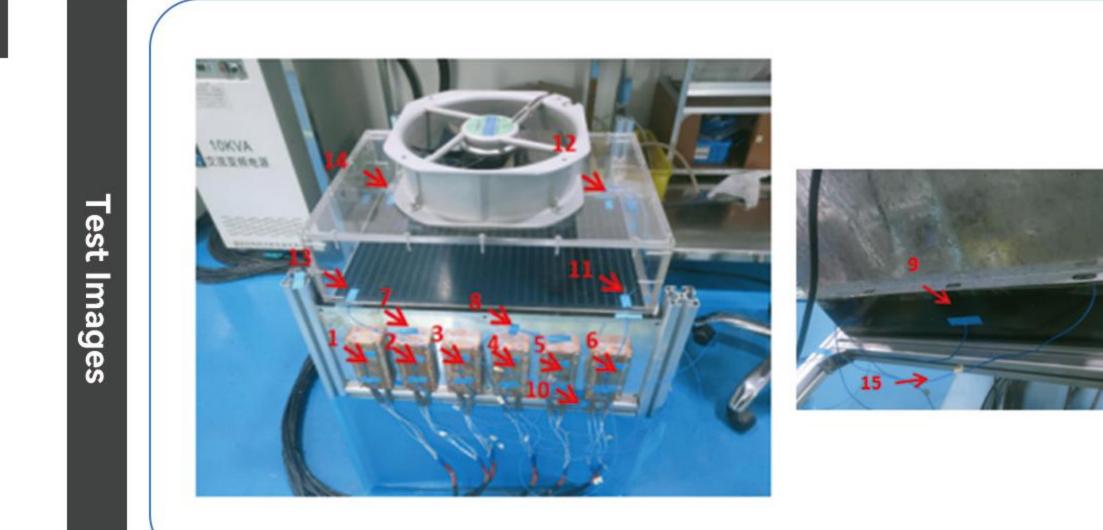


Aluminum Extruded Heat Sink

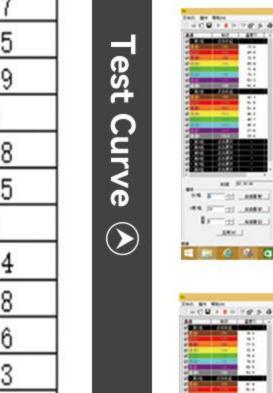


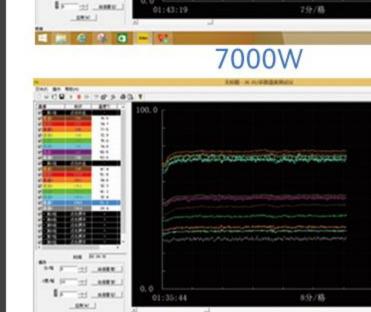
### Integrated 3D Phase Change Superconductive Heat Sink - Test Data

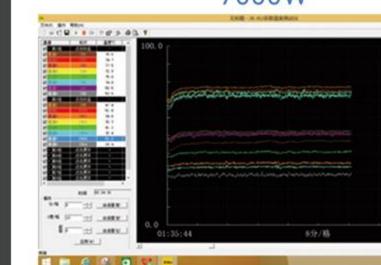
of and	Product Name	3D Superconductive Phase Change Heatsink	Fan Model	SJ2808HA2	Placement Method	S
	Product Dimensions	513x342x20mm	Test Power	6KW, 7KW, 8KW	Cooling Method	A

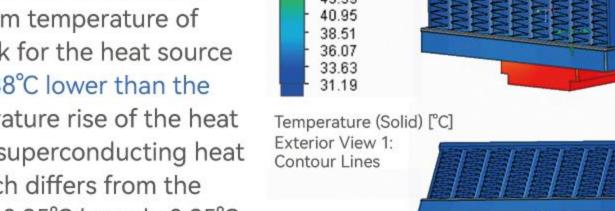


est Power:	6000¥	7000¥	8000¥
face Material:	Halnziye Silicone Grease - 2.7W	Halnziye Silicone Grease - 2.7W	Halnziye Silicone Grease - 2.7W
Heating Block)	62.7	73	75.5
Heating Block)	61.8	69.8	74.7
Heating Block)	63.7	72.5	77.5
leating Block)	60.4	68.4	72.9
Heating Block)	62.4	71.4	75
Heating Block)	59.4	73.7	74.8
T7	44	53.3	50.5
T8	43.9	52.6	53
d End Temperature	38.3	43.3	47.4
T10	44.6	51.8	51.8
T11	31.7	51.6	34.6
T12	29.7	46.2	32.3
T13	36	49.7	41.1
T14	30.4	45	32.4









3D Phase Change Superconducting Heat Sink