

Solid State Cooling Market: Focus on Application, Product, Technology, and Region - Analysis and Forecast, 2024-2034

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Abstracts

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The solid state cooling market is experiencing significant growth, driven by the increasing demand for energy-efficient cooling solutions across various industries. This market capitalizes on advancements in thermoelectric materials and solid state mechanisms to provide cooling without the environmental impact associated with traditional refrigerants. Industries such as electronics, automotive, healthcare, and aerospace are key beneficiaries of these technologies. As regulatory pressures mount against conventional cooling systems due to their environmental footprints, solid state cooling presents a viable and sustainable alternative. This shift is further bolstered by the technology's ability to offer precise temperature control and reliability, which are critical for applications such as medical device cooling and automotive climate control systems.

Looking ahead, the market dynamics of solid state cooling are poised for further evolution. Technological advancements and the integration of IoT technologies are expected to open new avenues for market expansion. Smart cooling systems, which can autonomously adjust their cooling capacity based on real-time data, are anticipated to gain traction. This would not only enhance energy efficiency but also extend the lifespan and performance of electronic devices and other sensitive equipment. Additionally, as the push for sustainability continues to shape industrial policies and consumer preferences, solid state cooling technologies are likely to receive increased

investment, both from venture capital and government grants, ensuring their role in the future landscape of cooling technologies is both prominent and transformative.

Recent developments in the solid state cooling market include several notable product launches and innovations. In October 2023, CUI Devices introduced new thermal design services using advanced simulation tools. In August 2023, Coherent Corp. developed a new additive manufacturing process for ceramic components, enhancing thermal management in semiconductor equipment. Laird Thermal Systems, Inc. released the OptoTEC MSX Series in June 2023, featuring compact thermoelectric coolers. Additionally, Solid State Cooling Systems launched the ThermoCube II, an upgraded chiller with a powerful controller and improved power architecture. Lastly, Laird Thermal Systems, Inc. expanded its line with micro thermoelectric coolers designed for LiDAR systems in April 2023.

The competitive landscape of the solid state cooling market is characterized by a mix of established players and innovative startups, each vying for technological leadership and market share. Major corporations like Ferrotec (USA) Corporation, Laird Thermal Systems, and Coherent Corp. are at the forefront, leveraging their robust manufacturing capabilities and extensive research and development resources. These companies continuously innovate to enhance the efficiency and applications of thermoelectric modules, a key component in solid state cooling systems. For instance, in September 2018, Ferrotec (USA) Corporation launched an advanced thermoelectric module series designed for high-efficiency cooling systems, indicating a strategic push to dominate high-performance segments. Startups, on the other hand, focus on niche applications and disruptive technologies, often forming strategic partnerships with larger firms or academic institutions to accelerate development and commercialization. Such synergies not only enhance technological advancements but also help in penetrating new markets with tailored solutions, thereby intensifying competition. As the demand for eco-friendly and energy-efficient cooling solutions grows, the market sees an increased rate of innovation and collaboration, making it both competitive and dynamic.

Market Segmentation:

Segmentation 1: by Application

Electronics

Medical and Laboratory Equipment

Consumer Appliances

Automotive Industry

Aerospace & Defence

Others

Segmentation 2: by Product

Refrigerators

Freezers

Air Conditioners

Chillers

Others

Segmentation 3: by Technology

Magnetocaloric

Electrocaloric

Elasto-caloric

Others

Segmentation 4: by Region

North America

Europe

Asia-Pacific

Rest-of-the-World

Contents

Executive Summary
Scope and Definition
Market/Product Definition
Key Questions Answered
Analysis and Forecast Note

1. MARKETS: INDUSTRY OUTLOOK

1.1 Trends: Current and Future Impact Assessment
1.2 Supply Chain Overview
 1.2.1 Value Chain Analysis
 1.2.2 Pricing Forecast
1.3 Regulatory Landscape
1.4 Stakeholder Analysis
 1.4.1 Use Case
 1.4.2 End User and Buying Criteria
1.5 Impact Analysis for Key Global Events
1.6 Market Dynamics Overview
 1.6.1 Market Drivers
 1.6.2 Market Restraints
 1.6.3 Market Opportunities

2. SOLID STATE COOLING MARKET(BY APPLICATION)

2.1 Application Segmentation
2.2 Application Summary
2.3 Solid State Cooling Market (by Application)
 2.3.1 Electronics
 2.3.2 Medical and Laboratory Equipment
 2.3.3 Consumer Appliances
 2.3.4 Automotive Industry
 2.3.5 Aerospace & Defence
 2.3.6 Others

3. SOLID STATE COOLING (BY PRODUCT)

3.1 Product Segmentation

- 3.2 Product Summary
- 3.3 Solid State Cooling (by Product)
 - 3.3.1 Refrigerators
 - 3.3.2 Freezers
 - 3.3.3 Air Conditioners
 - 3.3.4 Chillers
 - 3.3.5 Others
- 3.4 Solid State Cooling (by Technology)
 - 3.4.1 Magnetocaloric
 - 3.4.2 Electrocaloric
 - 3.4.3 Elasto-caloric
 - 3.4.4 Others

4. GLOBAL SOLID STATE COOLING (BY REGION)

- 4.1 Solid State Cooling (by Region)
- 4.2 North America
 - 4.2.1 Regional Overview
 - 4.2.2 Driving Factors for Market Growth
 - 4.2.3 Factors Challenging the Market
 - 4.2.4 Application
 - 4.2.5 Product
 - 4.2.6 U.S.
 - 4.2.6.1 Market by Application
 - 4.2.6.2 Market by Product
 - 4.2.7 Canada
 - 4.2.7.1 Market by Application
 - 4.2.7.2 Market by Product
 - 4.2.8 Mexico
 - 4.2.8.1 Market by Application
 - 4.2.8.2 Market by Product
- 4.3 Europe
 - 4.3.1 Regional Overview
 - 4.3.2 Driving Factors for Market Growth
 - 4.3.3 Factors Challenging the Market
 - 4.3.4 Application
 - 4.3.5 Product
 - 4.3.6 Germany
 - 4.3.6.1 Market by Application

- 4.3.6.2 Market by Product
- 4.3.7 France
 - 4.3.7.1 Market by Application
 - 4.3.7.2 Market by Product
- 4.3.8 U.K.
 - 4.3.8.1 Market by Application
 - 4.3.8.2 Market by Product
- 4.3.9 Italy
 - 4.3.9.1 Market by Application
 - 4.3.9.2 Market by Product
- 4.3.10 Rest-of-Europe
 - 4.3.10.1 Market by Application
 - 4.3.10.2 Market by Product
- 4.4 Asia-Pacific
 - 4.4.1 Regional Overview
 - 4.4.2 Driving Factors for Market Growth
 - 4.4.3 Factors Challenging the Market
 - 4.4.4 Application
 - 4.4.5 Product
 - 4.4.6 China
 - 4.4.6.1 Market by Application
 - 4.4.6.2 Market by Product
 - 4.4.7 Japan
 - 4.4.7.1 Market by Application
 - 4.4.7.2 Market by Product
 - 4.4.8 India
 - 4.4.8.1 Market by Application
 - 4.4.8.2 Market by Product
 - 4.4.9 South Korea
 - 4.4.9.1 Market by Application
 - 4.4.9.2 Market by Product
 - 4.4.10 Rest-of-Asia-Pacific
 - 4.4.10.1 Market by Application
 - 4.4.10.2 Market by Product
- 4.5 Rest-of-the-World
 - 4.5.1 Regional Overview
 - 4.5.2 Driving Factors for Market Growth
 - 4.5.3 Factors Challenging the Market
 - 4.5.4 Application

4.5.5 Product

4.5.6 South America

4.5.6.1 Market by Application

4.5.6.2 Market by Product

4.5.7 Middle East and Africa

4.5.7.1 Market by Application

4.5.7.2 Market by Product

5. COMPANIES PROFILED

5.1 Next Frontiers

5.2 Geographic Assessment

5.2.1 Coherent Corp.

5.2.1.1 Overview

5.2.1.2 Top Products/Product Portfolio

5.2.1.3 Top Competitors

5.2.1.4 Target Customers

5.2.1.5 Key Personnel

5.2.1.6 Analyst View

5.2.1.7 Market Share

5.2.2 CUI Devices

5.2.2.1 Overview

5.2.2.2 Top Products/Product Portfolio

5.2.2.3 Top Competitors

5.2.2.4 Target Customers

5.2.2.5 Key Personnel

5.2.2.6 Analyst View

5.2.2.7 Market Share

5.2.3 Delta Electronics, Inc.

5.2.3.1 Overview

5.2.3.2 Top Products/Product Portfolio

5.2.3.3 Top Competitors

5.2.3.4 Target Customers

5.2.3.5 Key Personnel

5.2.3.6 Analyst View

5.2.3.7 Market Share

5.2.4 Ferrotec (USA) Corporation.

5.2.4.1 Overview

5.2.4.2 Top Products/Product Portfolio

- 5.2.4.3 Top Competitors
- 5.2.4.4 Target Customers
- 5.2.4.5 Key Personnel
- 5.2.4.6 Analyst View
- 5.2.4.7 Market Share
- 5.2.5 Laird Thermal Systems, Inc.
 - 5.2.5.1 Overview
 - 5.2.5.2 Top Products/Product Portfolio
 - 5.2.5.3 Top Competitors
 - 5.2.5.4 Target Customers
 - 5.2.5.5 Key Personnel
 - 5.2.5.6 Analyst View
 - 5.2.5.7 Market Share
- 5.2.6 KELK Ltd.
 - 5.2.6.1 Overview
 - 5.2.6.2 Top Products/Product Portfolio
 - 5.2.6.3 Top Competitors
 - 5.2.6.4 Target Customers
 - 5.2.6.5 Key Personnel
 - 5.2.6.6 Analyst View
 - 5.2.6.7 Market Share
- 5.2.7 TEC Microsystems GmbH
 - 5.2.7.1 Overview
 - 5.2.7.2 Top Products/Product Portfolio
 - 5.2.7.3 Top Competitors
 - 5.2.7.4 Target Customers
 - 5.2.7.5 Key Personnel
 - 5.2.7.6 Analyst View
 - 5.2.7.7 Market Share
- 5.2.8 Solid State Cooling Systems
 - 5.2.8.1 Overview
 - 5.2.8.2 Top Products/Product Portfolio
 - 5.2.8.3 Top Competitors
 - 5.2.8.4 Target Customers
 - 5.2.8.5 Key Personnel
 - 5.2.8.6 Analyst View
 - 5.2.8.7 Market Share
- 5.2.9 Align Sourcing LLC.
 - 5.2.9.1 Overview

- 5.2.9.2 Top Products/Product Portfolio
- 5.2.9.3 Top Competitors
- 5.2.9.4 Target Customers
- 5.2.9.5 Key Personnel
- 5.2.9.6 Analyst View
- 5.2.9.7 Market Share
- 5.2.10 EVERREDtronics Ltd.
 - 5.2.10.1 Overview
 - 5.2.10.2 Top Products/Product Portfolio
 - 5.2.10.3 Top Competitors
 - 5.2.10.4 Target Customers
 - 5.2.10.5 Key Personnel
 - 5.2.10.6 Analyst View
 - 5.2.10.7 Market Share
- 5.2.11 Xiamen Hicool Electronics Co.,Ltd.
 - 5.2.11.1 Overview
 - 5.2.11.2 Top Products/Product Portfolio
 - 5.2.11.3 Top Competitors
 - 5.2.11.4 Target Customers
 - 5.2.11.5 Key Personnel
 - 5.2.11.6 Analyst View
 - 5.2.11.7 Market Share
- 5.2.12 Kryotherm
 - 5.2.12.1 Overview
 - 5.2.12.2 Top Products/Product Portfolio
 - 5.2.12.3 Top Competitors
 - 5.2.12.4 Target Customers
 - 5.2.12.5 Key Personnel
 - 5.2.12.6 Analyst View
 - 5.2.12.7 Market Share
- 5.2.13 MERIT TECHNOLOGY GROUP.
 - 5.2.13.1 Overview
 - 5.2.13.2 Top Products/Product Portfolio
 - 5.2.13.3 Top Competitors
 - 5.2.13.4 Target Customers
 - 5.2.13.5 Key Personnel
 - 5.2.13.6 Analyst View
 - 5.2.13.7 Market Share
- 5.2.14 Phononic

- 5.2.14.1 Overview
- 5.2.14.2 Top Products/Product Portfolio
- 5.2.14.3 Top Competitors
- 5.2.14.4 Target Customers
- 5.2.14.5 Key Personnel
- 5.2.14.6 Analyst View
- 5.2.14.7 Market Share
- 5.2.15 Sheetak
 - 5.2.15.1 Overview
 - 5.2.15.2 Top Products/Product Portfolio
 - 5.2.15.3 Top Competitors
 - 5.2.15.4 Target Customers
 - 5.2.15.5 Key Personnel
 - 5.2.15.6 Analyst View
 - 5.2.15.7 Market Share
- 5.2.16 Others

6. RESEARCH METHODOLOGY

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