

Global Single-stage TEC Market 2025 by Manufacturers, Regions, Type and Application, Forecast to 2031

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Abstracts

According to our (Global Info Research) latest study, the global Single-stage TEC market size was valued at US\$ 612 million in 2024 and is forecast to a readjusted size of USD 1030 million by 2031 with a CAGR of 7.9% during review period.

Thermoelectric Cooler Assemblies, also known as thermoelectric coolers (TECs), are solid-state devices that utilize the Peltier effect to transfer heat between two surfaces when an electric current is applied. They consist of multiple pairs of p-type and n-type semiconductor materials connected electrically in series and thermally in parallel. When a DC current passes through the module, one side absorbs heat (cooling side), while the other side releases heat (heating side). This allows for precise temperature control without moving parts, making them compact, reliable, and quiet. Single-stage TEC achieve cooling through only one layer of thermoelectric stack. Due to its simple structure and high reliability, it has become the mainstream choice for scenarios with small and medium temperature differences, especially in applications with limited space or requiring precise temperature control.

The history of Thermoelectric Cooler Assemblies can be traced back to the discovery of the Peltier effect in the 19th century, but it was not until the mid-20th century, with the development of semiconductor materials, that Thermoelectric Cooler Assemblies technology was truly commercialized. Early Thermoelectric Cooler Assemblies were mainly used in the military and aerospace fields. After the 1980s, with the rapid development of the electronics industry, Thermoelectric Cooler Assemblies gradually entered the consumer electronics, medical equipment and industrial fields.

Single-stage TEC work based on the Peltier effect. When current passes through a

thermocouple composed of p-type and n-type semiconductor materials, one end absorbs heat (cold end) and the other end releases heat (hot end), thereby achieving the effect of cooling or heating. This solid-state thermal management technology does not require mechanical moving parts and has the characteristics of compact structure, no noise, high reliability, and precise temperature control. In addition, by reversing the direction of the current, Single-stage TEC can also achieve a heating function, which gives it a unique advantage in bidirectional temperature control applications. The core advantage of Single-stage TEC lies in their solid-state design and precise temperature control capabilities, but their efficiency is relatively low and they are usually used in low-power or high-space and noise requirements.

With the popularization of technologies such as 5G communications, artificial intelligence, and the Internet of Things, the development of Single-stage TEC in consumer electronics, communications, automobiles, and medical fields has been accelerated. According to our data, the global shipment of Single-stage TEC will exceed 130 million units in 2024, and it is expected to continue to grow at an average annual compound growth rate (CAGR) of more than 9% by 2030.

North America, Europe, and Asia Pacific are the main regions of the Single-stage TEC market. The North American market benefits from strong demand for the electronics industry and medical technology, while the European market focuses on environmental protection and sustainable development. The Asia-Pacific region (especially China, Japan, and South Korea) has become the fastest growing region in the global Single-stage TEC market with its rapidly developing electronics manufacturing and new energy vehicle industries. In 2024, the market size of the Asia-Pacific region accounting for more than 50% of the world, of which China occupies the largest consumer market in Asia-Pacific.

From the perspective of industry participants, the main players in Single-stage TEC include Ferrotec, KELK Ltd. (Komatsu), Coherent Corp (formerly II-VI Incorporated), Laird Thermal Systems, Z-MAX, KJLP, Thermion Company, Phononic, Guangdong Fuxin Technology, KYOCERA, Thermonamic Electronics, TE Technology, Same Sky (formerly CUI Devices), Kryotherm Industries, Crystal Ltd, Merit Technology Group, Wakefield Thermal, etc. The leading manufacturers are mainly concentrated in Japan, Europe and the United States. According to our data, the revenue share of the world's top 5 manufacturers in 2024 is about 55%, among which Ferrotec, ranked first, has a share of more than 20%. Due to the late start in China, most of the products are concentrated in the field of consumer electronics, and there is a certain gap between the technology and management level and the world's advanced level. Therefore, the

high-end application fields such as communications, medical, and automotive markets are mainly occupied by international leading manufacturers.

From the perspective of downstream applications, shipments in consumer electronics, communications, medical, automotive, industrial, defense and aerospace and other fields have continued to rise. Among them, consumer electronics still occupies the largest consumer market. In 2024, the consumer electronics market size accounted for 25% of the world. With the rapid penetration of 5G communications and electric vehicles, the communications and automotive fields will show a higher growth rate during the forecast period.

This report is a detailed and comprehensive analysis for global Single-stage TEC market. Both quantitative and qualitative analyses are presented by manufacturers, by region & country, by Type and by Application. As the market is constantly changing, this report explores the competition, supply and demand trends, as well as key factors that contribute to its changing demands across many markets. Company profiles and product examples of selected competitors, along with market share estimates of some of the selected leaders for the year 2025, are provided.

Key Features:

Global Single-stage TEC market size and forecasts, in consumption value (\$ Million), sales quantity (K Units), and average selling prices (US\$/Unit), 2020-2031

Global Single-stage TEC market size and forecasts by region and country, in consumption value (\$ Million), sales quantity (K Units), and average selling prices (US\$/Unit), 2020-2031

Global Single-stage TEC market size and forecasts, by Type and by Application, in consumption value (\$ Million), sales quantity (K Units), and average selling prices (US\$/Unit), 2020-2031

Global Single-stage TEC market shares of main players, shipments in revenue (\$ Million), sales quantity (K Units), and ASP (US\$/Unit), 2020-2025

The Primary Objectives in This Report Are:

To determine the size of the total market opportunity of global and key countries
To assess the growth potential for Single-stage TEC

To forecast future growth in each product and end-use market
To assess competitive factors affecting the marketplace

This report profiles key players in the global Single-stage TEC market based on the following parameters - company overview, sales quantity, revenue, price, gross margin, product portfolio, geographical presence, and key developments. Key companies covered as a part of this study include Ferrotec, KELK Ltd.(Komatsu), Coherent Corp (formerly II-VI Incorporated), Laird Thermal Systems, Z-MAX, KJLP, Thermion Company, Phononic, Guangdong Fuxin Technology, KYOCERA, etc.

This report also provides key insights about market drivers, restraints, opportunities, new product launches or approvals.

Market Segmentation

Single-stage TEC market is split by Type and by Application. For the period 2020-2031, the growth among segments provides accurate calculations and forecasts for consumption value by Type, and by Application in terms of volume and value. This analysis can help you expand your business by targeting qualified niche markets.

Market segment by Type

Circle Type

Rectangle Type

Others

Market segment by Application

Consumer Electronics

Communication

Medical

Automotive

Industrial

Aerospace Defense

Others

Major players covered

Ferrotec

KELK Ltd.(Komatsu)

Coherent Corp (formerly II-VI Incorporated)

Laird Thermal Systems

Z-MAX

KJLP

Thermion Company

Phononic

Guangdong Fuxin Technology

KYOCERA

Thermonamic Electronics

TE Technology

Same Sky (formerly CUI Devices)

Kryotherm Industries

Crystal Ltd

Wakefield Thermal

Pelonis Technologies

Zhejiang Wangu Semiconductor

P&N Technology

JiangXi Arctic Industrial

Henan Hongchang Electronic

Wei County Zhongtian Electron Stock Cooperative

Beijing Xinyu Kaimeng Electronic Technology

Beijing Huimao Refrigeration Equipment

Hangzhou Aurin Cooling Device

Market segment by region, regional analysis covers

North America (United States, Canada, and Mexico)

Europe (Germany, France, United Kingdom, Russia, Italy, and Rest of Europe)

Asia-Pacific (China, Japan, Korea, India, Southeast Asia, and Australia)

South America (Brazil, Argentina, Colombia, and Rest of South America)

Middle East & Africa (Saudi Arabia, UAE, Egypt, South Africa, and Rest of Middle East & Africa)

The content of the study subjects, includes a total of 15 chapters:

Chapter 1, to describe Single-stage TEC product scope, market overview, market estimation caveats and base year.

Chapter 2, to profile the top manufacturers of Single-stage TEC, with price, sales quantity, revenue, and global market share of Single-stage TEC from 2020 to 2025.

Chapter 3, the Single-stage TEC competitive situation, sales quantity, revenue, and

global market share of top manufacturers are analyzed emphatically by landscape contrast.

Chapter 4, the Single-stage TEC breakdown data are shown at the regional level, to show the sales quantity, consumption value, and growth by regions, from 2020 to 2031.

Chapter 5 and 6, to segment the sales by Type and by Application, with sales market share and growth rate by Type, by Application, from 2020 to 2031.

Chapter 7, 8, 9, 10 and 11, to break the sales data at the country level, with sales quantity, consumption value, and market share for key countries in the world, from 2020 to 2025. and Single-stage TEC market forecast, by regions, by Type, and by Application, with sales and revenue, from 2026 to 2031.

Chapter 12, market dynamics, drivers, restraints, trends, and Porters Five Forces analysis.

Chapter 13, the key raw materials and key suppliers, and industry chain of Single-stage TEC.

Chapter 14 and 15, to describe Single-stage TEC sales channel, distributors, customers, research findings and conclusion.

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