

Thin Film Piezoelectric Devices Market Forecasts to 2030 – Global Analysis by Product (Piezoelectric Sensors, Piezoelectric Actuators, Piezoelectric Energy Harvesters and Other Products), Material, Application, End User and By Geography

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Abstracts

According to Statistics MRC, the Global Thin Film Piezoelectric Devices Market is accounted for \$5.8 billion in 2024 and is expected to reach \$14.8 billion by 2030 growing at a CAGR of 16.8% during the forecast period. Thin Film Piezoelectric Devices are miniature parts that transform mechanical energy into electrical energy and vice versa by using thin layers of piezoelectric materials. These devices can be integrated into microelectromechanical systems (MEMS) since they are frequently made using deposition techniques like chemical vapor deposition or sputtering. They are perfect for use in sensors, actuators, energy harvesting, and medical ultrasound because of their great sensitivity, quick response times, and small form factors.

Market Dynamics:

Driver:

Advancements in Energy Harvesting

Advancements in energy harvesting are driving significant growth in the market by enhancing efficiency, miniaturization, and durability. Innovations in materials like PZT and AlN improve power output, enabling broader applications in wearables, IoT sensors, and biomedical devices. Enhanced fabrication techniques, including MEMS integration, boost scalability and cost-effectiveness. The rising demand for self-powered electronics and wireless sensors in industries like healthcare, automotive, and industrial

automation further accelerates market adoption, fostering sustainable and energy-efficient solutions.

Restraint:

High Manufacturing Costs

High manufacturing costs in the thin film piezoelectric devices industry hamper growth by limiting affordability and scalability. Expensive raw materials, intricate fabrication procedures, and sophisticated machinery increase production costs, deterring new competitors and lowering company margins. Additionally, high costs limit market expansion by stifling innovation and adoption in cost-sensitive applications. Because of this, producers find it difficult to get economies of scale, which affects both technological improvements and overall competitiveness.

Opportunity:

Increased Adoption in Industrial Automation

The growing use of industrial automation is a major driver of the thin film piezoelectric device market, increasing demand for high-precision sensors, actuators, and energy harvesters. Thin film piezoelectric devices are perfect for robotics, process control, and smart manufacturing since automation demands components that are effective, small, and extremely responsive. Real-time monitoring and predictive maintenance are supported by their capacity to deliver precise and quick mechanical-electrical conversions. The market for these devices keeps growing as industries prioritize automation for cost and efficiency savings.

Threat:

Material Limitations

Material constraints in the industry impede performance, durability, and scalability. Efficiency and longevity are decreased by problems such as low piezoelectric coefficients, material fatigue, and thermal instability. Manufacturing flexibility is limited by substrate and deposition method compatibility issues. Furthermore, the cost of production is raised by expensive or rare materials, which restricts commercialization. These limitations hinder innovation and impact uptake in fields such as medical devices, energy harvesting, and MEMS sensors.

Covid-19 Impact

The COVID-19 pandemic disrupted the thin film piezoelectric devices market due to supply chain disruptions, manufacturing delays, and reduced demand in automotive and consumer electronics. However, increased adoption in medical devices, particularly sensors and ultrasound equipment, offset some losses. Post-pandemic recovery, rising investments in IoT and wearables, and renewed industrial activity are driving market growth despite initial setbacks.

The robotics segment is expected to be the largest during the forecast period

The robotics segment is expected to account for the largest market share during the forecast period, as robotics applications, including medical robots, industrial automation, and consumer robotics, demand compact, high-performance piezoelectric components for enhanced motion control and responsiveness. The rising adoption of automation, AI-driven robotics, and miniaturized electronic systems is accelerating market growth. Additionally, advancements in microelectromechanical systems (MEMS) and increasing investments in smart robotics further boost demand for thin film piezoelectric devices.

The piezoelectric sensors segment is expected to have the highest CAGR during the forecast period

Over the forecast period, the piezoelectric sensors segment is predicted to witness the highest growth rate, because of the growing need for small, highly sensitive sensors in industrial, automotive, consumer electronics, and healthcare applications. For wearables, Internet of Things devices, and medical implants, these sensors provide accurate pressure, vibration, and audio sensing. Growth is further aided by developments in MEMS technology, growing use in energy harvesting, and ultrasonic imaging. Furthermore, their market penetration is improved by the move toward flexible electronics and downsizing.

Region with largest share:

During the forecast period, the North America region is expected to hold the largest market share due to the growing need in consumer electronics, automotive, and healthcare applications for miniature sensors, actuators, and energy harvesters. Investments in MEMS technology spur innovation, while the expansion of IoT, 5G, and wearable medical devices speeds up acceptance. Government support for defense and

aerospace applications accelerates industry growth. The region's market is also growing as a result of developments in flexible electronics and a greater emphasis on energy-efficient solutions.

Region with highest CAGR:

Over the forecast period, the Asia Pacific region is anticipated to exhibit the highest CAGR, owing to growth in 5G deployment, IoT, and medical devices accelerates adoption, while government investments in smart manufacturing enhance opportunities. Expanding renewable energy projects and the push for miniaturized, energy-efficient sensors fuel market expansion. Countries like China, Japan, and South Korea lead innovation, supported by strong R&D ecosystems and increasing demand for high-performance microelectromechanical systems (MEMS) in various industries.

Key players in the market

Some of the key players profiled in the Thin Film Piezoelectric Devices Market include APC International, Ltd, CeramTec GmbH, CTS Corporation, Hanergy, Johnson Matthey Piezo Products GmbH, Kistler Group, Mad City Labs, Inc, Manz AG, Meggitt PLC, Murata Manufacturing Co., Ltd., Noliac A/S, Physik Instrumente (PI) GmbH & Co. KG, PI Ceramic GmbH, Piezosystem Jena GmbH, Sensor Technology Ltd, Sparkler Ceramics Pvt. Ltd, Taiyo Yuden Co., Ltd, TDK Corporation, Tokyo Electron Ltd and TRS Technologies, Inc.

Key Developments:

In September 2024, Tokyo Electron signed a memorandum of understanding with Tata Electronics Private Limited. The two companies will collaborate to accelerate semiconductor equipment infrastructure for India's first Fab being built by Tata Electronics in Dholera, Gujarat, and for its assembly and test facility in Jagiroad, Assam.

In October 2023, TDK announced the launch of the TDK i3 Micro Module, an innovative energy harvesting and storage solution designed to power ultra-low-power IoT devices.

Products Covered:

Piezoelectric Sensors

Piezoelectric Actuators

Piezoelectric Energy Harvesters

Piezoelectric Micro-Electro-Mechanical Systems (MEMS)

Other Products

Materials Covered:

Lead Zirconate Titanate (PZT)

Aluminum Nitride (AlN)

Zinc Oxide (ZnO)

Other Materials

Applications Covered:

Ultrasound Transducers

Microfluidics

Haptic Feedback Devices

Microphones

Robotics

Active Noise Control

Lidar Sensors

Precision Navigation Systems

Energy Harvesting For IoT Devices

Other Applications

End Users Covered:

Healthcare & Medical

Consumer Electronics

Automotive & Transportation

Aerospace & Defense

Industrial & Manufacturing

Energy & Utilities

Other End Users

Regions Covered:

North America

US

Canada

Mexico

Europe

Germany

UK

Italy

France

Spain

Rest of Europe

Asia Pacific

Japan

China

India

Australia

New Zealand

South Korea

Rest of Asia Pacific

South America

Argentina

Brazil

Chile

Rest of South America

Middle East & Africa

Saudi Arabia

UAE

Qatar

South Africa

Rest of Middle East & Africa

What our report offers:

- Market share assessments for the regional and country-level segments
- Strategic recommendations for the new entrants
- Covers Market data for the years 2022, 2023, 2024, 2026, and 2030
- Market Trends (Drivers, Constraints, Opportunities, Threats, Challenges, Investment Opportunities, and recommendations)
- Strategic recommendations in key business segments based on the market estimations
- Competitive landscaping mapping the key common trends
- Company profiling with detailed strategies, financials, and recent developments
- Supply chain trends mapping the latest technological advancements

Free Customization Offerings:

All the customers of this report will be entitled to receive one of the following free customization options:

Company Profiling

Comprehensive profiling of additional market players (up to 3)

SWOT Analysis of key players (up to 3)

Regional Segmentation

Market estimations, Forecasts and CAGR of any prominent country as per the client's interest (Note: Depends on feasibility check)

Competitive Benchmarking

Benchmarking of key players based on product portfolio, geographical presence, and strategic alliances

Contents

1 EXECUTIVE SUMMARY

2 PREFACE

- 2.1 Abstract
- 2.2 Stake Holders
- 2.3 Research Scope
- 2.4 Research Methodology
 - 2.4.1 Data Mining
 - 2.4.2 Data Analysis
 - 2.4.3 Data Validation
 - 2.4.4 Research Approach
- 2.5 Research Sources
 - 2.5.1 Primary Research Sources
 - 2.5.2 Secondary Research Sources
 - 2.5.3 Assumptions

3 MARKET TREND ANALYSIS

- 3.1 Introduction
- 3.2 Drivers
- 3.3 Restraints
- 3.4 Opportunities
- 3.5 Threats
- 3.6 Product Analysis
- 3.7 Application Analysis
- 3.8 End User Analysis
- 3.9 Emerging Markets
- 3.10 Impact of Covid-19

4 PORTERS FIVE FORCE ANALYSIS

- 4.1 Bargaining power of suppliers
- 4.2 Bargaining power of buyers
- 4.3 Threat of substitutes
- 4.4 Threat of new entrants
- 4.5 Competitive rivalry

5 GLOBAL THIN FILM PIEZOELECTRIC DEVICES MARKET, BY PRODUCT

- 5.1 Introduction
- 5.2 Piezoelectric Sensors
- 5.3 Piezoelectric Actuators
- 5.4 Piezoelectric Energy Harvesters
- 5.5 Piezoelectric Micro-Electro-Mechanical Systems (MEMS)
- 5.6 Other Products

6 GLOBAL THIN FILM PIEZOELECTRIC DEVICES MARKET, BY MATERIAL

- 6.1 Introduction
- 6.2 Lead Zirconate Titanate (PZT)
- 6.3 Aluminum Nitride (AlN)
- 6.4 Zinc Oxide (ZnO)
- 6.5 Other Materials

7 GLOBAL THIN FILM PIEZOELECTRIC DEVICES MARKET, BY APPLICATION

- 7.1 Introduction
- 7.2 Ultrasound Transducers
- 7.3 Microfluidics
- 7.4 Haptic Feedback Devices
- 7.5 Microphones
- 7.6 Robotics
- 7.7 Active Noise Control
- 7.8 Lidar Sensors
- 7.9 Precision Navigation Systems
- 7.10 Energy Harvesting For IoT Devices
- 7.11 Other Applications

8 GLOBAL THIN FILM PIEZOELECTRIC DEVICES MARKET, BY END USER

- 8.1 Introduction
- 8.2 Healthcare & Medical
- 8.3 Consumer Electronics
- 8.4 Automotive & Transportation
- 8.5 Aerospace & Defense

- 8.6 Industrial & Manufacturing
- 8.7 Energy & Utilities
- 8.8 Other End Users

9 GLOBAL THIN FILM PIEZOELECTRIC DEVICES MARKET, BY GEOGRAPHY

- 9.1 Introduction
- 9.2 North America
 - 9.2.1 US
 - 9.2.2 Canada
 - 9.2.3 Mexico
- 9.3 Europe
 - 9.3.1 Germany
 - 9.3.2 UK
 - 9.3.3 Italy
 - 9.3.4 France
 - 9.3.5 Spain
 - 9.3.6 Rest of Europe
- 9.4 Asia Pacific
 - 9.4.1 Japan
 - 9.4.2 China
 - 9.4.3 India
 - 9.4.4 Australia
 - 9.4.5 New Zealand
 - 9.4.6 South Korea
 - 9.4.7 Rest of Asia Pacific
- 9.5 South America
 - 9.5.1 Argentina
 - 9.5.2 Brazil
 - 9.5.3 Chile
 - 9.5.4 Rest of South America
- 9.6 Middle East & Africa
 - 9.6.1 Saudi Arabia
 - 9.6.2 UAE
 - 9.6.3 Qatar
 - 9.6.4 South Africa
 - 9.6.5 Rest of Middle East & Africa

10 KEY DEVELOPMENTS

- 10.1 Agreements, Partnerships, Collaborations and Joint Ventures
- 10.2 Acquisitions & Mergers
- 10.3 New Product Launch
- 10.4 Expansions
- 10.5 Other Key Strategies

11 COMPANY PROFILING

- 11.1 APC International, Ltd
- 11.2 CeramTec GmbH
- 11.3 CTS Corporation
- 11.4 Hanergy
- 11.5 Johnson Matthey Piezo Products GmbH
- 11.6 Kistler Group
- 11.7 Mad City Labs, Inc
- 11.8 Manz AG
- 11.9 Meggitt PLC
- 11.10 Murata Manufacturing Co., Ltd.
- 11.11 Noliac A/S
- 11.12 Physik Instrumente (PI) GmbH & Co. KG
- 11.13 PI Ceramic GmbH
- 11.14 Piezosystem Jena GmbH
- 11.15 Sensor Technology Ltd
- 11.16 Sparkler Ceramics Pvt. Ltd
- 11.17 Taiyo Yuden Co., Ltd
- 11.18 TDK Corporation
- 11.19 Tokyo Electron Ltd
- 11.20 TRS Technologies, Inc

List Of Tables

LIST OF TABLES

Table 1 Global Thin Film Piezoelectric Devices Market Outlook, By Region (2022-2030) (\$MN)

Table 2 Global Thin Film Piezoelectric Devices Market Outlook, By Product (2022-2030) (\$MN)

Table 3 Global Thin Film Piezoelectric Devices Market Outlook, By Piezoelectric Sensors (2022-2030) (\$MN)

Table 4 Global Thin Film Piezoelectric Devices Market Outlook, By Piezoelectric Actuators (2022-2030) (\$MN)

Table 5 Global Thin Film Piezoelectric Devices Market Outlook, By Piezoelectric Energy Harvesters (2022-2030) (\$MN)

Table 6 Global Thin Film Piezoelectric Devices Market Outlook, By Piezoelectric Micro-Electro-Mechanical Systems (MEMS) (2022-2030) (\$MN)

Table 7 Global Thin Film Piezoelectric Devices Market Outlook, By Other Products (2022-2030) (\$MN)

Table 8 Global Thin Film Piezoelectric Devices Market Outlook, By Material (2022-2030) (\$MN)

Table 9 Global Thin Film Piezoelectric Devices Market Outlook, By Lead Zirconate Titanate (PZT) (2022-2030) (\$MN)

Table 10 Global Thin Film Piezoelectric Devices Market Outlook, By Aluminum Nitride (AlN) (2022-2030) (\$MN)

Table 11 Global Thin Film Piezoelectric Devices Market Outlook, By Zinc Oxide (ZnO) (2022-2030) (\$MN)

Table 12 Global Thin Film Piezoelectric Devices Market Outlook, By Other Materials (2022-2030) (\$MN)

Table 13 Global Thin Film Piezoelectric Devices Market Outlook, By Application (2022-2030) (\$MN)

Table 14 Global Thin Film Piezoelectric Devices Market Outlook, By Ultrasound Transducers (2022-2030) (\$MN)

Table 15 Global Thin Film Piezoelectric Devices Market Outlook, By Microfluidics (2022-2030) (\$MN)

Table 16 Global Thin Film Piezoelectric Devices Market Outlook, By Haptic Feedback Devices (2022-2030) (\$MN)

Table 17 Global Thin Film Piezoelectric Devices Market Outlook, By Microphones (2022-2030) (\$MN)

Table 18 Global Thin Film Piezoelectric Devices Market Outlook, By Robotics

(2022-2030) (\$MN)

Table 19 Global Thin Film Piezoelectric Devices Market Outlook, By Active Noise Control (2022-2030) (\$MN)

Table 20 Global Thin Film Piezoelectric Devices Market Outlook, By Lidar Sensors (2022-2030) (\$MN)

Table 21 Global Thin Film Piezoelectric Devices Market Outlook, By Precision Navigation Systems (2022-2030) (\$MN)

Table 22 Global Thin Film Piezoelectric Devices Market Outlook, By Energy Harvesting For IoT Devices (2022-2030) (\$MN)

Table 23 Global Thin Film Piezoelectric Devices Market Outlook, By Other Applications (2022-2030) (\$MN)

Table 24 Global Thin Film Piezoelectric Devices Market Outlook, By End User (2022-2030) (\$MN)

Table 25 Global Thin Film Piezoelectric Devices Market Outlook, By Healthcare & Medical (2022-2030) (\$MN)

Table 26 Global Thin Film Piezoelectric Devices Market Outlook, By Consumer Electronics (2022-2030) (\$MN)

Table 27 Global Thin Film Piezoelectric Devices Market Outlook, By Automotive & Transportation (2022-2030) (\$MN)

Table 28 Global Thin Film Piezoelectric Devices Market Outlook, By Aerospace & Defense (2022-2030) (\$MN)

Table 29 Global Thin Film Piezoelectric Devices Market Outlook, By Industrial & Manufacturing (2022-2030) (\$MN)

Table 30 Global Thin Film Piezoelectric Devices Market Outlook, By Energy & Utilities (2022-2030) (\$MN)

Table 31 Global Thin Film Piezoelectric Devices Market Outlook, By Other End Users (2022-2030) (\$MN)

Note: Tables for North America, Europe, APAC, South America, and Middle East & Africa Regions are also represented in the same manner as above.

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