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SIX TRENDS SHAPING THE FUTURE OF THE PRINTED CIRCUIT BOARD MARKET

The printed circuit board market is changing significantly due to advancements in technologies, ranging from traditional low-density PCBs to high-density interconnect HDI boards, representing huge growth potential for the PCB market. Some of the key trends in the PCB market are high-power boards, high-density interconnect boards, flex PCBs, PTFE (Teflon) materials for high-frequency PCBs, miniaturization of PCBs, and green PCBs. Increasing demand for PCBs in the

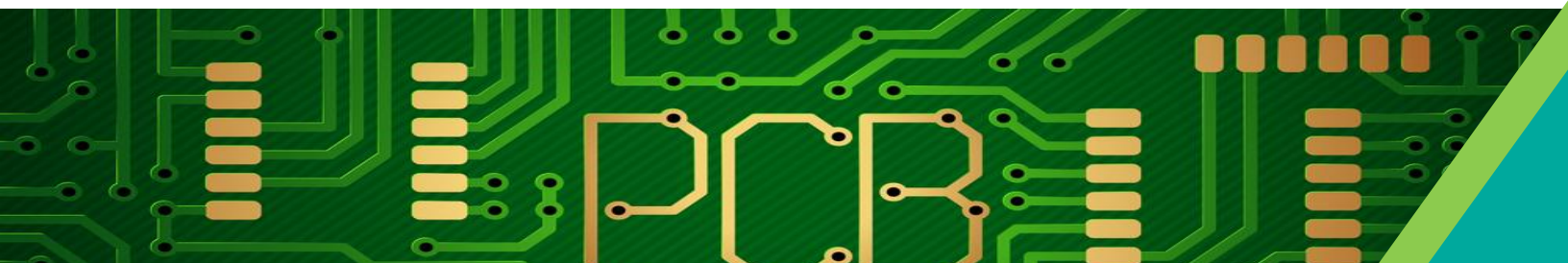
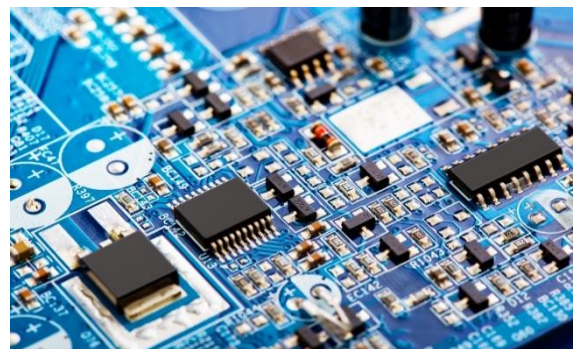
communication industry, growth in connected devices, and advancements in automotive electronics are driving the PCB market.

The PCB market is divided into several segments, such as standard multilayer, flexible, HDI/Microvia/build-up, IC substrate, rigid 1-2 sided, rigid flex, and others. Key players in the PCB market include Zhen Ding Technology Holding, Calumet, NOK Corporation, TTM Technologies, Unimicron Technology, Compeq Manufacturing, and Young Poong Electronics. These have been working on different strategies to drive sales using highly influential marketing approaches; however, as we examine the challenges and opportunities ahead in this market, companies can benefit from a strategy of developing high-density interconnect boards and flex PCBs, as well as considering the key target market trends we have identified. Lucintel predicts that the global PCB market will be valued at \$85 billion by 2025, with an expected CAGR of 3% to 5% between 2020 and 2025.

Lucintel identifies six trends set to influence the global PCB market. Most of the industry players and experts agree that these six trends will accelerate developments in the PCB industry in the near future. In terms of the widespread knowledge about the PCB market already on the horizon, there is still a lack of unified perspective on the direction the industry is moving to proactively address developments. To help bring more clarity to this gap, our study aims to provide insights concerning the direction that changes are taking and how these changes will impact the PCB market.

1. High-Density Interconnect Boards

HDI boards represent one of the fastest growing technologies in PCBs. As consumer demands change, using HDI technology, designers now have the option to place more components on both sides of the raw PCB. The decreased component size and pitch allow



for more I/O in smaller geometries. This means faster transmission of signals and a significant reduction in signal loss and crossing delays. High-density interconnect (HDI) was developed in response to the demand for smaller products with greater capability, especially in terms of routing traces. This capability allows for fewer layers in the PCB stackup and promotes high-speed signal transmission.

2. High-Power Boards (48V and Higher)

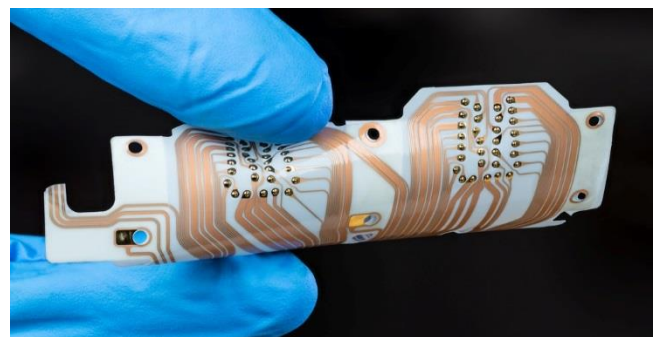
There is a growing demand for higher power PCBs. This includes boards with up to 48V supplies. These voltage levels are in response to the growth in solar energy, where panels typically operate at 24V or 48V, and electric vehicles (EVs), where voltages may be in the hundreds. The reason for increasing the power of PCBs is the option to accommodate



more substantial and more numerous components. These high-power boards require PCBs to mount larger components like battery packs while being able to effectively deal with interference issues.

3. Flex PCBs

Flex PCBs are rapidly gaining market share in the PCB market. Flex PCBs are an excellent choice for designs in which there are strict limitations on space, weight, and size. They are also better suited to high-temperature and high-density applications. Flexible PCBs are ideal for

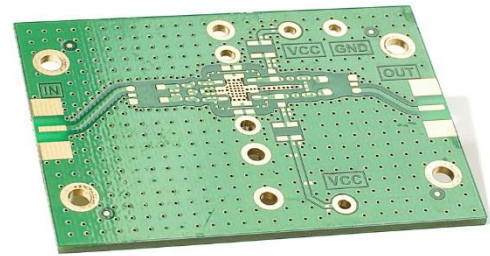


more specific applications, including medical devices, implants, sensors and mobile consumer

electronics.

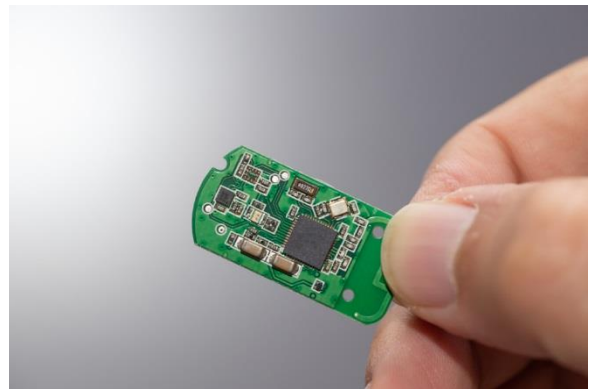
4. PTFE (Teflon) Materials for High-Frequency PCBs

Polytetrafluoroethylene (PTFE) is a synthetic thermoplastic fluoropolymer that has excellent dielectric properties at microwave frequencies. PTFE material is widely used in high-frequency PCB manufacturing. PTFE is also called Teflon, and its frequency is normally above 5GHz. In terms of DK, DF, water absorption and frequency features, Teflon is the Pong best material. When product applications require frequency above 10GHz, a good choice for manufacturing is Teflon PCB substrate.



5. Miniaturization of PCBs

In 3C applications (computers/peripheral, consumer electronics, and communication), the demand for more compact and convenient, high-speed, cheaper, and more efficient products is growing. In order to meet requirements, manufacturers are designing sophisticated PCBs in smaller sizes with higher component densities that can perform at higher speeds.

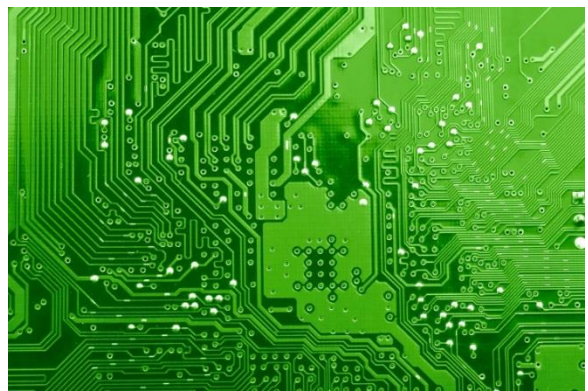


With continuous technological advancement in the 3C industry, the pressure is on PCB manufacturers to come up with solutions to meet the demand. In the present scenario, the demand for smaller products with more features is at a peak, and is thereby pushing the market for advanced PCBs, such as the HDI and IC substrate product types. Miniaturization of PCBs to meet the demand for compact devices with more

features is expected to drive the market. Increasing demand for lightweight and portable devices is expected to increase demand for more compact and highly efficient PCBs.

6. Green PCBs

Growing environmental concerns regarding the use of green materials to control emission of hazardous materials force PCB manufacturers to use green materials. The industry players are now mandated to use technology and materials that are environmentally clean so as to meet legislative norms. An example of the launch of green products in the PCB industry is Atotech, a laminate manufacturing company, which has launched the Ecoganth series of laminates for PCB and IC substrate manufacturers to meet technical and ecological requirements while, at the same time, avoiding all harmful substances that are used in conventional processes. Ecoganth is free of formaldehyde, nickel, phosphorous, and cyanide.

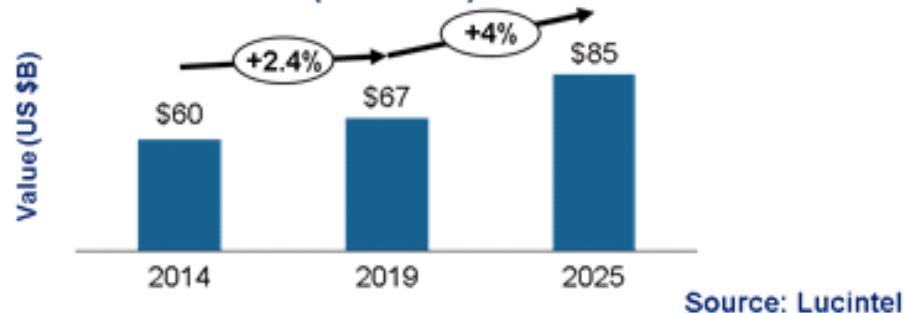


Strategic Considerations for Key Players in the PCB Market

The PCB industry is dynamic and ever-changing. Successful industry players are masters of innovation, change and adaptation. To retain this status, they need to be attentive to current trends. We believe there will be promising opportunities for PCBs in the computer/peripheral, communication, consumer electronic, industrial, automotive, and military/aerospace industries. As per Lucintel's latest market research report (Source: <https://www.lucintel.com/pcb-markets.aspx>), the [PCB market](#) is expected to grow with a CAGR of 3% to 5% between 2020 and 2025, and reach \$85 billion by 2025. This market is primarily driven by increasing demand for PCB in the communication industry, growth in connected devices, and advancement in

automotive electronics.

Trends and Forecast for the Global PCB Market (US \$B) (2014-2025)



Whether you are new to the PCB market or an experienced player, it is important to understand the trends that impact the development process, as these trends as listed above will lead players to create long-term strategy formulation that will allow them to remain competitive and successful in the long run. For example, to capture growth, some of the strategic considerations for players in the PCB market are as follows:

- Development of low-dielectric constant PCBs for high-speed applications.
- There is a need for thermal management in PCB's; even thin and lightweight boards are capable of producing incredible amounts of heat. PCB manufacturers can develop capabilities for thermal management with a combination of design and components such as heatsinks.
- 5G technology presents new design and manufacturing challenges for high-frequency PCBs. PCB players can focus on new imaging, inspection, and metrology technologies to manufacture the PCBs needed for 5G infrastructure and devices.
- The PCB market players can increase their capabilities to develop high-density interconnect boards for faster transmission of signals and reduction in signal loss and crossing delays.
- Flex PCBs for high-temperature and high-density applications as these are rapidly gaining

market share in the PCB market.

- Players can focus on designing and developing sophisticated PCBs in smaller sizes to align with the requirements of the miniature electronic devices expected to lead future trends.
- Investments to increase competencies in developing green PCBs.
- Research and development activities to develop high-performance and low-cost PCB solutions.

Note: In order to gain better understanding, and learn more about the scope, benefits, and companies researched, as well as other details in the PCB market report from Lucintel, click on <https://www.lucintel.com/pcb-markets.aspx>. This comprehensive report provides you with in-depth analysis on market trends and forecast, segment analysis, regional analysis, competitive benchmarking and company profiling of key players. In addition, we also offer **strategic growth consulting** to meet your customized needs. We have worked with many PE firms and corporate customers in the process of their market entry and M & A initiatives.

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Industries Served



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