

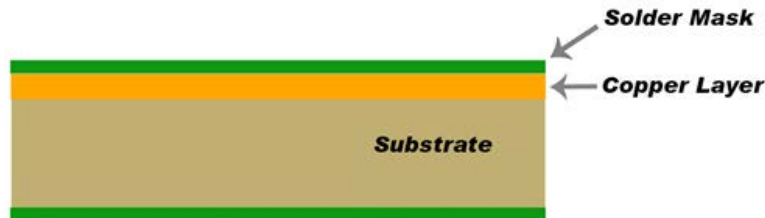
# Different Types of PCBs

Printed Circuit Boards (PCBs) are classified into various types based on manufacturing processes, design specifications, and application requirements such as medical, automotive, defense, and space. More complex designs based on consumers' needs and requirements pave the way for manufacturing different types of PCBs. Before you pick a PCB, you must look for a few considerations like space required, stress handling, and mechanical and electrical stability.

The different types of PCBs available are:

- Single-Sided PCBs
- Double-Sided PCBs
- Multilayer PCBs
- Rigid PCBs
- Flex PCBs
- Rigid-Flex PCBs

## Single-Sided PCBs



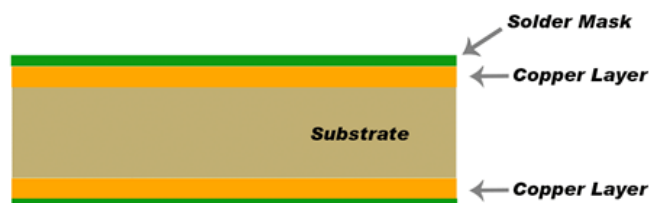
A single-sided PCB is the most common type of printed circuit board. It has a single conductive copper layer above the substrate. The electrical components are soldered or placed on one side of the board, and the entire etched circuit is visible on the other. Since these boards only have one conducting layer, the conductive paths cannot intersect or overlap and hence take up a lot of space.

As a result, these PCBs are suitable for low-density design requirements. Single-sided printed circuit boards (PCBs) are used for basic and low-cost electrical/electronic instruments such as calculators, power supplies, LED lighting boards, FM radios, timing circuits, and so on.

### Advantages of Single-Sided PCBs

- Cost-effective
- Easy to manufacture
- Suitable for low-density designs
- Easy to repair if in case something goes wrong
- Easy to design

## Double-Sided PCBs



A thin layer of conducting material, such as copper, is added to both the top and bottom sides of the board in a double-sided PCB. Holes in the circuit board allow metal parts to be connected from one side to the other.

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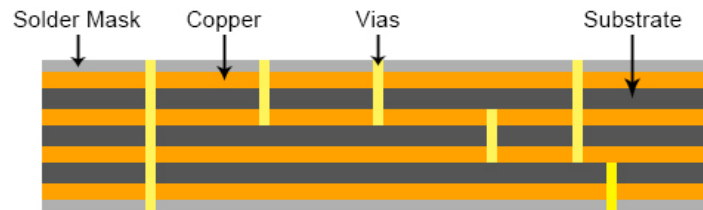
These PCBs connect the circuits on either side using one of two mounting methods, through-hole technology or surface mount technology. Through-hole technology entails installing lead components into pre-drilled holes on the circuit board, which are then soldered to pads on opposite sides. Surface mount technology entails the precise placement of electrical components on the surface of circuit boards.

Double-sided PCBs are used in a variety of applications such as cell phone systems, power monitoring, test equipment, amplifiers, HVAC application, UPS system, and many more.

## Advantages of Double-Sided PCBs

- Reduced size which makes circuit compact
- Relatively lower cost
- More flexible
- Increased circuit density
- Suitable for advanced electronic systems

## Multi-Layer PCBs



Multilayer PCBs have more than two copper layers. In general, any board featuring at least three conductive layers is included in this category. Multilayer PCBs are designed in a 'sandwich' fashion, with several double-sided conductive layers divided by an equal number of insulating material sheets. All of these must be bonded and laminated together under high pressures and temperatures to ensure that no air gaps exist and that the final PCB assembly is properly stable.

Multi-layer PCBs are used in computers, laptops, mobile phones, tablets, medical equipment, GPS trackers, and many other more complex circuits and devices.

## Advantages of Multi-Layer PCBs

- Compact in size
- More robust
- High level of design flexibility
- Suitable for high-speed circuits

## Rigid PCBs



As the name implies, a rigid PCB is a circuit board that cannot be twisted or folded. The board's base material is a rigid substrate, which gives the board rigidity and strength. They are composed of multiple layers including a substrate layer, a copper layer, a solder mask layer, and a silk screen layer which are adhered together with adhesive and heat. Although some circuit boards are either single-sided, double-sided, or multi-layered, rigid

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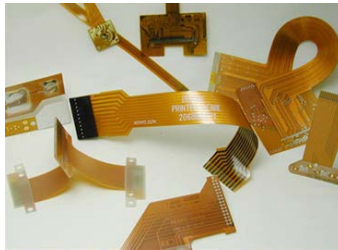
PCBs may be any of these depending on the needs. However, once made, they cannot be modified or changed.

Rigid PCBs are used in GPS equipment, computer, laptops, tablets, mobile phones, X-rays, heart monitors, CAT scans, MRI systems, temperature sensors, control tower instrumentation, etc.

## Advantages of Rigid PCBs

- Cost-effective
- Ease of diagnostics & repair
- Low electronic noise
- Ability to absorb vibrations
- Compact
- Lightweight

## Flex PCBs



A flexible printed circuit board is made up of many printed circuits and components that are arranged on a flexible substrate. Flexible PCBs are commonly made from polyamide, PEEK (Polyether ether ketone), or a transparent conductive polyester film. Flex circuit boards, flex PCBs, flex circuits, and versatile printed circuits are other names for these circuit boards. These printed circuit boards are made using the same components as rigid printed circuit boards. The main distinction is that the board is designed to flex to the desired form throughout the application. These PCBs are available in single-sided, double-sided, and multilayer configurations. This contributes to a reduction in the complexity of the unit assembly.

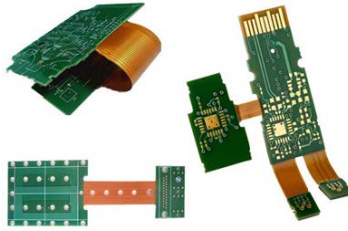
Flex PCBs are used in organic light emitting diode (OLED) fabrication, LCD fabrication, flex solar cell, automotive industries, cellular telephones, cameras, and complex electronics products such as laptop computers.

## Advantages of Flex PCBs

- Save space
- Eliminate connectors
- Thermal management
- Increase reliability and repeatability
- Provide uniform electrical characteristics for high-speed circuitry
- Suitable for applications where high signal trace density is needed

# Different Types of PCBs

## Rigid-Flex PCBs



A Rigid-Flex PCB is a hybrid circuit board that combines elements from both flexible and rigid circuit boards, resulting in a board that can be folded or continuously flexed and is typically shaped into a flexed shape or curve during the manufacturing process. The flexible portion of the board is typically used for interconnections between rigid boards, allowing for narrower conductor lines that take up less room, resulting in smaller boards. Using flexible PCBs for interconnections often removes the need for connectors, which are bulky and cumbersome, making rigid-flex printed circuit boards much lighter. Rigid-Flex PCB designs are a little more complicated since these boards are constructed in 3D, allowing the board to be folded or twisted to produce the desired shape for the product. Designing a board in 3D allows for greater spatial performance, which can then be used in special cases where space and weight reduction are needed, such as in medical devices.

Rigid-flex boards can be designed in a compact manner, and their lightweight nature makes them an excellent option for a wide range of applications in the aerospace, medical, and consumer electronics fields.

### Advantages of Rigid-Flex PCBs

- 360-degree bendability
- Reduced space requirement through 3D ability
- Shock resistance
- Increased reliability
- Light weight
- Fewer solder joints assure higher connection reliability
- Simplified PCB assembly processes

While choosing a PCB manufacturing partner think about cost optimization, adequate material usage, and more. World electronics is your go to partner as we follow the latest IPC standards and tolerances and DFM and DFA rules to better suit your next upcoming PCB design.

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