

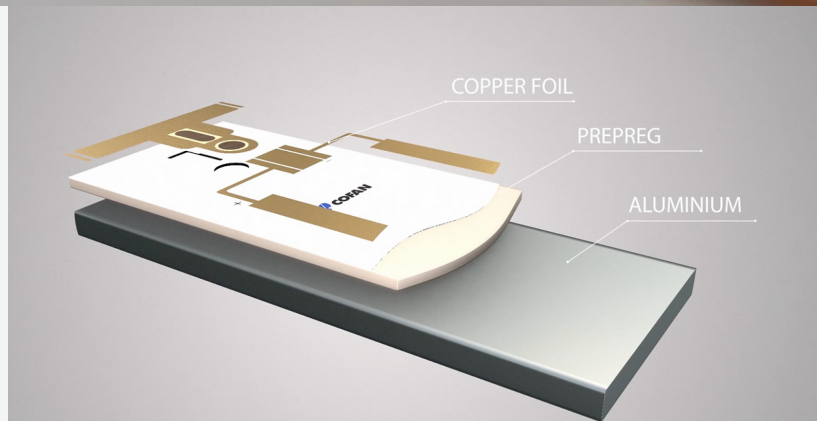
MULTI LAYER MCPCBS

Multi-Layer MCPCBs (Metal-Core Printed Circuit Boards)

What is an MCPCB?

A **Metal Core PCB (MCPCB)** is a specialized type of printed circuit board designed with a **metal base layer (aluminum or copper)** that acts as a built-in heat sink. This unique structure enables superior **thermal management** compared to standard FR4 PCBs.

We specialize in **custom MCPCB production** with a strong focus on **quality, precision, and thermal performance**. Whether you require aluminum-based PCBs for cost-effective solutions or copper-core PCBs for maximum heat dissipation, our team ensures top-tier manufacturing to meet your project goals.



An MCPCB typically consists of three layers:

1. Metal Base (Aluminum or Copper) – provides mechanical strength and heat dissipation.
2. Dielectric Layer – a thermally conductive but electrically insulating pre-preg insulator.
3. Copper Foil Circuit Layer – where electronic components such as LEDs are mounted.

The combination of these layers allows heat generated by components (e.g., high-power LEDs) to quickly transfer away from the circuit, ensuring stable performance and extended product lifespan.

LEDs are assembled at the top with the heat transferred across the surface of the MCPCB down to the attached heatsink. Aluminum is recommended for most applications due to its cost-effectiveness, weight, and thermal dissipation but copper offers the best thermal dissipation.

Why Choose MCPCBs Over Standard PCBs?

Compared to traditional FR4 boards, **Metal Core PCBs offer up to 10x better thermal conductivity**, making them the ideal choice for applications that demand high brightness, reliability, and durability.

Key benefits include:

- **Superior Heat Dissipation** – Prevents component overheating and ensures consistent performance.
- **High Thermal Conductivity** – Thermally conductive dielectric efficiently transfers heat away from sensitive components.
- **Enhanced Durability** – Stronger structure, resistant to vibration, shock, and environmental stress.
- **Reduced Thermal Expansion (CTE)** – Minimizes the risk of solder joint cracks and component damage.
- **Optimized Electrical Performance** – Suitable for high-frequency and high-power circuits.
- **Extended Component Lifespan** – Protects LEDs, MOSFETs, IGBT modules, and other heat-sensitive devices.

We can customize MCPCBs for your specific needs; for more information, please see [PCB Capabilities](#).

Types of MCPCBs We Offer

We provide **customized MCPCB solutions** based on your project requirements:

- **Single-Layer MCPCB** – Cost-effective and efficient for basic LED lighting applications.
- **Double-Layer MCPCB** – For moderate thermal and electrical complexity.
- **Multi-Layer MCPCB** – Designed for advanced, high-power electronics with demanding thermal requirements.

Whether you need **aluminum MCPCBs** for lightweight, cost-effective designs or **copper MCPCBs** for maximum heat dissipation, we can manufacture boards tailored to your exact specifications.

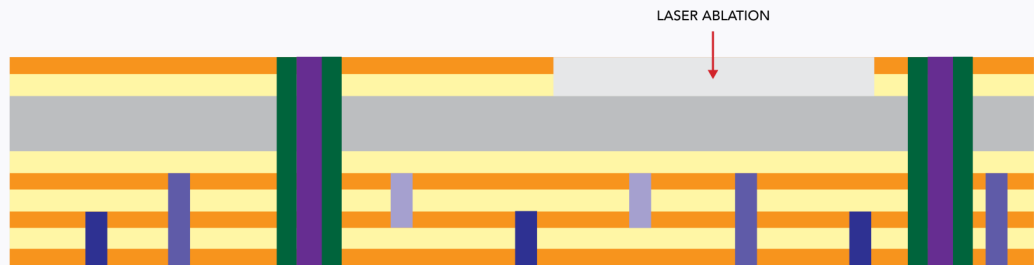
Key Features of MCPCB (Metal Core PCB)

- **Superior Heat Dissipation** – The metal core (aluminum, copper, or alloy) efficiently transfers heat away from components, preventing overheating and improving performance.
- **High Thermal Conductivity** – MCPCBs have a thermally conductive dielectric layer that enhances heat transfer compared to standard FR4 PCBs.
- **Enhanced Durability** – The metal base provides mechanical strength, making MCPCBs more resistant to vibration, impact, and environmental stress.
- **Reduced Thermal Expansion** – Lower coefficient of thermal expansion (CTE) compared to traditional PCBs, reducing the risk of solder joint failure and component damage.
- **Improved Electrical Performance** – Designed for high-power and high-frequency applications with minimal thermal interference.
- **Single-layer, Double-Layer, or Multi-Layer Options** – Available in different structures to meet varying complexity and thermal requirements.
- **Efficient Power Handling** – Ideal for LED lighting, automotive, aerospace, power electronics, and RF applications that require stable operation under high power loads.
- **Longer Component Lifespan** – By efficiently managing heat, MCPCBs extend the life of LEDs, MOSFETs, IGBT modules, and other heat-sensitive components.

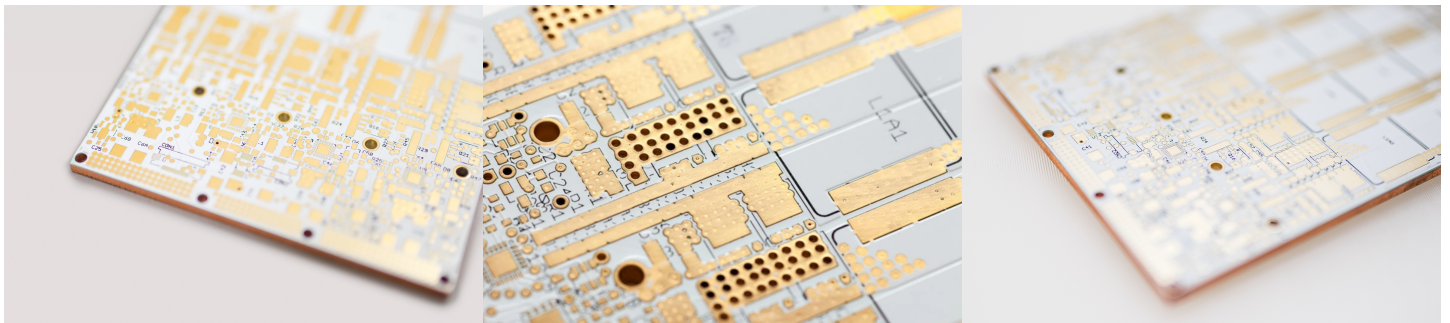
Comparison: Multilayer MCPCB vs. Traditional Multilayer PCB

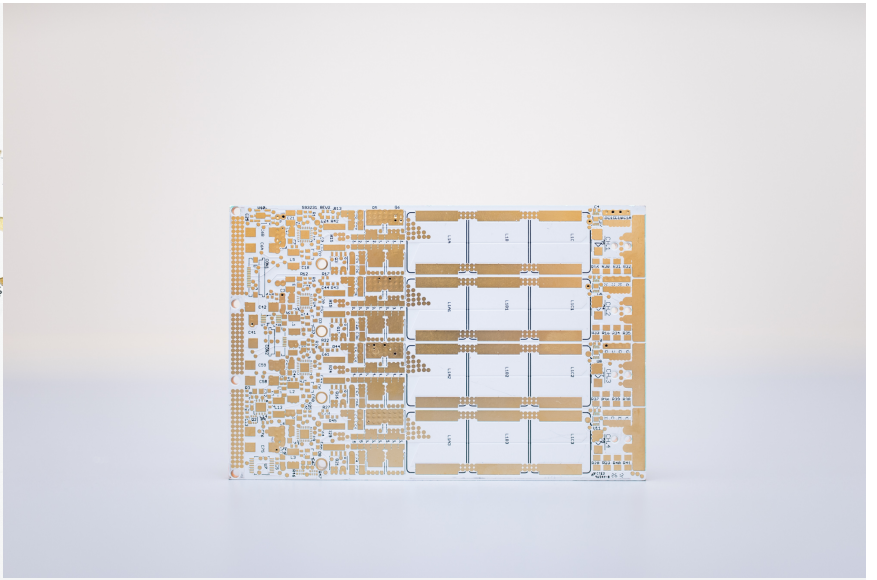
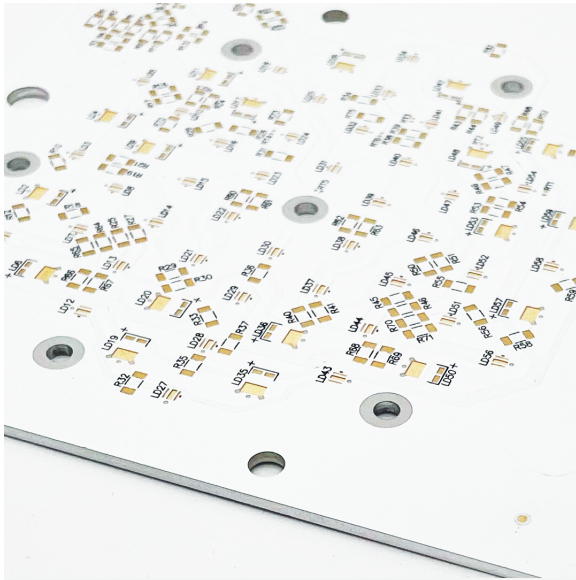
Feature	Multilayer MCPCB	Traditional Multilayer MCPCB
Core Material	Metal (Aluminum, Copper)	Non-metal (FR4, Polyimide, CEM-3)
Thermal Conductivity	High (1~400 W/m.k)	Low (0.3~0.5 W/m.k)
Heat Dissipation	Excellent - Conducts heat away efficiently	Poor - Relies on thermal vias and heat sinks
Layer Count	Typically 2-8 layers	Can go up to 40+ layers
Electrical Performance	Good, but may have higher parasitic capacitance	Excellent for high-speed signals
Weight	Heavier (Metal core adds weight)	Lighter (Made of fiberglass)
Flexibility	Rigid, limited flexibility	Available in rigid & flexible versions
Cost	Higher due to metal core & processing complexity	Lower for standard FR4 designs
Application	High-power LEDs, power electronics, automotive, aerospace	Consumer electronics, telecommunications, IoT devices

4 LAYERS MCPCB WITH BLIND & BURIED VIAS AND LASER ABLATION



- 0.0007" X 4 = 0.0028" + PLATING = 0.0056" COPPER FOIL FOR LAYER 1,2,3 AND 4
 - BURRIED VIAS 2-3 (IF NEEDED) PLATED VIAS
 - BURRIED VIAS 2-4 (IF NEEDED) PLATED VIAS
 - BURRIED VIAS 3-4 (IF NEEDED) PLATED VIAS
 - PLATED HOLES FOR THROUGH HOLES CONNECTORS
 - CAVITIES HOLES TO BE FILLED WITH NON CONDUCTIVE EPOXY FOR THROUGH HOLES CONNECTORS TO BE MOUNTED ON BOTTOM SIDE (LAYER 4)
 - 0.004" THERMALLY CONDUCTIVE DIELECTRIC PP
 - COPPER BASE OR ALUMINUM BASE 0.040" THICK
- SOLDER MASK = WHITE / BLACK / BLUE / GREEN
 - SILK SCREEN = BLACK / WHITE
 - TOTAL THICKNESS = 0.062"





Advantages

- Longer component life (components operate at lower temperatures)
- Durable
- Flatness maintained in all 3 layers
- High heat dissipation
- High density of components
- Reduced PCB size / small footprint
- Higher watt density
- Less hardware (topical heatsinks, screws, clips, etc)
- Lower manufacturing cost

Services Provided

- Prototyping with short lead times
- Complete thermal analysis and design
- Custom heatsinks/designs
- Stocking program available

Applications of MCPCBs

As LED technology advances, the demand for **efficient thermal management in electronics** grows. MCPCBs are widely used in industries that require reliable, high-performance PCBs under extreme conditions, including:

LED Lighting – Street lights, UV lamps, stage lights, automotive headlights.

Automotive Electronics – Power controllers, sensors, EV chargers.

Medical Devices – Surgical lighting, diagnostic equipment.

Military & Aerospace – Rugged, heat-resistant electronics for harsh environments.

Power Electronics & RF Applications – MOSFET drivers, amplifiers, converters.