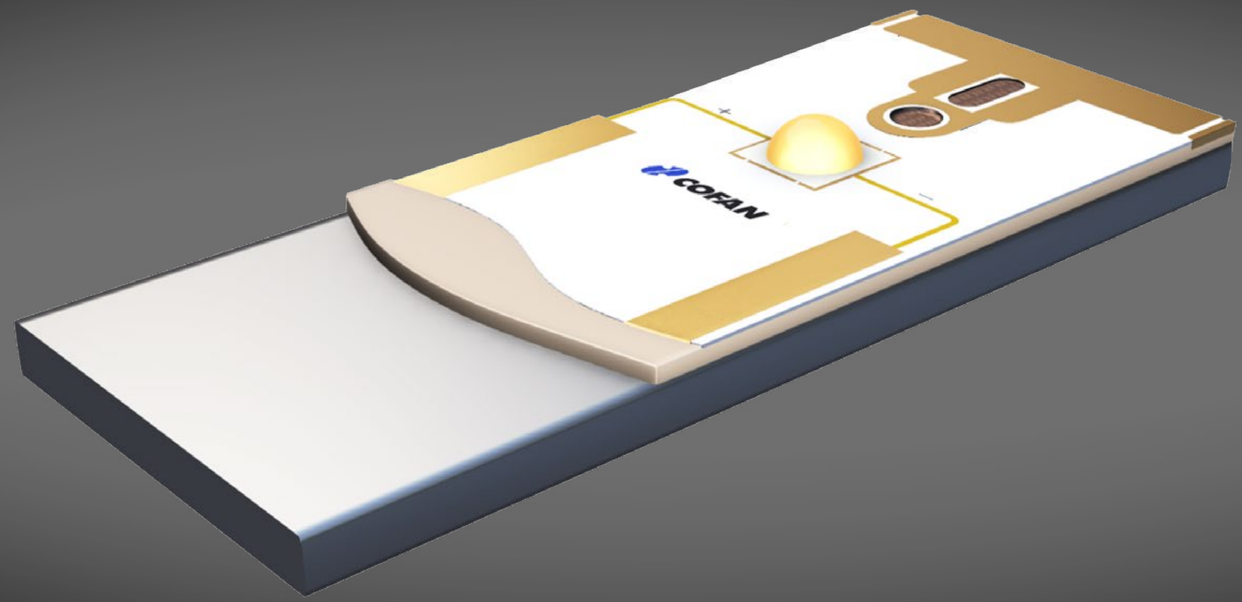
MULTI LAYER MCPCBS

METAL CORE PRINTED CIRCUIT BOARD



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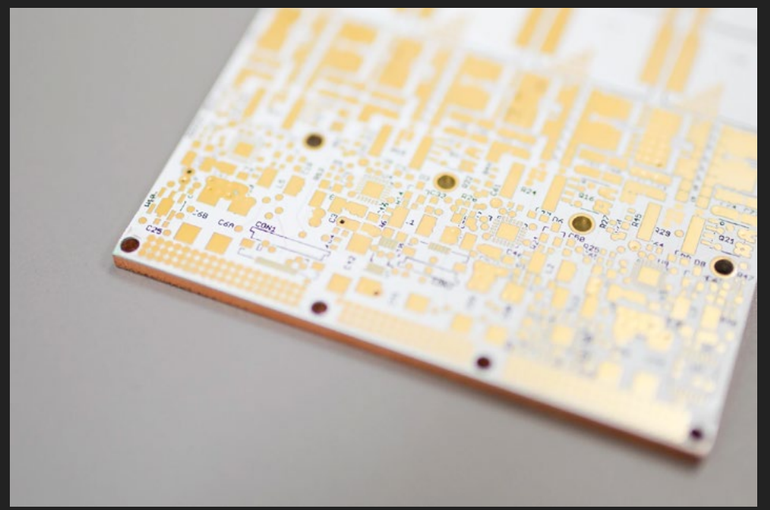
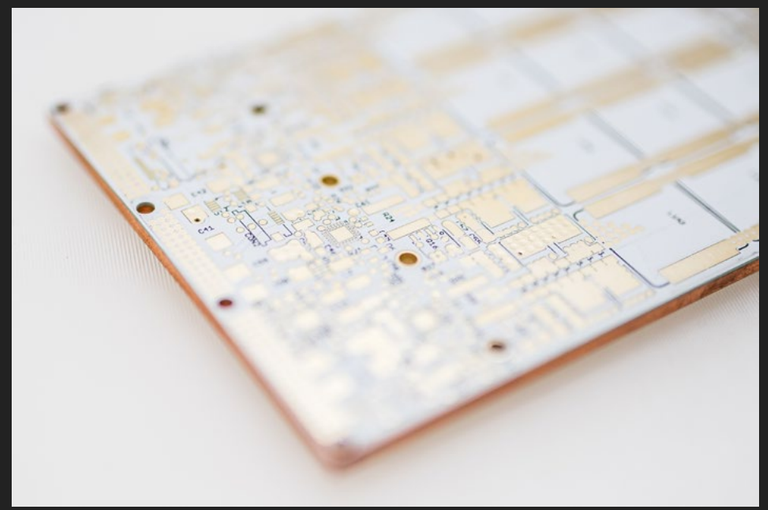
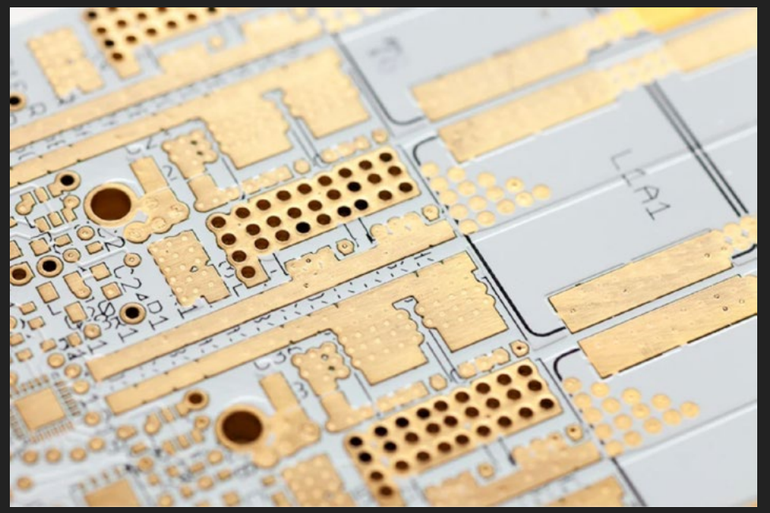
MULTILAYER MCPCB

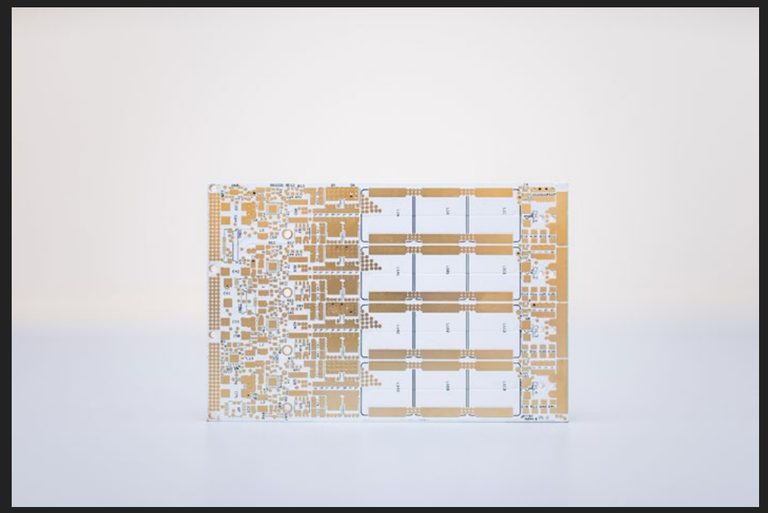
What is an Multilayer MCPCB?

A Multilayer Metal Core PCB (MCPCB) is a type of PCB that has multiple circuit layers stacked together with a thermally conductive metal core, such as aluminum or copper, for enhanced heat dissipation. Unlike single-layer MCPCBs, multilayer versions allow for more complex circuit designs while maintaining excellent thermal management.









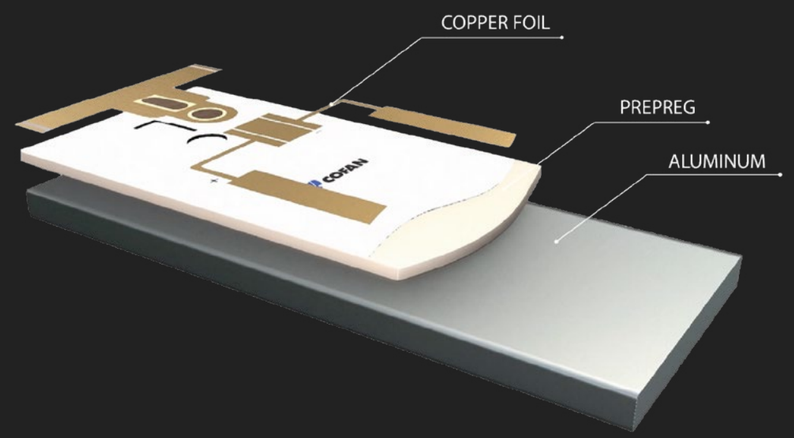
MULTILAYER MCPCB VS. TRADITIONAL MULTILAYER PCB

Multilayer MCPCB for

- Application generates high heat (LEDs, power modules, motor controllers).
- Better durability in extreme environments (automotive, aerospace).
- Reducing additional heat sinks and cooling components.

Traditional Multilayer PCB for

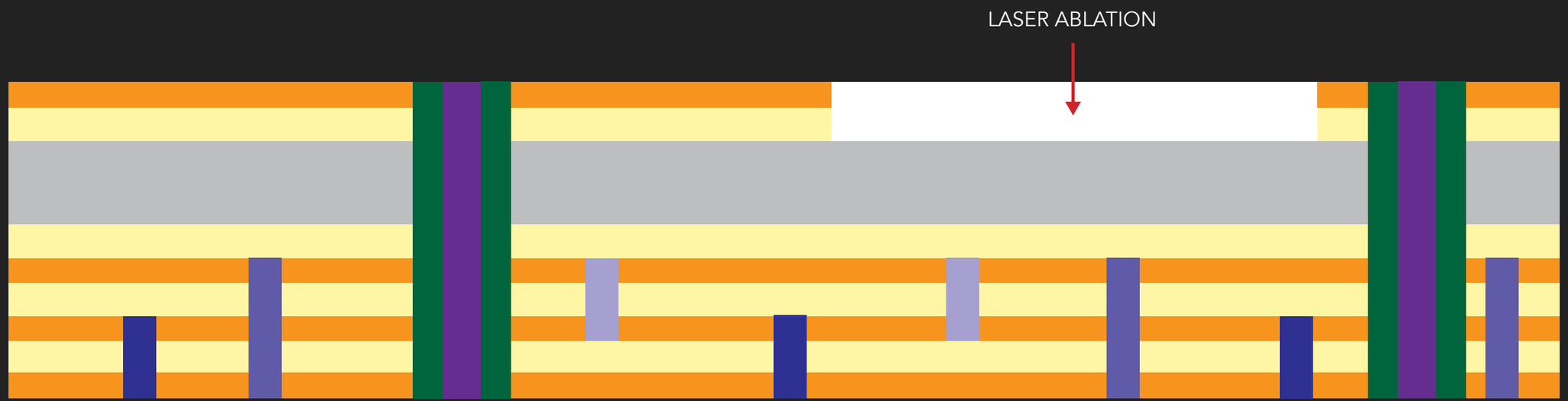
- A design requires many layers (complex circuits, high-speed data).
- Application is low-power or standard electronics (smartphones, IoT, servers).
- Flexibility (e.g., wearable devices, foldable screens).



Feature	Multilayer MCPCB	Traditional Multilayer MCPCB
Core Material	Metal (Aluminum, Copper)	Non-metal (FR4, Polymide, 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 & BURRIED 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 MOUTED 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"*

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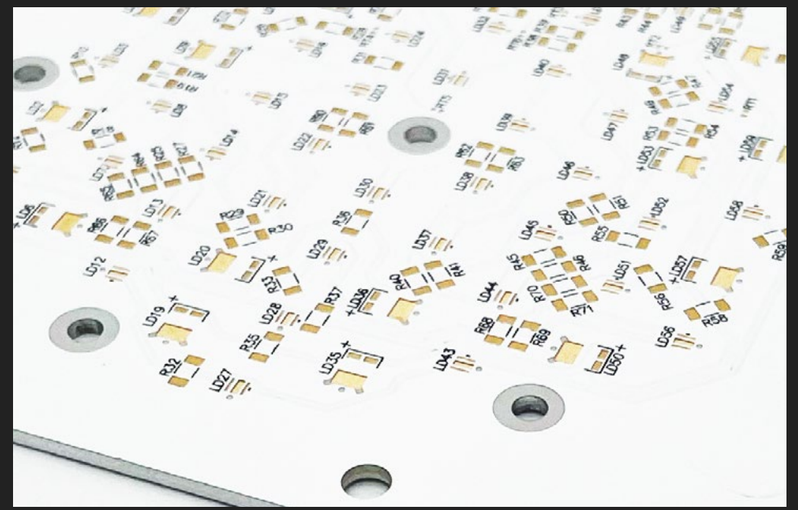
MULTI LAYER MCPCB

Why use MCPCBs?

MCPCBs offer 10 times the thermal conductivity of a standard FR-4 PCB, which means better heat dissipation, brighter lumen output, and a longer-lasting product.
MCPCBs are used in high-powered LED lighting applications in many industries worldwide. Notable industries that use MCPCBs include automotive, lighting (UV, street, stage), medical, and military.
We can customize MCPCBs for your specific needs; for more information, please see PCB Capabilities.



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

MATERIALS FOR MULTI LAYER MCPCB

• Metal Core Selection

The metal core serves as the main heat dissipation layer and provides mechanical support.

Aluminum Core – Most commonly used due to its cost-effectiveness, lightweight, and good thermal conductivity (~1-5 W/m·K).
Copper Core – Offers superior thermal performance (~200-400 W/m·K) but is heavier and more expensive.
Stainless Steel Core – Provides structural strength but lower thermal conductivity than aluminum or copper.

• Dielectric Layer

This layer electrically isolates the circuits while allowing heat transfer.

Thermally Conductive Epoxy or Ceramic-Filled Polymer – Ensures high thermal conductivity (~1-3 W/m·K).
Thickness Range – Typically between 50µm to 200µm, depending on heat dissipation needs.

• Copper Foil Layers

The copper circuit layers are responsible for electrical conductivity and signal integrity.

Thickness Options – Common values include 1oz, 2oz, or 3oz copper (higher thickness for high-current applications).
Number of Layers – Can range from 2 to 8+ layers, depending on design complexity.

PROCESS OF MULTI LAYER MCPCB

1. *Substrate Preparation*

2. *Base Layer Lamination*

3. *Dielectric Layer Deposition*

4. *Lamination of Additional Layers*

5. *Final Etching and Surface Finishing*

6. *Solder Mask Application*

7. *Through-Hole and Blind Vias*

8. *Testing and Quality Control*

9. *Cutting and Shaping*

10. *Assembly*

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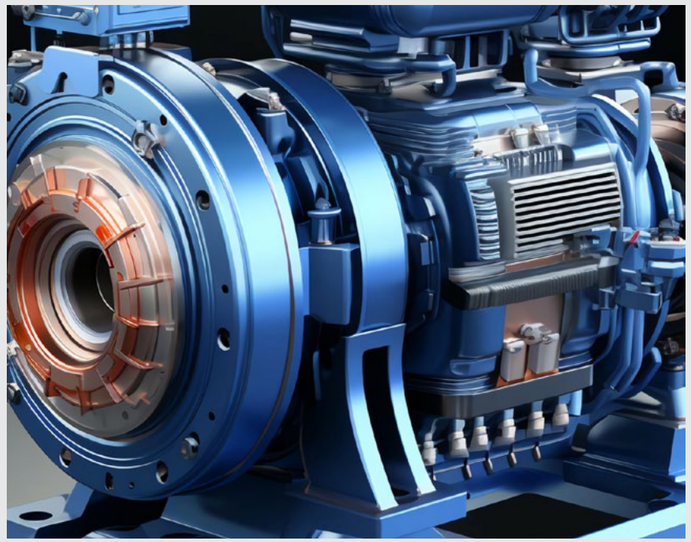
MCPCB APPLICATIONS

Automotive

- Found in headlights, brake lights, infotainment systems, and electric vehicle (EV) power modules.
- Withstands high temperatures and vibrations, ensuring durability in harsh conditions.

Power Electronics

- In power converters, inverters, and motor controllers, MCPCBs manage heat dissipation to maintain efficiency and prevent failure.
- Common in electric vehicles (EVs), industrial power supplies, and solar power inverters.



Medical

- Applied in medical imaging systems, laser surgical equipment, and diagnostic devices.
- Helps maintain stable operating temperatures for high-precision applications.

MCPCB APPLICATIONS

Military

- Applied in medical imaging systems, laser surgical equipment, and diagnostic devices.
- Helps maintain stable operating temperatures for high-precision applications.

Telecommunications

- Used in 5G antennas, RF amplifiers, and satellite communication equipment.
- Enhances signal stability by maintaining optimal operating temperatures.

Street Lighting

- MCPCBs enhance heat dissipation in LED streetlights, extending their lifespan.
- Their metal core ensures durability in harsh outdoor conditions.

CERTIFICATIONS

- ISO 9001:2015
- ISO 14001:2015
- ISO 45001:2020
- IATF 16949:2016
- Reach-SVCH Statement
- RoHS Compliance Certificate
- ITAR

ISO 9001:2015
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ISO 9001:2015
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ISO 14001:2015
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ISO 14001:2015
COFAN Taiwan

ISO 45001:2020
COFAN Dongguan

IATF 16949:2016
COFAN Taiwan

ITAR
COFAN USA

Reach-SVCH
Statement

RoHS-Compliance Certificate
Cofan Taiwan

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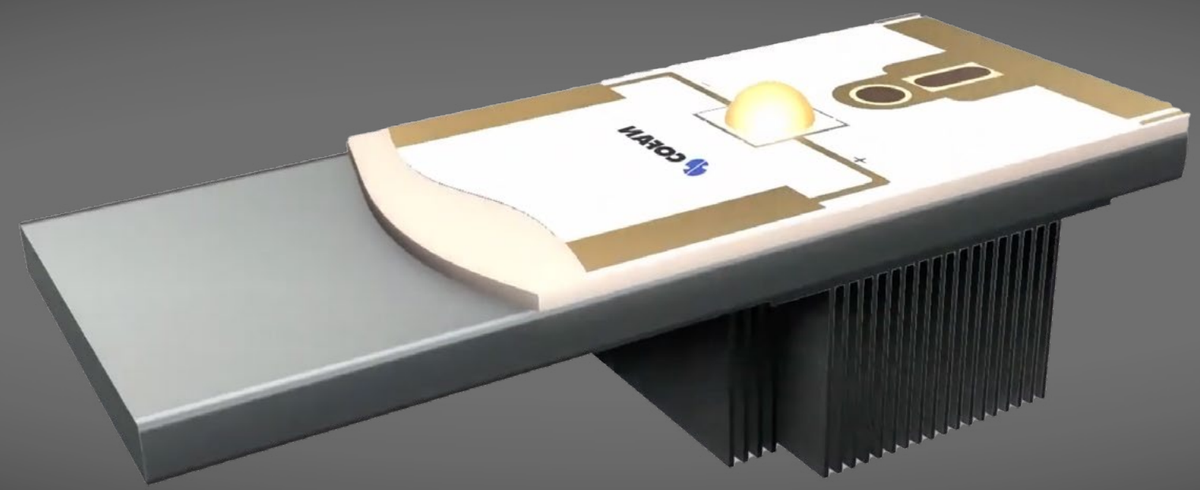

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