

Metal Core PCB Fabrication

with Concurrent Engineering

- Metal Core PCB Fabrication
- Heat Sinks & Heat Pipes
- Enclosures (Plastic and Metal Alloys)
- SMT & Through Hole PCB Assembly
- Final Integration & Test Services



COFAN PCB[®]
A Subsidiary of Cofan USA

www.cofan-pcb.com

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About the Company

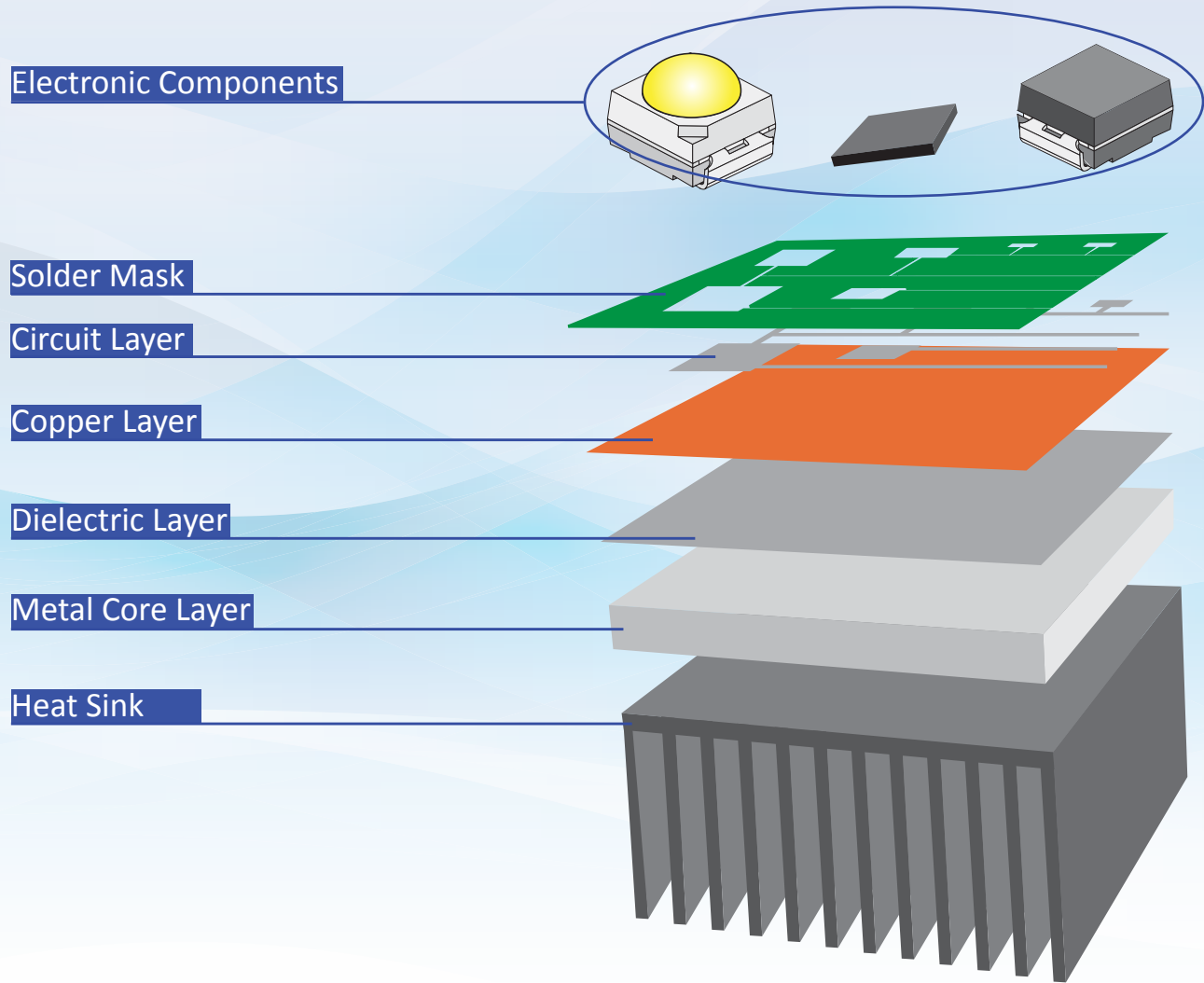
Cofan USA was founded in 1994. Our main office is located in Fremont, CA. Cofan has manufacturing facilities in Shenzhen, China and in Taipei, Taiwan. Also, we have sales office in Toronto, Canada. All of our facilities are ISO 9000:2001 certified for consistent management of our processes.

Cofan offers design and manufacturing services for enclosures, heat sinks, and other customized mechanical parts. Our services include custom sheet metal, die-casting, Aluminum and Copper extrusions, CNC machined parts, and injection molded parts. We use industrial standard design software, such as Flowtherm, ANSYS Icepak, SolidWorks, Pro/E to support your design needs.

We have been in mainstream in energy saving LED lighting industry for 5 years, offering FR-4, MCPCB, thermal solutions and assemblies. We are focused in developing and producing new technologies at Light Guide Panels and Chip-on-Board.

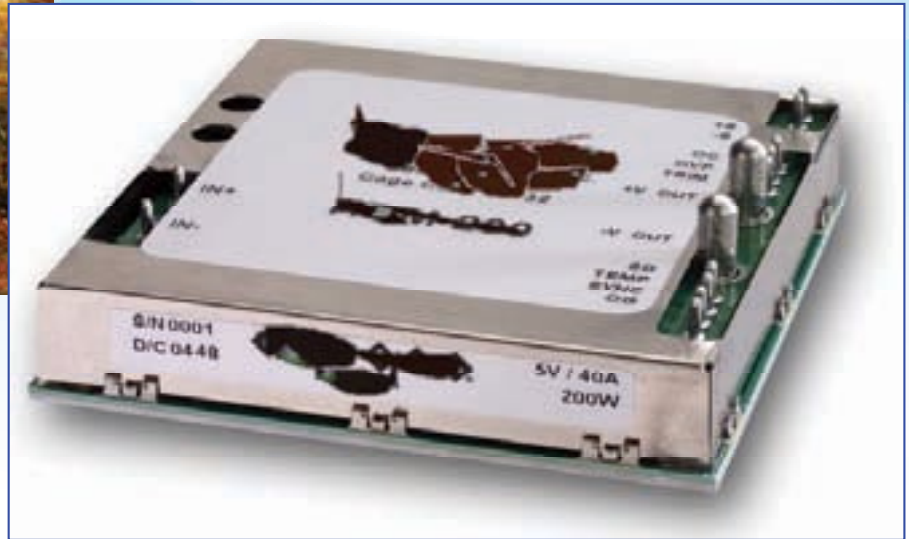
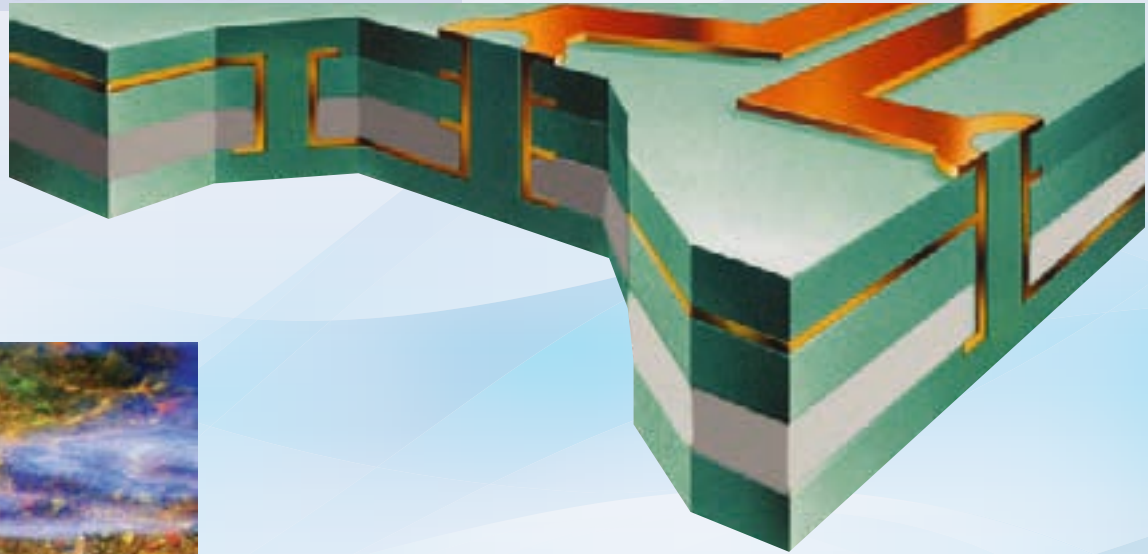
We pride ourselves in giving the best possible customer service, the highest quality products with the shortest lead time in the industry at competitive pricing.

Typical Metal Core PCB Assembly



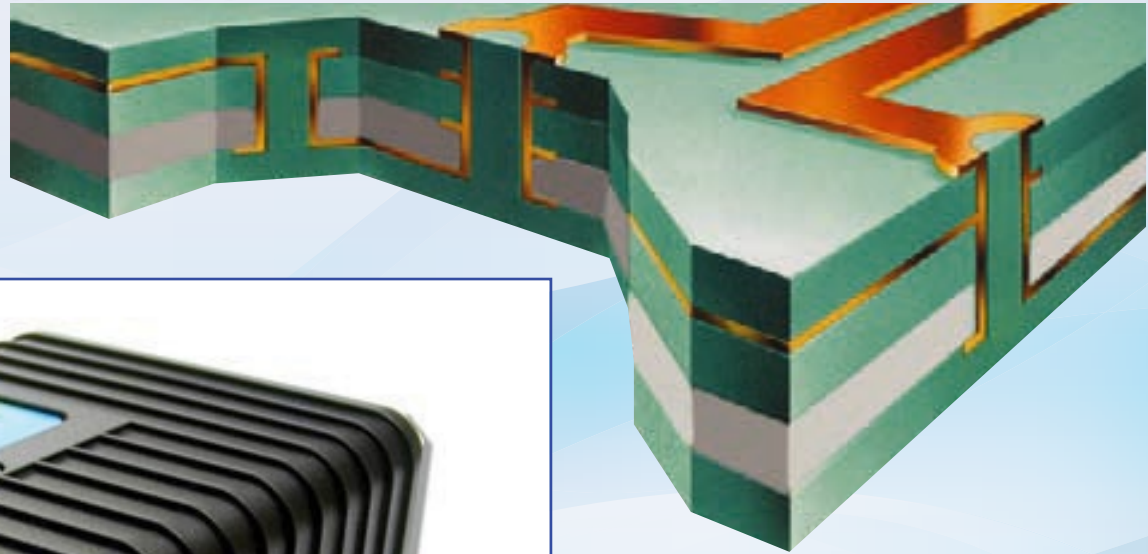
Typical Applications

High Density Power Conversion



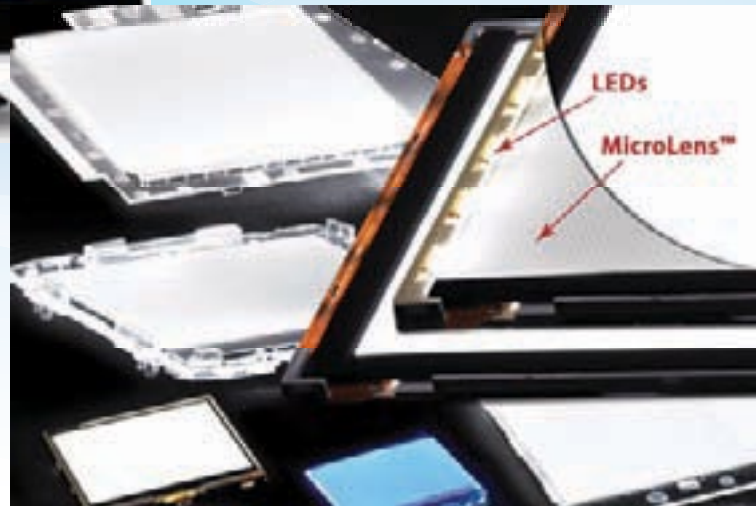
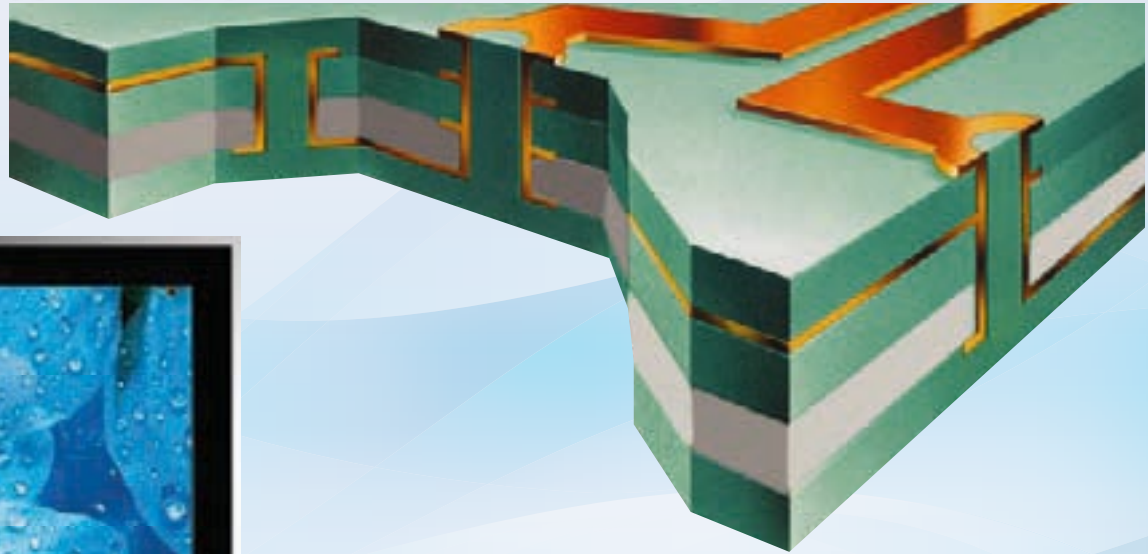
Typical Applications

Motor Control



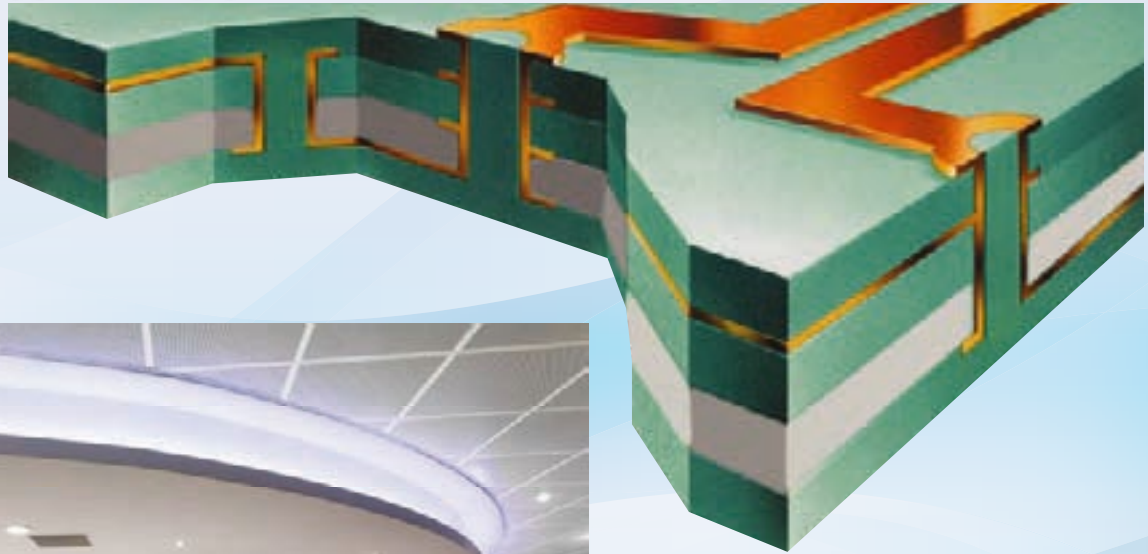
Typical Applications

Flat Panel Displays



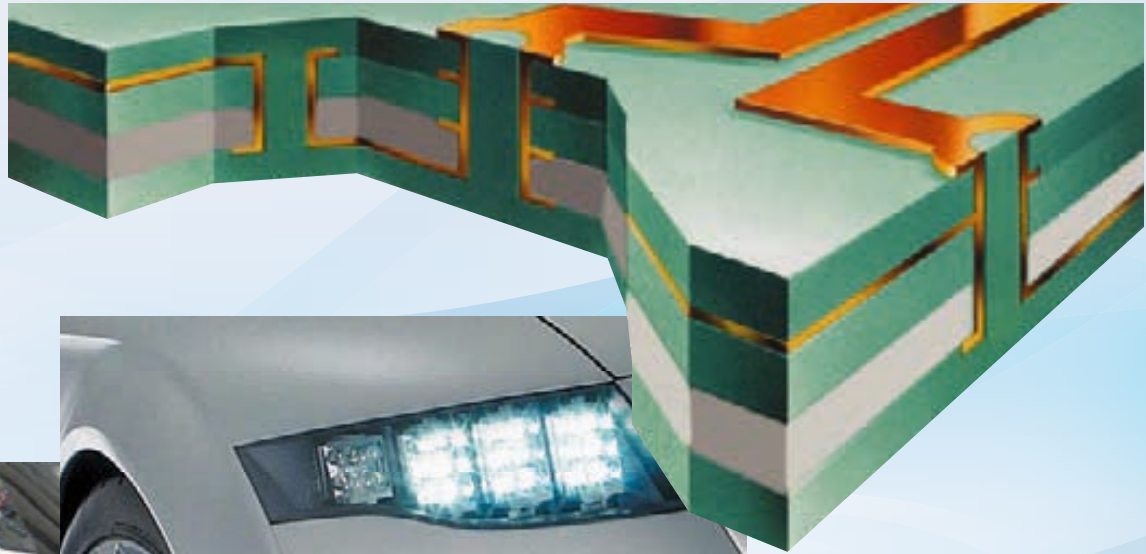
Typical Applications

General Lighting



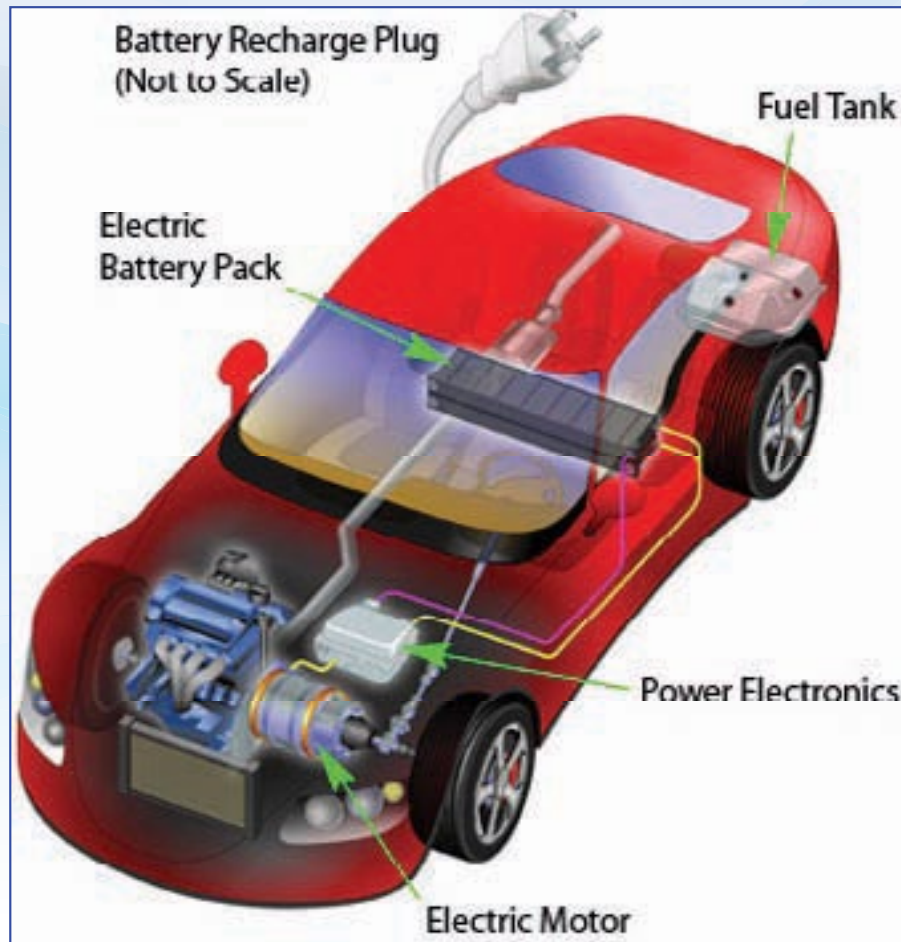
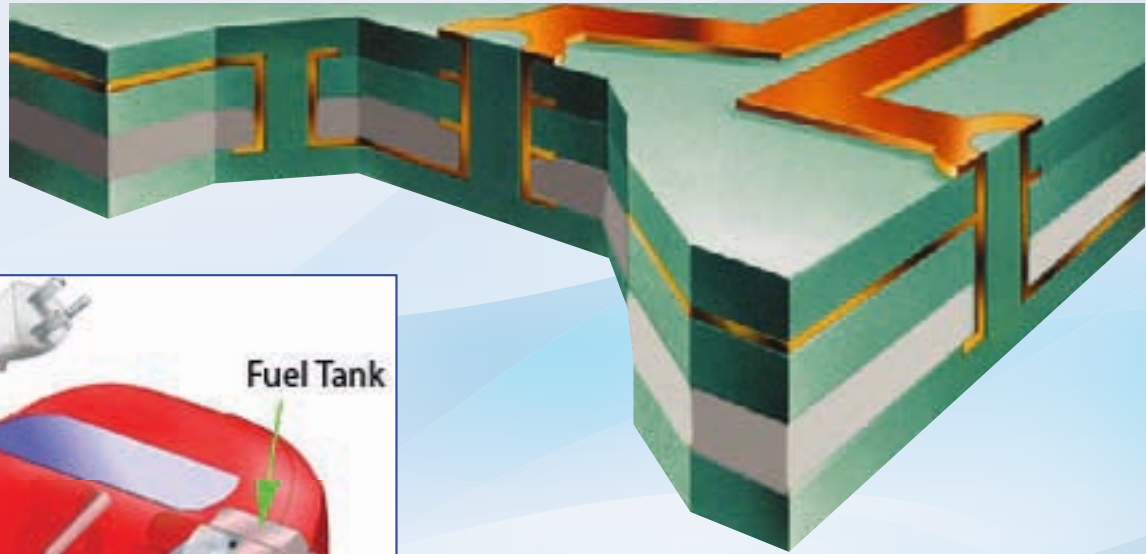
Typical Applications

Automotive



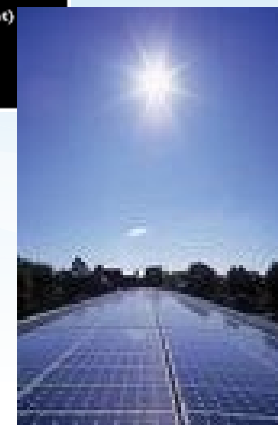
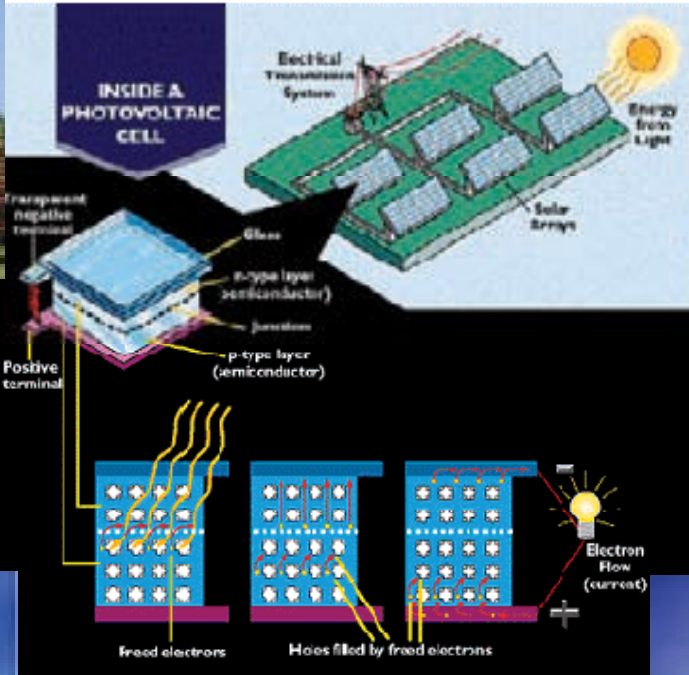
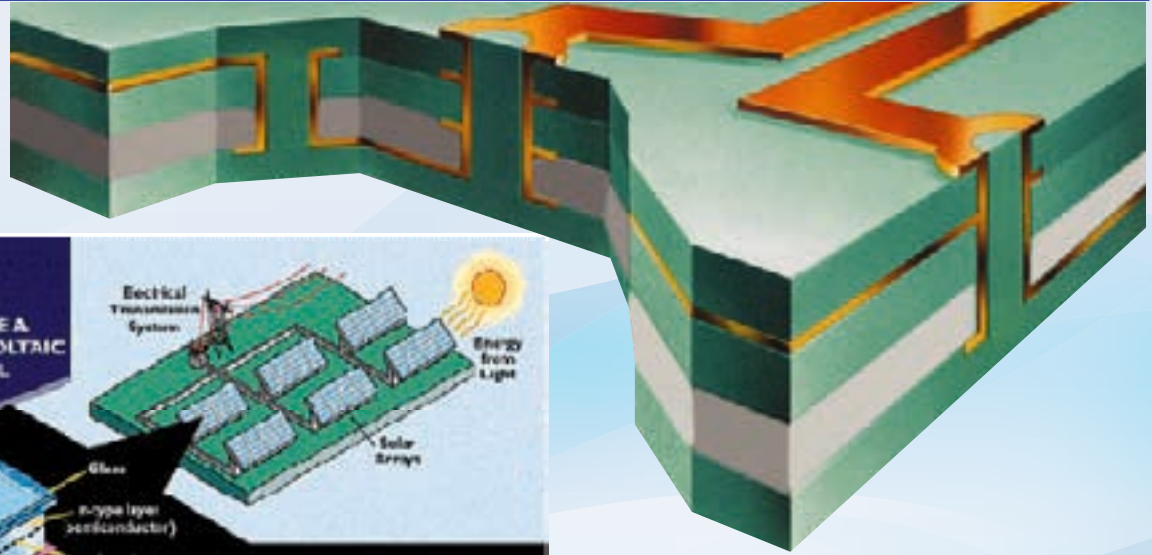
Typical Applications

Hybrid & Electric Vehicles



Typical Applications

Solar & Alternative Energy



Typical Construction Methods

Single Layer Construction

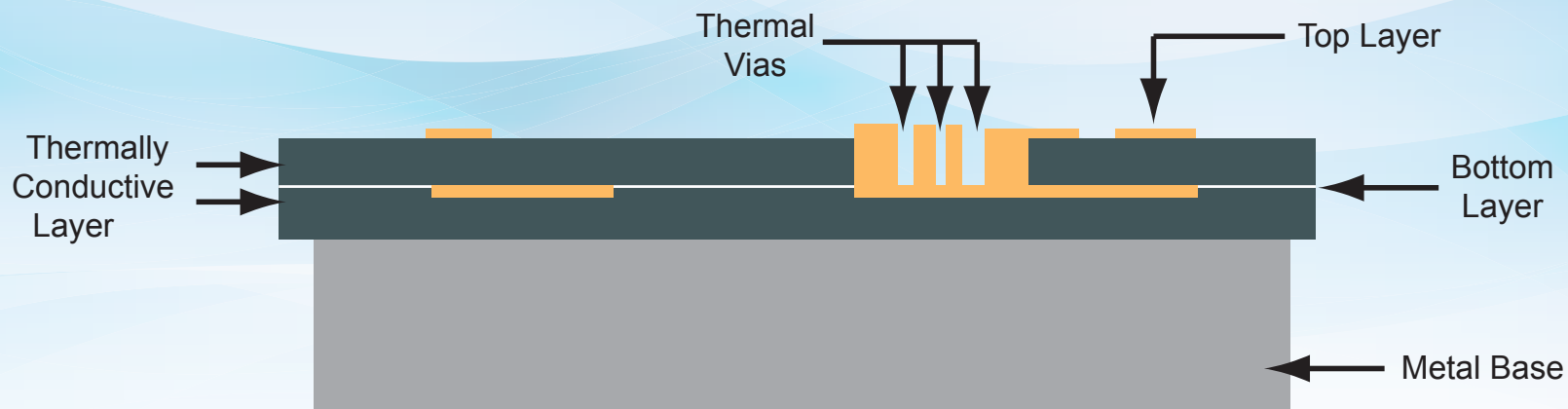
- Single-Sided with Metal Base
- Wide Selection of Thermally Conductive PP
- One Layer of Pre-Preg (4,6 or 8 mm)
- Copper Weight 1~6oz
- Metal Base, Copper or Aluminum, 10~10mm
- Fully Automation Production Line



Typical Construction Methods

Two Layer Construction

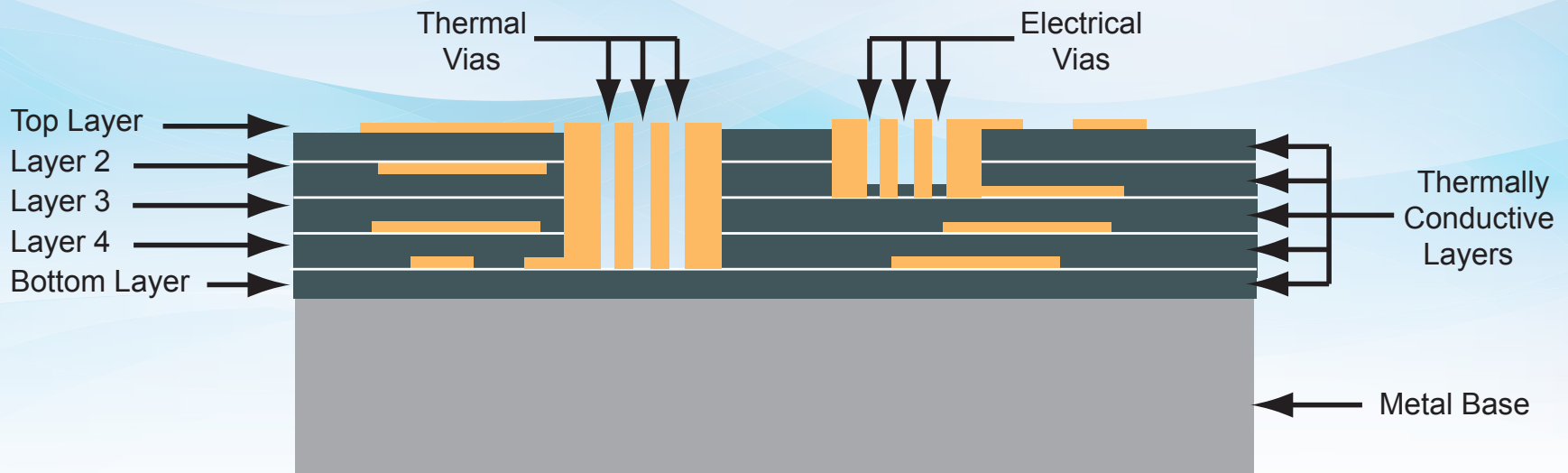
- ❑ Single side SMT with Metal Base
- ❑ Surface Mounting on Top Layer
- ❑ All connectivities are done on second layer.



Typical Construction Methods

Four Layer Construction

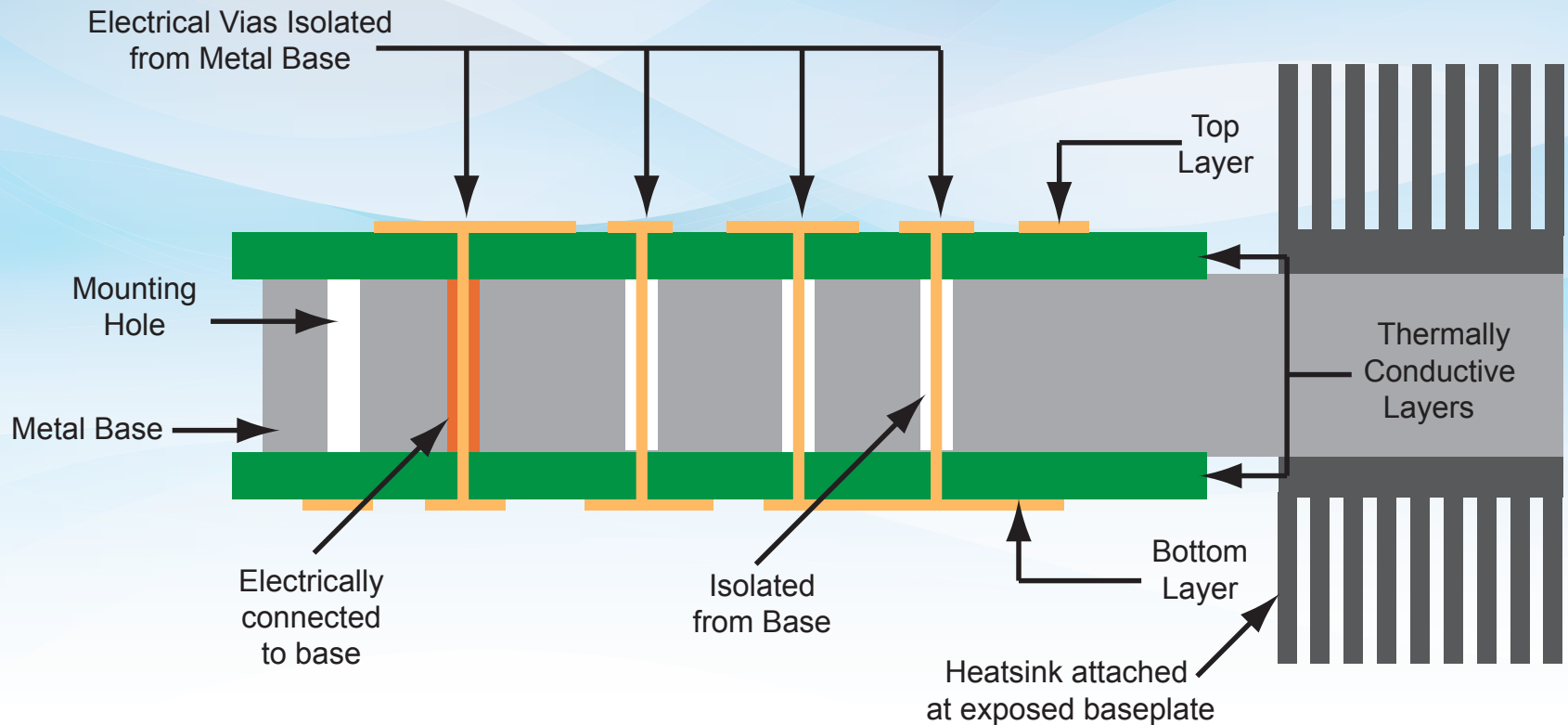
- ❑ Single side SMT with Metal Base
- ❑ Surface Mounting on Top Layer
- ❑ All connectivities are done on 2nd and 3rd layer
- ❑ EMI is applied on fourth layer
- ❑ Thermal Vias, Electrical Vias, and Chasis Viasayer.



Typical Construction Methods

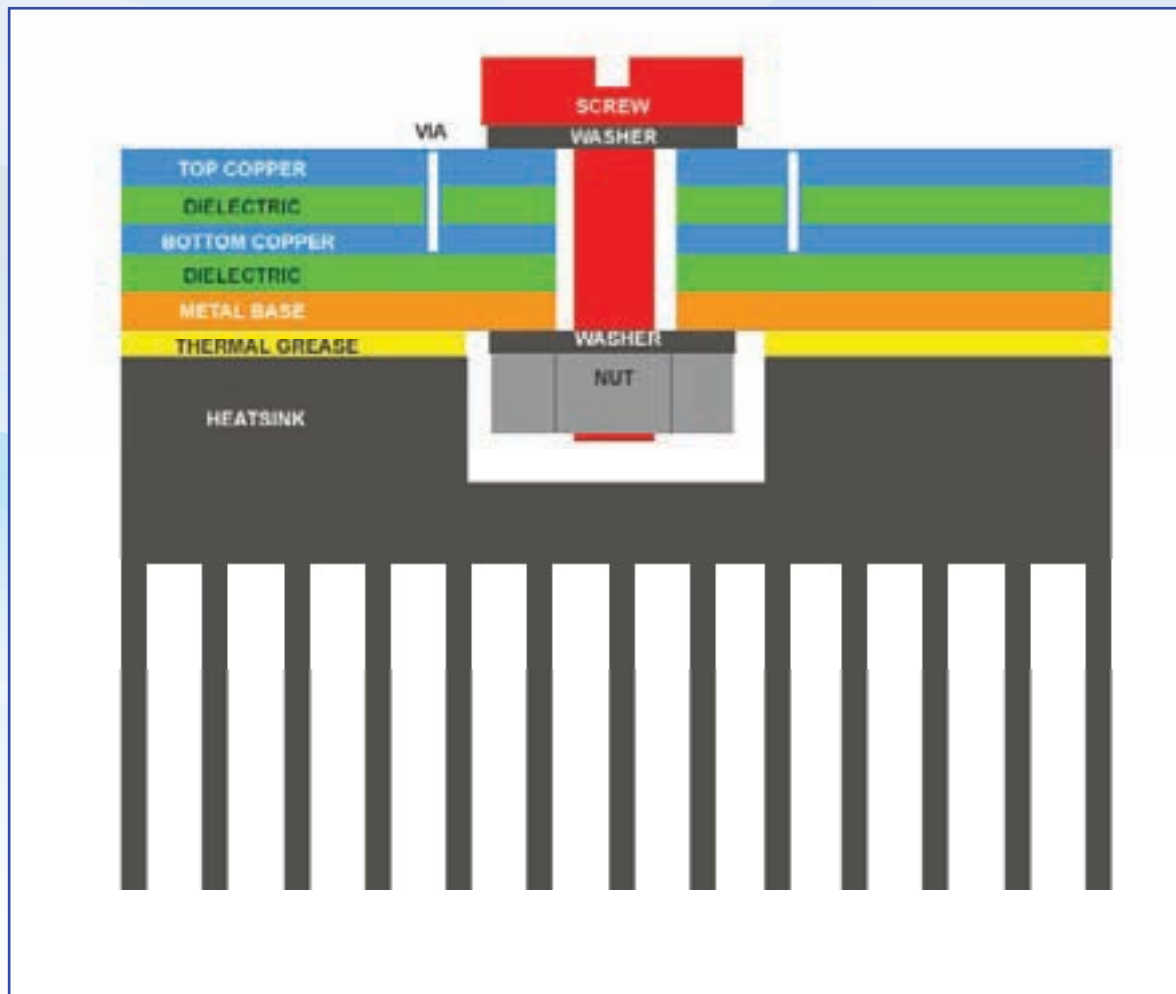
Double-Sided / Single Layer Construction

- Double-sided surface mounting
- Metal can be isolated or connected to electrical vias
- Chasis Vias and thermal interface can be interfaced with the heat sink.



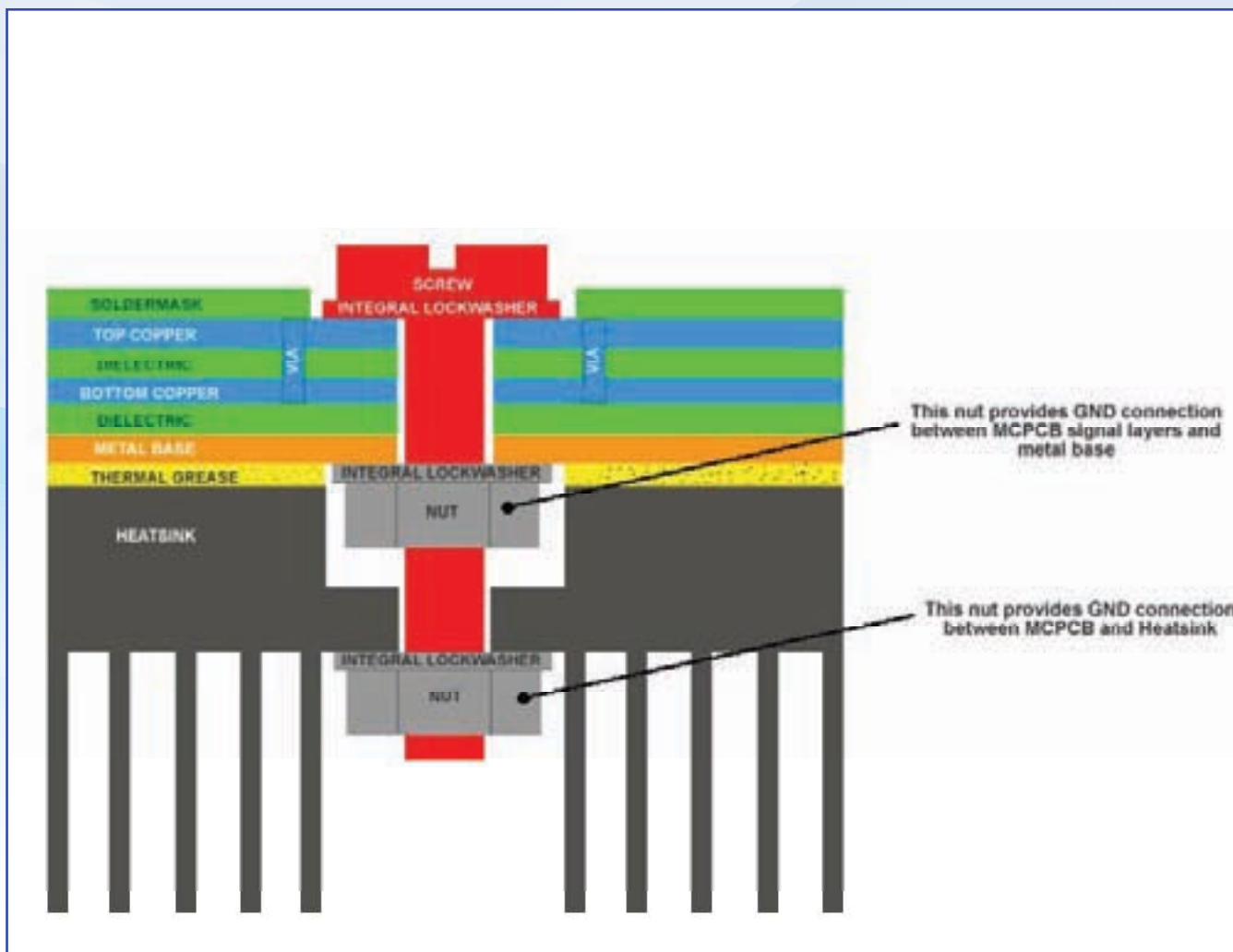
Typical Construction Methods

Concept on Metal Base Grounded to 2nd Layer



Typical Construction Methods

Concept on Metal Base Grounded to 2nd Layer & Heat Sink



Materials & Capabilities

Thermal Pre-Preg

Material Selection

- T-lam (Thermagon)
- Sekisui
- Customized by Cofan Taiwan
- Bergquist
- Denka

PCB Lamination

- Thermagon – 3.5W/m-k 1KA series
- Bergquist
- Doosan

Metal Core Material Selection

- Aluminum
- Copper
- Heat Sink
- Heat Sink with Heat Pipes and Heat Spreaders

Layer Count

- Single-sided through 6-layer
- Blind/Buried Vias
- Thermal Vias
- Chassis Vias

Copper Weight

- Accommodate up to 10 oz.

PCB Thickness

- Inner layer dielectrics 0.004~0.25”

Surface Finish

- Solder (63/37 Tin-Lead)
- SN100C
- OSP
- Carbon Ink
- 1m Au

Concurrent Engineering Services

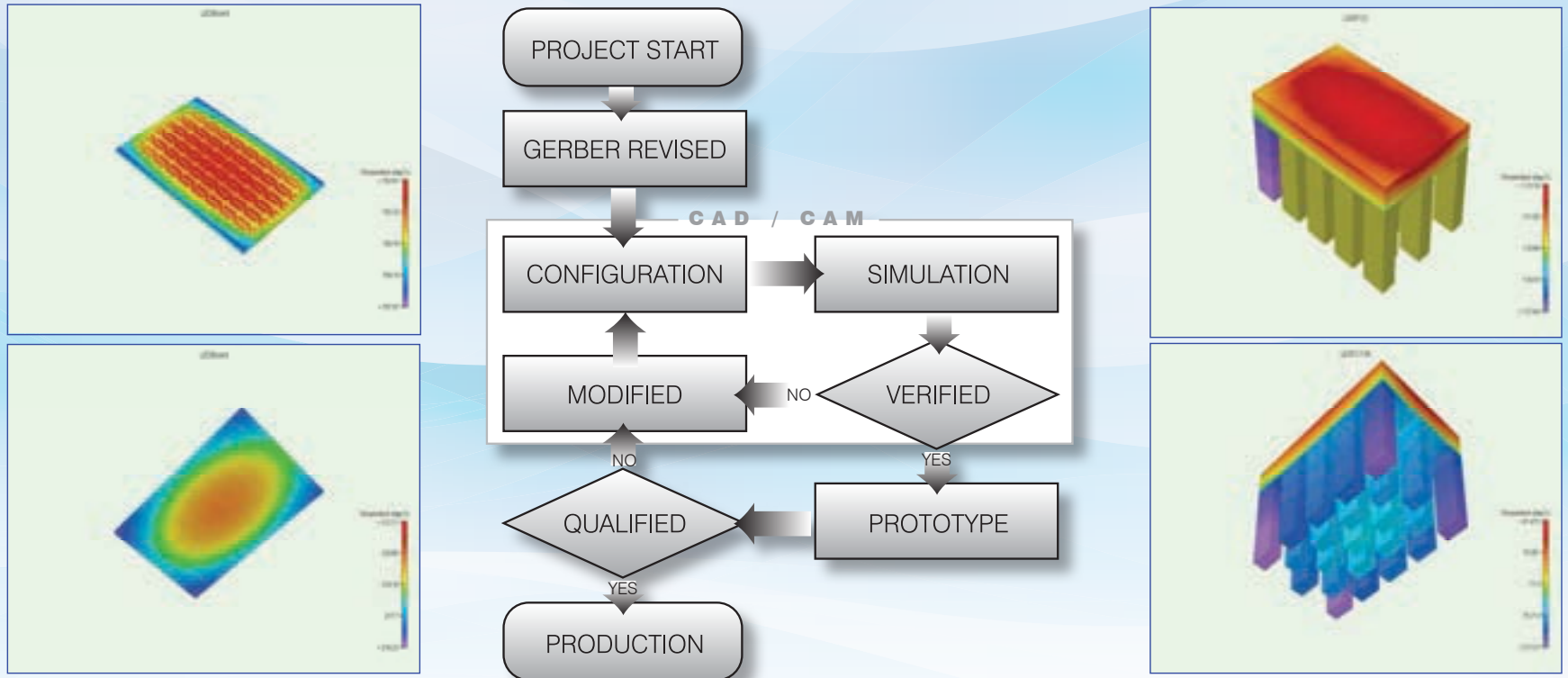
Our Concurrent Engineering service is what truly separates Cofan from other Fabricators. Our Applications Engineering Team offers 10+ years of experience in the design and manufacturing of Metal Core PCBs, assisting our customers during the design and ongoing manufacturing processes of PCB assemblies to ensure the highest level of performance at the lowest possible cost.

We can review your Gerber files and recommend the best possible Design for Manufacturing practices – including appropriate dielectric insulation characteristics and current carrying capacity. Before proceeding with the procurement, identifying what can be improved at the earlier stage will save substantial time and money for the prototypes.

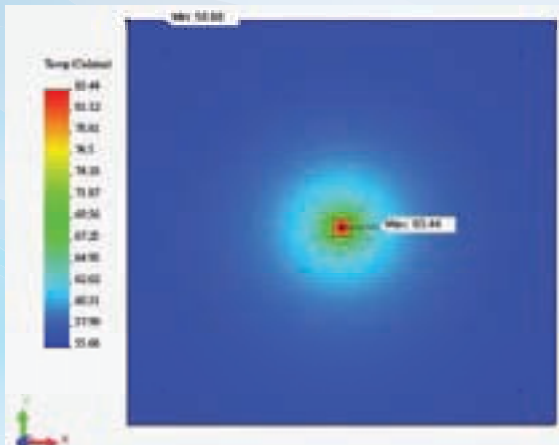
Moreover, we offer thermal simulation service for your final PCB integration to predict the thermal characteristics of your design. After getting the results, our team can check what components can be simplified and rearranged for the feasible layouts. The customized thickness of the baseplate or any additional direct integration components (i.e., heat sink) can be specified. Either way, Cofan will eliminate the need for multiple prototypes, reducing the time it takes to get your project on the market.



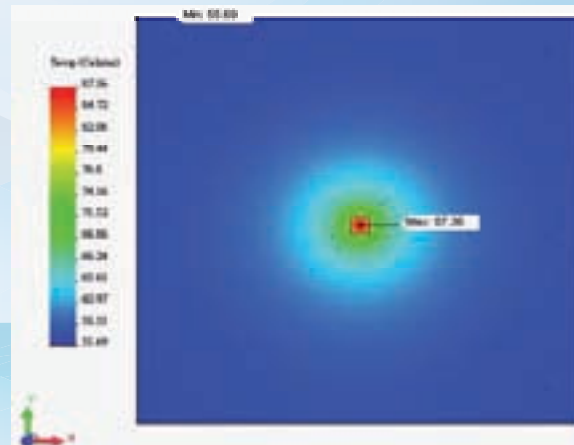
Thermal Modeling Flowchart



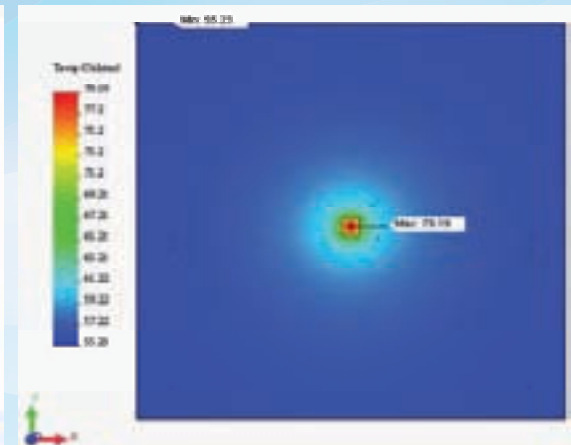
Thermal Simulation



BOARD THICKNESS: 1.5MM
 BOARD SIZE: 120 MM X 120 MM
 MAXIMUM TEMPERATURE: 87.36 C



BOARD THICKNESS: 2.0 MM
 BOARD SIZE: 120 MM X 120 MM
 MAXIMUM TEMPERATURE: 83.44 C

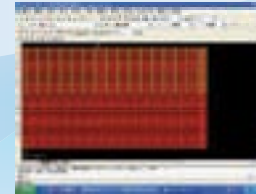


BOARD THICKNESS: 3.0 MM
 BOARD SIZE: 120 MM X 120 MM
 MAXIMUM TEMPERATURE: 79.19 C

Tools for Assisting Product Development

Computer Aided Design

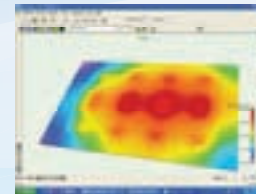
- AutoCAD
- Pro/E
- SolidWorks



CAD

Simulation Software

- FloTHERM
- ANSYS Icepak
- COSMOS



CAE

Computer Aided Manufacturing

- Mastercam
- CAM 350



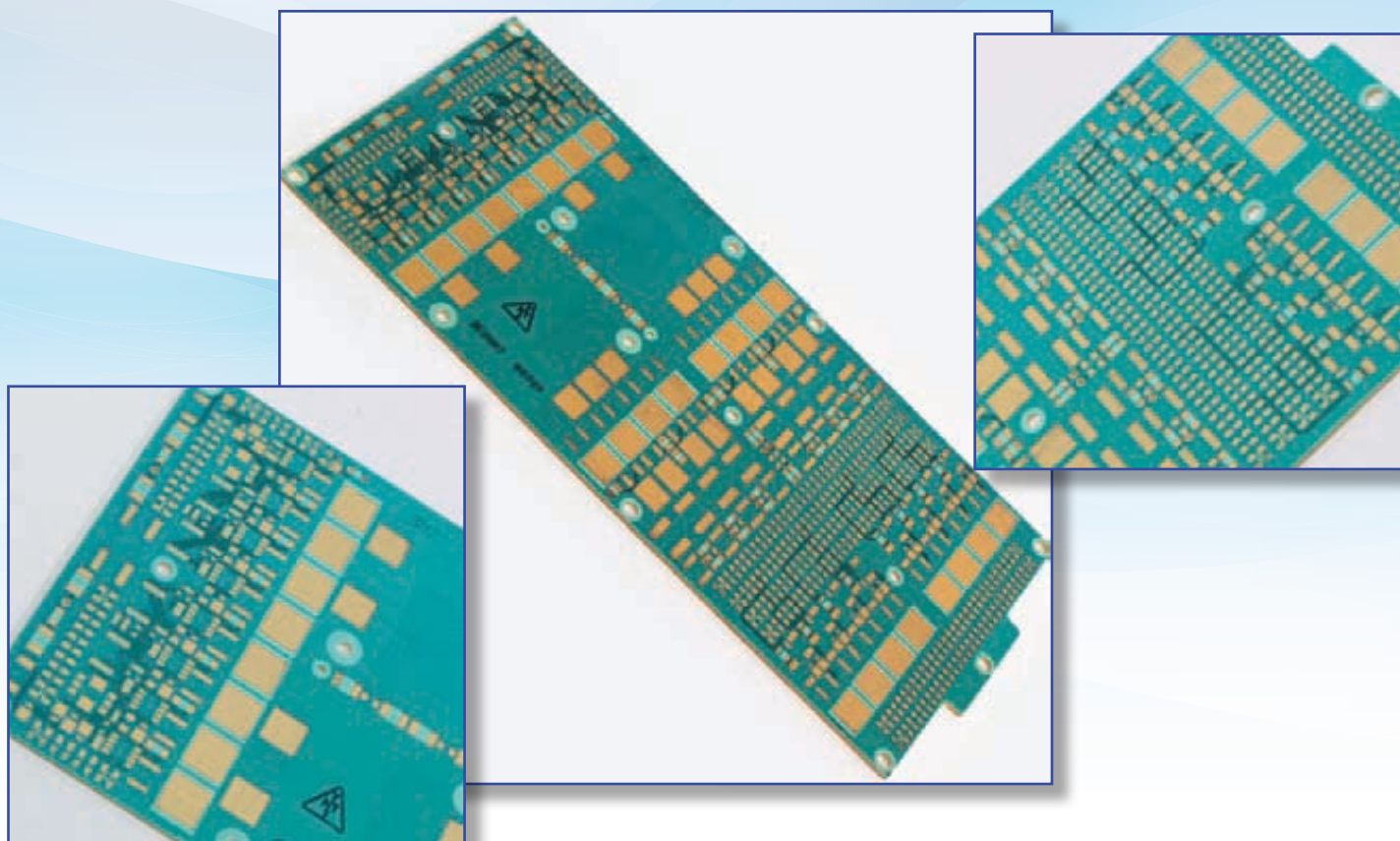
CAM

MCPCB Application Examples

Example 1

The customer contacted us with a plan for a 3-layer design. After reviewing their requirements and the sensitivity of their application, Cofan advised an additional layer to act as a ground plane to reduce EMI.

The final design utilizes a Copper Base for improved thermal conductivity and enables grounding of all the capacitors. The design includes both thermal and electrical vias filled with DuPont's CB100 for improved conductivity.

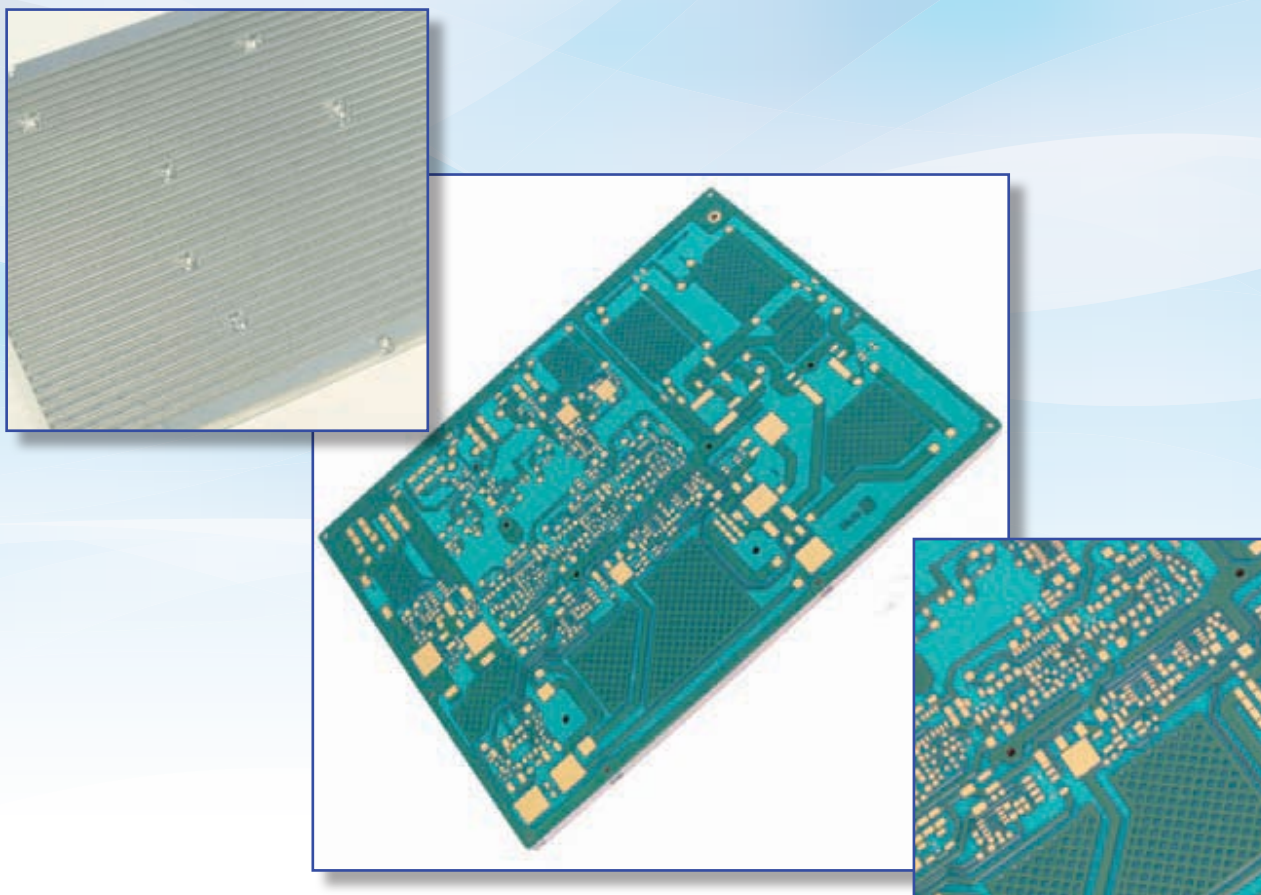


MCPCB Application Examples

Example 2

The customer contacted us with a plan for MCPCB assembly that would need to be attached to a Heat Sink assembly.

Cofan developed a new lamination process, which would allow us to mount the MCPCB directly to a Heat Sink with T-Lam PP material. The end result is a stand-alone MCPCB and Heat Sink assembly that costs less and minimizes manufacturing processes. Also, it improves the thermal management characteristics.

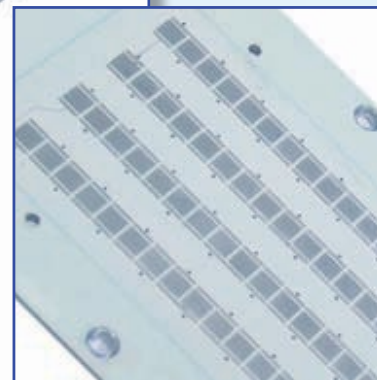
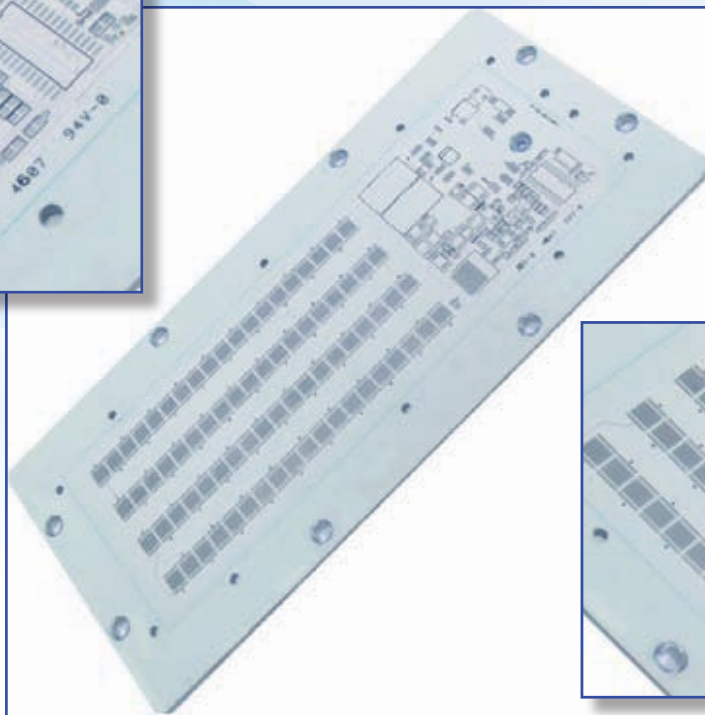
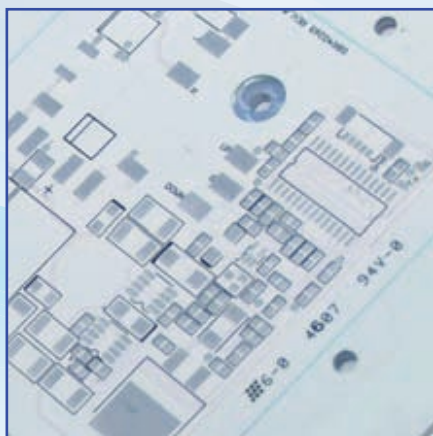


MCPCB Application Examples

Example 3

The customer's MCPCB was experiencing a thermal issue and did not get any suggestions/improvements from another fabricator's Application Engineer. The client assumed their maximum height was limiting their options and was close to scrapping entire project.

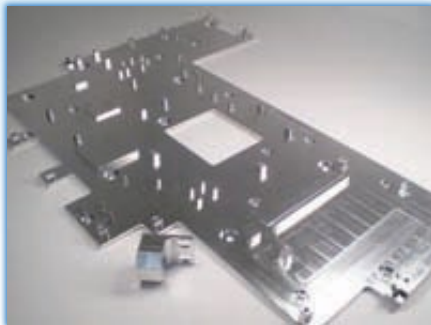
By taking some time to review and understand their application, Cofan was able to increase the base-plate thickness from .062" to .0125", which was made possible by using counter-bore mounted screw holes. Cofan was also able to implement the improved thermal lamination to maximize the heat dissipation. Cofan helped resolve their issues beyond their expectations.



Metal Fabrication

Cofan USA operates along with Cofan CN (China based facilities) to fabricate the simplest to most complex sheet metal part for a quick-turn prototype or for a production stage. Cofan offers competitive pricing.

Cofan's procurement items range from simple flat metal plate with a single hole to the complex larger assemblies, consisting various components that have been punched, formed, machined, welded, sanded, plated, painted, silk-screened, and installed along with hardware together. The assembly can include the rivets or welding. Majority of the parts require additional operations, such as finishing operation on painting or plating before packaging.



Trumpf, Fanuc CNC, Fanuc Wirecut, Charmille Wirecut, Ona Wirecut

Sheet Metal operations

- Bending
- Ironing
- Laser Cutting
- Press Brake Forming
- Punching
- Roll Forming
- Stamping
- NC Routing
- Welding

Full line Machining operation including

- CNC Tapping / Drill Center
- CNC Lathe
- Double/Single-Sided Grinding

Measuring Instruments

- CMM, Microscope, etc.

Full line metal finishing

- Wet/powder coat painting
- Anodizing
- Nickel plating, etc.

Heat Sink & Heat Pipes Assemblies

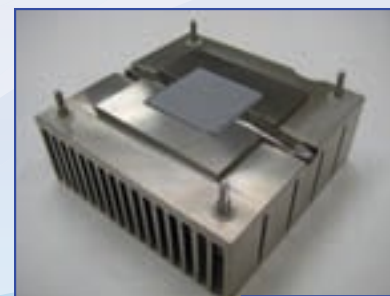
Cofan has stock units of standard heat pipes with various diameters that can be integrated into custom heat pipe assemblies. It can be tailored for your application needs.

Cofan's flexible solutions

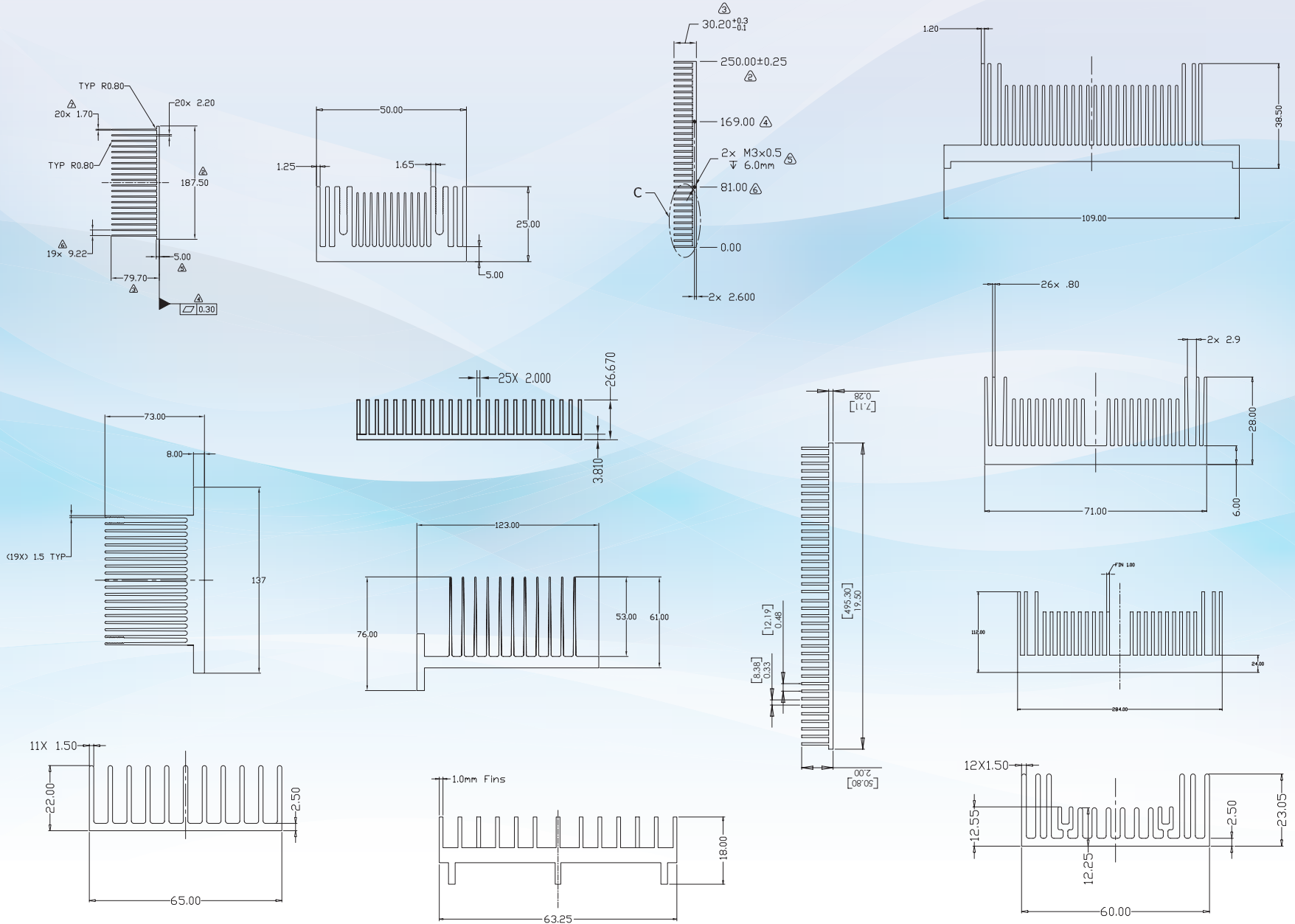
- At the copper heat pipe, multiple plating options are available. Nickel plated heat pipes can be used at outdoor.
- Custom bending can be done in-house for use in any hardware layout.
- Various heat pipe diameters. Small diameters can be used at constrained environments, and larger diameters can be utilized for maximum performance.
- Various heat pipe lengths (up to 400mm)
Off-shelf lengths for readily available stock.
Customized lengths.

Cofan's services

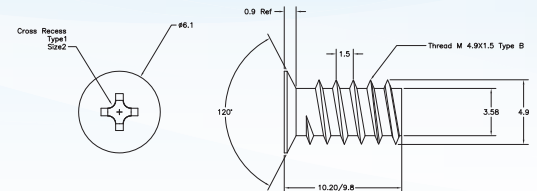
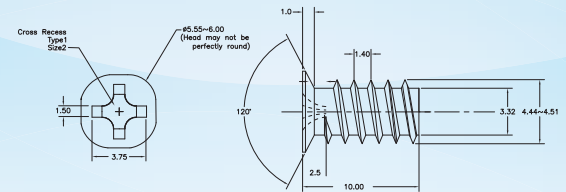
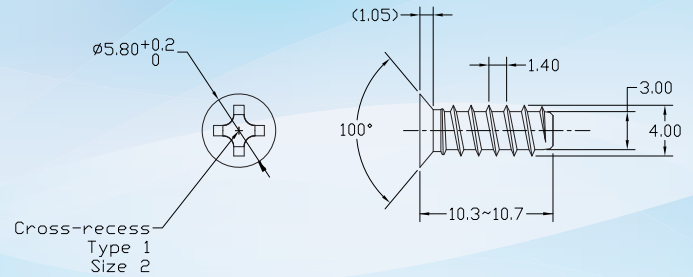
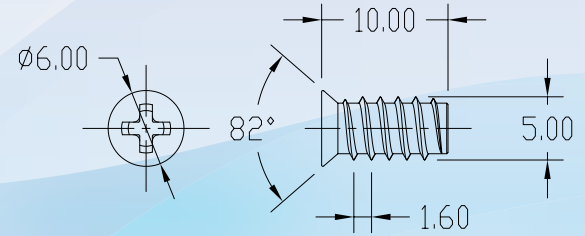
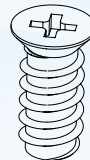
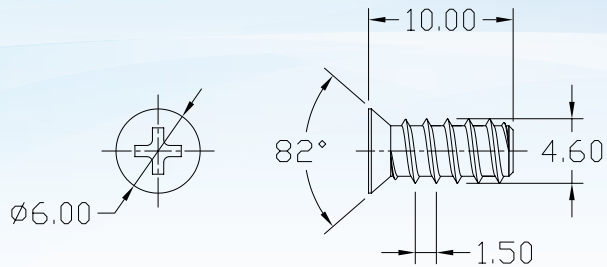
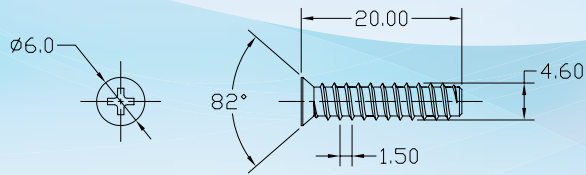
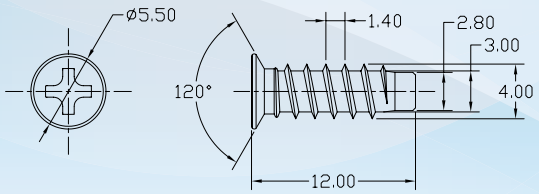
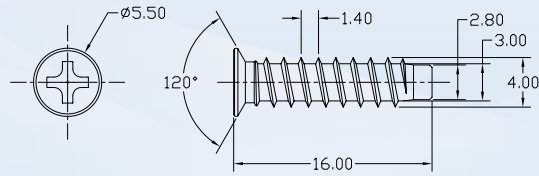
- Custom bending can be done in-house at our Fremont, CA facility.
- The work can be ready in less than one week. Cofan offers 100% inspection on all of the heat pipes before and after bending.
- All heat pipes must pass the stringent heat transfer tests to reach a minimum temperature gradient within a minimal time period ($\Delta T < 4\text{ }^{\circ}\text{C}$, time period ≈ 7 seconds).
- ISO9001 Certified Facilities.
- Capacity: 500,000 heat pipes/month with lead time of less than one week. R&D team dedicated to continuous improvement and product development. Design at active or passive forms.



Copper or Aluminum Extrusion Profiles



Mounting Hardware



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