

AUTOMOTIVE

Thermal Management Solutions

Innovative Engineering for Increased Reliability

ABOUT TTM

TTM Technologies, Inc. is a leading global manufacturer of technology solutions including engineered systems, RF components and RF microwave/microelectronic assemblies and quick-turn and technologically advanced PCBs. TTM stands for time-to-market, representing how TTM's time-critical, one-stop manufacturing services enable customers to shorten the time required to develop new products and bring them to market. Additional information can be found at www.ttm.com.

FOLLOW US      

#TTM #TTMTECH #INSPIRINGINNOVATION

OUR WEBSITE WWW.TTM.COM

AUTOMOTIVE

The Hybrid & Electric Vehicle Revolution is now

Electric vehicles are becoming mainstream, along with increasingly complex electronic systems, including:



Engine Control Units



Electric Powertrain



Braking



Battery management



Charging Stations



Radar

And even more...

Common to all these systems is the need for innovative thermal management solutions.

Thermal management is essential to maintaining the component temperature within designed values by removing excess generated heat.

TTM Technologies ("TTM") has a proven track record for developing heat management solutions for high-reliability applications. Our global team of dedicated engineers has broad experience with diverse applications; they offer design for manufacture guidance and stack-up reviews to find opportunities to improve reliability, manufacturability and save our customers' time.



TEMPERATURE VS. RELIABILITY

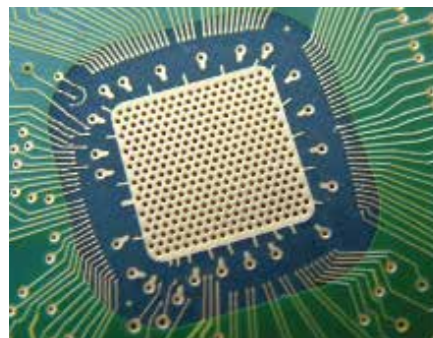
The long-term reliability of electronic systems is a function of operating temperature. Lowering the operating temperature and minimizing the thermal cycling delta increases reliability, which also be beneficial in extending product life.

A circuit board's primary function is to provide connectivity and a mechanical foundation for all circuit components. As circuit densities increase due to miniaturization, circuit boards have become an integral part of the thermal management system, transferring heat away from components to a region where the heat can be dissipated. At TTM Technologies, we understand the complexities of thermal management and strive to provide cost-effective solutions for high-volume production.

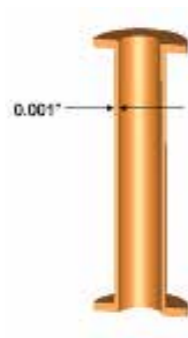
TYPES OF THERMAL MANAGEMENT SOLUTIONS

Thermal Via

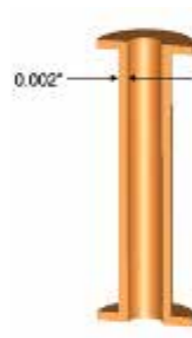
The most economical method to increase thermal conductivity is the thermal vias; this method provides an enhanced thermal path through the board or to an internal plane spreading the heat. Conductivity of thermal vias can be through thicker copper plating at a relatively low cost.



Thermal Via Farm



Standard Via

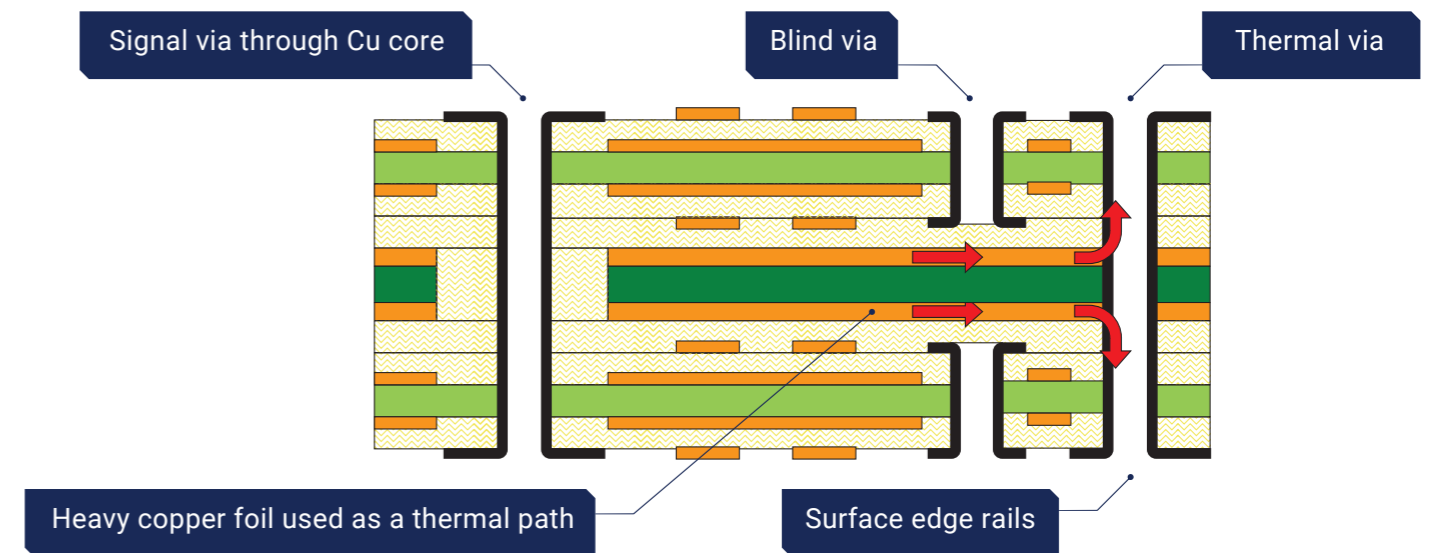


Enhanced Via

TYPES OF THERMAL MANAGEMENT SOLUTIONS

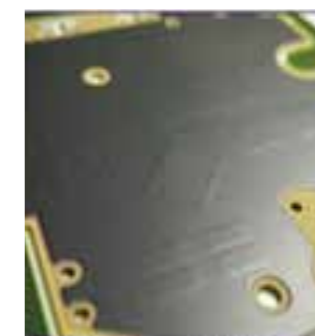
Increased Copper Density

Increasing in-plane conductivity can be achieved using thicker copper within the board; depending on the design, planes ranging from 2 to 10 oz can be integrated with thermal vias, providing an enhanced thermal path.



Screened Heat-sink Paste ("HSP")

When designs require both increased thermal conductivity as well as dielectric isolation, screened heat sink paste may be the preferred option.



HSP on base material (SIR Board)

TYPES OF THERMAL MANAGEMENT SOLUTIONS

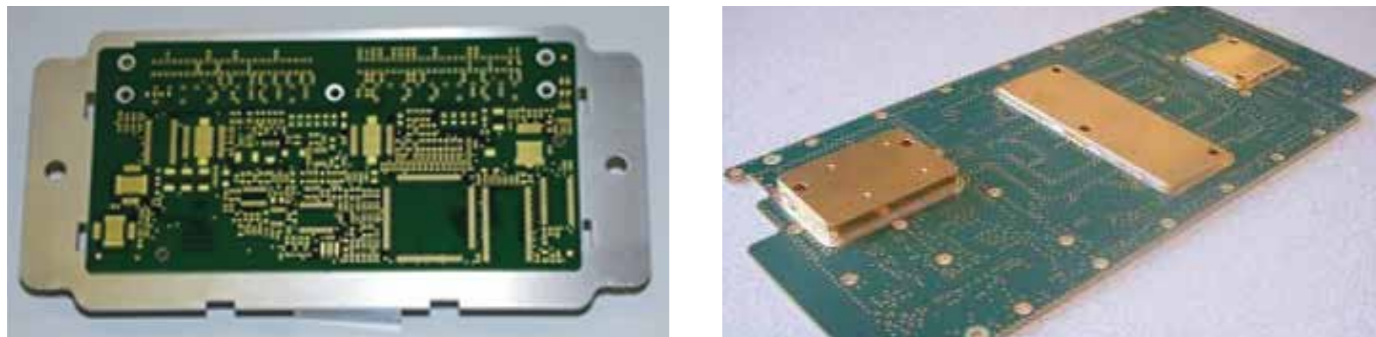
Coin Technologies

Press-fit copper coins provide low thermal resistance and are common in high-volume production using automated pic, place, and lamination equipment.



Heat-sinks and Pallets

TTM provides production viable external heat sinks and soldered pallets to enhance thermal conductivity when applications require an improved thermal path.



For more information on Thermal Management Solutions, please speak with your TTM Sales representative or contact us by:

 CorporateMarketing@ttm.com

 ttm.com/contact

TTM GLOBAL LOCATIONS



CORPORATE LOCATIONS /REGIONAL OFFICE

LOCATION	PHONE
NORTH AMERICA	
Global Headquarters (HQ)	+1.714.327.3000
TTM St. Louis (STL)	+1.314.727.2087
ASIA PACIFIC	
Commercial Sector Headquarters (CS HQ)	+852.2660.3100 +852.2272.2222
TTM Taiwan (TW)	+886.3.280.7577
TTM Japan (JP)	+81.050.5306.2122 050.5306.2123 (Japan Domestic Only)
EMEA	
TTM Germany (DE)	+49.171.285.4994
TTM India (IN)	+91.9980.047.215

COMMERCIAL FACILITIES

LOCATION	PHONE
NORTH AMERICA	
TTM Chippewa Falls (CF)	+1.715.720.5000
TTM Logan (LG)	+1.435.753.4700
TTM San Jose (SJ)	+1.408.280.0422
TTM Syracuse (SYR-W)	+1.315.233.5510
TTM Toronto (TOR)	+1.416.208.2100
ASIA PACIFIC	
TTM Dongguan (DMC)	+86.769.8622.8000
TTM Guangzhou (GZ)	+86.20.6287.8777
TTM Huiyang (HY)	+86.752.261.7111
TTM Hong Kong (OPCM)	+852.2660.3100
TTM Shanghai (SH)	+86.21.6495.4551
TTM Suzhou (SUZ)	+86.512.6274.9282
TTM Zhongshan (ZS)	+86.760.2226.9805