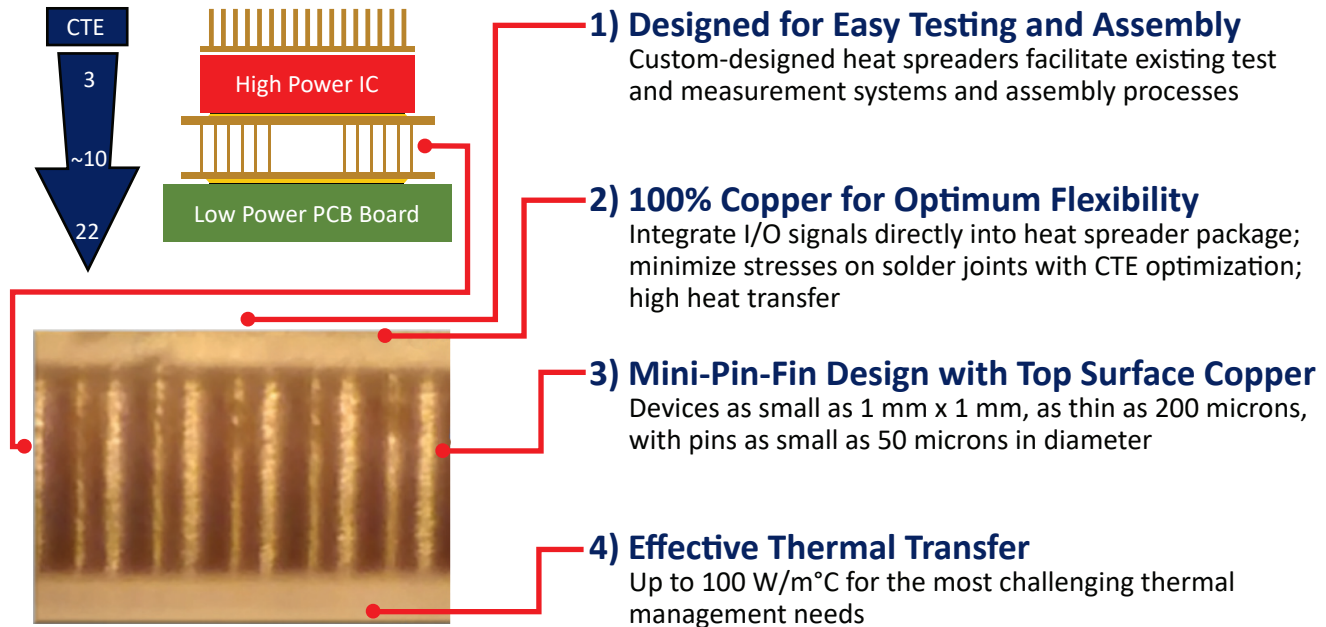


# THERMAL MANAGEMENT

## MINI-PIN-FIN HEAT SPREADERS AND MINI-PIN-FIN HEAT SINKS

### Improved Heat Dissipation and Thermal Cycling

100% copper system minimizes stress on solder joints over repeated, long term, thermal cycling.



### Improve Performance and Reduce Package Size

Heat spreaders and heat sinks from our unique mini-pin-fin manufacturing process enable designers of small electronics to build more compact packages.

Heat spreaders and heat sinks made with 100% copper can be made as small as 1 mm x 1 mm, and as thin as 200 microns, enabling small packages.

### 100% Copper Enables Better Performance

Copper has a higher thermal conductivity and conducts heat faster than aluminum. Therefore, the temperature across the heat spreader or heat sink will be more uniform. With a higher volumetric heat capacity than aluminum, it takes a larger quantity of energy to raise temperature, thus smoothing out the thermal load.

Copper heat spreaders and heat sinks better match the CTE of solder of joints, which reduces fatigue failure from repeated long-term thermal cycling.

Heat spreaders and heat sinks from 3DGS with the mini-pin-fin design leverage the advantages of copper.

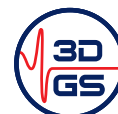
100% copper heat spreaders out-perform copper 'coin' designs, as the mini-pin-fin internal structure enables torsion, relieving stresses from thermal cycling.



1-505-916-5590



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# THERMAL MANAGEMENT

## MINI-PIN-FIN HEAT SPREADERS AND MINI-PIN-FIN HEAT SINKS

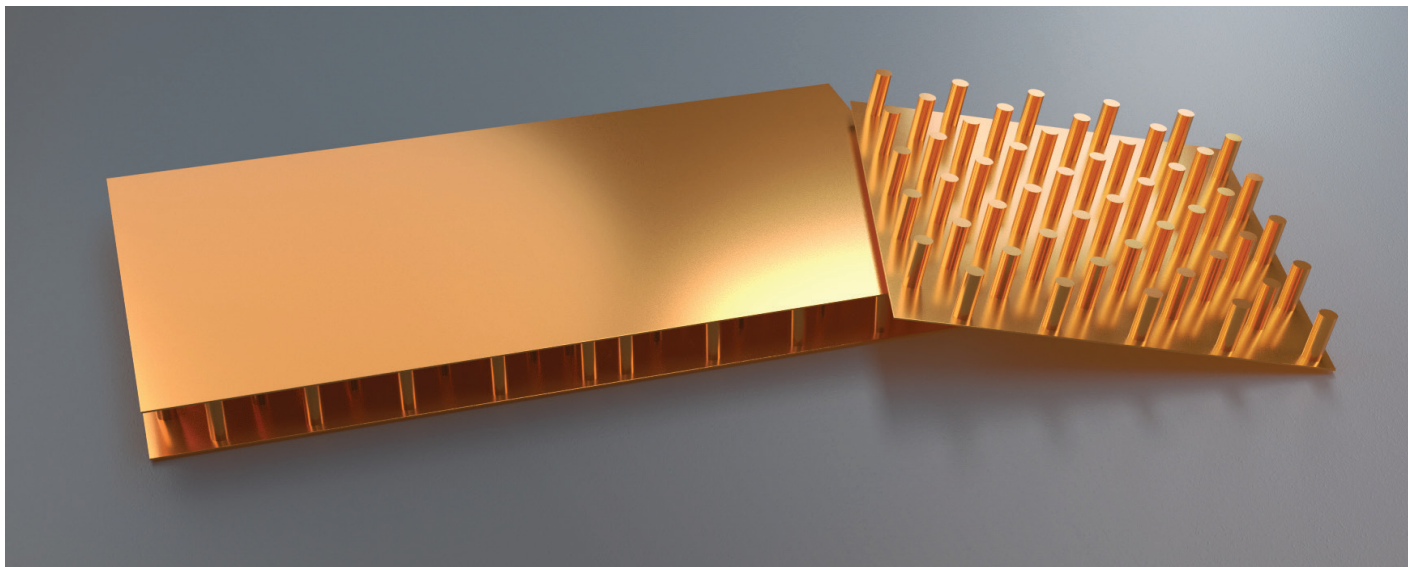
### Ultra-Small Designs for Ultra-Small Packages

50-micron mini-pin-fins enable effective thermal transfers of up to 100 W/m<sup>2</sup>C. This is far superior to the single piece copper coin solution which is limited by its inherent surface area.

Traditional production methods in the past have not been able to cost-effectively produce efficient and small heat spreaders and heat sinks.

### Custom Solutions for Improved Outcomes

Each application is unique in footprint, thermal management requirements, and additional features. Contact us directly with your specific needs.



### Design Limits

PARAMETERS	TYPICAL
Size	5 mm x 5 mm
Height	250 µm
Mini-pin-fin spacing	50 µm to 200 µm
Mini-pin-fin diameter	50 µm to 100 µm

### Applications

- RF amplifiers
  - GaN amplifiers
  - GaAs amplifiers
  - LDMOS amplifiers
- LED
- LCD
- Small electronics with heat management challenges



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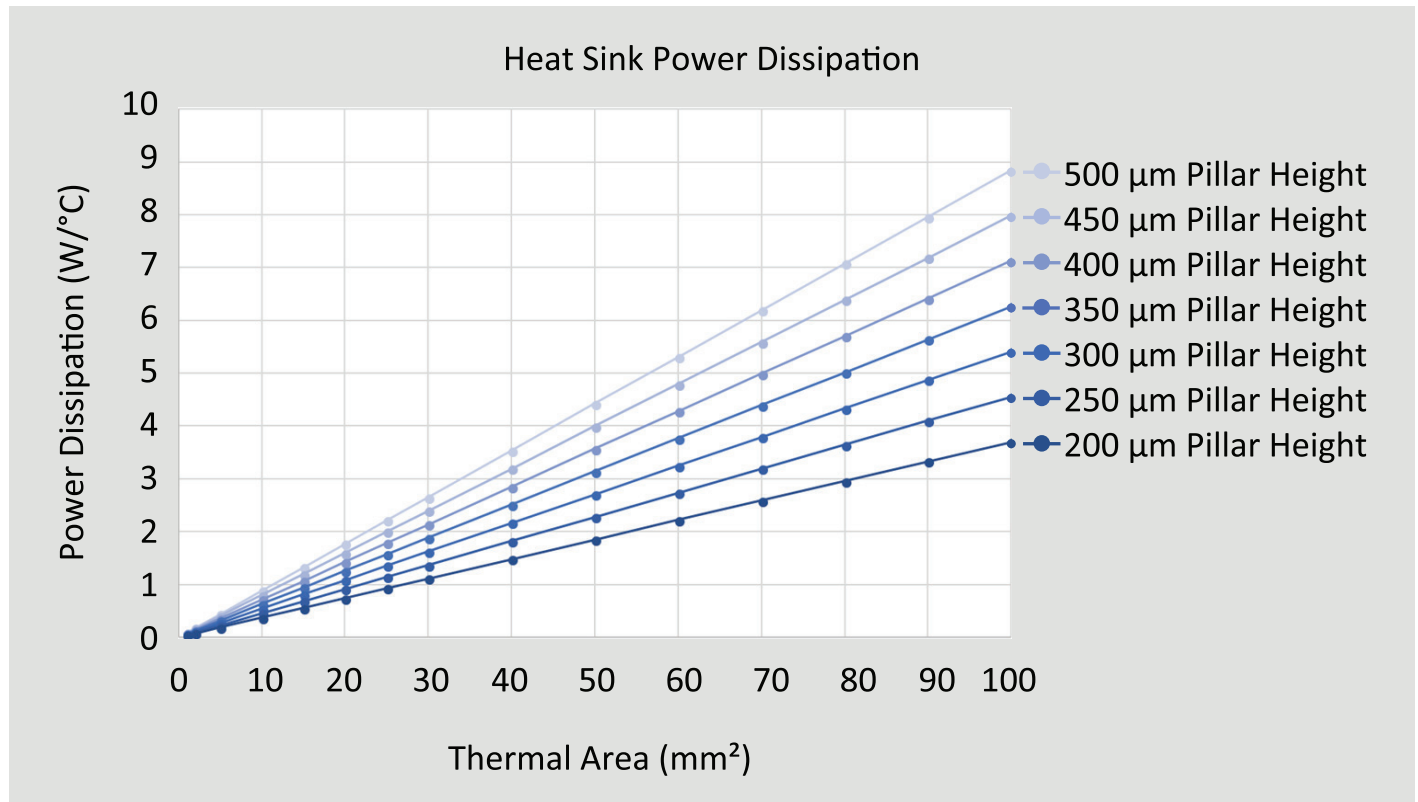


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# THERMAL MANAGEMENT

## MINI-PIN-FIN HEAT SPREADERS AND MINI-PIN-FIN HEAT SINKS



*Data represents the standard performance range and gives the maximum power dissipation for a given area assuming a pin diameter = 60 µm and pin pitch = 120 µm.*

*Pin diameter, pitch and height can all be customized (within design guidelines) to meet specific needs.*

*To calculate total watts dissipated, the W/°C value needs to be multiplied by the temperature delta between the chip and air [watts dissipated = W/°C x ΔT].*



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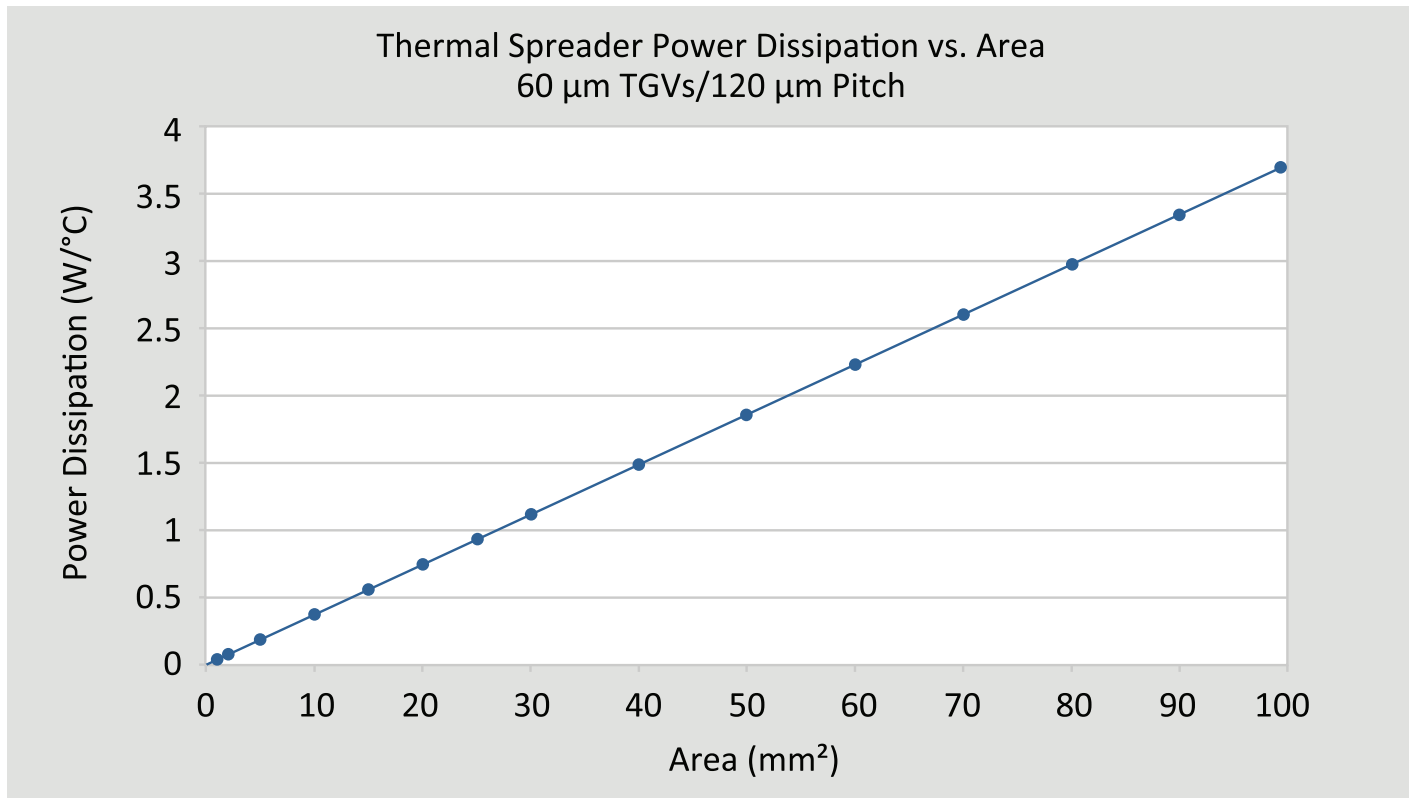
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**Enabling the GHz Generation**

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