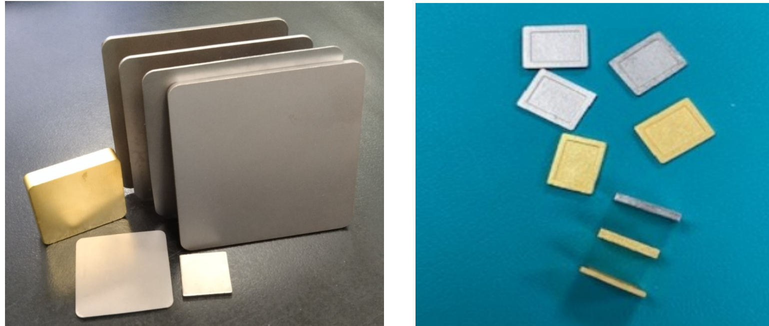
Tungsten-Copper Powder Metallurgy

Product Category	**Sintered W-Cu Heat Spreader/Thermal Lid**

Product Description

Highly-conductive heat spreader and thermal lid made of sintered W-Cu plates for power electronics and IC packaging.



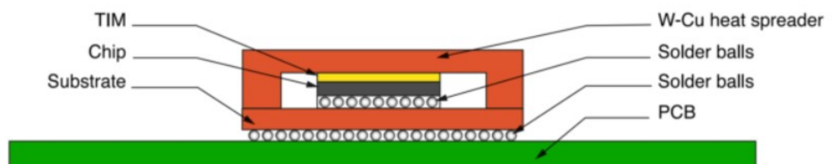
A wide range of form-factors are available and feasible per request and consultation.

Features

- Excellent thermal conductive
- Low coefficient of thermal expansion (CTE)
- Great mechanical strength for slim form factors of packages
- Various types of surface treatment available
- Built for durability

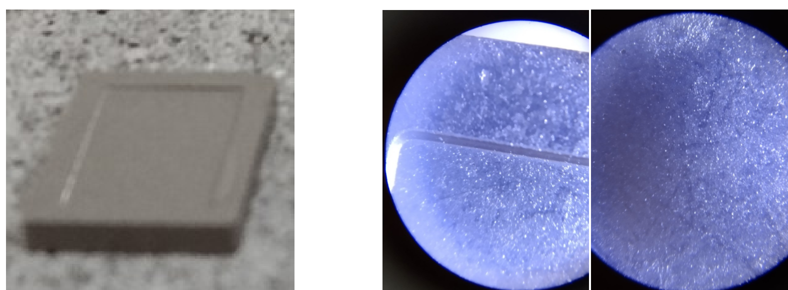
Primary Applications

The sintered tungsten-copper products are specifically developed for high-performing IC packages and power modules requiring adequate CTE matching and thermal conductivity. Applications include, but not limited to, heat spreader, cold plate, thermal lid, etc for power electronics (e.g., IGBT) and IC/optical packages (e.g., TOSA/ROSA)



Microstructure Details

Single-Step Thermal Lid (with sharp densified step)



The picture (left) illustrates a one-step W-Cu thermal lid of 0.1mm step depth (0.8mm outmost thickness and 6.3mmX5mm footprint). Photos on the right show the magnified views of the steps and edges.

Material Properties

Specs	Cu wt%	Density (g/cc)	Rel. Density	Hardness (HRB)	Ra (μm)	Electrical (IACS/expt)	Thermal (W/mK/expt)
Typical	15~25	15.0~15.4	>96%	96~105	0.5~1.0	32~38%	180~230
Special Orders	±2.5%	>15.2~15.4 controlled	>98~99%	>98~103 controlled	0.3~0.5	Per request	Per request

Standard Dimensions

List of P/Ns & Dimensions

		Footprint (mm2)				
	P/N Dimensions	5 X 5 (0505)	10 X 10 (1010)	12.7 X 12.7 (1313)	25.4 X 25.4 (2525)	50.8 X 50.8 (5050)
Thickness (mm)	0.25	PMWCu2-5050-25 5mm X 5mm X 0.25mm	PMWCu2-100100-25 10mm X 10mm X 0.25mm	PMWCu2-130130-25 12.7mm X 12.7mm X 0.25mm		
	0.50				PMWCu2-250250-50 25.4mm X 25.4mm X 0.5mm	
	1.00				PMWCu2-250250-100 25.4mm X 25.4mm X 1.0mm	PMWCu2-500500-100 50.8mm X 50.8mm X 1.0mm
	1.50					PMWCu2-500500-150 50.8mm X 50.8mm X 1.5mm

Surface Finishing Nickel/gold (ENIG) plating or electroplating (other options per request)

Background Info

Increasing demands on smaller, slimmer, and lighter electronic products have stimulated collective wisdom of all engineering disciplines in the innovation of miniaturizing and material reduction. Shrinkage of components, packages, modules, and systems inevitably poses concerns of structural integrity and thermal reliability. Commonly used metals, e.g., copper and aluminum, have too high a thermal expansion coefficient to be used directly with semiconductors and ceramics, otherwise, may lead to various modes of functionality failure.

In recent years, sintered tungsten-copper alloys have emerged as the most promising package structural materials for their low coefficient of thermal expansion (<7.8ppm) and high enough thermal conductivity (>190 W/mK). Additionally, Malico has established an innovative PM compacting methodology especially for small and delicate parts which were not considered feasible and economical by most other conventional forming means, e.g., die-casting, CNC machining, and forging.

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