

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.



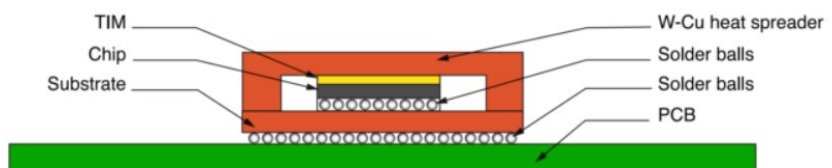
A wide range of form-factors are available and feasible per request and consultation.

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

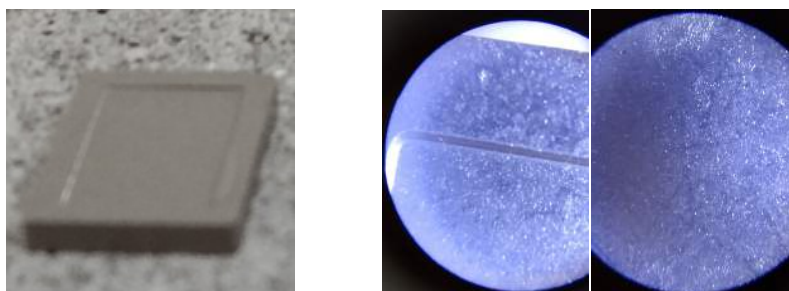
Primary Applications

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 [Ⓢ] (μ m) [Ⓢ]	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 [Ⓢ]	\pm 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 (mm ²)						
	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.

The data sheet contains, to the best of our current knowledge, true and accurate information. Values stated herein represent typical numbers for not all tests are run on each lot of material produced. All specifications are subject to change without notice. Varied conditions of use are beyond our control, the users should make their best judgment to determine the suitability of our products, and all recommendations or suggestions are presented without guarantee or responsibility on our part. This products are sold without warranty either expressed or implied, of fitness for a particular purpose or otherwise, except that this product shall be of standard quality or the extent otherwise specified in the invoice, quotation, or order acknowledgement. We disclaim any and all liabilities incurred with the use of information contained herein, or otherwise. All risks of such are assumed by the user. Furthermore, nothing contained herein shall be construed as a recommendation to use any process or to manufacture or to use any product in conflict with existing or future patents covering any product or material or its use.