

# Thermal Management Solutions

## Overview

Thermal Management of sensitive electronic components is one of the biggest challenges in the microelectronics industry. Keeping semiconductors, transistors, optoelectronics and microprocessors from overheating is vital to performance, reliability and longevity. Additionally, rapid advancements in technology and higher power requirements constantly increase the demand for heat control and thermal conductivity, especially as circuits get smaller, lighter and faster.

At Qnnect, we provide the microelectronics industry with solutions to critical thermal management challenges. As experts in thermal management materials and manufacturing, we offer solutions including: thermal spreader tabs, thermal spreader carriers, sub-mounts and base plates.

## Technical Specifications

We work closely with our customers, metallurgists and engineers to understand each unique challenge and identify the best thermal management solution based on application, geometry and tolerance requirements, as well as lead-time needs. Proper material selection is fundamental to the solution and we use technically robust advanced thermal management materials, such as Molybdenum Copper (MoCu), Copper Molybdenum Copper (CMC) and Tungsten Copper (WCu). The products are machined (EDM or milled) or stamped to precise size and dimensions and then electroplated in a state of the art facility, known for its exceptional quality. The end result is that our products not only solve the thermal management challenge, but consistently exceed customers' expectations for quality, workmanship standards (especially corners and edges), plating requirements and ease of use.

With application expertise across multiple industries, our depth of knowledge facilitates cross-pollination of ideas from the defense, aerospace, medical device, petrochemical and industrials markets. In short, our products work – every time and on time. Qnnect is confident it can take the heat so you don't have to!





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## Comparative Material Properties Chart (for reference only)

	Category	Material	Composition	CTE [ppm/K]	Thermal Conductivity [W/(m*K)]		Density [g/cm3]
					Room Temp.	100°C	
Heat Spreader	Metals	W	100%W	4.5	167	159	19.3
		Mo	100%Mo	5.1	159	138	10.2
		Cu	100%Cu	16.5	400	-	8.96
	Metals, Composites, Alloys	CuW	90%W/10%Cu	6.5	180	176	17
			80%W/20%Cu	8.3	200	197	15.65
			75%W/25%Cu	9.0	220	230	14.9
		Cu-Mo	85%Mo/15%Cu	7.0	160	156	10.01
			70%Mo/30%Cu	7.1	200	196	9.8
			65%Mo/35%Cu	9.4	210	205	9.7
			Cu/PCM/Cu	11.5	300	-	9.1
	Metal Laminates	Cu-Mo- Cu	13%Cu/74%Mo/13%Cu	5.6	208	-	9.88
			20%Cu/60%Mo/20%Cu	6.8	242	-	9.66
	Ceramics	AlN	SALN-20 White	4.5	>200	>180	3.26
	Ceramics- Metal	Al-Si	60%Si/40%Al	9.1	129	-	2.46
		Al-SiC	70%SiC/30%Al	8	140	-	2.6
		Si-SiC	18%Si-SiC	3	>200	-	3
	Copper Diamond	Cu-Dia	~65% Dia/~35%Cu	7.0-8.0	500	-	5.5
Reference Data	Semiconductor	Si		3	151	-	2.3
		GaAs		5.9	46	34	5.32
		InP		4.5	70	-	4.79
		GaN		a5.6-c3.2	130	-	6.15
		SiC		3.1	490	-	3.2
	Ceramics	Al2O3		6.7	17	17	3.6
		BeO		7.6	251	180	2.9
		Cu		17	393	393	8.93
	Metals	Al		23	238	-	2.7
		Kovar		5.3	17	17	8.36
	Organic	FR-4		x15-y17	0.2	-	-
		Polyimide		25	0.2	-	-

