



curamik®
COOLING
SOLUTIONS

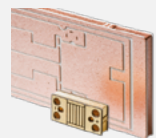
Product Information

curamik® CoolPerformance curamik® CoolPerformance Plus



High performance liquid coolers for laser diode applications

curamik® CoolPower curamik® CoolPower Plus



Liquid coolers for high power applications like CPU for data centers, direct cooled power modules, high brightness LED or solar-cell arrays (CPV)

curamik® CoolEasy



Passive cooling for laser diode applications

Rogers offers two kinds of cooling solutions – coolers for liquid or passive cooling.

For liquid cooling Rogers offers the **curamik® CoolPower** and **CoolPower Plus** as well as the **curamik® CoolPerformance** and **CoolPerformance Plus**. At the heart of these liquid coolers, there is a micro or macro channel structure made of thin copper foils that are put together into a hermetically tight block using the curamik bonding process. The specific channel structure determines the thermal resistance, pressure drop and flow rate. The coolant usually enters and exits through openings connected with o-rings or screw fittings. Liquid coolers are an ideal solution for high-power applications.

Advantages

- // Four times more efficient cooling than traditional module structures with liquid cooling
- // Lower weight
- // Smaller sizes

The **curamik® CoolEasy** is a high precise machined copper cooler for passive laser diode cooling.



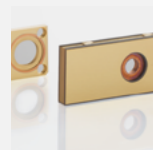
curamik® CoolPower curamik® CoolPower Plus

The **curamik® CoolPower** consists of several layers of pure copper with very fine structures. These layers create three-dimensional structures for cooling high-performance electronics. During the curamik bonding process, the different layers are hermetically combined without any additional soldering or adhesive layers.

curamik® CoolPower Plus coolers are integrated DBC coolers with ceramic substrates (Al_2O_3 or AlN). The DBC substrate-layers enable direct assembly of the components (chip on board) and provide at the same time electrical isolation from the cooling circuit.

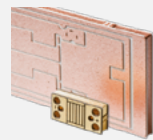
curamik® CoolPower and **curamik® CoolPower Plus** are used for the cooling of high-performance components, high brightness LED or solar-cell arrays.

curamik® CoolPerformance
curamik® CoolPerformance Plus



High performance liquid coolers for laser diode applications

curamik® CoolPower
curamik® CoolPower Plus



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For liquid cooling Rogers offers the **curamik® CoolPower** and **CoolPower Plus** as well as the **curamik® CoolPerformance** and **CoolPerformance Plus**. At the heart of these liquid coolers, there is a micro or macro channel structure made of thin copper foils that are put together into a hermetically tight block using the curamik bonding process. The specific channel structure determines the thermal resistance, pressure drop and flow rate. The coolant usually enters and exits through openings connected with o-rings or screw fittings. Liquid coolers are an ideal solution for high-power applications.

Advantages

- // Four times more efficient cooling than traditional module structures with liquid cooling
- // Lower weight
- // Smaller sizes

The **curamik® CoolEasy** is a high precise machined copper cooler for passive laser diode cooling.

The **curamik® CoolPerformance** coolers are high performance copper coolers for laser diode cooling. The coolers consist of several layers of pure copper with very fine structures. These layers create three-dimensional micro- or macro-channel structures for cooling laser diode bars up to 5 mm cavity length.

Applications for these coolers are laser diode stacks which are used in diode pumped lasers or direct diode lasers for industrial, medical and research applications.

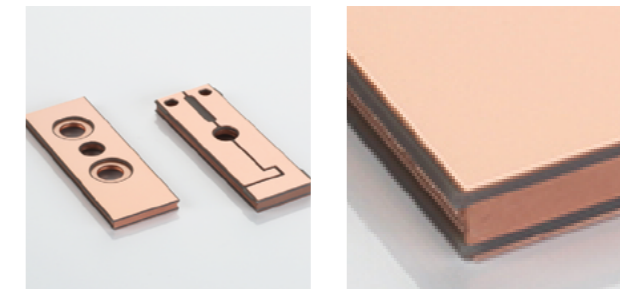


Geometric properties

Length	± 0.025 mm
Width	± 0.025 mm
Thickness	± 0.025 mm
Symmetry	± 0.06 mm
Flatness*	Front area: 0.5 µm, complete: 5 µm
Surface roughness*	R _a ≤ 0.01 µm
Edge quality	-5 µm
Layer offset @ 1.5 mm total thickness	< 0.15 mm
Etching tolerances 0.3 mm foils	± 50 µm
Holes	+ 0.05 mm / - 0.2 mm + etching tolerance / - (etching tolerance + layer offset)
Material	OFHC copper
Possible designs	Open or closed version
Recommended layer stack-up	4 x 0.3 mm + 1 x 0.4 mm (0.3 mm after machining)
Available layer thickness	(0.2 mm); 0.25 mm; 0.3 mm; 0.4 mm; 0.5 mm; 0.6 mm
O-Ring seat pocket (standard)	0.3 mm

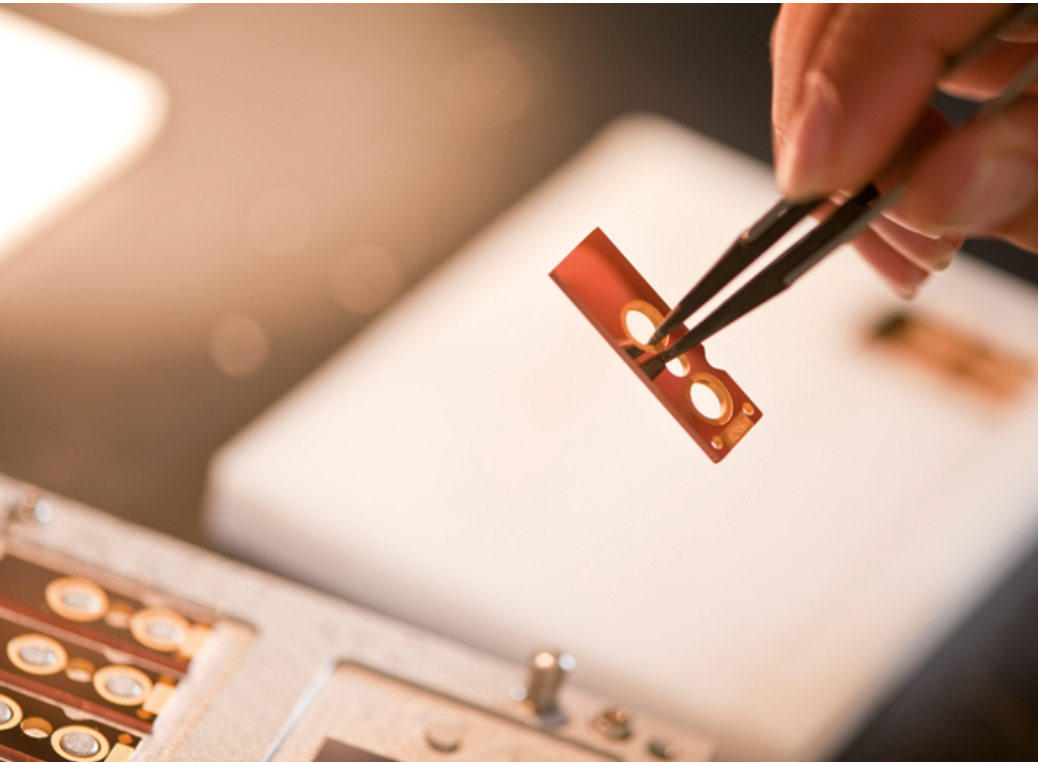
curamik® CoolPerformance Plus coolers are high performance isolated copper coolers which additionally contain an AlN isolation layer on top and bottom. The AlN isolation layers separate the water channels from the electrical contact to the laser diode and reduce the CTE value of the cooler to 5 – 6.5 ppm/K. The top and front surface of these coolers can be diamond-milled to meet the exacting needs of flatness of laser diodes.

Both types of coolers can be used with high power laser diodes in the range of 20 to more than 100 W.



Geometric properties

Length	± 0.1 mm
Width	± 0.1 mm
Thickness one-sided diamond-turned	± 0.075 mm
Thickness two-sided diamond-turned	± 0.05 mm
Top copper thickness	± 0.05 mm
Symmetry	0.15 mm
Edge quality	- 30 µm
Edge roughness	R _a ≤ 2 µm
Flatness laser diode area @ 10 x 5 mm ²	≤ 1 µm
Flatness complete @ 30 x 15 mm ²	≤ 5 µm
Surface roughness Ni/Au top side	R _a ≤ 1 µm
Surface roughness Cu top side	R _a ≤ 0.1 µm
Layer offset	≤ 0.15 mm
Etching tolerances @ 0.2 mm Cu	± 0.15 mm
Through holes	± 0.05 mm
Machined holes	on request



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