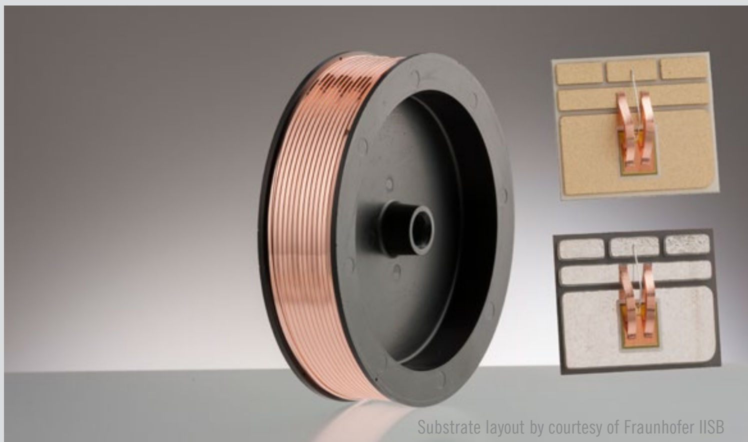
Heraeus

Electronics

PowerCu Soft Bonding Ribbons
Copper Bonding Ribbons of Extreme Softness


Substrate layout by courtesy of Fraunhofer IISB

PowerCu Soft Bonding Ribbons Benefits

- Extreme softness
- Best thermal stability
- Uniform fine grained structure
- Advanced mechanical properties for bonding technologies
- Highest Cu purity for electrical resistance
- Replaces up to 3 single Cu wires

PowerCu SOFT

PowerCu Soft bonding ribbons are Heraeus' preferred material for the next generation of power devices – enabling module operation temperatures higher than 250°C. In comparison with standard aluminum bonding ribbons, PowerCu Soft bonding ribbons comes with superior electrical conductivity, increased fusing current values and extraordinary mechanical properties. It is favored in advanced packaging modules dedicated for high operation temperature and highest robustness challenges.

Due to the mechanical property differences of aluminum and copper, higher bonding forces and special consumables are required to process the PowerCu Soft bonding ribbons. A robust frontside copper metallization is required for a stable and controlled bonding process. Heraeus Die Top System (DTS) is offering a perfect matching solution.

A special process sequence enables Heraeus to manufacture extremely soft and fine grained PowerCu Soft bonding ribbons. The excellent bondability of PowerCu Soft bonding ribbons is based on the material's low deformation resistance.

Next generation technologies based on SiC (silicon carbide) or GaN (gallium nitride) are demanding for solutions in regards of power density, operation temperature or low conductivity. Copper is the perfect match material fulfilling next generation technology requirements.

In addition cost optimization within production (UPH improvement) can be achieved by upgrading wires to ribbons. One PowerCu Soft ribbon (0.3x2mm) is able to replace up to three 500µm Cu wires.

Recommended Technical Data of PowerCu Soft Bonding Ribbons

Dimension	**mm**	0.1 x 1	0.2 x 1	0.3 x 1	0.1 x 1.5	0.2 x 1.5	0.3 x 1.5	0.1 x 2	0.2 x 2	0.3 x 2
	mils *	4 x 40	8 x 40	12 x 40	4 x 60	8 x 60	12 x 60	4 x 80	8 x 80	12 x 80
Elongation	%	> 10								
Breaking Load	**cN**	2100 - 2700	4200 - 5400	6300 - 8100	3100 - 4100	6300 - 8100	9500 - 12100	4200 - 5400	8400 - 10800	12600 - 16200

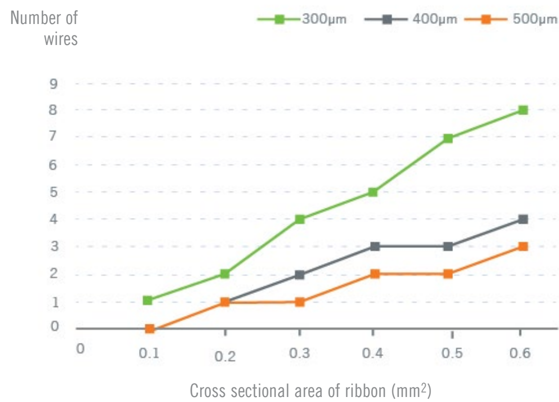
For other diameters, please contact Heraeus Electronics Product Management.
* 1mil ≈ 25µm
1cN ≈ 1g

Characteristics of PowerCu Soft Bonding Ribbons

Melting Point	1083	°C
Modulus of rigidity	48	GPa
Thermal conductivity at 20°C	399	W/(m * K)
Linear expansion coefficient (20°C – 30°C)	16.8	$10^{-6} * K^{-1}$
Electrical Resistivity at 20°C	1.8	µΩ * cm
Temperature coefficient of electrical resistance (0°C – 300°C)	3.9	$10^{-3} * K^{-1}$
Meter resistance at 0.2 x 1mm µm (20°C)	91.7	Ω/m
Density	8.933	Kg/dm^3
Other Guidelines		
Floor Life	14	days
Shelf Life Time	6	months

* Theoretical bulk material properties

Substituition Matrix : Wires By Ribbons



Fine grained and homogeneous texture of Cu ribbons

Cross section of PowerCu Soft ribbon with natural rounded and burr-free edge

The data given here is valid. We reserve the right to make technical alterations.

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