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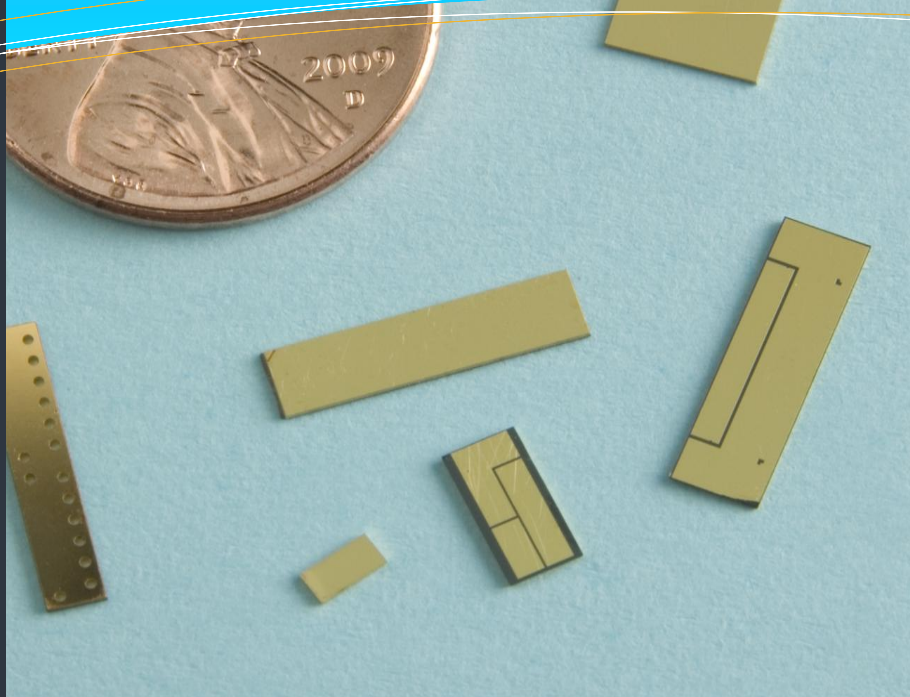
DiaTherm™ CVD Diamond Heat Spreaders



WHY DiaTherm™?

The buildup of heat can severely limit or impair the performance of electronic devices. Designed for thermal management applications, sp3's DiaTherm™ diamond heat spreaders exhibit exceptionally high thermal diffusivity and greater thermal conductivity than other material choices:

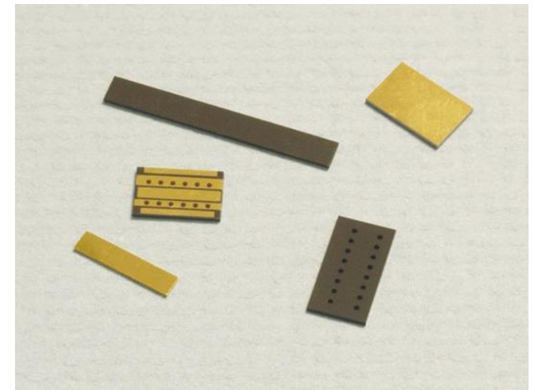
- 3X greater than copper
- 5X greater than aluminum nitride or beryllium oxide
- 5X greater than refractory metals like copper tungsten or molybdenum copper

TYPICAL APPLICATIONS

- Laser diodes
- Laser diode arrays
- LED's
- RF power devices
- Other high power electronics

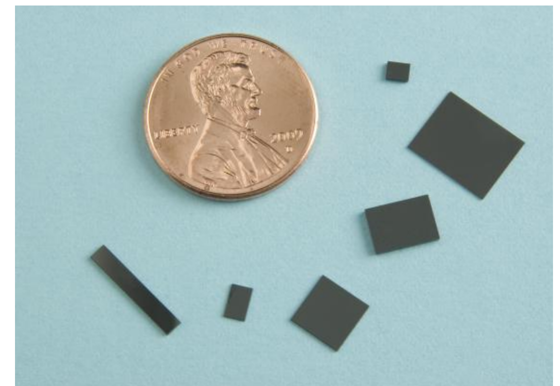
FEATURES

- Excellent thermal conductivity
- Highly polished/flat surface
- Electrically non-conductive
- Low coefficient of thermal expansion
- Diamond is completely inert
- DiaTherm™ can be easily laser machined and metallized
- Through vias easily machined



BENEFITS

- Higher device performance and/or reliability
- Uniform void-free contact
- Electrical isolation – front to back
- Low CTE = excellent match for silicon devices
- No long term chemical reaction or degradation
- Large variety of shapes and sizes possible



For more information, call 877-773-9940
www.sp3diamondtech.com

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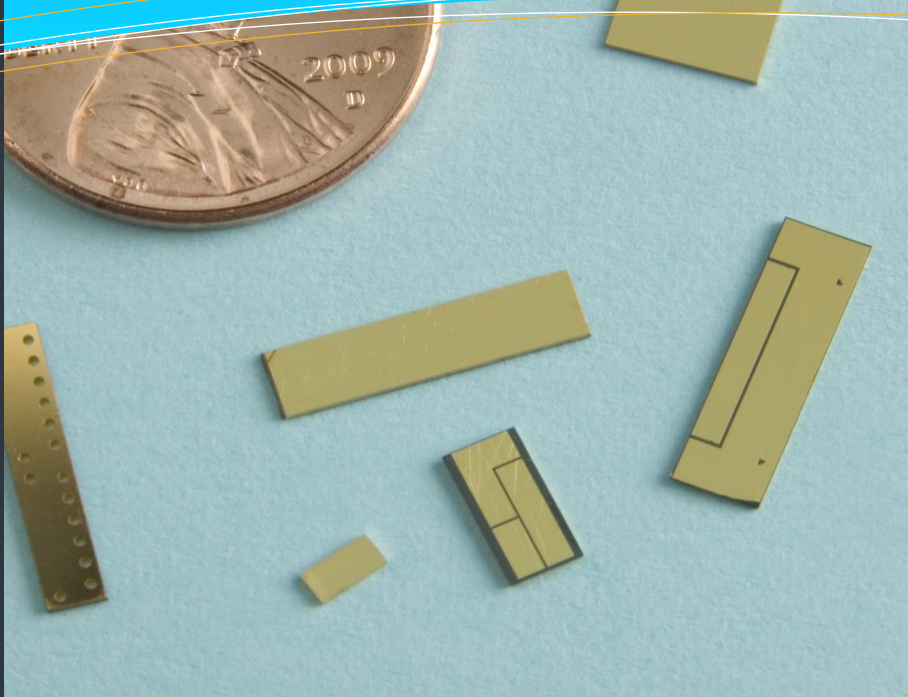


METALLIZATION CAPABILITIES

- Standard 1750A Ti/1250A Pt/5000A Au
- Adhesion layers – Ti, NiCr
- Barrier layers – Ni, Pt
- Conduction/bonding layers – Cu, Au, In, AuSn
- Multiple vias/patterns permissible

MATERIAL CHARACTERISTICS

- Thermal conductivity up to 1400 W/m°K (1000-1200 W/m°K typical)
- 100% polycrystalline diamond
- Density 3.5g.cm^{3}
- Electric resistivity 10^{13} - 10^{16} ohms/cm (10^{15} ohms/cm typical)
- Coefficient of thermal expansion – 1.5 ppm /°C

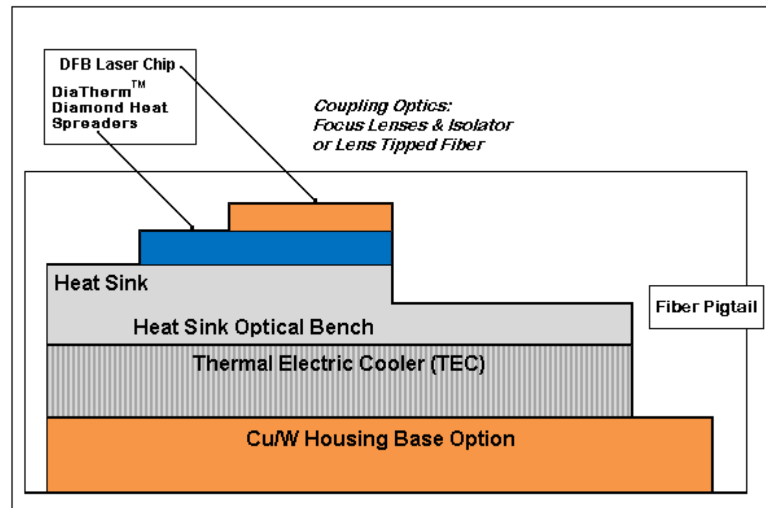
PHYSICAL CHARACTERISTICS

- Coupon size up to 25mm x 25mm
- Thickness – 300 to 500 microns

(Special sizes and thicknesses avail.)

- Size – typically 1.4 to 2X device size
- Dimensional accuracy– +/- 0.05 mm typical
- Through hole/via size – 1X material thickness minimum
- Surface finish device (A) side – <80 nm Ra
- Surface finish heat sink (B) side – <5 microns Ra
- Corner radii tolerance – < 3 microns

DiaTherm ™ is typically positioned between the electronic device and a larger heat sink. The heat generated within the electronic device is most often concentrated in a small area and temperatures in this region rise much higher. By spreading the localized heat generated by the device, DiaTherm™ can improve cooling capability of laser die in assembled devices by 30% to 100%.



Diamond Heat Spreaders in Laser Packaging

About sp3 Diamond Technologies…

Founded in 1993 and headquartered in Santa Clara, California, USA, sp3 Diamond Technologies, Inc. is a privately held company that provides diamond products for advanced thermal management, cutting tool applications, diamond coating and material services, hot filament CVD diamond deposition reactors and deposition consulting services. sp3 Diamond Technologies is a subsidiary of sp3 Inc., a full service provider of products and services relating to thin-film and freestanding diamond deposition and other diamond materials.

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