

ELECTRONICS

Diafilm™



CVD DIAMOND THE ULTIMATE SEMICONDUCTOR THERMAL MANAGEMENT SOLUTION

——— *Our customized CVD diamond enables system size reduction, improved reliability and the opportunity to design higher power systems within an existing module footprint and/or operating temperature.*

DIAMOND SINGULATED HEAT SPREADERS THE OPTIMAL THERMAL SOLUTIONS

Diafilm TM is a proven thermal management material ideal for high-power RF, optoelectronics and high-voltage power semiconductor devices. It reduces thermal gradients near a device, making heat sinks more efficient and allows higher power devices to be used without increasing the system size or reducing the operating ambient temperature.

Diafilm TM singulated heat spreaders can:

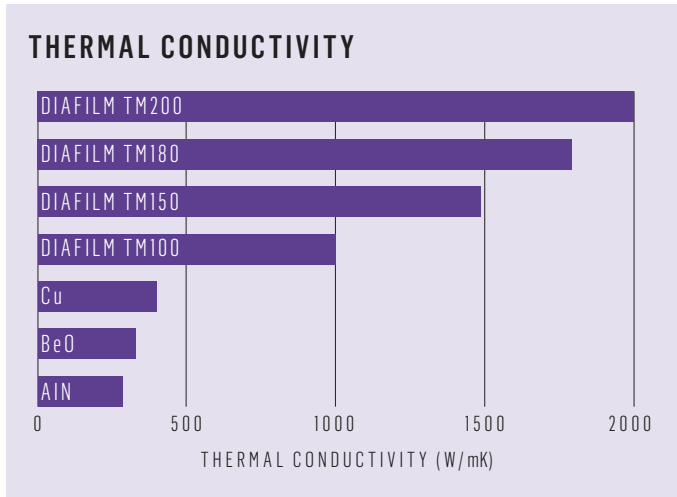
- Lower device temperatures
- Improve reliability
- Expand performance capability

| PROPERTY | DIAFILM TM100 | DIAFILM TM150 | DIAFILM TM180 | DIAFILM TM200 |
|--------------------------------------|----------------|----------------|----------------|----------------|
| THERMAL CONDUCTIVITY | | | | |
| @ 300 K (W/mK) | >1000 | >1500 | >1800 | >2000 |
| @ 425 K (W/mK) | >900 | >1400 | >1500 | >1500 |
| THERMAL EXPANSION COEFFICIENT | | | | |
| @ 300 K (ppm/K) | 1.0 ± 0.1 | 1.0 ± 0.1 | 1.0 ± 0.1 | 1.0 ± 0.1 |
| @ 1000 K (ppm/K) | 4.4 ± 0.1 | 4.4 ± 0.1 | 4.4 ± 0.1 | 4.4 ± 0.1 |
| THERMAL DIFFUSIVITY | | | | |
| @ 300 K (cm ² /s) | >5.5 | >8.3 | >10.0 | >11.1 |
| SPECIFIC HEAT CAPACITY | | | | |
| @ 300 K (J/kgK) | 520 | 520 | 520 | 520 |
| VICKERS HARDNESS | | | | |
| @ 300 K (kg/mm ²) | 8000± 1900 | 8000± 1900 | 8000± 1900 | 8000± 1900 |
| FRACTURE TOUGHNESS | | | | |
| (MPam ^{0.5}) | 5.3 – 7.0 | 5.3 – 7.0 | 5.3 – 7.0 | 5.3 – 7.0 |
| YOUNG'S MODULUS | | | | |
| (GPa) | 1000 – 1100 | 1000 – 1100 | 1000 – 1100 | 1000 – 1100 |
| Poisson's ratio | 0.1 | 0.1 | 0.1 | 0.1 |
| DENSITY | | | | |
| (10 ³ kg/m ³) | 3.52 | 3.52 | 3.52 | 3.52 |

FIND OUT MORE ABOUT DIAFILM TM

Contact your nearest Element Six technical representative: call +1 408 986 2400, email ustechnologies@e6.com or visit our website www.e6.com/thermal

Diafilm TM outperforms other commercially available heat spreader materials, with the highest known thermal conductivity of any solid material at room temperature.



ADVANTAGES OF DIAFILM TM MICROWAVE CVD DIAMOND HEAT SPREADERS

- Highest thermal conductivity of any material
- Electrically insulating
- Four levels of thermal conductivity available
- Range of sizes, thicknesses, and metalizations available
- Broad range of die bonding solutions
- Available in diameters up to 140 mm

GOING BEYOND TODAY'S TECHNICAL BOUNDARIES

Diafilm TM's superior thermal conductivity presents unprecedented reductions in junction temperature, while maintaining the same power level. This offers engineers the opportunity to create more economical and reliable systems.

MODELING AND ANALYZING PROPOSED SOLUTIONS

Our engineers and technologists use the latest computer modeling systems to model and analyze every aspect of the thermal and mechanical properties of a proposed application.

We recommend and provide the optimal size, shape and thickness, and work with customers to most effectively integrate diamond into their applications.