Optics

SINGLE CRYSTAL DIAMOND

THERMAL GRADE

Single crystal diamond is widely recognized for its exceptional material properties across a broad range of applications. Its extremely high thermal conductivity makes it well suited for advanced thermal management solutions. Diamond's wide optical transparency from the ultraviolet through the infrared, as well as its low microwave loss, enables use in demanding optical and RF applications. In single crystal form, diamond exhibits an atomically smooth surface finish, making it ideal for high-reflectivity optics and direct bonding to other materials.

FEATURES

- Single crystal CVD diamond
- Atomically, smooth, polishable surfaces
- High thermal conductivity and chemical inertness
- Wide optical transmission window (UV–IR)
- High electrical resistivity and dielectric strength

APPLICATIONS

- Thermal management
- Optical windows
- Laser optics

COHERENT

Coherent has long been a leader in the development and manufacturing of polycrystalline diamond for optical, thermal, and scientific applications. Building on this expertise, we now offer a comprehensive portfolio of single crystal diamond (SCD) solutions. Leveraging proprietary chemical vapor deposition (CVD) growth techniques, we produce multiple SCD grades engineered to meet the demands of precision-driven applications requiring exceptional purity and performance.

Coherent offers a general-purpose SCD offering, delivering the advanced thermal, mechanical, and optical properties for which diamond is valued. It has multiple uses in thermal management applications, optics, and wear applications. Its single crystal structure enables atomic-scale surface smoothness after polishing, making it well suited for applications requiring direct bonding.

In addition to our standard grade offering, Coherent offers optical grade SCD for high performance optical and microwave applications (SCD-O), electronic grade for electronic applications (SCD-E), and quantum grade for quantum applications (SCD-Q). Please contact Coherent for more information on these grades.

Single Crystal Diamond – Thermal Grade (SCD-T)	
Growth Method	Plasma Enhanced Chemical Vapor Deposition
Physical Characteristics	
Structure	Single Crystal
Crystalline Orientation	{1 0 0}
Thickness	0.25-5 mm
Surface Roughness - Sa	<0.5 nm
Material Properties	
Thermal Conductivity	≥2,200 W/mK (Thermal Grade)
Thermal Expansion Coefficient	1 (10^{-6} K^{-1})
Specific Heat (25 °C)	0.536 J/g-K

Coherent offers multiple grades of CVD diamond tailored to specific optical, thermal, electronic, quantum, and custom requirements. Contact us to discuss material selection for your application.

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