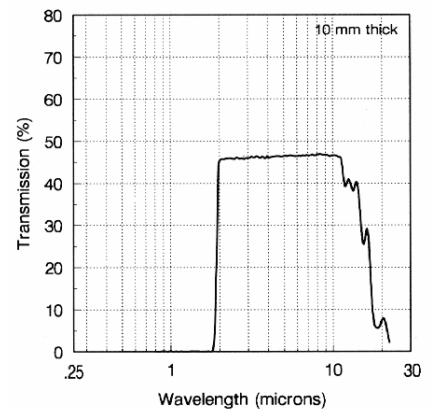


Germanium Monocrystalline & Polycrystalline Ge

OVERVIEW

Germanium is most widely used for lenses and windows in infrared systems operating in the 2-12 μm range. Due to wide transmission range and opaque in the visible, Ge is well suited for manufacturing of optical components for IR applications in lasers and optical systems. Germanium's high refractive index makes Ge ideal for low power imaging systems because of minimum surface curvature. Chromatic aberration is small, often eliminating the need for correction. Germanium absorption increases with temperature. Pronounced transmission degradation starts at about 100°C and rapid degradation between 200°C and 300°C, resulting in possible catastrophic failure of the optic. Germanium components are used with AR coatings because of high surface reflectivity of substrate.

Germanium Transmission Spectrum



PRODUCTS



Phoenix Infrared offers SMTY blanks in diameters ranging from 7 mm to 300mm and thickness from .8mm to 40mm. Rectangular blank dimensions 200mmx200mm and thickness to 100mm. Resistivity 5-40 ohm-cm.

Generated curved blanks from 15mm to 200mm in diameter are possible. Diameter tolerances are possible to 0.03mm with 0.1mm being the standard diameter tolerance. Prisms, tapers and other optical components according to customer specifications and drawings are possible.

SPECIFICATIONS

Chemical Properties	Ge
Density, (25 °C)	5.323 g/cm ³
Hardness (20 °C)	780 kg/mm ²
Flexural Strength (20 °C)	13,000 psi
Young's Modulus (20 °C)	14.9 Mpsi
Thermal Conductivity (20 °C)	0.60 W/cm-k
Thermal Expansion (20°C)	5.7 ppm/K
Specific Heat (20 °C)	0.31 J/g-K
Melting Point	936 °C
Poisson's Ratio (20 °C)	0.28

Optical Properties	Ge
Max Transmittance	
2.5 μm	46.4%
10 μm	46.9%
Absorption Coefficient	$\times 10^{-3}$ cm ⁻¹
2.5 μm	0.010
7.0 μm	0.017
9.0 μm	0.025
10.6 μm	0.035
Index of Inhomogeneity	29 ppm
10.6 μm	
Thermo-optic Coefficient (dn/dT)	$\times 10^{-5}$ K ⁻¹
10.6 μm	40.0

Wavelength μm	Refractive Index
2.06	4.10
2.58	4.06
3.42	4.03
4.36	4.02
6.24	4.01
8.66	4.00
9.72	4.00
11.04	4.00
13.02	4.00