



# E.R. PRECISION OPTICAL

"ONCE YOU LOOK THROUGH OUR OPTICS, YOUR CHOICE WILL BE CRYSTAL" CLEAR™



## MATERIAL DATA SHEET – Germanium (Ge)

### GERMANIUM

The most notable physical characteristics of germanium are its high index of refraction and its low optical dispersion. These make it especially useful for wide-angle camera lenses, microscopy, and for the core part of optical fibers. Germanium is the material of choice for systems operating in the far IR wavelength 8-12 microns. It is especially used as the front optic in thermal imaging cameras for passive thermal imaging and for hot-spot detection in military, night vision system in cars, and fire fighting applications.

ER Precision Optical offers custom crystals, grown to meet your advanced optics specifications.

### MATERIAL CHARACTERISTICS

GROWTH METHOD	Czochralski (CZ) grown material (purity) Optical grade (>99.99999%) Solar grade (>99.999%) Custom grade—please specify
CRYSTALLINE FORM	Single crystal Poly-crystal
ORIENTATION	<100>, <111>
TYPE	N-type (Antimony) P-type (Gallium)
RESISTIVITY	Customer specific (0.005—500 Ω-cm) Undoped Standard to custom optical ranges Solar applications
SIZES	Full ingots, blanks, flats, wedges up to Ø200 mm Custom machined part dimensions available

### PHYSICAL PROPERTIES

Melting Point	938°C
Density	5.33 g/cm <sup>3</sup>
Thermal expansion coefficient	5.7 x 10.6 per G rad Celsius
Young's Modulus	102.7 GPa <100> 155.6 GPa <111>
Modulus of rupture	72.4 MPa
Hardness	780 Knoop
Intrinsic resistivity	53 Ω-cm

### OPTICAL PROPERTIES

Transmission Range	2 to 12µm 46% at 25°C
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