



# E.R. PRECISION OPTICAL

“ONCE YOU LOOK THROUGH OUR OPTICS, YOUR CHOICE WILL BE CRYSTAL CLEAR”

## MATERIAL DATA SHEET – Silicon (Si)



### SILICON

Silicon is the second most abundant element in the earth’s crust. Commonly used as substrate material in optical applications for infrared reflectors and windows for IR transmission in the 1.5 - 8 μ region. It is frequently used for laser mirrors because of its high thermal conductivity and low density making it ideal for systems with weight constraints. It is also useful as a transmitter in the 20μ range. Silicon as used within the advanced semiconductor process tools requires consistent high purity materials and tight control of resistivity ranges.

ERPOC produces a range of material grades, from solar grade material to defect free ultra-high purity . We specialize in growing crystals to meet unique characteristics for advanced applications in multiple markets.

### MATERIAL CHARACTERISTICS

GROWTH METHOD	Czochralski (CZ) grown material (purity) Semiconductor grade (>99.9999999%) Optical grade (>99.99999%) Solar grade (>99.999%) Custom grade—please specify
CRYSTALLINE FORM	Single crystal Mono-crystal
ORIENTATION	<100>, <111>
TYPE	N-type (phosphorous) P-type (boron)
RESISTIVITY	Customer specific (0.005—500 Ω-cm) Undoped Standard to custom optical ranges Typical semiconductor ranges Solar applications
SIZES	Full ingots, blanks, flats, wedges up to Ø250 mm Custom machined part dimensions available

### PHYSICAL PROPERTIES

Melting Point	1420°C
Density	2.33 g/cm <sup>3</sup>
Thermal expansion coefficient	2.6 x 10.6 per G rad Celsius
Young’s Modulus	131 GPa <100> 187 GPa <111>
Modulus of rupture	9 MPa
Hardness	1150 Knoop
Intrinsic resistivity	> 10,000 Ω-cm

### OPTICAL PROPERTIES

Transmission Range	1.2μm to 10μm 48 to >100 μm
Refractive Index	3.42 at 10 μm
Reflection Loss	46% at 10 μm (2 surfaces)

