



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 20 μ 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. Our standard optical silicon has a transmission over 53% in the range of 2 - 8 microns and 50 - 100 microns.

MATERIAL CHARACTERISTICS

GROWTH METHOD

- Czochralski (CZ) grown material

PURITY

- Semiconductor applications (>99.999999%)
- Optical applications (>99.9999%)
- Solar applications (>99.99%)
- Custom application (please specify)

CRYSTALLINE FORM

- Single crystal
- Poly-crystal

ORIENTATION

- <100>
- <111>

TYPE

- P-type (boron)
- N-type (phosphorous)

RESISTIVITY

- Customer specific (0.005—500 Ω -cm)
- Undoped
- Typical semiconductor ranges
- Standard & custom optical ranges
- Solar applications

SHAPES & SIZES

- Full ingots, blanks, flats, wedges up to \varnothing 250 mm
- Custom machined part dimensions available

OPTICAL PROPERTIES

TRANSMISSION RANGE	1.2 μ m to 10 μ m 48 to >100 μ m
REFRACTIVE INDEX	3.42 at 10 μ m
REFLECTION LOSS	46% at 10 μ m (2 surfaces)

PHYSICAL PROPERTIES

MELTING POINT	1420°C
DENSITY	2.33 g/cm ³
THERMAL EXPANSION COEFFICIENT	2.6 x 10.6 per G rad Celsius
YOUNG’S MODULUS	131 GPa <100> 187 GPa <111>
MODULUS OF RUPTURE	125 MPa
HARDNESS	1150 Knoop
INTRINSIC RESISTIVITY	> 10,000 Ω -cm

