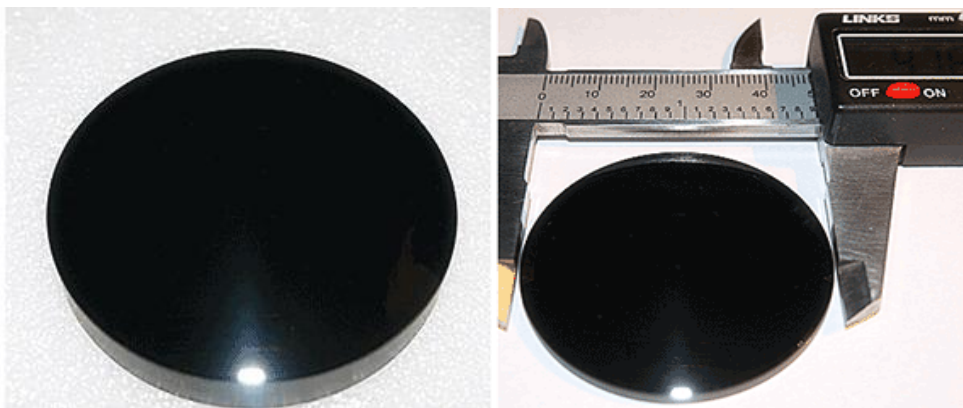


## Silicon lenses

- Transmits wavelength range 1.2-7  $\mu\text{m}$
- Ideal for weight sensitive applications
- Cheaper than germanium and ZnSe

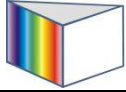
**Silicon (Si) lenses** manufactured from optical grade silicon are popular for the 1.2 - 7 $\mu\text{m}$  spectral region due to their low cost and low density. Due to its low density (half that of germanium or zinc selenide), silicon is ideal for weight sensitive applications, especially those in the MWIR thermal imaging 3 - 5 $\mu\text{m}$  region. Density is 2.329 g/cm<sup>3</sup> and Knoop Hardness is 1150, making it harder and less brittle than germanium.



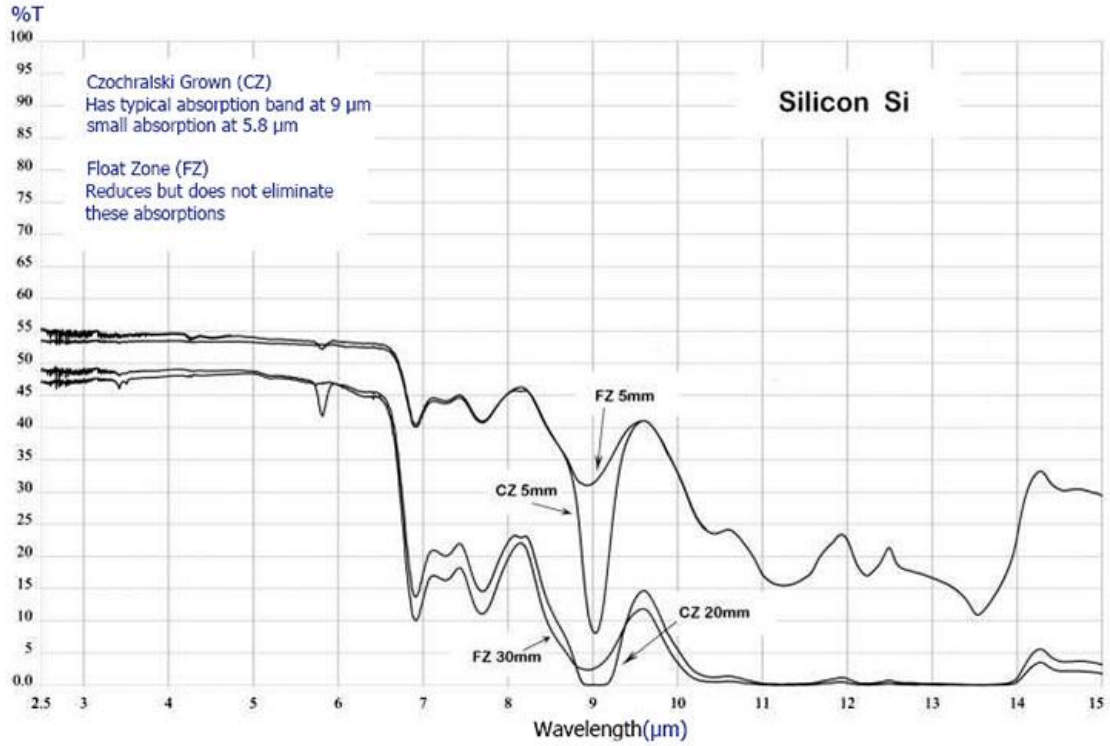
## SPECIFICATIONS

Specifications	
Materials	Silicon crystals
Diameter range	~300mm
Diameter Tolerance	+0.0/-0.2mm
Thickness Tolerance	+/-0.2mm
Surface Quality	60/40 S/D
Frings (N)	3
Irregularity (delta N)	1
Centration	3'
Chamfer	0.1-0.3mmx45 degree
Coatings	AR/AR@3-5micro DLC/AR@3-5micro

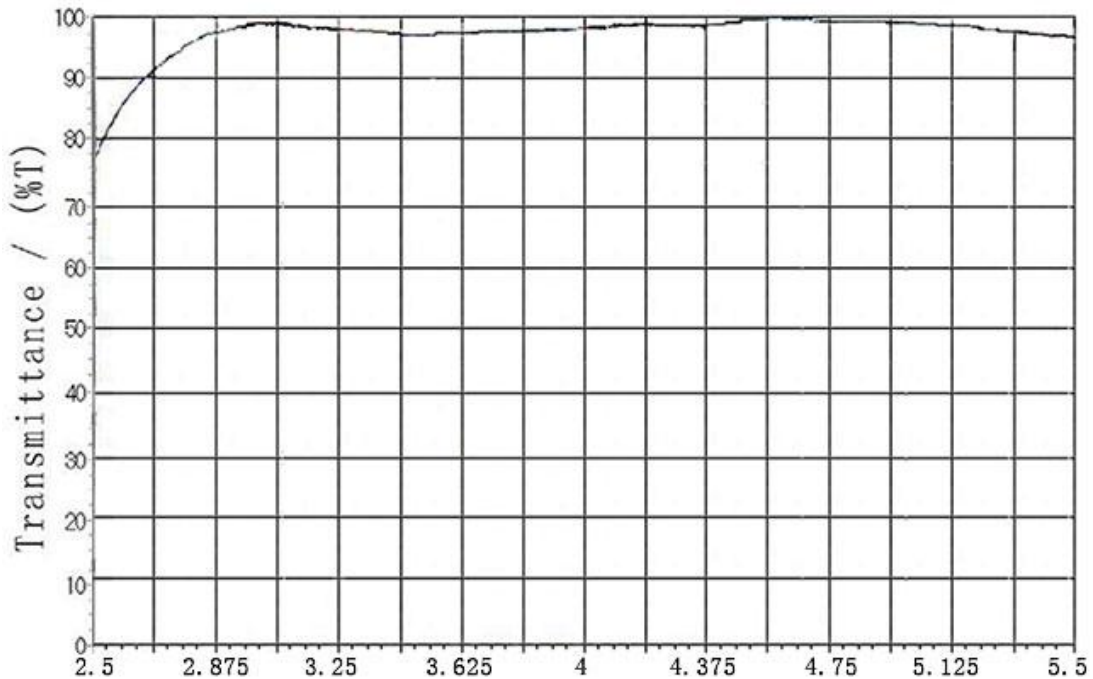
Note: the domes of other specifications is available upon customer's request.



**1. Transmission curve of the Silicon windows (no coating)**



**2. Transmission curve of the Silicon windows with AR/AR coating at 3-5μm**



## Basic Properties

Physical and optical properties	
Transmission Range	1.2 to 15 $\mu\text{m}$ (1)
Refractive Index	3.4223 @ 5 $\mu\text{m}$ (1) (2)
Reflection Loss	46.2% at 5 $\mu\text{m}$ (2 surfaces)
Absorption Coefficient	0.01 $\text{cm}^{-1}$ at 3 $\mu\text{m}$
Reststrahlen Peak	n/a
$dn/dT$	$160 \times 10^{-6} / ^\circ\text{C}$ (3)
$dn/d\mu = 0$	10.4 $\mu\text{m}$
Density	2.33 g/cc
Melting Point	1420 $^\circ\text{C}$
Thermal Conductivity	163.3 $\text{W m}^{-1} \text{K}^{-1}$ at 273 K
Thermal Expansion	$2.6 \times 10^{-6} /$ at 20 $^\circ\text{C}$
Hardness	Knoop 1150
Specific Heat Capacity	703 $\text{J Kg}^{-1} \text{K}^{-1}$
Dielectric Constant	13 at 10 GHz
Youngs Modulus (E)	131 GPa (4)
Shear Modulus (G)	79.9 GPa (4)
Bulk Modulus (K)	102 GPa
Elastic Coefficients	$C_{11}=167; C_{12}=65; C_{44}=80$ (4)
Apparent Elastic Limit	124.1MPa (18000 psi)
Poisson Ratio	0.266 (4)
Solubility	Insoluble in Water
Molecular Weight	28.09
Class/Structure	Cubic diamond, Fd3m