

Sapphire Ball Lenses and Half Ball Lenses

Sapphire and **Ruby ball** and **half-ball (hemispherical) lenses** feature a very short back focal length with the convenience of a flat surface for easy mounting. Sapphire features a high index of refraction and excellent broadband transmission characteristics. Ruby half-ball lenses are easier to see and therefore easier to handle for physical applications. The lenses are very chemically stable and are great for severe environments, high temperature applications, and applications requiring high melting points. Typical applications include fiber communication, endoscopy, microscopy, optical pick-up devices, and laser measurement systems.

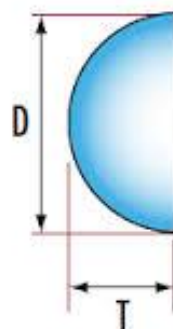
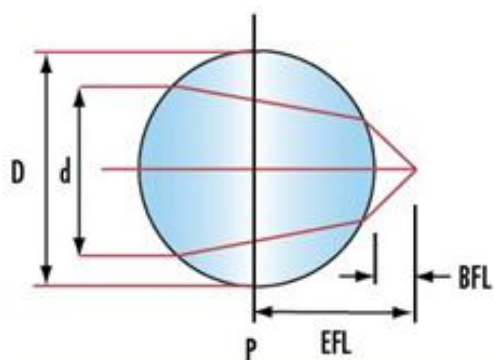


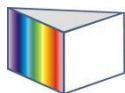
Features

- Large wavelength range: 0.15~5 μ m
- Extreme hardness for harsh environment
- Chemical and erosion resistant front surface

SPECIFICATIONS

Specifications	
Lens Type	Ball lenses, half-ball lenses
Materials	Optical grade single crystal sapphire, ruby
Diameter range	0.5mm ~100mm
Diameter tolerance	$\pm 0.02\text{mm}$
Surface roughness	$0.1\mu\text{m}$
Surface Quality	Option: 80/50,60/40, 40/20 or 20/10 S/D
Coating	According to customer's requirement





Physical and optical properties	
Transmission Range	0.17 to 5.5 μm
Refractive Index	No 1.75449; Ne 1.74663 at 1.06 μm (1)
Reflection Loss	14% at 1.06 μm
Absorption Coefficient	$0.3 \times 10^{-3} \text{ cm}^{-1}$ at 2.4 μm (2)
Reststrahlen Peak	13.5 μm
dn/dT	13.1×10^{-6} at 0.546 μm (3)
$dn/d\mu = 0$	1.5 μm
Density	3.97 g/cc
Melting Point	2040°C
Thermal Conductivity	27.21 W m ⁻¹ K ⁻¹ at 300K
Thermal Expansion	5.6 (para) & 5.0 (perp) $\times 10^{-6}/\text{K}$ *
Hardness	Knoop 2000 with 2000g indenter
Specific Heat Capacity	763 J Kg ⁻¹ K ⁻¹ at 293K (4)
Dielectric Constant	11.5 (para) 9.4 (perp) at 1MHz
Youngs Modulus (E)	335 GPa
Shear Modulus (G)	148.1 GPa
Bulk Modulus (K)	240 GPa
Elastic Coefficients	C11=496 C12=164 C13=115 C33=498 C44=148
Apparent Elastic Limit	300 MPa (45,000 psi)
Poisson Ratio	0.25
Solubility	98×10^{-6} g/100g water
Molecular Weight	101.96
Class/Structure	Trigonal (hex), R3c