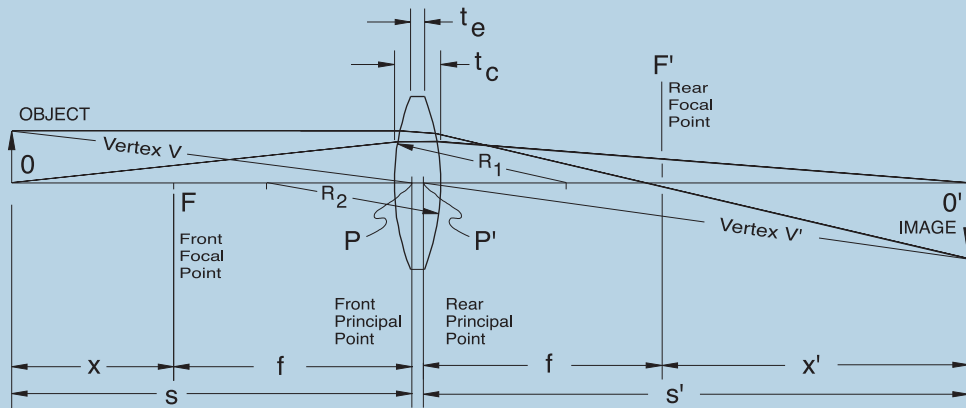


Spherical Lens Parameters



\varnothing = Lens Diameter

$M = \frac{S'}{S}$ Magnification or Conjugate Ratio

f = EFL (Effective Focal Length)

$$\frac{1}{f} = \frac{1}{S} + \frac{1}{S'}$$

Paraxial Lens Formula (assumes $\sin \theta \approx \theta$)

S = Object Distance, positive for objects to the left of the front principal point P .

S' = Image Distance, positive for images to the right of the rear principal point P'

Transmission of Various Materials

GLASS	DESCRIPTION	TRANSMISSION	
BK7	BK7 is a high-quality optical glass commonly used to make lenses intended for laboratory use. It has excellent mechanical and optical properties as well as good transmission in the visible and IR.	350nm to 2.0 μ m	<p>1mm Thick Sample Surface Reflections Included</p>
UV Fused Silica	UV fused silica is an excellent material for the transmission of UV light. It is durable and has good mechanical properties $T_{\text{external}} \geq 80\%/cm @ 185nm$ $T_{\text{internal}} \geq 88\%/cm @ 185nm$	185nm to 2.1 μ m	<p>1mm Thick Sample Surface Reflections Included</p>
CaF ₂	Calcium fluoride provides great transmission from the UV to the IR. Synthetic CaF ₂ is used to improve deep UV transmission and to increase the damage threshold.	180nm to 8.0 μ m	<p>1mm Thick Sample Surface Reflections Included</p>
MgF ₂	Magnesium fluoride, an extremely rugged and durable material, is transparent over an extensive range of wavelengths from the UV to the IR.	200nm to 6.0 μ m	<p>1mm Thick Sample Surface Reflections Included</p>

GLASS	DESCRIPTION	TRANSMISSION	
SF11	This glass provides excellent chemical resistance and has a high refractive index, which allows for the same amount of refraction with less curvature. It is useful for constructing optics that would be extremely difficult to make from BK7.	420nm to 2.3µm	<p>1mm Thick Sample Surface Reflections Included</p>
Ge	The transmission characteristics of germanium in the IR region of the spectrum make it an ideal choice for imaging 2.0 - 16µm light. Ge plano-convex lenses are particularly well suited for more biomedical and military imaging applications.	2.0µm to 16µm	<p>1mm Thick Sample Surface Reflections Included</p>
ZnSe	With a transmission range from 600nm - 600nm to 16µm, zinc selenide plano-convex lenses are ideal for IR applications. Due to the low absorption coefficient, these lenses are also particularly well suited for high-power CO ₂ laser applications. In contrast to Ge and Si, which also transmit in this spectral range, ZnSe transmits some visible light, thereby allowing for visual alignment of the optic.	600nm to 16µm	<p>1mm Thick Sample Surface Reflections Included</p>
Si	Silicon plano-convex lenses are an ideal choice for applications from 1.2 - 8µm and are particularly well suited for imaging, biomedical, and military applications.	1200nm to 8.0 µm	<p>1mm Thick Sample Surface Reflections Included</p>

- Optical Systems
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Spherical Singlet Anti-Reflection Coatings

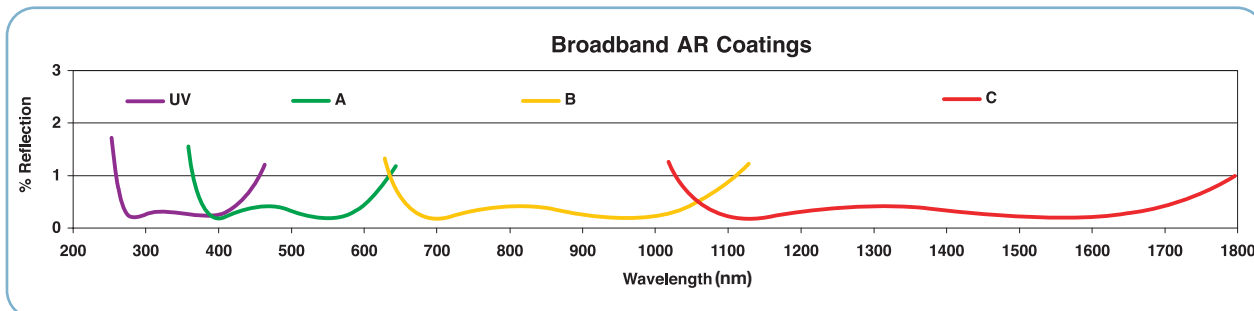
Most of our standard optics are available with high-performance, multilayer AR coatings, which minimize surface reflections within the specified wavelength ranges. These coatings are designed for angles of incidence between 0° and 30° (0.5 NA). For optics intended to be used at large

angles, consider using a custom coating optimized at a 45° of incidence; these coatings are effective from 25° to 52°. The plot shown below indicates the performance of the standard coatings in this family as a function of wavelength for a single surface. Broadband coatings have a typical absorption of 0.25% that is not shown in the reflectivity plots.

- R < 0.5% Average Over Band at 0° Incidence
- Less Angular Sensitivity within Angular Range
- Frequently Run Coatings are Listed Below

Normal Incidence Broadband Multilayer Anti-Reflective Coating

COATING CODE	WAVELENGTH RANGE	DESIGN ANGLE OF INCIDENCE	USEFUL ANGLE OF INCIDENCE
-UV	290-370nm	0°	0 to 30°
-A	350-650nm	0°	0 to 30°
-B	650-1050nm	0°	0 to 30°
-C	1050-1620nm	0°	0 to 30°

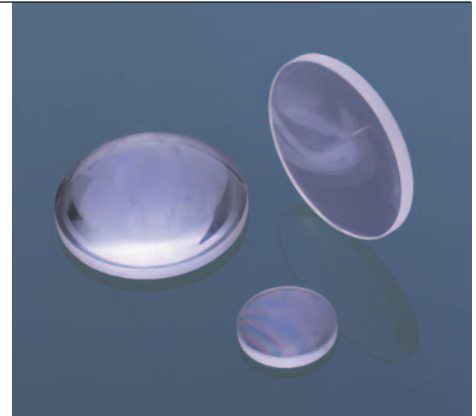


Optics

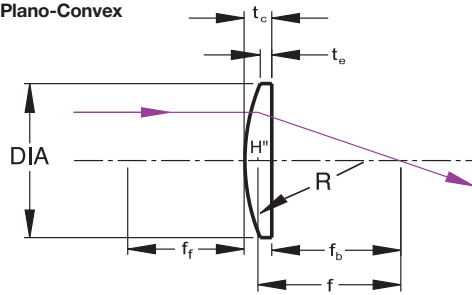
BK7: Plano-Convex Lenses – Page 1 of 2

Specifications

- Material: BK7
- Wavelength Range: 350nm to 2.0 μ m
- Design Wavelength: 633nm (n = 1.515)
- Dia. Tolerance: +0.00/-0.10mm
- Focal Length Tolerance: $\pm 1\%$
- Scratch-Dig: 40-20
- Centration: ≤ 3 arcmin
- Clear Aperture: $> 90\%$



Plano-Convex



**AR
Coating
Plot on
Page 699**

Plano-Convex optics are best used where one conjugate point (object distance S or image distance S') is more than five times the other. The performance of this lens shape is near best-form for either focusing collimated light or for collimating a point source.

Standard Broadband AR Coatings

To order the lens with a standard broadband AR Coating, add the coating code to the Item#, and then add the coating cost to the lens price.

COATING	WAVELENGTH	\$	£	€	RMB
-A	350-650nm	\$ 9.20	£ 5.80	€ 8,60	¥ 87.90
-B	650-1050nm	\$ 9.20	£ 5.80	€ 8,60	¥ 87.90
-C	1050-1620nm	\$ 12.20	£ 7.70	€ 11,30	¥ 116.50

Example: LA1116 Coated with a 350-650nm Broadband AR Coating is LA1116-A and the cost is \$18.00 + \$9.20 = \$27.20.



BK7 Plano-Convex Lenses: Diameter < 25.4mm (1")

ITEM #	DIA (mm)	f (mm)	PRICE UNCOATED (For Coated Lens Add Suffix)				R (mm)	t _c (mm)	t _e ' (mm)	f _b (mm)	SUGGESTED MOUNT ²
			\$	£	€	RMB					
LA1116	6.0	10.0	\$ 18.00	£ 11.30	€ 16,70	¥ 171.90	5.2	2.5	1.5	8.4	LMRA6 & LMR05
LA1470	6.0	12.0	\$ 16.75	£ 10.60	€ 15,60	¥ 160.00	6.2	2.3	1.5	10.5	
LA1222	6.0	15.0	\$ 16.75	£ 10.60	€ 15,60	¥ 160.00	7.7	2.1	1.5	13.6	
LA1700	6.0	30.0	\$ 16.50	£ 10.40	€ 15,30	¥ 157.60	15.5	1.8	1.5	28.8	
LA1576	9.0	12.0	\$ 18.65	£ 11.70	€ 17,30	¥ 178.10	6.2	3.0	1.5	9.7	LMRA9 & LMR05
LA1472	9.0	20.0	\$ 16.75	£ 10.60	€ 15,60	¥ 160.00	10.3	2.5	1.5	18.3	
LA1540	12.7	15.0	\$ 18.65	£ 11.70	€ 17,30	¥ 178.10	7.7	5.1	1.8	11.6	LMR05
LA1074	12.7	20.0	\$ 18.40	£ 11.60	€ 17,10	¥ 175.70	10.3	4.0	1.8	17.4	
LA1560	12.7	25.0	\$ 17.05	£ 10.70	€ 15,90	¥ 162.80	12.9	3.5	1.8	22.7	
LA1289	12.7	30.0	\$ 16.75	£ 10.60	€ 15,60	¥ 160.00	15.5	3.2	1.8	27.9	
LA1304	12.7	40.0	\$ 16.40	£ 10.30	€ 15,30	¥ 156.60	20.6	2.8	1.8	38.1	
LA1213	12.7	50.0	\$ 16.30	£ 10.30	€ 15,20	¥ 155.70	25.8	2.6	1.8	48.3	
LA1207	12.7	100.0	\$ 16.30	£ 10.30	€ 15,20	¥ 155.70	51.5	2.2	1.8	98.6	
LA1859	18.0	20.0	\$ 19.60	£ 12.30	€ 18,20	¥ 187.20	10.3	7.1	1.8	15.3	LH1
LA1270	18.0	25.0	\$ 18.65	£ 11.70	€ 17,30	¥ 178.10	12.9	5.5	1.8	21.4	
LA1085	18.0	30.0	\$ 18.20	£ 11.50	€ 16,90	¥ 173.80	15.5	4.7	1.8	26.9	
LA1119	18.0	50.0	\$ 18.20	£ 11.50	€ 16,90	¥ 173.80	25.8	3.4	1.8	47.7	

1) Edge thickness given before 0.20mm at 45° typical chamfer.

2) See the Lens Mount Section, Starting on Page 153.



Ø1" BK7 Plano-Convex Lens Kits See Page 713

ITEM #	\$	£	€	RMB
LSB01	\$ 348.00	£ 219.20	€ 323,60	¥ 3,323.40
LSB01-A	\$ 451.00	£ 284.10	€ 419,40	¥ 4,307.10
LSB01-B	\$ 451.00	£ 284.10	€ 419,40	¥ 4,307.10
LSB01-C	\$ 485.00	£ 305.60	€ 451,10	¥ 4,631.80

BK7: Plano-Convex Lenses – Page 2 of 2



- Optical Systems
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- Multi-Element Lenses
- Cylindrical Lenses
- Aspheric Lenses
- Mirrors
- Diffusers & Lens Arrays
- Windows
- Prisms
- Gratings
- Polarization Optics
- Beamsplitters
- Filters & Attenuators
- Gas Cells

BK7 Plano-Convex Lenses: Diameter = 25.4mm (1")

ITEM #	DIA (mm)	f (mm)	PRICE UNCOATED (For Coated Lens Add Suffix)				R (mm)	t _c (mm)	t _e ¹ (mm)	f _b (mm)	SUGGESTED MOUNT ²
			\$	£	€	RMB					
LA1951	25.4	25.4	\$ 21.50	£ 13.50	€ 20.00	¥ 205.30	13.1	11.7	1.8	17.7	LMR1
LA1805	25.4	30.0	\$ 20.95	£ 13.20	€ 19.50	¥ 200.10	15.5	8.6	2.0	24.3	
LA1027	25.4	35.0	\$ 20.40	£ 12.90	€ 19.00	¥ 194.80	18.0	7.2	2.0	30.2	
LA1422	25.4	40.0	\$ 20.10	£ 12.70	€ 18.70	¥ 192.00	20.6	6.4	2.0	35.8	
LA1131	25.4	50.0	\$ 19.55	£ 12.30	€ 18.20	¥ 186.70	25.8	5.3	2.0	46.5	
LA1134	25.4	60.0	\$ 19.35	£ 12.20	€ 18.00	¥ 184.80	30.9	4.7	2.0	56.9	
LA1608	25.4	75.0	\$ 19.15	£ 12.10	€ 17.80	¥ 182.90	38.6	4.1	2.0	72.3	
LA1509	25.4	100.0	\$ 18.50	£ 11.70	€ 17.20	¥ 176.70	51.5	3.6	2.0	97.6	
LA1986	25.4	125.0	\$ 18.50	£ 11.70	€ 17.20	¥ 176.70	64.4	3.3	2.0	122.9	
LA1433	25.4	150.0	\$ 18.00	£ 11.30	€ 16.70	¥ 171.90	77.3	3.1	2.0	148.0	
LA1229	25.4	175.0	\$ 17.90	£ 11.30	€ 16.60	¥ 170.90	90.1	2.9	2.0	173.1	
LA1708	25.4	200.0	\$ 17.80	£ 11.20	€ 16.60	¥ 170.00	103.0	2.8	2.0	198.2	
LA1461	25.4	250.0	\$ 17.60	£ 11.10	€ 16.40	¥ 168.10	128.8	2.6	2.0	248.3	
LA1484	25.4	300.0	\$ 17.55	£ 11.10	€ 16.30	¥ 167.60	154.5	2.5	2.0	298.3	
LA1172	25.4	400.0	\$ 17.55	£ 11.10	€ 16.30	¥ 167.60	206.0	2.4	2.0	398.4	
LA1908	25.4	500.0	\$ 17.55	£ 11.10	€ 16.30	¥ 167.60	257.6	2.3	2.0	498.5	
LA1978	25.4	750.0	\$ 17.55	£ 11.10	€ 16.30	¥ 167.60	386.3	2.2	2.0	748.5	
LA1464	25.4	1000.0	\$ 17.25	£ 10.90	€ 16.00	¥ 164.70	515.1	2.2	2.0	998.6	

1) Edge thickness given before 0.20mm at 45° typical chamfer.
 2) See the Lens Mount Section, Starting on Page 153.



BK7 Plano-Convex Lenses: Diameter = 30mm

ITEM #	DIA (mm)	f (mm)	PRICE UNCOATED (For Coated Lens Add Suffix)				R (mm)	t _c (mm)	t _e ¹ (mm)	f _b (mm)	SUGGESTED MOUNT ²
			\$	£	€	RMB					
LA1274	30.0	40.0	\$ 25.30	£ 15.90	€ 23.50	¥ 241.60	20.6	9.0	2.5	34.1	LMR30
LA1102	30.0	50.0	\$ 22.00	£ 13.90	€ 20.50	¥ 210.10	25.8	7.3	2.5	45.2	
LA1765	30.0	75.0	\$ 22.00	£ 13.90	€ 20.50	¥ 210.10	38.6	5.5	2.5	71.3	
LA1031	30.0	100.0	\$ 21.80	£ 13.70	€ 20.30	¥ 208.20	51.5	4.7	2.5	96.9	
LA1911	30.0	120.0	\$ 21.80	£ 13.70	€ 20.30	¥ 208.20	61.8	4.3	2.5	117.1	

1) Edge thickness given before 0.20mm at 45° typical chamfer.
 2) See the Lens Mount Section, Starting on Page 153.



BK7 Plano-Convex Lenses: Diameter = 50.8mm (2")

ITEM #	DIA (mm)	f (mm)	PRICE UNCOATED (For Coated Lens Add Suffix)				R (mm)	t _c (mm)	t _e ¹ (mm)	f _b (mm)	SUGGESTED MOUNT ²
			\$	£	€	RMB					
LA1401	50.8	60.0	\$ 31.50	£ 19.80	€ 29.30	¥ 300.80	30.9	16.3	3.0	49.2	LMR2
LA1145	50.8	75.0	\$ 29.10	£ 18.30	€ 27.10	¥ 277.90	38.6	12.5	3.0	66.7	
LA1050	50.8	100.0	\$ 25.80	£ 16.30	€ 24.00	¥ 246.40	51.5	9.7	3.0	93.6	
LA1384	50.8	125.0	\$ 25.70	£ 16.20	€ 23.90	¥ 245.40	64.4	8.2	3.0	119.6	
LA1417	50.8	150.0	\$ 25.30	£ 15.90	€ 23.50	¥ 241.60	77.3	7.3	3.0	145.2	
LA1399	50.8	175.0	\$ 25.30	£ 15.90	€ 23.50	¥ 241.60	90.1	6.7	3.0	170.6	
LA1979	50.8	200.0	\$ 25.30	£ 15.90	€ 23.50	¥ 241.60	103.0	6.2	3.0	195.9	
LA1301	50.8	250.0	\$ 25.15	£ 15.80	€ 23.40	¥ 240.20	128.8	5.5	3.0	246.4	
LA1256	50.8	300.0	\$ 26.85	£ 16.90	€ 25.00	¥ 256.40	154.5	5.1	3.0	296.6	
LA1725	50.8	400.0	\$ 27.05	£ 17.00	€ 25.20	¥ 258.30	206.0	4.6	3.0	397.0	
LA1380	50.8	500.0	\$ 27.05	£ 17.00	€ 25.20	¥ 258.30	257.3	4.3	3.0	497.2	
LA1727	50.8	750.0	\$ 27.05	£ 17.00	€ 25.20	¥ 258.30	386.3	3.8	3.0	747.5	
LA1779	50.8	1000.0	\$ 27.05	£ 17.00	€ 25.20	¥ 258.30	515.1	3.6	3.0	997.6	

1) Edge thickness given before 0.20mm at 45° typical chamfer.
 2) See the Lens Mount Section, Starting on Page 153.



BK7 Plano-Convex Lenses: Diameter = 75mm

ITEM #	DIA (mm)	f (mm)	PRICE UNCOATED (For Coated Lens Add Suffix)				R (mm)	t _c (mm)	t _e ¹ (mm)	f _b (mm)	SUGGESTED MOUNT ²
			\$	£	€	RMB					
LA1740	75.0	85.0	\$ 38.15	£ 24.00	€ 35.50	¥ 364.30	43.8	24.2	3.0	69.0	LMR75
LA1238	75.0	100.0	\$ 38.15	£ 24.00	€ 35.50	¥ 364.30	51.5	19.2	3.0	87.3	
LA1002	75.0	150.0	\$ 36.55	£ 23.00	€ 34.00	¥ 349.10	77.3	12.7	3.0	141.6	
LA1353	75.0	200.0	\$ 34.25	£ 21.60	€ 31.90	¥ 327.10	103.0	10.1	3.0	193.4	

1) Edge thickness given before 0.20mm at 45° typical chamfer. 2) See the Lens Mount Section, Starting on Page 153

AR Coating Plot on Page 699