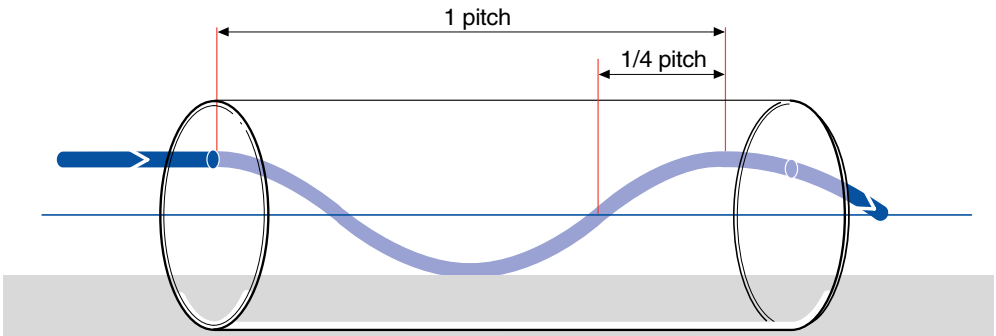
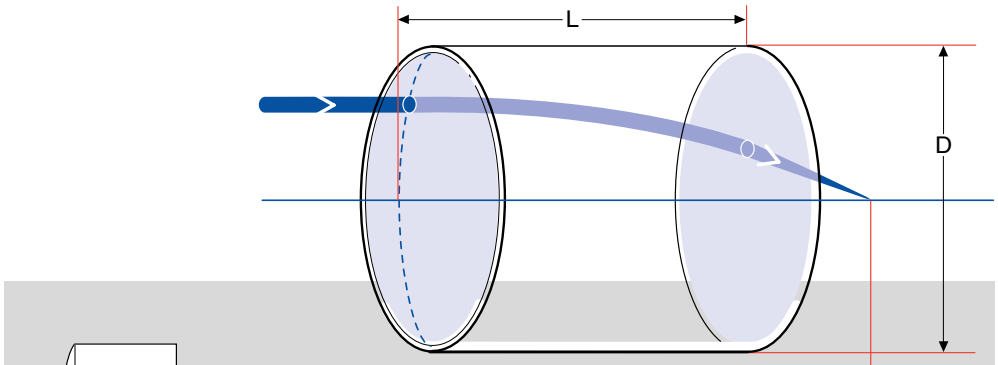
Gradient Index Microlenses

- Cylindrical shape is easy to mount, easy to align
- Available with both plano and convex end profiles
- Available for popular visible and IR laser wavelengths
- Perfect solution for optical data transmission applications
- Also available with the focal plane falling outside the lens for non-contact use

Optical glass with a refractive index gradient provides a very efficient and simple way to produce high quality imaging lenses. The material used in these microlenses is Selfoc®. This material has a radial index gradient which causes focusing to occur within the material. The index variation is defined by and is normally specified by the constant √ A. The simplest form of gradient index lens is a simple cylinder of Selfoc®. Collimated light incident on one end of the lens will be focused as it travels along the length of the cylinder. These microlenses are particularly useful for fiber and diode coupling since they can be mounted in close proximity to the source. They are ideal for use in optical data transmission. We offer gradient index microlenses with plano end faces and also in a convex configuration for greater imaging power. The convex lenses have a spherical radius on one end only. Normally these lenses are a quarter pitch so that they focus a collimated input at the remote face of the lens. However, we also offer lenses having slightly less than 1/4 pitch so that they focus just outside the lens. This is often more convenient since contact with the source or detector may be physically impossible. Two different numerical apertures are offered, 0.46 and 0.6. These lenses are wavelength specific. They are supplied for the wavelengths 633, 830, 1300 and 1560 nm and are Anti-Reflection coated for these wavelengths. They will work at other wavelengths but their focusing characteristics will vary from the published figures and the coatings will not be optimized.



LIGHT PATH THROUGH GRADIENT INDEX MATERIAL



GRADIENT INDEX CONVEX MICROLENS

Specifications & Tolerances

Diameter: ±0.02mm
Length: +0, -0.04mm
Parallelism: ≤10arcmin
Index gradient: ±0.75%
Clear aperture: 70% of diameter
Material: Doped borosilicate glass
Coating: NMAR V-coat

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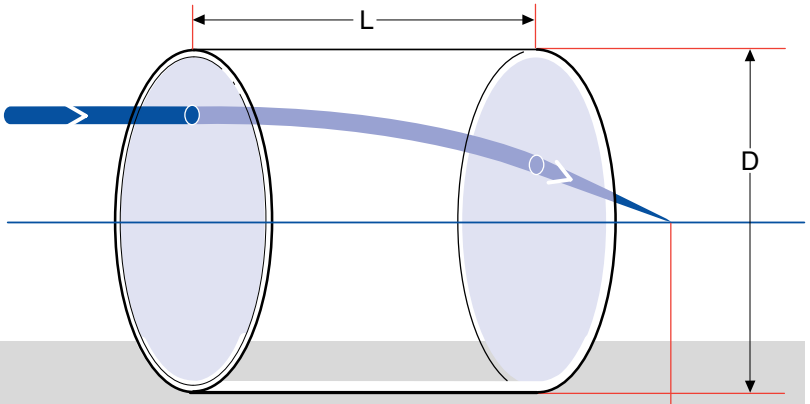
Gradient Index Convex Microlenses

Wavelength Range (nm)	N.A.	Diameter, D (inches)	(mm)	Length, L (mm)	Pitch	Refractive Index (axial)	Index Constant $\sqrt{A}$ (mm^{-1})	Price	PART NUMBER
830	0.46	0.07	1.8	4.7	0.25	1.60	0.33		**024-1110**
830	0.60	0.07	1.8	3.0	0.20	1.65	0.42		**024-1130**
1300	0.46	0.07	1.8	4.8	0.25	1.59	0.33		**024-1140**
1300	0.60	0.07	1.8	3.0	0.20	1.64	0.42		**024-1160**
1560	0.46	0.07	1.8	4.8	0.25	1.59	0.33		**024-1170**
1560	0.60	0.07	1.8	3.0	0.20	1.63	0.42		**024-1190**



GRADIENT INDEX PLANO MICROLENS

Gradient Index Plano Microlenses

Wavelength Range (nm)	N.A.	Diameter, D (inches)	(mm)	Length, L (mm)	Pitch	Refractive Index (axial)	Index Constant $\sqrt{A}$ (mm^{-1})	Price	PART NUMBER
633	0.46	0.04	1.0	2.6	0.25	1.61	0.61		**024-0130**
633	0.46	0.07	1.8	4.6	0.25	1.61	0.40		**024-0140**
633	0.46	0.07	1.8	4.3	0.23	1.61	0.40		**024-0160**
633	0.60	0.07	1.8	3.7	0.25	1.66	0.40		**024-0180**
633	0.46	0.08	2.0	5.2	0.25	1.61	0.30		**024-0220**
830	0.46	0.04	1.0	2.6	0.25	1.60	0.60		**024-0330**
830	0.46	0.07	1.8	4.7	0.25	1.60	0.33		**024-0340**
830	0.46	0.07	1.8	4.4	0.23	1.60	0.33		**024-0360**
830	0.60	0.07	1.8	3.7	0.25	1.65	0.33		**024-0380**
830	0.46	0.08	2.0	5.3	0.25	1.60	0.30		**024-0440**
1300	0.46	0.04	1.0	2.6	0.25	1.59	0.60		**024-0460**
1300	0.46	0.07	1.8	4.8	0.25	1.59	0.33		**024-0470**
1300	0.46	0.07	1.8	4.4	0.23	1.59	0.33		**024-0490**
1300	0.60	0.07	1.8	3.8	0.25	1.64	0.33		**024-0560**
1300	0.46	0.08	2.0	5.3	0.25	1.60	0.30		**024-0580**
1560	0.46	0.04	1.0	2.6	0.25	1.59	0.60		**024-0660**
1560	0.46	0.07	1.8	4.8	0.25	1.59	0.33		**024-0670**
1560	0.46	0.07	1.8	4.4	0.23	1.59	0.33		**024-0690**
1560	0.60	0.07	1.8	3.8	0.25	1.63	0.33		**024-0780**
1560	0.46	0.08	2.0	5.3	0.25	1.59	0.29		**024-0880**

Selfoc® is a registered trademark of Nippon Sheet Glass Company

Gradient Index Imaging Microlenses

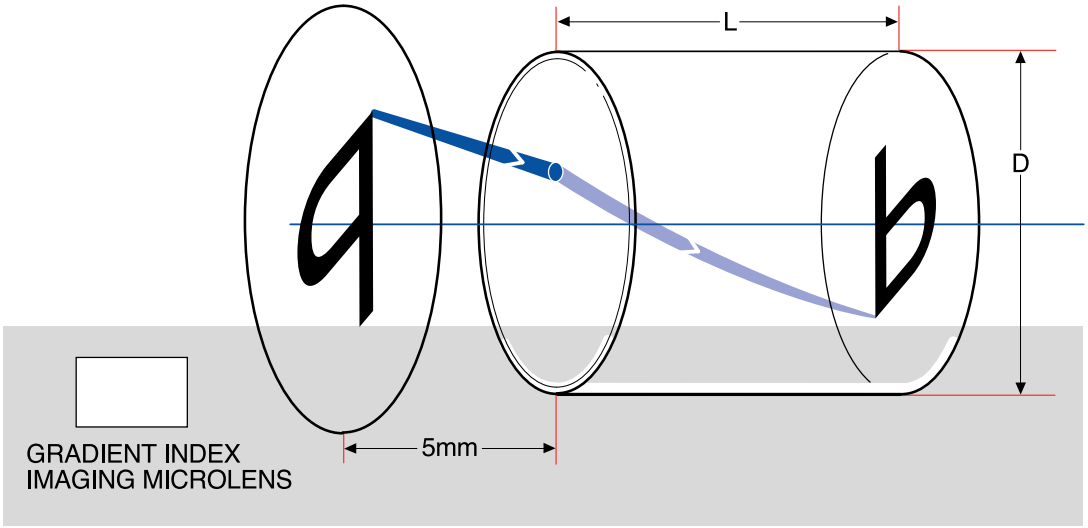
- Available in diameters from 0.25 to 1.0mm
- Magnifications from 5 to 20X
- High resolution performance, 200 line-pairs per mm

These gradient index microlenses are optimized for imaging applications. They form an image at one face of the lens of an object at a working distance of 5mm from the opposite face of the lens. This image may be viewed directly by a 100X microscope or transferred to the distal end of a coherent fiber bundle or gradient index relay lens. The lenses are supplied uncoated and no coatings are offered.

Specifications & Tolerances

Diameter: +0, -0.05mm
Resolution: 200 line-pairs/mm
Surface quality: 10-5

Length: ±10%
Field curvature: 0.1mm (max)
Material: Doped borosilicate glass



Gradient Index Imaging Microlenses

Diameter, D (inches)	(mm)	Length, L (mm)	Field of View (degrees)	Magnification	Price	PART NUMBER
0.01	0.25	0.7	50	19.0		**024-2230**
0.02	0.50	1.4	50	10.0		**024-2250**
0.04	1.00	3.0	50	5.0		**024-2270**
0.02	0.50	1.1	70	13.0		**024-2360**
0.04	1.00	2.2	70	6.5		**024-2380**

THESE LENSES CONTAIN SUBSTANCES WHICH MAY BE TOXIC IF INGESTED, SWALLOWED OR INSERTED INTO A LIVING CREATURE. THE PURCHASER IS REQUIRED TO PAY SPECIAL ATTENTION TO THIS POSSIBILITY – HOWEVER UNLIKELY.

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Gradient Index Relay Microlenses

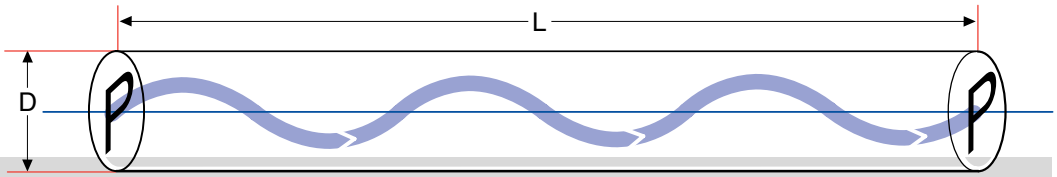
These microlenses are formed from gradient index glass as rods whose length is equal to an integral number of pitches. In this way an image formed on one end of the lens is transferred to the remote end from where it may be viewed or transferred to another medium.

These are used in rigid endoscopes and other applications which require the transfer of images. They are ideal for use with the gradient index imaging microlenses described previously.

If you need a gradient index lens quickly, just let us know. Our next-day delivery option costs a little extra, but your system will be up and running that much sooner. And if you don't see exactly the lens that you need give us a call. We have a wide range of special focal lengths and diameters available.

Specifications & Tolerances

Diameter: +0, -0.05mm
Surface quality: 20-10
Length: ±3%
Material: Doped borosilicate glass



GRADIENT INDEX RELAY MICROLENS

Gradient Index Relay Microlenses

Diameter, D (inches)	(mm)	Length, L (mm)	Pitch	Price	PART NUMBER
0.02	0.5	30.2	1.00		**024-3380**
0.02	0.5	60.4	2.00		**024-3390**
0.02	0.5	90.6	3.00		**024-3440**
0.04	1.0	44.7	1.00		**024-3490**
0.04	1.0	89.4	2.00		**024-3550**
0.04	1.0	134.1	3.00		**024-3560**
0.08	2.0	100.5	1.00		**024-3660**
0.08	2.0	201.0	2.00		**024-3670**
0.08	2.0	301.5	3.00		**024-3680**

We can supply assembled combinations of imaging and relay microlenses. Please call to discuss your special requirements.

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