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THORLABS

LPVISB100 - Nov. 10, 2016

Item # LPVISB100 was discontinued on Nov. 10, 2016. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

NANOPARTICLE LINEAR FILM POLARIZER

- ▶ UV, Visible, NIR, and IR Spectral Ranges
- ▶ Unmounted and Mounted Versions
- ▶ Extinction Ratios up to 100 000:1
- ▶ Laser Damage Thresholds up to 25 W/cm^2

Unmounted Linear Polarizers

LPVIS100
(Ø25.0 mm)

LPUV050
(Ø12.5 mm)

LPVISB050-MP2
(SM05 Compatible)

LPMIR100-MP2
(SM1 Compatible)

Mounted Linear Polarizer in RSP1X15 Indexed Rotation Mount

OVERVIEW

Features

- High Extinction Ratio and Laser Damage Threshold (See Tables Below)
- Two Polarizer Sizes: Ø12.5 mm and Ø25.0 mm
- Unmounted or Mounted in SM-Threaded Housing
- Unmounted Versions Have Protective Glass Substrate (Except LPNIRA & LPMIR)
- Resistant to UV Radiation and Chemicals

Linear Polarizer Selection Guide	
Item # Prefix	**Wavelength Range**
LPUV	365 - 395 nm
LPVISA	480 - 550 nm
LPVISB	500 - 720 nm
LPVIS	550 nm - 1.5 µm
LPNIR	650 nm - 2.0 µm
LPNIRA	1.0 - 3.0 µm
LPMIR	1.5 - 5.0 µm

These Nanoparticle Linear Film Polarizers consist of spherical ellipsoid nanoparticles that have been embedded in sodium-silicate glass. They offer superior performance compared to conventional polymer-based polarizers. While both conventional and nanoparticle polarizers absorb the light that is polarized perpendicular to the transmission axis, the nanoparticles have a significantly higher damage threshold and a dramatically better extinction ratio. The polarizer's transmission axis is indicated by two black marks on the edge of every unmounted polarizer except the LPMIR050 and LPMIR100. On the mounted polarizers, the polarization axis is indicated by engraved white lines on the housing.

The unmounted polarizers shown below (except for the LPNIRA and LPMIR) consist of a thin layer of sodium-silicate polarizer laminated between two pieces of index-matched Schott glass (B270) for additional strength. The mounted polarizers, as well as LPNIRA and LPMIR unmounted polarizers, are not laminated, allowing for a higher laser damage threshold. They only consist of the thin sodium-silicate polarizer, which is between 0.20 mm and 0.28 mm thick; as a result, they are more delicate to handle. However, they may still be cleaned using standard optics cleaning methods and solvents.

Please note that the mounted polarizers cannot be separated from their housings. Due to their thickness and precise alignment, they are permanently attached using a retaining ring and epoxy.

SPECS

<table>
<tr><th colspan="2">Item # Prefix</th><th>LPUV</th><th>LPVISA</th><th>LPVISB</th><th>LPVIS</th><th>LPNIR</th><th>LPNIRA</th><th>LPMIR</th></tr>
<tr><td colspan="2">Wavelength Range</td><td>365 - 395 nm</td><td>480 - 550 nm</td><td>500 - 720 nm</td><td>550 - 1500 nm</td><td>650 - 2000 nm</td><td>1000 - 3000 nm</td><td>1500 - 5000 nm</td></tr>
<tr><td colspan="9">Extinction Ratios[a]</td></tr>
<tr><td colspan="2">> 100 000 : 1</td><td>372 - 388 nm</td><td>-</td><td>-</td><td>600 - 1200 nm</td><td>850 - 1600 nm</td><td>-</td><td>-</td></tr>
<tr><td colspan="2">> 10 000 : 1</td><td>369 - 390 nm</td><td>480 - 550 nm</td><td>500 - 720 nm</td><td>550 - 1500 nm</td><td>750 - 1800 nm</td><td>1200 - 3000 nm</td><td>2000 - 4500 nm</td></tr>
<tr><td colspan="2">> 1000 : 1</td><td>365 - 395 nm</td><td>-</td><td>-</td><td>-</td><td>650 - 2000 nm</td><td>1000 - 3000 nm</td><td>1500 - 5000 nm</td></tr>
<tr><td colspan="9">General Specifications</td></tr>
<tr><td colspan="2">Polarizer Material</td><td colspan="7">Nanoparticles in Sodium-Silicate Glass</td></tr>
<tr><td colspan="2">Substrate Material</td><td colspan="5">Unmounted Version: Schott Glass B270
Mounted Version: None</td><td colspan="2">None</td></tr>
<tr><td colspan="2">Optic Diameter</td><td colspan="7">Ø12.5 mm (Ø0.49") ± 0.2 mm (0.008")
Ø25.0 mm (Ø0.98") ± 0.2 mm (0.008")</td></tr>
<tr><td rowspan="2">Optic Thickness</td><td>Unmounted</td><td colspan="5">2.0 ± 0.2 mm</td><td>250 ± 65 µm</td><td>200 ± 50 µm</td></tr>
<tr><td>Mounted[b]</td><td>220 ± 50 µm</td><td>280 ± 50 µm</td><td>280 ± 50 µm</td><td>260 ± 50 µm</td><td>220 ± 50 µm</td><td>250 ± 65 µm</td><td>200 ± 50 µm</td></tr>
<tr><td colspan="2">Housing Diameter[c]</td><td colspan="7">Ø17.8 mm (Ø0.70") or Ø30.5 mm (Ø1.20")</td></tr>
<tr><td colspan="2">Housing Depth[c]</td><td colspan="7">10.4 mm for Ø12.5 mm Polarizers or 11.4 mm for Ø25.0 mm Polarizers</td></tr>
<tr><td colspan="2">Clear Aperture</td><td colspan="7">Unmounted Version: Ø11.86 mm (Ø0.47") or Ø24.37 mm (Ø0.96");
Mounted Version: Ø10.90 mm (Ø0.43") or Ø22.90 mm (Ø0.90")</td></tr>
<tr><td colspan="2">Wavefront Distortion</td><td colspan="5"><λ/4 @ 633 nm</td><td colspan="2"><3λ @ 633 nm</td></tr>
<tr><td rowspan="2">Parallelism</td><td>Unmounted</td><td colspan="5"><1 arcmin</td><td colspan="2"><20 arcmin</td></tr>
<tr><td>Mounted[b]</td><td colspan="7"><20 arcmin</td></tr>
<tr><td colspan="2">Surface Quality</td><td colspan="5">Scratch-Dig: 40-20 (MIL-O-13830A)
Surface Imperfections: 5/2 x 0.04 within 1 cm² acc. (ISO 10110-07)</td><td colspan="2">N/A</td></tr>
<tr><td colspan="2">Acceptance Angle[d]</td><td colspan="7">±20°</td></tr>
<tr><td colspan="2">Laser Damage Threshold</td><td colspan="5">Unmounted Version: 1 W/cm² Continuous Block, 5 W/cm² Continuous Pass
Mounted Version: 10 W/cm² Continuous Block, 25 W/cm² Continuous Pass</td><td colspan="2">10 W/cm² Continuous Block
25 W/cm² Continuous Pass</td></tr>
<tr><td colspan="2">Operating Temperature</td><td colspan="5">-20 to +120 °C</td><td colspan="2">-50 to +400 °C (Unmounted)
-20 to +120 °C (Mounted)</td></tr>
<tr><td colspan="2">Maintenance</td><td colspan="7">Clean with Standard Cleaning Solvents</td></tr>
</table>

a. The extinction ratio (ER) is the ratio of the maximum transmission of a linear polarized signal when the polarizer’s axis is aligned with the signal to the minimum transmission when the polarizer is rotated by 90°. These polarizers maintain an extinction ratio of at least 1000:1 over the full operating bandwidth. Extinction ratios of >10,000:1 or >100,000:1 are maintained over specific wavelength ranges (see the *Graphs* tab for details).

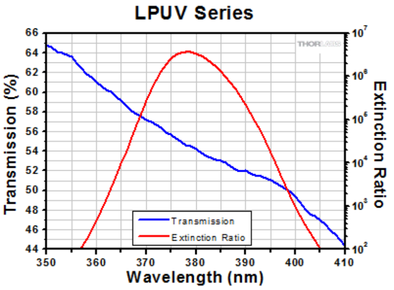
b. Optics in mounted polarizers are permanently epoxied and not removable.

c. Applies to mounted polarizers only.

d. The acceptance angle is limited by losses due to Fresnel reflections.

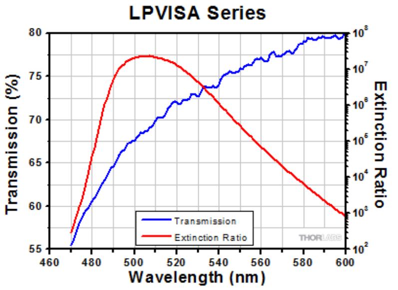
GRAPHS

The plots below show the measured transmission as a function of wavelength (blue lines) and the theoretically calculated extinction ratio (ER) as a function of wavelength (red lines) for each linear polarizer when the light is normally incident. For measured extinction ratio values which are guaranteed, please see the *Specs* tab. The percent transmission is the percentage of light with a linear state of polarization (SOP) aligned with the transmission axis that is transmitted through the linear polarizer. This number is less than 100% because of surface reflections and internal absorption. The ER is the ratio of the transmitted intensity of a linearly polarized beam of light with the orientation of the SOP parallel to the transmission axis to the transmitted intensity of the same linearly polarized beam of light with the orientation of the SOP perpendicular to the transmission axis. For reference, an ER of 1x10^{6} is typical of a top-of-the-line Glan-Laser Calcite Polarizer, although a calcite polarizer has a significantly higher damage threshold.



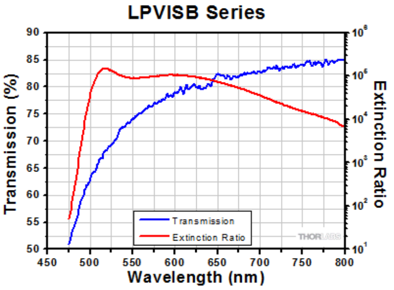
Click to Enlarge

Click to Download LPUV Series Transmission Data



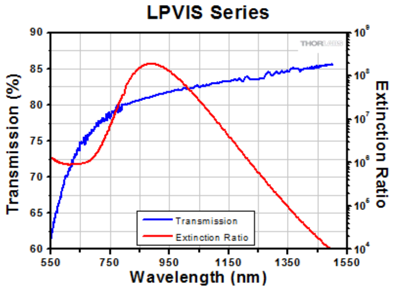
Click to Enlarge

Click to Download LPVISA Series Transmission Data



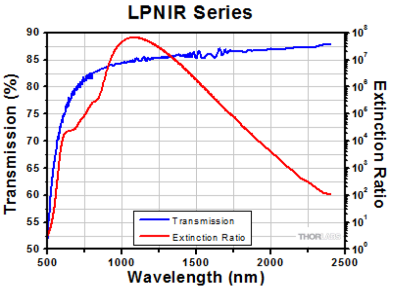
Click to Enlarge

Click to Download LPVISB Series Transmission Data



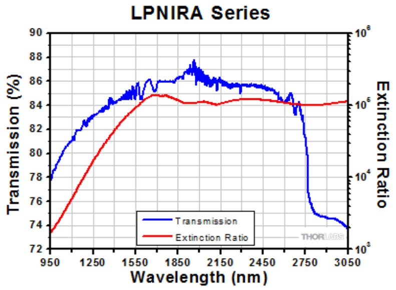
Click to Enlarge

Click to Download LPVIS Series Transmission Data



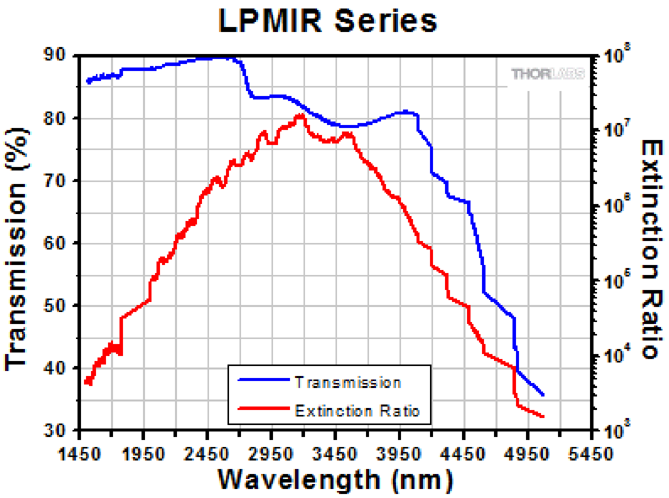
Click to Enlarge

Click to Download LPNIR Transmission Data



Click to Enlarge

Click to Download LPVISB Series Transmission Data



Click to Enlarge

Click to Download LPMIR Transmission Data

Damage Threshold Data for Thorlabs' Nanoparticle Linear Film Polarizers

The specifications in the table to the right are for Thorlabs' Nanoparticle Linear Film Polarizers. Damage threshold specifications are constant for all nanoparticle linear film polarizers, regardless of the size of the polarizer.

Damage Threshold Specifications

Item # Prefix	Damage Threshold
LPUV	Unmounted Versions: 1 W/cm^2 Continuous Block; 5 W/cm^2 Continuous Pass Mounted Versions: 10 W/cm^2 Continuous Block; 25 W/cm^2 Continuous Pass
LPVIS	
LPVISA	
LPVISB	
LPNIR	
LPNIRA	10 W/cm^2 Continuous Block; 25 W/cm^2 Continuous Pass
LPMIR	

Laser Induced Damage Threshold Tutorial

The following is a general overview of how laser induced damage thresholds are measured and how the values may be utilized in determining the appropriateness of an optic for a given application. When choosing optics, it is important to understand the Laser Induced Damage Threshold (LIDT) of the optics being used. The LIDT for an optic greatly depends on the type of laser you are using. Continuous wave (CW) lasers typically cause damage from thermal effects (absorption either in the coating or in the substrate). Pulsed lasers, on the other hand, often strip electrons from the lattice structure of an optic before causing thermal damage. Note that the guideline presented here assumes room temperature operation and optics in new condition (i.e., within scratch-dig spec, surface free of contamination, etc.). Because dust or other particles on the surface of an optic can cause damage at lower thresholds, we recommend keeping surfaces clean and free of debris. For more information on cleaning optics, please see our *Optics Cleaning* tutorial.

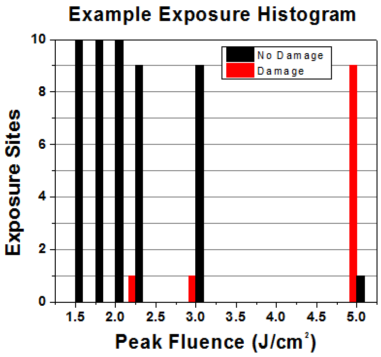
Testing Method

Thorlabs' LIDT testing is done in compliance with ISO/DIS11254 specifications. A standard 1-on-1 testing regime is performed to test the damage threshold.

First, a low-power/energy beam is directed to the optic under test. The optic is exposed in 10 locations to this laser beam for a set duration of time (CW) or number of pulses (pulse repetition frequency specified). After exposure, the optic is examined by a microscope (~100X magnification) for any visible damage. The number of locations that are damaged at a particular power/energy level is recorded. Next, the power/energy is either increased or decreased and the optic is exposed at 10 new locations. This process is repeated until damage is observed. The damage threshold is then assigned to be the highest power/energy that the optic can withstand without causing damage. A histogram such as that below represents the testing of one BB1-E02 mirror.

The photograph above is a protected aluminum-coated mirror after LIDT testing. In this particular test, it handled 0.43 J/cm^2 (1064 nm, 10 ns pulse, 10 Hz, Ø1.000 mm) before damage.

According to the test, the damage threshold of the mirror was 2.00 J/cm^2 (532 nm, 10 ns pulse, 10 Hz, Ø0.803 mm). Please keep in mind that these tests are performed on clean optics, as dirt and contamination can significantly lower the damage threshold of a component. While the test results are only representative of one coating run, Thorlabs specifies damage threshold values that account for coating variances.



Example Test Data

Fluence	# of Tested Locations	Locations with Damage	Locations Without Damage
1.50 J/cm^2	10	0	10
1.75 J/cm^2	10	0	10
2.00 J/cm^2	10	0	10
2.25 J/cm^2	10	1	9
3.00 J/cm^2	10	1	9
5.00 J/cm^2	10	9	1

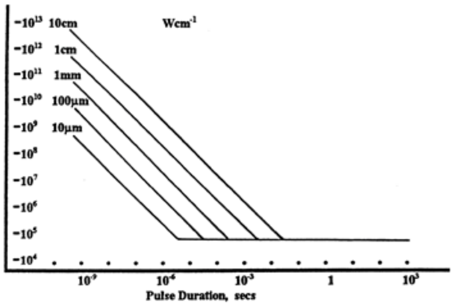
Continuous Wave and Long-Pulse Lasers

When an optic is damaged by a continuous wave (CW) laser, it is usually due to the melting of the surface as a result of absorbing the laser's energy or damage to the optical coating (antireflection) [1]. Pulsed lasers with pulse lengths longer than 1 µs can be treated as CW lasers for LIDT discussions. Additionally, when pulse lengths are between 1 ns and 1 µs, LIDT can occur either because of absorption or a dielectric breakdown (must check both CW and pulsed LIDT). Absorption is either due to an intrinsic property of the optic or due to surface irregularities; thus LIDT values are only valid for optics meeting or exceeding the surface quality specifications given by a manufacturer. While many optics can handle high power CW lasers, cemented (e.g., achromatic doublets) or highly absorptive (e.g., ND filters) optics tend to have lower CW damage thresholds. These lower thresholds are due to absorption or scattering in the cement or metal coating.

Pulsed lasers with high pulse repetition frequencies (PRF) may behave similarly to CW beams. Unfortunately, this is highly dependent on factors such as absorption and thermal diffusivity, so there is no reliable method for determining when a high PRF laser will damage an optic due to thermal effects. For beams with a large PRF both the average and peak powers must be compared to the equivalent CW power. Additionally, for highly transparent materials, there is little to no drop in the LIDT with increasing PRF.

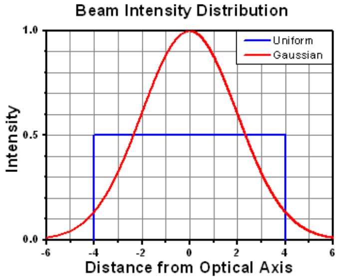
In order to use the specified CW damage threshold of an optic, it is necessary to know the following:

1. Wavelength of your laser
2. Linear power density of your beam (total power divided by 1/e^2 beam diameter)
3. Beam diameter of your beam (1/e^2)
4. Approximate intensity profile of your beam (e.g., Gaussian)



LIDT in linear power density vs. pulse length and spot size. For long pulses to CW, linear power density becomes a constant with spot size. This graph was obtained from [1].

The power density of your beam should be calculated in terms of W/cm. The graph to the right shows why expressing the LIDT as a linear power density provides the best metric for long pulse and CW sources. In this regime, the LIDT given as a linear power density can be applied to any beam diameter; one does not need to compute an adjusted LIDT to adjust for changes in spot size. This calculation assumes a uniform beam intensity profile. You must now consider hotspots in the beam or other non-uniform intensity profiles and roughly calculate a maximum power density. For reference, a Gaussian beam typically has a maximum power density that is twice that of the uniform beam (see lower right).



Now compare the maximum power density to that which is specified as the LIDT for the optic. If the optic was tested at a wavelength other than your operating wavelength, the damage threshold must be scaled appropriately. A good rule of thumb is that the damage threshold has a linear relationship with wavelength such that as you move to shorter wavelengths, the damage threshold decreases (i.e., a LIDT of 10 W/cm at 1310 nm scales to 5 W/cm at 655 nm):

$$\text{Adjusted LIDT} = \text{LIDT Power}\left(\frac{\text{Your Wavelength}}{\text{LIDT Wavelength}}\right)$$

While this rule of thumb provides a general trend, it is not a quantitative analysis of LIDT vs wavelength. In CW applications, for instance, damage scales more strongly with absorption in the coating and substrate, which does not necessarily scale well with wavelength. While the above procedure provides a good rule of thumb for LIDT values, please contact Tech Support if your wavelength is different from the specified LIDT wavelength. If your power density is less than the adjusted LIDT of the optic, then the optic should work for your application.

Please note that we have a buffer built in between the specified damage thresholds online and the tests which we have done, which accommodates variation between batches. Upon request, we can provide individual test information and a testing certificate. The damage analysis will be carried out on a similar optic (customer's optic will not be damaged). Testing may result in additional costs or lead times. Contact Tech Support for more information.

Pulsed Lasers

As previously stated, pulsed lasers typically induce a different type of damage to the optic than CW lasers. Pulsed lasers often do not heat the optic enough to damage it; instead, pulsed lasers produce strong electric fields capable of inducing dielectric breakdown in the material. Unfortunately, it can be very difficult to compare the LIDT specification of an optic to your laser. There are multiple regimes in which a pulsed laser can damage an optic and this is based on the laser's pulse length. The highlighted columns in the table below outline the relevant pulse lengths for our specified LIDT values.

Pulses shorter than 10^{-9} s cannot be compared to our specified LIDT values with much reliability. In this ultra-short-pulse regime various mechanics, such as multiphoton-avalanche ionization, take over as the predominate damage mechanism [2]. In contrast, pulses between 10^{-7} s and 10^{-4} s may cause damage to an optic either because of dielectric breakdown or thermal effects. This means that both CW and pulsed damage thresholds must be compared to the laser beam to determine whether the optic is suitable for your application.

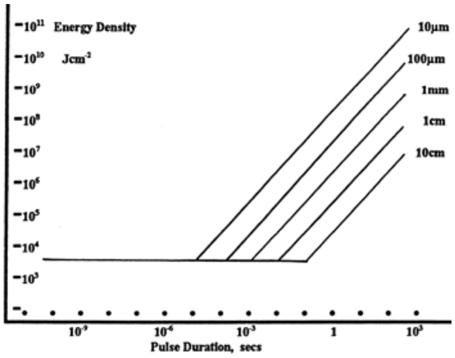
Pulse Duration	$t < 10^{-9}$ s	$10^{-9} < t < 10^{-7}$ s	$10^{-7} < t < 10^{-4}$ s	$t > 10^{-4}$ s
Damage Mechanism	Avalanche Ionization	Dielectric Breakdown	Dielectric Breakdown or Thermal	Thermal
Relevant Damage Specification	N/A	Pulsed	Pulsed and CW	CW

When comparing an LIDT specified for a pulsed laser to your laser, it is essential to know the following:

1. Wavelength of your laser
2. Energy density of your beam (total energy divided by 1/e^2 area)
3. Pulse length of your laser
4. Pulse repetition frequency (prf) of your laser
5. Beam diameter of your laser (1/e^2)

6. Approximate intensity profile of your beam (e.g., Gaussian)

The energy density of your beam should be calculated in terms of J/cm^2. The graph to the right shows why expressing the LIDT as an energy density provides the best metric for short pulse sources. In this regime, the LIDT given as an energy density can be applied to any beam diameter; one does not need to compute an adjusted LIDT to adjust for changes in spot size. This calculation assumes a uniform beam intensity profile. You must now adjust this energy density to account for hotspots or other nonuniform intensity profiles and roughly calculate a maximum energy density. For reference a Gaussian beam typically has a maximum energy density that is twice that of the 1/e^2 beam.



LIDT in energy density vs. pulse length and spot size. For short pulses, energy density becomes a constant with spot size. This graph was obtained from [1].

Now compare the maximum energy density to that which is specified as the LIDT for the optic. If the optic was tested at a wavelength other than your operating wavelength, the damage threshold must be scaled appropriately [3]. A good rule of thumb is that the damage threshold has an inverse square root relationship with wavelength such that as you move to shorter wavelengths, the damage threshold decreases (i.e., a LIDT of 1 J/cm^2 at 1064 nm scales to 0.7 J/cm^2 at 532 nm):

$$Adjusted\ LIDT = LIDT\ Energy\sqrt{\frac{Your\ Wavelength}{LIDT\ Wavelength}}$$

You now have a wavelength-adjusted energy density, which you will use in the following step.

Beam diameter is also important to know when comparing damage thresholds. While the LIDT, when expressed in units of J/cm², scales independently of spot size; large beam sizes are more likely to illuminate a larger number of defects which can lead to greater variances in the LIDT [4]. For data presented here, a <1 mm beam size was used to measure the LIDT. For beams sizes greater than 5 mm, the LIDT (J/cm2) will not scale independently of beam diameter due to the larger size beam exposing more defects.

The pulse length must now be compensated for. The longer the pulse duration, the more energy the optic can handle. For pulse widths between 1 - 100 ns, an approximation is as follows:

$$Adjusted\ LIDT = LIDT\ Energy\sqrt{\frac{Your\ Pulse\ Length}{LIDT\ Pulse\ Length}}$$

Use this formula to calculate the Adjusted LIDT for an optic based on your pulse length. If your maximum energy density is less than this adjusted LIDT maximum energy density, then the optic should be suitable for your application. Keep in mind that this calculation is only used for pulses between 10^{-9} s and 10^{-7} s. For pulses between 10^{-7} s and 10^{-4} s, the CW LIDT must also be checked before deeming the optic appropriate for your application.

Please note that we have a buffer built in between the specified damage thresholds online and the tests which we have done, which accommodates variation between batches. Upon request, we can provide individual test information and a testing certificate. Contact Tech Support for more information.

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[1] R. M. Wood, Optics and Laser Tech. **29**, 517 (1997).
[2] Roger M. Wood, *Laser-Induced Damage of Optical Materials* (Institute of Physics Publishing, Philadelphia, PA, 2003).
[3] C. W. Carr *et al.*, Phys. Rev. Lett. **91**, 127402 (2003).
[4] N. Bloembergen, Appl. Opt. **12**, 661 (1973).

Polarizer Selection Guide

Thorlabs offers a diverse range of polarizers, including wire grid, film, calcite, alpha-BBO, rutile, and beamsplitting polarizers. Collectively, our line of wire grid polarizers offers coverage from the visible range to the beginning of the Far-IR range. Our nanoparticle linear film polarizers provide extinction ratios as high as 100 000:1. Alternatively, our other film polarizers offer an affordable solution for polarizing light from the visible to the Near-IR. Next, our beamsplitting polarizers allow for use of the reflected beam, as well as the more completely polarized transmitted beam. Finally, our alpha-BBO (UV), calcite (visible to Near-IR), rutile (Near-IR to Mid-IR), and yttrium orthovanadate (YVO_4) (Near-IR to Mid-IR) polarizers each offer an exceptional extinction ratio of 100 000:1 within their respective wavelength ranges.

To explore the available types, wavelength ranges, extinction ratios, transmission, and available sizes for each polarizer category, click *More [+]* in the appropriate row below.

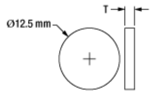
Wire Grid Polarizers	More [+]
Film Polarizers	More [+]
Beamsplitting Polarizers	More [+]
alpha-BBO Polarizers	More [+]
Calcite Polarizers	More [+]
Quartz Polarizers	More [+]
Magnesium Fluoride Polarizers	More [+]
Yttrium Orthovanadate (YVO_4) Polarizers	More [+]
Rutile Polarizers	More [+]

a. Click on the graph icons in this column to view a transmission curve for the corresponding polarizer. Each curve represents one substrate sample or coating run and is not guaranteed.
b. Mounted in a protective box, unthreaded ring, or cylinder that indicates the polarization axis.
c. Available unmounted or in an SM05-threaded (0.535"-40) mount that indicates the polarization axis.
d. Available unmounted or in an SM1-threaded (1.035"-40) mount that indicates the polarization axis.
e. Available unmounted or mounted in cubes for cage system compatibility.
f. Calcite's transmittance of light near 350 nm is typically around 75% (see *Transmission* column).
g. Available unmounted or in an unthreaded Ø1/2" housing.
h. The transmission curves for calcite are valid for linearly polarized light with a polarization axis aligned with the mark on the polarizer's housing.
i. The 1064 nm V coating corresponds to a -C26 suffix in the item number.
j. Available unmounted or mounted in a protective box or unthreaded cylinder that indicates the polarization axis.

Ø12.5 mm Unmounted Linear Polarizers

Item #	Extinction Ratio[a]			Transmission and ER Graph	Laser Damage Threshold	Thickness (T)	Clear Aperture
	> 1000:1	> 10 000:1	> 100 000:1				
LPUV050	365 - 395 nm	369 - 390 nm	372 - 388 nm		1 W/cm² Continuous Block 5 W/cm² Continuous Pass	2.0 ± 0.2 mm	Ø11.86 mm (Ø0.47")
LPVISA050	-	480 - 550 nm	-				
LPVISB050	-	500 - 720 nm	-				
LPVIS050	-	550 - 1500 nm	600 - 1200 nm				
LPNIR050	650 - 2000 nm	750 - 1800 nm	850 - 1600 nm				
LPNIRA050	1000 - 3000 nm	1200 - 3000 nm	-		10 W/cm² Continuous Block 25 W/cm² Continuous Pass	250 ± 65 µm	
LPMIR050	1500 - 5000 nm	2000 - 4500 nm	-			200 ± 50 µm	

a. The extinction ratio (ER) is the ratio of the maximum transmission of a linear polarized signal when the polarizer's axis is aligned with the signal to the minimum transmission when the polarizer is rotated by 90°. These polarizers maintain an extinction ratio of at least 1000:1 over the full operating bandwidth. Extinction ratios of >10 000:1 or >100 000:1 are maintained over specific wavelength ranges (see the *Graphs* tab for details).



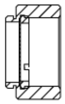
Part Number	Description	Price	Availability
LPUV050	**Ø12.5 mm Unmounted Linear Polarizer, 365 - 395 nm**	**$263.16**	**Lead Time**
LPVISA050	**Ø12.5 mm Unmounted Linear Polarizer, 480 - 550 nm**	**$316.20**	**Lead Time**
LPVISB050	**Ø12.5 mm Unmounted Linear Polarizer, 500 - 720 nm**	**$316.20**	**Today**
LPVIS050	**Ø12.5 mm Unmounted Linear Polarizer, 550 - 1500 nm**	**$334.56**	**Today**
LPNIR050	**Ø12.5 mm Unmounted Linear Polarizer, 650 - 2000 nm**	**$344.76**	**Lead Time**
LPNIRA050	**Ø12.5 mm Unmounted Linear Polarizer, 1000 - 3000 nm**	**$473.00**	**Today**
LPMIR050	**Ø12.5 mm Unmounted Linear Polarizer, 1500 - 5000 nm**	**$558.96**	**Today**

Mounted Ø12.5 mm Linear Polarizers, SM05-Threaded Housing

Item #	**Extinction Ratio[a]**			**Transmission and ER Graph**	**Laser Damage Threshold**	**Optic Thickness[b] (T)**	**Clear Aperture**
	> 1000:1	**> 10 000:1**	**> 100 000:1**				
LPUV050-MP2	365 - 395 nm	369 - 390 nm	372 - 388 nm	📈	10 W/cm² Continuous Block 25 W/cm² Continuous Pass	220 ± 50 µm	Ø10.9 mm (Ø0.43")
LPVISA050-MP2	-	480 - 550 nm	-	📈		280 ± 50 µm	
LPVISB050-MP2	-	500 - 720 nm	-	📈		280 ± 50 µm	
LPVIS050-MP2	-	550 - 1500 nm	600 - 1200 nm	📈		260 ± 50 µm	
LPNIR050-MP2	650 - 2000 nm	750 - 1800 nm	850 - 1600 nm	📈		220 ± 50 µm	
LPNIRA050-MP2	1000 - 3000 nm	1200 - 3000 nm	-	📈		250 ± 65 µm	
LPMIR050-MP2	1500 - 5000 nm	2000 - 4500 nm	-	📈		200 ± 50 µm	

[a] The extinction ratio (ER) is the ratio of the maximum transmission of a linear polarized signal when the polarizer's axis is aligned with the signal to the minimum transmission when the polarizer is rotated by 90°. These polarizers maintain an extinction ratio of at least 1000:1 over the full operating bandwidth. Extinction ratios of >10 000:1 or >100 000:1 are maintained over specific wavelength ranges (see the *Graphs* tab for details).

[b] Optics are permanently epoxied into the mount and not removable.



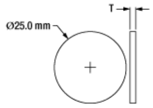
Click for Details

Part Number	Description	Price	Availability
LPUV050-MP2	**Ø12.5 mm SM05-Mounted Linear Polarizer, 365 - 395 nm**	**$357.00**	**Today**
LPVISA050-MP2	**Ø12.5 mm SM05-Mounted Linear Polarizer, 480 - 550 nm**	**$357.00**	**Today**
LPVISB050-MP2	**Ø12.5 mm SM05-Mounted Linear Polarizer, 500 - 720 nm**	**$357.00**	**Today**
LPVIS050-MP2	**Ø12.5 mm SM05-Mounted Linear Polarizer, 550 - 1500 nm**	**$385.00**	**Today**
LPNIR050-MP2	**Ø12.5 mm SM05-Mounted Linear Polarizer, 650 - 2000 nm**	**$404.00**	**Today**
LPNIRA050-MP2	**Ø12.5 mm SM05-Mounted Linear Polarizer, 1000 - 3000 nm**	**$533.00**	**Today**
LPMIR050-MP2	**Ø12.5 mm SM05-Mounted Linear Polarizer, 1500 - 5000 nm**	**$662.00**	**Today**

Ø25.0 mm Unmounted Linear Polarizers

Item #	Extinction Ratio[a]			Transmission and ER Graph	Laser Damage Threshold	Thickness (T)	Clear Aperture
	> 1000:1	> 10 000:1	> 100 000:1				
LPUV100	365 - 395 nm	369 - 390 nm	372 - 388 nm		1 W/cm² Continuous Block 5 W/cm² Continuous Pass	2.0 ± 0.2 mm	Ø24.37 mm (Ø0.96")
LPVISA100	-	480 - 550 nm	-				
LPVISB100	-	500 - 720 nm	-				
LPVIS100	-	550 - 1500 nm	600 - 1200 nm				
LPNIR100	650 - 2000 nm	750 - 1800 nm	850 - 1600 nm				
LPNIRA100	1000 - 3000 nm	1200 - 3000 nm	-		10 W/cm² Continuous Block 25 W/cm² Continuous Pass	250 ± 65 µm	
LPMIR100	1500 - 5000 nm	2000 - 4500 nm	-			200 ± 50 µm	

a. The extinction ratio (ER) is the ratio of the maximum transmission of a linear polarized signal when the polarizer's axis is aligned with the signal to the minimum transmission when the polarizer is rotated by 90°. These polarizers maintain an extinction ratio of at least 1000:1 over the full operating bandwidth. Extinction ratios of >10 000:1 or >100 000:1 are maintained over specific wavelength ranges (see the *Graphs* tab for details).



Part Number	Description	Price	Availability
LPUV100	**Ø25.0 mm Unmounted Linear Polarizer, 365 - 395 nm**	**$734.40**	**Today**
LPVISA100	**Ø25.0 mm Unmounted Linear Polarizer, 480 - 550 nm**	**$832.32**	**Today**
LPVISB100	**Ø25.0 mm Unmounted Linear Polarizer, 500 - 720 nm**	**$832.32**	**Today**
LPVIS100	**Ø25.0 mm Unmounted Linear Polarizer, 550 - 1500 nm**	**$848.64**	**Today**
LPNIR100	**Ø25.0 mm Unmounted Linear Polarizer, 650 - 2000 nm**	**$848.64**	**Today**
LPNIRA100	**Ø25.0 mm Unmounted Linear Polarizer, 1000 - 3000 nm**	**$1,130.00**	**Today**
LPMIR100	**Ø25.0 mm Unmounted Linear Polarizer, 1500 - 5000 nm**	**$1,428.00**	**Today**

Mounted Ø25.0 mm Linear Polarizers, SM1-Threaded Housing

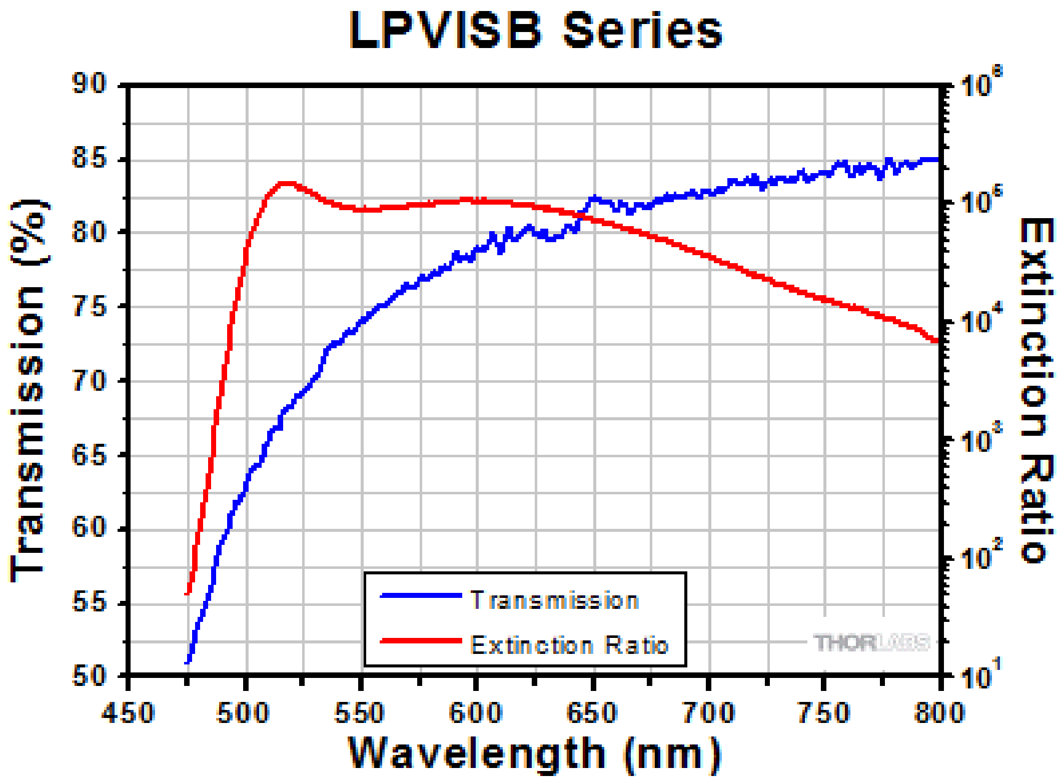
Item #	Extinction Ratio[a]			Transmission and ER Graph	Laser Damage Threshold	Optic Thickness[b] (T)	Clear Aperture
	> 1000:1	> 10 000:1	> 100 000:1				
LPUV100-MP2	365 - 395 nm	369 - 390 nm	372 - 388 nm	📈	10 W/cm² Continuous Block 25 W/cm² Continuous Pass	220 ± 50 µm	Ø22.9 mm (Ø0.90")
LPVISA100-MP2	-	480 - 550 nm	-	📈		280 ± 50 µm	
LPVISB100-MP2	-	500 - 720 nm	-	📈		280 ± 50 µm	
LPVIS100-MP2	-	550 - 1500 nm	600 - 1200 nm	📈		260 ± 50 µm	
LPNIR100-MP2	650 - 2000 nm	750 - 1800 nm	850 - 1600 nm	📈		220 ± 50 µm	
LPNIRA100-MP2	1000 - 3000 nm	1200 - 3000 nm	-	📈		250 ± 65 µm	
LPMIR100-MP2	1500 - 5000 nm	2000 - 4500 nm	-	📈		200 ± 50 µm	

a. The extinction ratio (ER) is the ratio of the maximum transmission of a linear polarized signal when the polarizer's axis is aligned with the signal to the minimum transmission when the polarizer is rotated by 90°. These polarizers maintain an extinction ratio of at least 1000:1 over the full operating bandwidth. Extinction ratios of >10 000:1 or >100 000:1 are maintained over specific wavelength ranges (see the *Graphs* tab for details).

b. Optics are permanently epoxied into the mount and not removable.

Click for Details

Part Number	Description	Price	Availability
LPUV100-MP2	**Ø25.0 mm SM1-Mounted Linear Polarizer, 365 - 395 nm**	**$769.00**	**Today**
LPVISA100-MP2	**Ø25.0 mm SM1-Mounted Linear Polarizer, 480 - 550 nm**	**$846.00**	**Today**
LPVISB100-MP2	**Ø25.0 mm SM1-Mounted Linear Polarizer, 500 - 720 nm**	**$846.00**	**Today**
LPVIS100-MP2	**Ø25.0 mm SM1-Mounted Linear Polarizer, 550 - 1500 nm**	**$950.00**	**Today**
LPNIR100-MP2	**Ø25.0 mm SM1-Mounted Linear Polarizer, 650 - 2000 nm**	**$984.00**	**Today**
LPNIRA100-MP2	**Ø25.0 mm SM1-Mounted Linear Polarizer, 1000 - 3000 nm**	**$1,230.00**	**Today**
LPMIR100-MP2	**Ø25.0 mm SM1-Mounted Linear Polarizer, 1500 - 5000 nm**	**$1,582.00**	**Today**


LPVISB Series
Transmission (%)
90
85
80
75
70
65
60
55
50
Extinction Ratio
10^6
10^5
10^4
10^3
10^2
10^1
450
500
550
600
650
700
750
800
Wavelength (nm)
Transmission
Extinction Ratio
THORLABS