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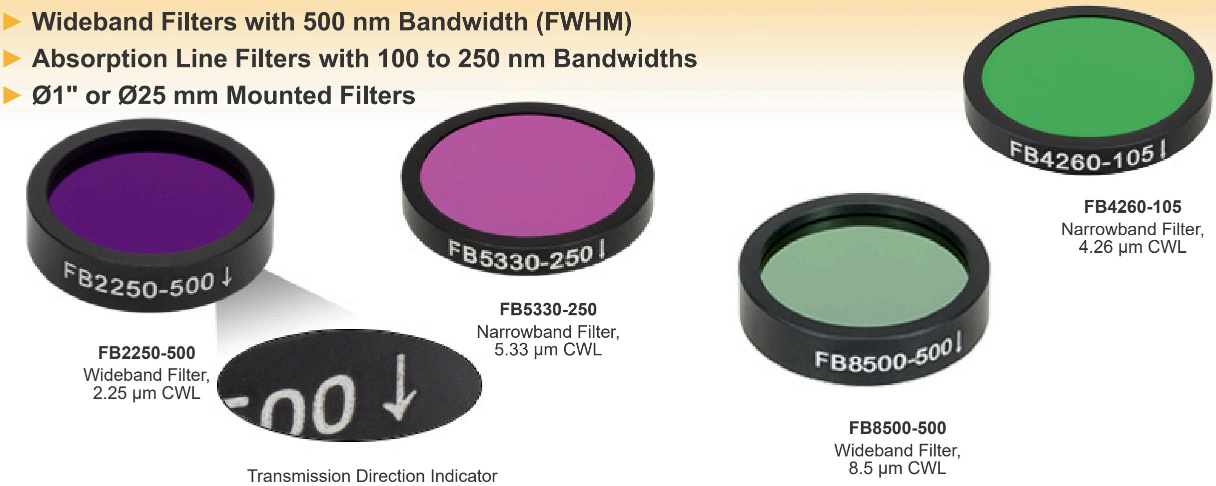
FB6500-500 - November 5, 2025

Item # FB6500-500 was discontinued on November 5, 2025. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

IR BANDPASS FILTERS: 1.75 - 12.00 MM CENTRAL WAVELENGTH

- **Pass Region Center Wavelengths from 1.75 to 12.00 µm**
- **Wideband Filters with 500 nm Bandwidth (FWHM)**
- **Absorption Line Filters with 100 to 250 nm Bandwidths**
- **Ø1" or Ø25 mm Mounted Filters**



OVERVIEW

Features

- Central Wavelengths from 1.75 to 12.00 µm
- Wideband Filters with 500 nm Bandpass Region (FWHM)
- Narrowband Filters Designed for Gas Absorption Lines with Bandwidths from 100 to 250 nm
- Minimum Transmission at Center Wavelength of 60% or Higher
- Mounted Filters with Ø1" or Ø25 mm Housing Diameter

Common Specifications		
Type	**Wideband**	**Narrowband**
Housing Diameter	1" (25.4 mm)	25 mm (0.98")
Housing Diameter Tolerance	+0.0 / -0.2 mm	
Housing Thickness	6.1 mm	3.5 mm
Housing Thickness Tolerance	+0.00 / -0.10 mm	
Surface/Coating Quality	80-50 Scratch-Dig	60-40 Scratch-Dig
Edge Treatment	Mounted in Black Anodized Aluminum Ring	
Edge Markings	(Item #) ↓ (Arrow Points in the Direction of Light Transmission)	

The bandpass filters shown on this page feature center wavelengths from 1.75 to 12.00 µm. Transmission curves for individual filters can be viewed by clicking the blue icons (i) in Tables G1.1 and G2.1. Each filter is epoxied into a black anodized aluminum ring which can fit inside our SM1 Lens Tubes. These filters feature a longer total lifetime than our UV, visible, and NIR standard bandpass filters because they are fabricated from a single coated substrate. This fabrication technique also allows the unmounted filters to be used without resulting damage; however, the blocking transmission may be affected. As these filters cannot be removed from their mounts after purchase, please contact Tech Sales to order custom unmounted filters.

Click to Enlarge
Figure 1.1 Bandpass Filter Mounted in a TRF90 Flip Mount Using a Retaining Ring

Thorlabs' bandpass filters provide one of the simplest ways to transmit light over a well-defined wavelength band, while rejecting other unwanted radiation. Their design is essentially that of a thin film Fabry-Perot interferometer formed by vacuum deposition techniques and consists of two reflecting stacks, separated by an even-order spacer layer. These reflecting stacks are constructed from alternating layers of high and low refractive index materials, which can have a reflectance in excess of 99.99%. By varying the thickness of the spacer layer and/or the number of reflecting layers, the central wavelength and bandwidth of the filter can be altered.

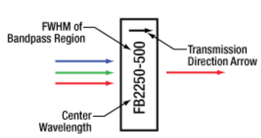


Figure 1.2 Bandpass Filter Engraving Schematic

Several filters below are designed for gas absorption lines at 1.90 µm (H_2O), 3.33 µm (CH_4), 4.26 µm (CO_2), 5.068 µm (H_2O), or 5.33 µm (NO). These filters have narrower transmission bands than the other filters. The green highlighted rows in Tables G1.1 and G2.1 denote narrowband filters for gas absorption lines.

Each filter is housed in a black anodized aluminum ring that is labeled with an arrow indicating the design propagation direction, as seen in Figure 1.2. The ring makes handling easier and enhances the blocking OD by limiting scattering. These filters can be mounted in our extensive line of filter mounts and wheels. As the mounts are not threaded, Ø1" retaining rings will be required to mount the filters in one of our internally-threaded SM1 lens tubes.

Additional Bandpass Filters				
UV/VIS Hard-Coated Bandpass Filters 300 - 694 nm CWLs	NIR Hard-Coated Bandpass Filters 700 - 2000 nm CWLs	IR Bandpass Filters 1750 - 12 000 nm CWLs	Wedged Hard-Coated Bandpass Filters 532 - 785 nm CWLs	Hard-Coated Bandpass Filter Kits
We also offer custom bandpass filters with other central wavelengths or FWHM. To request a quote, contact Tech Sales.				

DAMAGE THRESHOLDS

Damage Threshold Data for Thorlabs' IR Bandpass Filters

The specifications in Table 2.1 are measured data for one of Thorlabs' IR bandpass filters.

Table 2.1 Damage Threshold Specifications	
Item #	**Damage Threshold**
FB3250-500	Pulsed: 6 J/cm^2 (2940 nm, 250 µs, 2 Hz, Ø0.265 mm)

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/DIS 11254 and ISO 21254 specifications.

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 30 seconds (CW) or for a 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 shown in Figure 37B represents the testing of one BB1-E02 mirror.

Figure 37A This photograph shows 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.

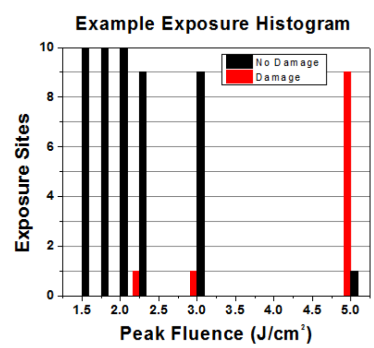


Figure 37B Example Exposure Histogram used to Determine the LIDT of BB1-E02 Mirror

Table 37C 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

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.

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.

When pulse lengths are between 1 ns and 1 µs, laser-induced damage can occur either because of absorption or a dielectric breakdown (therefore, a user 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 high 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.

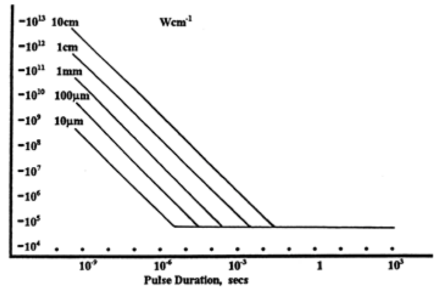


Figure 37D LIDT in linear power density vs. pulse length and spot size. For long pulses to CW, linear power density becomes a constant with spot size. This graph was obtained from [1].

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

Thorlabs expresses LIDT for CW lasers as a linear power density measured in W/cm. 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, as demonstrated in Figure 37D. Average linear power density can be calculated using this equation.

$$Linear\ Power\ Density = \frac{Power}{Beam\ Diameter}$$

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 Figure 37E).

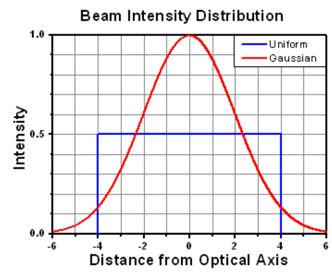


Figure 37E Intensity Distribution of Uniform and Gaussian Beam Profiles

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):

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

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 Table 37F 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.

Table 37F Laser Induced Damage Regimes

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	No Comparison (See Above)	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)

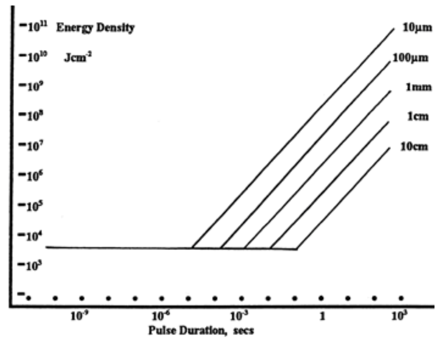


Figure 37G LIDT in energy density vs. pulse length and spot size. For short pulses, energy density becomes a constant with spot size. This graph was obtained from [1].

The energy density of your beam should be calculated in terms of J/cm^2. Figure 37G 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.

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.

[1] R. M. Wood, Optics and Laser Tech. **29**, 517 (1998).
[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).

LIDT CALCULATIONS

LIDT Calculator

In order to illustrate the process of determining whether a given laser system will damage an optic, a number of example calculations of laser induced damage threshold are given below. For assistance with performing similar calculations, we provide a spreadsheet calculator that can be downloaded by clicking the LIDT Calculator button. To use the calculator, enter the specified LIDT value of the optic under consideration and the relevant parameters of your laser system in the green boxes. The spreadsheet will then calculate a linear power density for CW and pulsed systems, as well as an energy density value for pulsed systems. These values are used to calculate adjusted, scaled LIDT values for the optics based on accepted scaling laws. This calculator assumes a Gaussian beam profile, so a correction factor must be introduced for other beam shapes (uniform, etc.). The LIDT scaling laws are determined from empirical relationships; their accuracy is not guaranteed. Remember that absorption by optics or coatings can significantly reduce LIDT in some spectral regions. These LIDT values are not valid for ultrashort pulses less than one nanosecond in duration.

CW Laser Example

Suppose that a CW laser system at 1319 nm produces a 0.5 W Gaussian beam that has a $1/e^2$ diameter of 10 mm. A naive calculation of the average linear power density of this beam would yield a value of 0.5 W/cm, given by the total power divided by the beam diameter:

$$Linear\ Power\ Density = \frac{Power}{Beam\ Diameter}$$

However, the maximum power density of a Gaussian beam is about twice the maximum power density of a uniform beam, as shown in Figure 71A. Therefore, a more accurate determination of the maximum linear power density of the system is 1 W/cm.

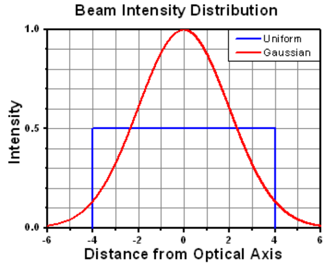


Figure 71A A Gaussian beam profile has about twice the maximum intensity of a uniform beam profile.

An AC127-030-C achromatic doublet lens has a specified CW LIDT of 350 W/cm, as tested at 1550 nm. CW damage threshold values typically scale directly with the wavelength of the laser source, so this yields an adjusted LIDT value:

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

The adjusted LIDT value of 350 W/cm x (1319 nm / 1550 nm) = 298 W/cm is significantly higher than the calculated maximum linear power density of the laser system, so it would be safe to use this doublet lens for this application.

Pulsed Nanosecond Laser Example: Scaling for Different Pulse Durations

Suppose that a pulsed Nd:YAG laser system is frequency tripled to produce a 10 Hz output, consisting of 2 ns output pulses at 355 nm, each with 1 J of energy, in a Gaussian beam with a 1.9 cm beam diameter ($1/e^2$). The average energy density of each pulse is found by dividing the pulse energy by the beam area:

$$Energy\ Density = \frac{Pulse\ Energy}{Beam\ Area}$$

As described above, the maximum energy density of a Gaussian beam is about twice the average energy density. So, the maximum energy density of this beam is ~0.7 J/cm^2.

The energy density of the beam can be compared to the LIDT values of 1 J/cm^2 and 3.5 J/cm^2 for a BB1-E01 broadband dielectric mirror and an NB1-K08 Nd:YAG laser line mirror, respectively. Both of these LIDT values, while measured at 355 nm, were determined with a 10 ns pulsed laser at 10 Hz. Therefore, an adjustment must be applied for the shorter pulse duration of the system under consideration. As described on the previous tab, LIDT values in the nanosecond pulse regime scale with the square root of the laser pulse duration:

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

This adjustment factor results in LIDT values of 0.45 J/cm^2 for the BB1-E01 broadband mirror and 1.6 J/cm^2 for the Nd:YAG laser line mirror, which are to be compared with the 0.7 J/cm^2 maximum energy density of the beam. While the broadband mirror would likely be damaged by the laser, the more specialized laser line mirror is appropriate for use with this system.

Pulsed Nanosecond Laser Example: Scaling for Different Wavelengths

Suppose that a pulsed laser system emits 10 ns pulses at 2.5 Hz, each with 100 mJ of energy at 1064 nm in a 16 mm diameter beam ($1/e^2$) that must be attenuated with a neutral density filter. For a Gaussian output, these specifications result in a maximum energy density of 0.1 J/cm^2. The damage threshold of an NDUV10A Ø25 mm, OD 1.0, reflective neutral density filter is 0.05 J/cm^2 for 10 ns pulses at 355 nm, while the damage threshold of the similar NE10A absorptive filter is 10 J/cm^2 for 10 ns pulses at 532 nm. As described on the previous tab, the LIDT value of an optic scales with the square root of the wavelength in the nanosecond pulse regime:

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

This scaling gives adjusted LIDT values of 0.08 J/cm^2 for the reflective filter and 14 J/cm^2 for the absorptive filter. In this case, the absorptive filter is the best choice in order to avoid optical damage.

Pulsed Microsecond Laser Example

Consider a laser system that produces 1 µs pulses, each containing 150 µJ of energy at a repetition rate of 50 kHz, resulting in a relatively high duty cycle of 5%. This system falls somewhere between the regimes of CW and pulsed laser induced damage, and could potentially damage an optic by mechanisms associated with either regime. As a result, both CW and pulsed LIDT values must be compared to the properties of the laser system to ensure safe operation.

If this relatively long-pulse laser emits a Gaussian 12.7 mm diameter beam ($1/e^2$) at 980 nm, then the resulting output has a linear power density of 5.9 W/cm and an energy density of 1.2×10^{-4} J/cm^2 per pulse. This can be compared to the LIDT values for a WPQ10E-980 polymer zero-order quarter-wave plate, which are 5 W/cm for CW radiation at 810 nm and 5 J/cm^2 for a 10 ns pulse at 810 nm. As before, the CW LIDT of the optic scales linearly with the laser wavelength, resulting in an adjusted CW value of 6 W/cm at 980 nm. On the other hand, the pulsed LIDT scales with the square root of the laser wavelength and the square root of the pulse duration, resulting in an adjusted value of 55 J/cm^2 for a 1 µs pulse at 980 nm. The pulsed LIDT of the optic is significantly greater than the energy density of the laser pulse, so individual pulses will not damage the wave plate. However, the large average linear power density of the laser system may cause thermal damage to the optic, much like a high-power CW beam.

1.75 - 6.00 µm Bandpass Filters

Green highlighted rows indicate filters with a narrow passband designed for gas absorption spectroscopy.

Table G1.1 Specifications

Item #	Center Wavelength (CWL)	Full Width at Half Maximum	Transmission at CWL	Blocking	Transmission/ OD Data[a]	Operating Temperature	Substrate	Clear Aperture	Housing Thickness
FB1750-500	1.75 µm ± 50 nm	500 ± 100 nm	70% (Min)	0.2 - 12 µm[b]		-50 to 80 °C	N-BK7	Ø21.0 mm	6.1 mm
FB1900-200	1.90 µm ± 28 nm	200 ± 40 nm	>85%	0.2 - 12 µm[b]		-40 to 80 °C	UV Fused Silica	>Ø21.0 mm	3.5 mm
FB2000-500	2.00 µm ± 50 nm	500 ± 100 nm	70% (Min)	0.2 - 12 µm[b]		-50 to 80 °C	N-BK7	Ø21.0 mm	6.1 mm
FB2250-500	2.25 µm ± 50 nm	500 ± 100 nm	70% (Min)	0.2 - 12 µm[b]		-50 to 80 °C	Sapphire	>Ø21.0 mm	
FB3250-500[c]	3.25 µm ± 50 nm	500 ± 100 nm	70% (Min)	0.2 - 12 µm[b]		-50 to 80 °C	Sapphire	>Ø21.0 mm	6.1 mm
FB3330-150	3.33 µm ± 17 nm	150 ± 15 nm	>70%	0.2 - 12 µm[d]		-40 to 80 °C	Fused Silica	>Ø21.0 mm	3.5 mm
FB3500-500	3.50 µm ± 50 nm	500 ± 100 nm	70% (Min)	0.2 - 12 µm[b]		-50 to 80 °C	Sapphire	>Ø21.0 mm	6.1 mm
FB3750-500	3.75 µm ± 50 nm	500 ± 100 nm	70% (Min)	0.2 - 12 µm[b]		-50 to 80 °C			
FB4000-500	4.00 µm ± 50 nm	500 ± 100 nm	70% (Min)	0.2 - 12 µm[b]		-50 to 80 °C			
FB4250-500	4.25 µm ± 50 nm	500 ± 100 nm	70% (Min)	0.2 - 12 µm[b]		-50 to 80 °C			
FB4260-105	4.26 µm ± 22 nm	105 ± 10 nm	>70%	0.2 - 12 µm[d]		-40 to 80 °C	Sapphire	>Ø21.0 mm	3.5 mm
FB4500-500	4.50 µm ± 50 nm	500 ± 100 nm	70% (Min)	0.2 - 12 µm[b]		-50 to 80 °C	Sapphire	>Ø21.0 mm	6.1 mm
FB4750-500	4.75 µm ± 50 nm	500 ± 100 nm	70% (Min)	0.2 - 12 µm[b]		-50 to 80 °C			
FB5000-500	5.00 µm ± 50 nm	500 ± 100 nm	70% (Min)	1.8 - 9.5 µm[d]		-50 to 80 °C	Ge	Ø21.0 mm	6.1 mm
FB5068-100	5.068 µm ± 26 nm	100 ± 15 nm	>70%	0.2 - 12 µm[b]		-40 to 80 °C	Sapphire	>Ø21.0 mm	3.5 mm
FB5330-250	5.33 µm ± 27 nm	250 ± 50 nm	>70%	0.2 - 12 µm[b]		-40 to 80 °C	Sapphire	>Ø21.0 mm	3.5 mm
FB5500-500	5.50 µm ± 50 nm	500 ± 100 nm	70% (Min)	1.8 - 9.5 µm[d]		-50 to 80 °C	Ge	Ø21.0 mm	6.1 mm
FB5750-500	5.75 µm ± 50 nm	500 ± 100 nm	70% (Min)	1.8 - 9.5 µm[d]		-50 to 80 °C			
FB6000-500	6.00 µm ± 50 nm	500 ± 100 nm	70% (Min)	1.8 - 9.5 µm[d]		-50 to 80 °C			

a. Click on for a plot and downloadable data. Measured data accounts for all losses including Fresnel reflections. Please note that the minimum transmission is only guaranteed for the specified center wavelength and that the data in the plots is typical. Actual performance may vary from lot to lot.
b. Transmission: <0.1% (Absolute)
c. Damage Threshold: 6 J/cm^2 (2940 nm, 250 µs, 2 Hz, Ø0.265 mm)
d. Transmission: <0.1% (Average)

Part Number	Description	Price	Availability
FB1750-500	**Ø1" IR Bandpass Filter, CWL = 1.75 µm, FWHM = 500 nm**	$442.45	Today
FB1900-200	**Ø25 mm IR Bandpass Filter, CWL = 1.90 µm, FWHM = 200 nm**	$442.45	Today
FB2000-500	**Ø1" IR Bandpass Filter, CWL = 2.00 µm, FWHM = 500 nm**	$442.45	Today
FB2250-500	**Ø1" IR Bandpass Filter, CWL = 2.25 µm, FWHM = 500 nm**	$442.45	Today
FB3250-500	**Ø1" IR Bandpass Filter, CWL = 3.25 µm, FWHM = 500 nm**	$442.45	Today
FB3330-150	**Customer Inspired! Ø25 mm IR Bandpass Filter, CWL = 3.33 µm, FWHM = 150 nm**	$388.95	Today
FB3500-500	**Ø1" IR Bandpass Filter, CWL = 3.50 µm, FWHM = 500 nm**	$388.95	Today
FB3750-500	**Ø1" IR Bandpass Filter, CWL = 3.75 µm, FWHM = 500 nm**	$388.95	Today

FB4000-500	Ø1" IR Bandpass Filter, CWL = 4.00 µm, FWHM = 500 nm	$388.95	Today
FB4250-500	Ø1" IR Bandpass Filter, CWL = 4.25 µm, FWHM = 500 nm	$388.95	In Stock Overseas
FB4260-105	Customer Inspired! Ø25 mm IR Bandpass Filter, CWL = 4.26 µm, FWHM = 105 nm	$311.54	Today
FB4500-500	Ø1" IR Bandpass Filter, CWL = 4.50 µm, FWHM = 500 nm	$388.95	Today
FB4750-500	Ø1" IR Bandpass Filter, CWL = 4.75 µm, FWHM = 500 nm	$388.95	Today
FB5000-500	Ø1" IR Bandpass Filter, CWL = 5.00 µm, FWHM = 500 nm	$648.25	Today
FB5068-100	Customer Inspired! Ø25 mm IR Bandpass Filter, CWL = 5.068 µm, FWHM = 100 nm	$311.54	Today
FB5330-250	Customer Inspired! Ø25 mm IR Bandpass Filter, CWL = 5.33 µm, FWHM = 250 nm	$311.54	Today
FB5500-500	Ø1" IR Bandpass Filter, CWL = 5.50 µm, FWHM = 500 nm	$648.25	Today
FB5750-500	Ø1" IR Bandpass Filter, CWL = 5.75 µm, FWHM = 500 nm	$648.25	Today
FB6000-500	Ø1" IR Bandpass Filter, CWL = 6.00 µm, FWHM = 500 nm	$648.25	Today

6.50 - 12.00 µm Bandpass Filters

Table G2.1 Specifications

Item #	Center Wavelength (CWL)	Full Width at Half Maximum	Transmission at CWL	Blocking[a]	Transmission/ OD Data[b]	Operating Temperature	Substrate	Clear Aperture	Housing Thickness
FB6500-500	6.50 µm ± 50 nm	500 ± 100 nm	>70%	0.2 - 16 µm		-40 to 80 °C	Si	Ø21.0 mm	6.1 mm
FB7500-500	7.50 µm ± 50 nm	500 ± 100 nm	>70%	0.2 - 16 µm		-40 to 80 °C			
FB8000-500	8.00 µm ± 50 nm	500 ± 100 nm	>70%	0.2 - 16 µm		-40 to 80 °C			
FB8500-500	8.50 µm ± 50 nm	500 ± 100 nm	>70%	0.2 - 16 µm		-40 to 80 °C			
FB9000-500	9.00 µm ± 50 nm	500 ± 100 nm	>70%	0.2 - 16 µm		-40 to 80 °C			
FB9500-500	9.50 µm ± 50 nm	500 ± 100 nm	>70%	0.2 - 16 µm		-40 to 80 °C			
FB10000-500	10.00 µm ± 50 nm	500 ± 100 nm	>70%	0.2 - 16 µm		-40 to 80 °C			
FB10500-500	10.50 µm ± 50 nm	500 ± 100 nm	>70%	0.2 - 16 µm		-40 to 80 °C			
FB11500-500	11.50 µm ± 50 nm	500 ± 100 nm	>60%	0.2 - 16 µm		-40 to 80 °C			
FB12000-500	12.00 µm ± 50 nm	500 ± 100 nm	>60%	0.2 - 16 µm		-40 to 80 °C			

a. Transmission: <0.1% (Average)

b. Click on for a plot and downloadable data. Measured data accounts for all losses including Fresnel reflections. Please note that the minimum transmission is only guaranteed for the specified center wavelength and that the data in the plots is typical. Actual performance may vary from lot to lot.

Part Number	Description	Price	Availability
FB6500-500	Ø1" IR Bandpass Filter, CWL = 6.50 µm, FWHM = 500 nm	$648.25	Lead Time
FB7500-500	Ø1" IR Bandpass Filter, CWL = 7.50 µm, FWHM = 500 nm	$648.25	Today
FB8000-500	Ø1" IR Bandpass Filter, CWL = 8.00 µm, FWHM = 500 nm	$648.25	Today
FB8500-500	Ø1" IR Bandpass Filter, CWL = 8.50 µm, FWHM = 500 nm	$648.25	Today
FB9000-500	Customer Inspired! Ø1" IR Bandpass Filter, CWL = 9.00 µm, FWHM = 500 nm	$648.25	In Stock Overseas
FB9500-500	Customer Inspired! Ø1" IR Bandpass Filter, CWL = 9.50 µm, FWHM = 500 nm	$648.25	Today
FB10000-500	Customer Inspired! Ø1" IR Bandpass Filter, CWL = 10.0 µm, FWHM = 500 nm	$648.25	Today
FB10500-500	Customer Inspired! Ø1" IR Bandpass Filter, CWL = 10.5 µm, FWHM = 500 nm	$648.25	Today
FB11500-500	Customer Inspired! Ø1" IR Bandpass Filter, CWL = 11.5 µm, FWHM = 500 nm	$648.25	Today
FB12000-500	Customer Inspired! Ø1" IR Bandpass Filter, CWL = 12.0 µm, FWHM = 500 nm	$648.25	Today