

## B9090AN - February 18, 2016

Item # B9090AN was discontinued on February 18, 2016. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

### 304L STEEL VIRTUALLY NONMAGNETIC BREADBOARDS, OPTIMIZED DAMPING, 60 MM (2.4") THICK



[Hide Overview](#)

#### OVERVIEW

##### Features

- Thickness: 60 mm (2.4")
- Sizes from 24" x 36" (600 mm x 900 mm) to 36" x 48" (900 mm x 1200 mm) Available
- Every Breadboard Individually Optimized, Tested, and Shipped with Test Data Certificate
- Constructed of 304L Grade Nonmagnetic Steel
- 1/2" (12.5 mm) Hole Border for Maximum Usable Area
- $\pm 0.1$  mm ( $\pm 0.004$ ") Surface Flatness over any 1 m<sup>2</sup> (11 ft<sup>2</sup>) Area
- 5 mm Stainless Steel Top and Bottom Skins with All-Steel Side Panels
- Steel-to-Steel Bonding Throughout Increases Thermal Stability

Thorlabs' 60 mm (2.4") thick Nexus™ breadboards are offered in a variety of lengths and widths from 24" x 36" (600 mm x 900 mm) to 36" x 48" (900 mm x 1200 mm). They feature all-steel construction, excellent thermal stability, and broadband damping optimized for each breadboard size. The 5 mm thick stainless steel top and bottom skins have a precision-machined matte finish with surface flatness of  $\pm 0.1$  mm over any 1 m<sup>2</sup> area. The breadboard has 1/4"-20 (M6) mounting holes on 1" (25 mm) centers with a 0.5" (12.5 mm) border at the edge of the breadboard.

##### Virtually Nonmagnetic Construction

These breadboards are constructed of 304L grade stainless steel. This alloy of steel contains less iron than typical stainless steel, which reduces its ferromagnetic properties. 304L steel is usually referred to as "virtually nonmagnetic" since weak magnetic properties are still present.

Nonmagnetic breadboards are built to order with a typical lead time of 4 - 6 weeks. Custom sizes and options are also available with a typical lead time of 6 - 8 weeks. See the *Nexus Guide* tab for a complete overview of the Nexus optical tables product line. For a comparison of all our breadboard options please see our *BB Selection Guide* Tab.

##### Support Options

We offer a number of support options for Breadboards. Our standard Breadboard Frames are available with rigid supports, or with passive or self-leveling active vibration isolation. We also offer passive isolator feet for mounting a breadboard on top of a table.

##### ScienceDesk Frames

Our ScienceDesk™ line of breadboard frames are ergonomic supports optimized for microscopy applications. They are available with rigid, passive, or active vibration isolators, and feature a number of convenient accessories. Sciencedesk frames are available to fit many of our breadboards sized from 2' x 3' to 3' x 4'.

##### Nexus™ Optical Tables and Breadboards

###### One High Quality Level

Nexus is a single high-quality grade of tables and breadboards manufactured in various sizes by Thorlabs. They are suitable for photonics, imaging, and microscopy applications and provide quality and vibration isolation performance that exceeds the highest level of our former product line. Each size is individually optimized, and each table ships with a unique test data certificate. See the *Vibration Isolation and Construction* tabs for more details.

###### More Options

See the *Nexus Guide* tab for a complete overview of our optical tables product line.





Nexus Product Line Quick Links	
Breadboards, 60 mm (2.4") Thick	Breadboards, 110 mm (4.3") Thick
Breadboards, 60 mm (2.4") Thick, Sealed Holes	Breadboards, 110 mm (4.3") Thick, Sealed Holes
Breadboards, Nonmagnetic Steel	Breadboards with No Holes
Optical Tables	

### Service & Installation

Thorlabs provides assistance with organizing table and breadboard installation. Contact techsupport@thorlabs.com or your local sales office for more information.

[Hide Specs](#)

## SPECS

Specifications		
<b>Construction</b>		
Breadboard Thickness	60 mm (2.4")	
Flatness	±0.1 mm (±0.004") Over Any 1 m <sup>2</sup>	
Construction	Symmetrical Isotropic Construction in All Axes	
Top and Bottom Plates	Matched 304L Grade Stainless Steel for Athermalized Design, 5 mm (0.20") Thick	
Core Construction	High-Density Plated 304L Grade Steel Honeycomb, 0.26 mm Thick	
Damping	Proprietary Optimized Broadband Damping	
Side Panels	Rigid 304L Grade Steel Box Section	
Side Trim Finish	Matte Black Linoleum, 2 mm Inset from Table Surface	
Top Surface Finish	Machined Matte Finish	
Compatible Mounting Options	Breadboard Frames and Isolators, ScienceDesk Frames	
Mounting Holes	<b>Imperial</b>	<b>Metric</b>
Threads and Spacing	1/4"-20 Tapped Holes on 1" Centers	M6 Tapped Holes on 25 mm Centers
Distance from Edge to First Holes	0.5" from Table Edge on all Sides	12.5 mm from Table Edge on all Sides
Maximum Screw Depth	55 mm (13.5 mm for Outer Border Holes)	

### Imperial Breadboard Dimensions & Weight

Item #	Dimensions (W x L x H)	Unpacked Weight	Packaged Shipping Weight	Packed Dimensions
B2436FN	24" x 36" x 2.4"	126.50 lbs	155.10 lbs	26.4" x 38.6" x 9.0"
B3030FN	30" x 30" x 2.4"	138.6 lbs	169.40 lbs	32.2" x 32.3" x 9.0"
B3036FN	30" x 36" x 2.4"	162.58 lbs	197.80 lbs	32.3" x 38.6" x 9.0"
B3048FN	30" x 48" x 2.4"	210.54 lbs	254.54 lbs	32.3" x 50.4" x 11.0"
B3636FN	36" x 36" x 2.4"	191.18 lbs	232.98 lbs	38.6" x 38.6" x 9.0"
B3648FN	36" x 48" x 2.4"	248.16 lbs	296.56 lbs	38.6" x 50.4" x 9.0"

### Metric Breadboard Dimensions & Mass

Item #	Dimensions (W x L x H)	Unpacked Mass	Packaged Shipping Mass	Packed Dimensions
B6090AN	600 mm x 900 mm x 60 mm	55.70 kg	69.70 kg	660 mm x 960 mm x 230 mm
B7575AN	750 mm x 750 mm x 60 mm	61.10 kg	75.10 kg	810 mm x 810 mm x 230 mm
B7590AN	750 mm x 900 mm x 60 mm	71.40 kg	87.40 kg	810 mm x 960 mm x 230 mm
B9090AN	900 mm x 900 mm x 60 mm	84.20 kg	102.20 kg	960 mm x 960 mm x 230 mm
B75120AN	750 mm x 1200 mm x 60 mm	92.70 kg	112.70 kg	810 mm x 1260 mm x 230 mm
B90120AN	900 mm x 1200 mm x 60 mm	109.40 kg	130.40 kg	960 mm x 1260 mm x 230 mm

[Hide Vibration Isolation](#)

VIBRATION ISOLATION

## Optimized Damping

### Broadband Damping

The most important feature of an optical table or breadboard is its resonant frequency. Since resonant frequency and vibration amplitude are inversely related, the resonant frequency should be as high as possible to minimize vibration intensity. Nexus tables and breadboards are broadband damped over a specific range of frequencies. For improved performance, the damping is optimized for each size of table and breadboard offered.

We have performed extensive testing to optimize the thickness/size ratio of our breadboards. Larger sized breadboards over 5' (1.2 m) long are offered with a standard 110 mm thickness. Smaller sizes are available in both 2.4" (60 mm) and 4.3" (110 mm) thicknesses.

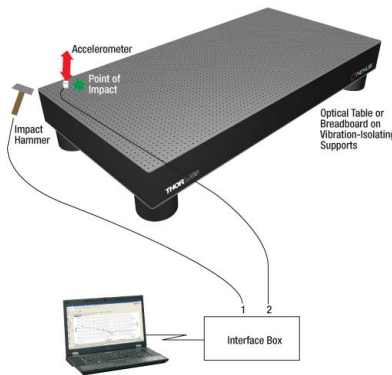
### Compliance

The most widely used transfer function for the vibrational response of an optical table is compliance. In the case of a constant (static) force, compliance is defined as the ratio of the linear or angular displacement to the magnitude of the applied force. In the case of a dynamically varying force (vibration), compliance is defined as the ratio of the excited vibrational amplitude (angular or linear displacement) to the amplitude of the force causing the vibration. Any deflection of the tabletop is evident by the change in relative position of the components mounted on the table surface. Therefore, by definition, the lower the compliance value is, the closer the optical table is to meeting the primary goal of optical table design: minimized deflection. Compliance is frequency dependant and is measured in units of displacement per unit force (meters per Newton).

See the Vibration Isolation Tutorial for more information on compliance.

### Compliance Measurement Procedure

An impulse hammer is used to apply a measured force to the top surface of the table or breadboard, and transducers attached to the surface detect the resultant vibrations (see diagram to the right). The signals from the transducers are interpreted by the analyzer and used to produce a frequency response spectrum (i.e., a compliance curve). During the development phase of an optical table, compliance curves are recorded at many points on the tabletop; however, the compliance is always greatest at the corners. The compliance curves and data published by Thorlabs are taken with the sensor located approximately 6" (150 mm) from the corner of the tabletop (closer to the edge for small breadboards), with the point of impact just inboard of the sensor. This test location represents the worst case data.



Click to Enlarge Compliance Test Schematic

### Unique Test Data Certificate

Each individual Nexus product is tested and shipped with a unique test data certificate and compliance curve. This provides more accurate data compared to the industry standard of using a single size-specific compliance curve to represent the entire product line. The compliance curves and data published by Thorlabs are from sensors located on the corner of the table and therefore represent the worst case data.



Click to Enlarge Nexus Table Compliance Testing

## Test Results

### 60 mm Thick Breadboards

Item #	Breadboard Size (W x L x H)	Compliance Curve (Click to View) <sup>a</sup>
B1212F / B1212T	12" x 12" x 60 mm	
B1218F / B1218T	12" x 18" x 60 mm	
B1224F / B1224T	12" x 24" x 60 mm	
B1236F / B1236T	12" x 36" x 60 mm	
B1818F / B1818T	18" x 18" x 60 mm	
B1824F / B1824T	18" x 24" x 60 mm	
B2424F / B2424T	24" x 24" x 60 mm	
B2436F / B2436T / B2436FN	24" x 36" x 60 mm	
B2448F / B2448T	24" x 48" x 60 mm	
B3030F / B3030T / B3030FN	30" x 30" x 60 mm	
B3036F / B3036T / B3036FN	30" x 36" x 60 mm	
B3036Y	30" x 36" x 60 mm (No Holes)	
B3048F / B3048T / B3048FN	30" x 48" x 60 mm	
B3048Y	30" x 48" x 60 mm (No Holes)	

### 110 mm Thick Breadboards

Item #	Breadboard Size (W x L x H)	Compliance Curve (Click to View) <sup>a</sup>
B2436G / B2436U	24" x 36" x 110 mm	
B2448G / B2436U	24" x 48" x 110 mm	
B2460G / B2460U	24" x 60" x 110 mm	
B3036G / B3036U	30" x 36" x 110 mm	
B3048G / B3048U	30" x 48" x 110 mm	
B3060G / B3060U	30" x 60" x 110 mm	
B3636G / B3636U	36" x 36" x 110 mm	
B3648G / B3648U	36" x 48" x 110 mm	
B3660G / B3660U	36" x 60" x 110 mm	
B3672G / B3672U	36" x 72" x 110 mm	
B4860G / B4860U	48" x 60" x 110 mm	
B4872G / B4872U	48" x 72" x 110 mm	
B6090B / B6090N	600 mm x 900 mm x 110 mm	

B3636F / B3636T / B3636FN	36" x 36" x 60 mm	
B3648F / B3648T / B3648FN	36" x 48" x 60 mm	
B3648Y	36" x 48" x 60 mm (No Holes)	
B3030A / B3030L	30 cm x 30 cm x 60 mm	
B3045A / B3045L	30 cm x 45 cm x 60 mm	
B3060A / B3060L	30 cm x 60 cm x 60 mm	
B3090A / B3090L	30 cm x 90 cm x 60 mm	
B4545A / B4545L	45 cm x 45 cm x 60 mm	
B4560A / B4560L	45 cm x 60 cm x 60 mm	
B6060A / B6060L	60 cm x 60 cm x 60 mm	
B6090A / B6090L / B6090AN / B6090Z	60 cm x 90 cm x 60 mm	
B60120A / B60120L	60 cm x 120 cm x 60 mm	
B7575A / B7575L / B7575AN	75 cm x 75 cm x 60 mm	
B7590A / B7590L / B7590AN / B7590Z	75 cm x 90 cm x 60 mm	
B75120A / B75120L / B75120AN / B75120Z	75 cm x 120 cm x 60 mm	
B9090A / B9090L / B9090AN	90 cm x 90 cm x 60 mm	
B90120A / B90120L / B90120AN / B90120Z	90 cm x 120 cm x 60 mm	

B60120B / B60120N	600 mm x 1500 mm x 110 mm	
B60150B / B60150N	600 mm x 1500 mm x 110 mm	
B7590B / B7590N	750 mm x 900 mm x 110 mm	
B75120B / B75120N	750 mm x 1200 mm x 110 mm	
B75150B / B75150N	750 mm x 1500 mm x 110 mm	
B9090B / B9090N	900 mm x 900 mm x 110 mm	
B90120B / B90120N	900 mm x 1200 mm x 110 mm	
B90150B / B90150N	900 mm x 1500 mm x 110 mm	
B90180BT / B90180N	900 mm x 1800 mm x 110 mm	
B120150B / B120150N	1200 mm x 1500 mm x 110 mm	
B120180B / B120180N	1200 mm x 1800 mm x 110 mm	

The compliance curves here are typical, and slight variations may occur between individual tables. Each table is individually tested before shipment and includes a certificate with the individual test data and compliance curve (see *Unique Test Data Certificate* section, above).

Note: Compliance data will be available soon for models with a greyed out plot icon. Compliance data is measured for each breadboard, and thus will be included with these models upon purchase.

[Hide Construction](#)

## CONSTRUCTION

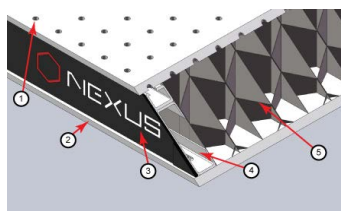
### Nexus Tables and Breadboards Construction Details Precision Steel Construction for Thermal Stability

#### All Steel Construction

Thorlabs' Nexus tables and breadboards feature all-steel construction, including 5 mm thick top and bottom skins and a 0.26 mm thick precision formed and welded steel honeycomb core. The core is geometrically formed using accurate pressing tools, and geometric pitch is retained by using welded flat shims. The honeycomb core in our Nexus tables and breadboards extends from the top skin to the bottom skin without intermediate layers, leading to a stiffer, more thermally stable product.

#### Thermal Stability

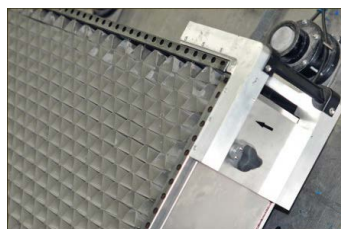
The key aspect of the thermally stable Nexus design is symmetrical isotropic steel construction in all axes. Steel components expand and contract similarly, maintaining flatness during changes in temperature. The steel core extends from top to bottom skin without intermediate plastic or aluminum spill management structures that reduce the overall stiffness of the product and introduce a higher coefficient of thermal expansion. Steel side panels are used rather than wood, which can introduce environmental instability due to susceptibility to moisture.



Click to Enlarge  
Nexus Table / Breadboard Cross Section, showing the (1) Top Skin, (2) Bottom Skin, (3) Side Finishing Trim, (4) Side Panels, and (5) Honeycomb Core

### Nexus Components

Note: For Illustrative Purposes Only. Not a representation of the Nexus Tables Construction Sequence



Click to Enlarge  
Honeycomb Core of a Nexus Table During Manufacturing

### Machined Finish

#### Automated Finishing Process

Our Nexus tables and breadboards feature an automated orbital machined matte finish that is significantly smoother and flatter than our previous product line. The improved surface finish achieves  $\pm 0.1$  mm ( $\pm 0.004$ ") flatness over 1 m<sup>2</sup> (11 ft<sup>2</sup>), providing a solid contact surface for mounting components and reducing the need for stoning the top surface.



Click to Enlarge

Nexus Tables and Breadboards Feature a Precision Machined Matte Finish, Holes that Extend to the Edge of the Tabletop, and Large Radius Corners

#### Large Radii Corners

Large radius corners are incorporated into the design, resulting in less pointed edges for lab safety.

#### Minimized Contamination

##### Sealed edges with anti-static packaging

This optional finishing and packaging service is suitable for customers that want to minimize the presence of airborne contaminants on the interior and exterior surfaces of the table or breadboard. The gap-free edge panel construction prevents dust from entering the product. The anti-static packaging, which includes a metallic foil inner layer protected by a heat shrink film outer cover, reduces static charge and minimizes the attraction of dust to the product.

#### Flexible Mounting Options

##### Individually Tapped, Countersunk Mounting Holes

Prior to bonding the components of the table, each mounting hole in the top surface is tapped and slightly countersunk to ensure that components mounted to the table sit flat. The mounting holes are then cleaned and sealed on the bottom with vinyl film discs (non-sealed models) or sealing cups (sealed hole models, see below). This ensures that each hole is completely free from any adhesive material. The vinyl film is easily punctured when using a hole for the first time. Cap screws can be finger tightened into the mounting holes of all Nexus tables and breadboards.

##### Reduced Hole Pattern Border

Our new top surface hole patterns extend to the edge of the table or breadboard with only a 12.5 mm (0.5") border, equal to half of a hole spacing. This increases the usable area of the table and improves mounting option flexibility.

##### Increased Screw Depth and Optional Sealed Holes

Our custom-designed core maker produces precision formed and welded honeycomb core strips. The core is shaped and installed so that it does not intersect with any screw holes (see photo below, to right), allowing screws to be inserted far into the table, all the way to the bottom skin (for non-sealed-hole models). See the *Specs* tab for specific screw depth specifications, including outer border holes.

##### Sealed Mounting Holes

Tables and breadboards can be manufactured with nylon sealing cups glued to the underside of the top skin (see photo below) for liquid spill management. Sealed hole tables are available in all sizes and thicknesses, and the maximum screw depth is 1" (25.4 mm).

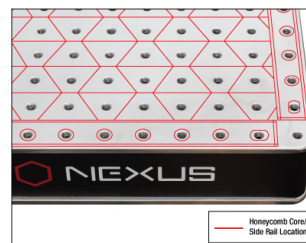
##### Mounting Holes on the Bottom Skin

Our breadboards feature at least four mounting holes in the base skin, permitting the secure attachment of standard or vibration isolating feet and allowing more flexibility for integrating breadboards onto tables or into setups in addition to using breadboard stands.



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Nylon Sealing Cups Installation During Manufacturing


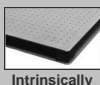








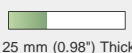


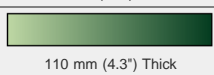
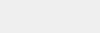
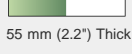




Click to Enlarge

Nexus breadboard showing the location of the honeycomb core and side panels, which do not intersect with any screw holes.

When sealing cups are not present, the maximum screw depth is equivalent to the thickness of the table or breadboard minus 5 mm. Sealed holes have a screw depth of 1" (25.4 mm) for both tables and breadboards. Border holes are 13.5 mm for breadboards and 23.5 mm for tables.

[Hide BB Selection Guide](#)

BB SELECTION GUIDE					
					
<b>Breadboards</b>	<b>Nexus, Optimized Damping</b>	<b>Intrinsically Damped</b>	<b>Aluminum Honeycomb</b>	<b>Solid Aluminum</b>	<b>Optically Clear Acrylic</b>
<b>Construction</b>					
Breadboard Thickness	60 mm (2.4") 110 mm (4.3")	58 mm (2.28")	25 mm (0.98") 55 mm (2.2")	12.7 mm (0.5")	12.7 mm (0.5")
Working Surface	430 Grade Stainless Steel Top Plate		Aluminum	Solid Aluminum Anodized or Unanodized	Acrylic
Top Skin	5 mm (0.20")	5 mm (0.20")	6 mm (0.24")	N/A	N/A
Bottom Skin	5 mm (0.20")	3 mm (0.12")	3 mm (0.12")	N/A	N/A
Core Design	High-Density Plated Steel Honeycomb, 0.26 mm Thick		High-Density Plated Aluminum Honeycomb	N/A	N/A
Side Panels	Rigid Steel Box Section	Moisture-Resistant Medium Density Fiberboard (MDF)	Black Laminated Aluminum Sides	N/A	N/A
Ferromagnetism	Magnetic or Non-Magnetic Options		Magnetic	Non-Magnetic	
Sealed Holes	Sealed (25 mm Depth) or Non-Sealed Options		Non-Sealed		N/A
Threads and Spacing	1/4"-20 (M6) Tapped Holes on 1" (25 mm) Centers or Untapped Top Plate		1/4"-20 (M6) Tapped Holes on 1" (25 mm) Centers		1/4"-20 Tapped Holes on 0.5" (12.7 mm) Centers
Distance from Edge to First Holes	0.5" (12.5 mm) on all Sides	1.5" (37.5 mm) on all Sides	1.0" (25 mm) on all Sides	0.5" (12.5 mm) on all Sides	1.0" (25.4 mm) on all Sides
<b>Performance<sup>a</sup></b>					
Damping				N/A	N/A
Stiffness	 60 mm (2.4") Thick		 25 mm (0.98") Thick		
	 110 mm (4.3") Thick		 55 mm (2.2") Thick		
<ul style="list-style-type: none"> <li>The damping and stiffness performance shown here is qualitative and does not relate to exact specifications of each breadboard.</li> </ul>					

[Hide Imperial Nonmagnetic Optical Breadboards, Built to Order, Shipped from the UK](#)

**Imperial Nonmagnetic Optical Breadboards, Built to Order, Shipped from the UK**

Part Number	Description	Price	Availability
B2436FN	Nexus Breadboard, 24" x 36" x 2.4", 1/4"-20 Mounting Holes, 304L Nonmagnetic Steel	\$1,856.38	Lead Time
B3030FN	Nexus Breadboard, 30" x 30" x 2.4", 1/4"-20 Mounting Holes, 304L Nonmagnetic Steel	\$1,899.17	Lead Time
B3036FN	Nexus Breadboard, 30" x 36" x 2.4", 1/4"-20 Mounting Holes, 304L Nonmagnetic Steel	\$2,113.16	Lead Time
B3636FN	Nexus Breadboard, 36" x 36" x 2.4", 1/4"-20 Mounting Holes, 304L Nonmagnetic Steel	\$2,369.95	Lead Time
B3048FN	Nexus Breadboard, 30" x 48" x 2.4", 1/4"-20 Mounting Holes, 304L Nonmagnetic Steel	\$2,541.14	Lead Time
B3648FN	Nexus Breadboard, 36" x 48" x 2.4", 1/4"-20 Mounting Holes, 304L Nonmagnetic Steel	\$2,883.53	Lead Time

[Hide Metric Nonmagnetic Optical Breadboards, Built to Order, Shipped from the UK](#)

**Metric Nonmagnetic Optical Breadboards, Built to Order, Shipped from the UK**

Part Number	Description	Price	Availability
B6090AN	Nexus Breadboard, 600 mm x 900 mm x 60 mm, M6 x 1.0 Mounting Holes, 304L Nonmagnetic Steel	\$1,856.38	Lead Time
B7575AN	Nexus Breadboard, 750 mm x 750 mm x 60 mm, M6 x 1.0 Mounting Holes, 304L Nonmagnetic Steel	\$1,899.17	Lead Time
B7590AN	Nexus Breadboard, 750 mm x 900 mm x 60 mm, M6 x 1.0 Mounting Holes, 304L Nonmagnetic Steel	\$2,113.16	Lead Time
B75120AN	Nexus Breadboard, 750 mm x 1200 mm x 60 mm, M6 x 1.0 Mounting Holes, 304L Nonmagnetic Steel	\$2,541.14	Lead Time
B9090AN	Nexus Breadboard, 900 mm x 900 mm x 60 mm, M6 x 1.0 Mounting Holes, 304L Nonmagnetic Steel	\$2,369.95	Lead Time
B90120AN	Nexus Breadboard, 900 mm x 1200 mm x 60 mm, M6 x 1.0 Mounting Holes, 304L Nonmagnetic Steel	\$2,883.53	Lead Time

Visit the [304L Steel Virtually Nonmagnetic Breadboards, Optimized Damping, 60 mm \(2.4"\) Thick](#) page for pricing and availability information:  
[https://www.thorlabs.com/newgrouppage9.cfm?objectgroup\\_id=1084](https://www.thorlabs.com/newgrouppage9.cfm?objectgroup_id=1084)