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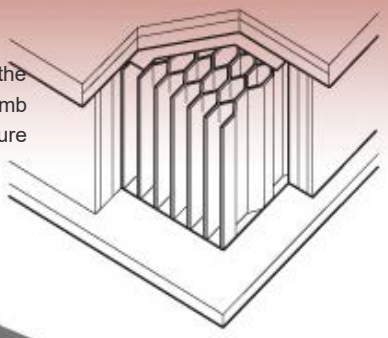
THORLABS

PBG11105 - June 20, 2019

Item # PBG11105 was discontinued on June 20, 2019. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

ALUMINUM BREADBOARDS: HIGH STIFFNESS, 25 MM (0.98") THICK

- **All-Aluminum Construction Minimizes Thermal Instabilities**
- **High Strength-to-Weight Ratio**
- **Useful for Applications Demanding a Totally Nonmagnetic Structure**



Cutaway Showing the Internal Honeycomb Structure



PBG11119
12" x 18" UltraLight™ Optical Breadboard



OVERVIEW

Features

- Thickness: 25 mm (0.98")
- Up to 20% Lighter than Equivalent Surface Area Solid Aluminum Surface Plates (See *Specs* Tab for Weights)
- All-Aluminum Construction for Matching CTE to Reduce Thermal Effects
- Large Range of Sizes (W x L):
  - Imperial: 1' x 1' to 3' x 5'
  - Metric: 300 mm x 300 mm to 900 mm x 1500 mm
- Higher Rigidity than 0.5" Thick Solid Aluminum Breadboards (See *Construction* Tab for Details)
- Black Matte Painted Surface Reduces Reflectivity and Backscatter
- High-Density Honeycomb Core Provides Static and Dynamic Rigidity
- Custom Sizes Available; Contact Tech Support for Details

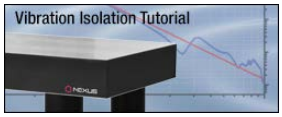
Key Specifications[a]		
Construction		
Breadboard Thickness	25 mm (0.98")	
Top Skin Flatness	±0.15 mm (±0.006") Over Any 0.3 m^2	
Construction	Double-Plate, Single-Honeycomb Core, Athermalized Aluminum Design	
Mounting Holes	**Imperial**	**Metric**
Threads and Spacing	1/4"-20 Tapped Holes on 1" Centers	M6 Tapped Holes on 25 mm Centers
Distance from Edge to First Holes	1.0" from Table Edge on all Sides	25.0 mm from Table Edge on all Sides
Maximum Screw Depth	6 mm (0.24") from Top Surface	

- a. For complete specifications that include specific breadboard dimensions and weights, see the *Specs* tab.

UltraLight™ Honeycomb Breadboards offer a high strength-to-weight ratio and an all-aluminum construction. Using aluminum throughout means that the breadboard will have similar coefficients of thermal expansion (CTE), which will minimize thermal instabilities. These breadboards are ideal for optical setups

where portability and dynamic rigidity are important. They are typically used as replacements for aluminum, steel, or granite surface plates, as well as for applications demanding a totally nonmagnetic surface.

Choosing an Optical Breadboard





When choosing an aluminum optical breadboard, stiffness is a major consideration. For aluminum optical breadboards, Thorlabs offers two levels of stiffness: high and enhanced. Although most people associate deflection under load with thickness, it is actually the stiffness of a board that determines the deflection.

The higher the stiffness, the better the breadboard's ability to resist bending when a load or force is applied to it. Therefore, when a heavy load is placed in the center of a breadboard with high stiffness, the board will deflect more than it would if the same load were placed on an enhanced stiffness breadboard. This deflection can create misalignment between two components on opposite ends of the breadboard. This is especially important, for example, when conducting experiments that require sliding optical setups across the breadboard while maintaining a straight optical axis.

We also offer a broad selection of Nexus® Steel Honeycomb Breadboards, which provide greater stiffness and vibration damping. For a quick comparison of our different breadboard options, please see the *BB Selection Guide* tab.

Frame and Isolation 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 and electronic isolator feet for mounting a breadboard on top of a table.

SPECS

Specifications		
Construction		
Breadboard Thickness	25 mm (0.98")	
Top Skin Flatness	±0.15 mm (± 0.006") Over Any 0.3 m^2	
Construction	Double-Plate, Single-Honeycomb Core, Athermalized Aluminum Design	
Top Plate	6 mm Thick Aluminum	
Bottom Plate	3 mm Thick Aluminum	
Core	High-Density Plated Aluminum Honeycomb	
Sides	Black Laminated Aluminum Sides, Slightly Inset	
Finish	Matte Black	
Mounting Holes	**Imperial**	**Metric**
Threads and Spacing	1/4"-20 Tapped Holes, Not Sealed, on 1" Centers	M6 Tapped Holes, Not Sealed, on 25 mm Centers
Distance from Edge to First Holes	1.0" on all Sides	25.0 mm on all Sides
Maximum Screw Depth	6 mm from Top Surface	

Imperial Breadboard Dimensions and Weights					
Item #	**Dimensions (W x L x H)**	**Unpackaged Mass[a]**	**Unpackaged Weight[a]**	**Packaged Shipping Mass[a]**	**Packaged Shipping Weight[a]**
PBG11101	12" x 12" x 0.98"	3.17 kg	7.00 lbs	7.00 kg	15.40 lbs
PBG11119	12" x 18" x 0.98"	3.80 kg	8.38 lbs	8.99 kg	19.84 lbs
PBG11102	12" x 24" x 0.98"	5.00 kg	11.02 lbs	11.00 kg	24.20 lbs
PBG11103	12" x 36" x 0.98"	9.07 kg	20.00 lbs	15.03 kg	33.07 lbs
PBG11104	12" x 48" x 0.98"	10.00 kg	22.05 lbs	20.00 kg	44.09 lbs

PBG11120	18" x 18" x 0.98"	5.70 kg	12.57 lbs	12.00 kg	26.46 lbs
PBG11118	18" x 24" x 0.98"	7.71 kg	17.00 lbs	16.00 kg	35.20 lbs
PBG11105	24" x 24" x 0.98"	9.07 kg	20.00 lbs	20.00 kg	44.00 lbs
PBG11106	24" x 36" x 0.98"	13.15 kg	29.00 lbs	27.94 kg	61.60 lbs
PBG11107	24" x 48" x 0.98"	20.41 kg	45.00 lbs	33.93 kg	74.80 lbs
PBG11110	30" x 36" x 0.98"	15.90 kg	35.00 lbs	32.93 kg	72.60 lbs
PBG11111	30" x 48" x 0.98"	25.00 kg	55.00 lbs	41.91 kg	92.40 lbs
PBG11112	36" x 36" x 0.98"	21.00 kg	46.30 lbs	38.91 kg	85.80 lbs
PBG11113	36" x 48" x 0.98"	30.94 kg	68.20 lbs	50.90 kg	112.20 lbs
PBG11114	36" x 60" x 0.98"	40.92 kg	90.20 lbs	62.90 kg	138.60 lbs

- a. These weights are approximate and are subject to change. The information is only to be used as a guideline.

Metric Breadboard Dimensions and Weights					
Item #	**Dimensions (W x L x H)**	**Unpackaged Mass[a]**	**Unpackaged Weight[a]**	**Packaged Shipping Mass[a]**	**Packaged Shipping Weight[a]**
PBG51501	300 mm x 300 mm x 25 mm	3.17 kg	7.00 lbs	6.99 kg	15.40 lbs
PBG51523	300 mm x 450 mm x 25 mm	3.70 kg	8.16 lbs	8.99 kg	19.84 lbs
PBG51502	300 mm x 600 mm x 25 mm	5.00 kg	11.00 lbs	11.00 kg	24.20 lbs
PBG51503	300 mm x 900 mm x 25 mm	7.50 kg	16.53 lbs	15.03 kg	33.00 lbs
PBG51524	450 mm x 450 mm x 25 mm	5.50 kg	12.12 lbs	12.00 kg	26.46 lbs
PBG51522	450 mm x 600 mm x 25 mm	8.16 kg	18.00 lbs	15.31 kg	33.75 lbs
PBG51505	600 mm x 600 mm x 25 mm	10.43 kg	23.00 lbs	20.00 kg	44.00 lbs
PBG51506	600 mm x 900 mm x 25 mm	15.00 kg	33.00 lbs	25.90 kg	57.00 lbs
PBG51507	600 mm x 1200 mm x 25 mm	16.78 kg	37.00 lbs	33.93 kg	74.80 lbs
PBG51509	750 mm x 750 mm x 25 mm	14.00 kg	30.86 lbs	26.00 kg	57.20 lbs
PBG51510	750 mm x 900 mm x 25 mm	18.14 kg	40.00 lbs	31.93 kg	70.40 lbs
PBG51511	750 mm x 1200 mm x 25 mm	25.00 kg	55.00 lbs	39.92 kg	88.00 lbs
PBG51512	900 mm x 900 mm x 25 mm	23.13 kg	51.00 lbs	36.92 kg	81.40 lbs
PBG51513	900 mm x 1200 mm x 25 mm	29.94 kg	66.00 lbs	50.90 kg	112.20 lbs
PBG51514	900 mm x 1500 mm x 25 mm	39.92 kg	88.00 lbs	56.88 kg	125.40 lbs

- a. These weights are approximate and are subject to change. The information is only to be used as a guideline.

CONSTRUCTION

Ultralight™ Honeycomb Aluminum Breadboard Construction



Click to Enlarge Construction Features

Thorlabs UltraLight™ optical breadboards offer high strength-to-weight ratio and excellent thermal stability. These breadboards are ideal for optical setups where portability and dynamic rigidity are important.

As shown in the diagram to the right, these breadboards incorporate a double-plate, single-honeycomb design, providing excellent stiffness and dynamic rigidity (see test performed below). The top layer consists of a 6 mm aluminum top plate. The second layer adds the main aluminum honeycomb structure and the 3 mm aluminum bottom plate. The main honeycomb core is fabricated from strips of precision-formed plated aluminum, which is bonded together with a high tensile strength epoxy adhesive.

Excellent Surface Flatness

Breadboard flatness is critically important during many experimental setups. Lack of local flatness requires readjustment of components for height variations across the breadboard and can cause component “wobble”. Thorlabs breadboards offer an unsurpassed flatness of ±0.15 mm (±0.006") over any 0.3 m^2 area

due to the high-precision aluminum plates which are specially handled to maintain superior flatness throughout the manufacturing process. A unique thermal bonding process ensures that stress is not induced during manufacture, thereby retaining the flatness of the top plate.

Athermalized Design

Thorlabs breadboards have matched aluminum for both the top and bottom plates. This unique athermalized design eliminates thermal bowing effects caused by temperature variations.

Stiffness Comparison Testing: Honeycomb Aluminum Breadboards vs. Solid Aluminum Breadboards

Purpose: Show that an UltraLight PBG51507 breadboard measuring 600 mm x 1200 mm x 25 mm with an unpackaged mass of 16.78 kg has a greater stiffness then the equivalent size MB60120/M solid aluminum breadboard that is 0.5" thick and has an unpackaged mass of 23.00 kg.

Procedure: As shown in Figure 1 below, each table was supported by fulcrum points that were spaced 1 m apart. Then, various loads were applied uniformly across the center of the breadboard and the amount of deflection was measured. From the data collected, a plot of Force vs. Displacement was created as shown to the right.

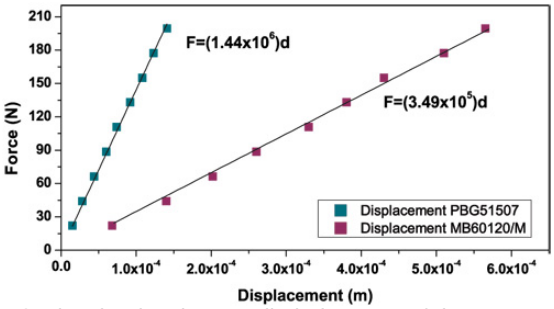


Figure 2: Plot Showing the Overall Displacement of the PBG51507 and MB60120/M After a Uniform Force was Applied to the Center of the Breadboard (See Diagram to the Left)

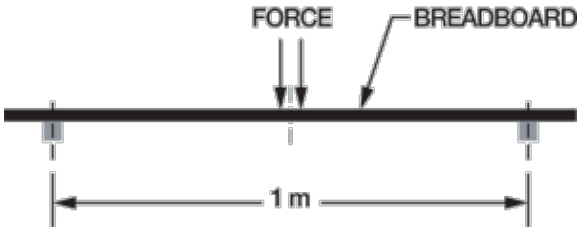
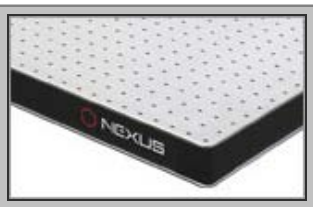
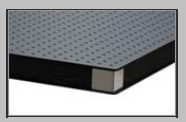
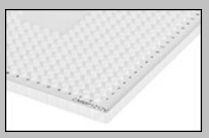


Figure 1: Both breadboards were reinforced at two defined fulcrum points. A uniform force was then applied to the center of each board and deflection measured.

Results: The result shown in figure 2 shows that the PBG51507 honeycomb aluminum breadboard, which is 27% lighter than the MB60120/M solid aluminum breadboard, is 4.1 times stiffer. This can be found by dividing the two stiffness values, 1.44 x 10^6 and 3.49 x 10^5.

Conclusions: As can be seen in Figure 2, it is clear that the PBG51507 UltraLight honeycomb aluminum breadboards, though lighter by 6.22 kg, have a greater stiffness than the MB60120/M 0.5" thick solid aluminum breadboards. Therefore, our UltraLight series of breadboards is an excellent choice if you are looking for a light-weight breadboard with extremely good rigidity.

BB SELECTION GUIDE

Breadboards	 Nexus, Optimized Damping	 Intrinsically Damped	 Aluminum Honeycomb	 Solid Aluminum	 Optically Clear Acrylic
Construction					
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	Unplasticized Polyvinyl Chloride (uPVC)	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	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		1.0" (25 mm) on all Sides	0.5" (12.5 mm) on all Sides	1.0" (25.4 mm) on all Sides
Performance[a]					
Damping				N/A	N/A
Stiffness	 60 mm (2.4") Thick  110 mm (4.3") Thick		 25 mm (0.98") Thick  55 mm (2.2") Thick		

- a. The damping and stiffness performance shown here is qualitative and does not relate to exact specifications of each breadboard.

Optical Breadboard Selection Guides

The selection guides below list every size offered for our honeycomb, solid aluminum, and acrylic breadboards. Simply locate the specific width and length needed and then select the type of breadboard. Expand each table by clicking the *More [+]* button within the header.

Imperial Optical Breadboard Size Options										
Width	Length	Honeycomb					Solid Aluminum			Acrylic, Transparent
		Nexus (60 mm Thick)[a]	Nexus (110 mm Thick)[a]	Intrinsically Damped (58 mm Thick)	Aluminum (25 mm Thick)	Aluminum (55 mm Thick)	Anodized, Standard	Anodized, Double Density	Unanodized, Standard	

- a. Item Number Suffix:
  - F, A, B, or G: Non-Sealed Mounting Holes
  - T, L, U, or N: Sealed Mounting Holes
  - FN or AN: Nonmagnetic Mounting Holes
  - Y or Z: No Mounting Holes
- b. Build-to-Order
- c. Tapped Hole Pattern Aligned at 45°

Metric Optical Breadboard Size Options									
Width	Length	Honeycomb					Solid Aluminum		
		Nexus (60 mm Thick)[a]	Nexus (110 mm Thick)[a]	Intrinsically Damped (58 mm Thick)	Aluminum (25 mm Thick)	Aluminum (55 mm Thick)	Anodized, Standard	Anodized, Double Density	Unanodized, Standard

- a. Item Number Suffix:
  - F, A, B, or G: Non-Sealed Mounting Holes
  - T, L, U, or N: Sealed Mounting Holes
  - FN or AN: Nonmagnetic Mounting Holes

Y or Z: No Mounting Holes

- b. Build-to-Order
- c. Tapped Hole Pattern Aligned at 45°

Imperial Breadboards, Stocked in USA

Part Number	Description	Price	Availability
PBG11119	UltraLight Breadboard, 12" x 18" x 0.98", 1/4"-20 Taps	$502.19	Today
PBG11102	UltraLight Breadboard, 12" x 24" x 0.98", 1/4"-20 Taps	$557.87	Today
PBG11103	UltraLight Breadboard, 12" x 36" x 0.98", 1/4"-20 Taps	$671.33	Today
PBG11120	UltraLight Breadboard, 18" x 18" x 0.98", 1/4"-20 Taps	$587.29	Today
PBG11118	UltraLight Breadboard, 18" x 24" x 0.98", 1/4"-20 Taps	$672.38	Today
PBG11105	UltraLight Breadboard, 24" x 24" x 0.98", 1/4"-20 Taps	$786.90	Today
PBG11106	UltraLight Breadboard, 24" x 36" x 0.98", 1/4"-20 Taps	$1,012.78	Today
PBG11107	UltraLight Breadboard, 24" x 48" x 0.98", 1/4"-20 Taps	$1,247.06	Today
PBG11110	UltraLight Breadboard, 30" x 36" x 0.98", 1/4"-20 Taps	$1,181.93	Today
PBG11111	UltraLight Breadboard, 30" x 48" x 0.98", 1/4"-20 Taps	$1,471.89	Today
PBG11112	UltraLight Breadboard, 36" x 36" x 0.98", 1/4"-20 Taps	$1,354.22	Today
PBG11113	UltraLight Breadboard, 36" x 48" x 0.98", 1/4"-20 Taps	$1,697.77	Today

Imperial Breadboards, Custom Order

The price box below lists commonly requested breadboard sizes. If another size is required, please contact Tech Support.

Part Number	Description	Price	Availability
PBG11101	UltraLight Breadboard, 12" x 12" x 0.98", 1/4"-20 Taps	$445.45	Lead Time
PBG11104	UltraLight Breadboard, 12" x 48" x 0.98", 1/4"-20 Taps	$786.90	Lead Time
PBG11114	UltraLight Breadboard, 36" x 60" x 0.98", 1/4"-20 Taps	$2,030.81	Lead Time

Metric Breadboards, Stocked in UK

Part Number	Description	Price	Availability
PBG51501	UltraLight Breadboard, 300 x 300 x 25 mm, M6 Taps	$445.45	Today
PBG51523	UltraLight Breadboard, 300 x 450 x 25 mm, M6 Taps	$502.19	Lead Time
PBG51502	UltraLight Breadboard, 300 x 600 x 25 mm, M6 Taps	$557.87	Today
PBG51503	UltraLight Breadboard, 300 x 900 x 25 mm, M6 Taps	$671.33	Lead Time
PBG51524	UltraLight Breadboard, 450 x 450 x 25 mm, M6 Taps	$587.29	Lead Time
PBG51522	UltraLight Breadboard, 450 x 600 x 25 mm, M6 Taps	$672.38	Today
PBG51505	UltraLight Breadboard, 600 x 600 x 25 mm, M6 Taps	$786.90	Lead Time
PBG51506	UltraLight Breadboard, 600 x 900 x 25 mm, M6 Taps	$1,012.78	Today
PBG51507	UltraLight Breadboard, 600 x 1200 x 25 mm, M6 Taps	$1,247.06	Today
PBG51510	UltraLight Breadboard, 750 x 900 x 25 mm, M6 Taps	$1,181.93	Lead Time

PBG51511	UltraLight Breadboard, 750 x 1200 x 25 mm, M6 Taps	$1,471.89	Lead Time
PBG51512	UltraLight Breadboard, 900 x 900 x 25 mm, M6 Taps	$1,354.22	Lead Time
PBG51513	UltraLight Breadboard, 900 x 1200 x 25 mm, M6 Taps	$1,697.77	Lead Time
PBG51514	UltraLight Breadboard, 900 x 1500 x 25 mm, M6 Taps	$2,030.81	Lead Time

Metric Breadboards, Custom Order

The price box below lists commonly requested breadboard sizes. If another size is required, please contact Tech Support.

Part Number	Description	Price	Availability
PBG51509	UltraLight Breadboard, 750 x 750 x 25 mm, M6 Taps	$1,138.85	Lead Time

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