



# PBG11103 - July 16, 2019

Item # PBG11103 was discontinued on July 16, 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



#### See BB Selection Guide Tab

### **Hide Overview**

## OVERVIEW

## **Features**

- Thickness: 25 mm (0.98")
- Sides with Smooth Finish or T-Slot for 25 mm Rail Compatibility
- · Lighter than Equivalent Surface Area Solid Aluminum Surface Plates
- All-Aluminum Plates and Core for Matching CTE to Reduce Thermal Effects
- · Large Range of Sizes (W x L):
  - Imperial: 1' x 1' to 3' x 4'
  - Metric: 300 mm x 300 mm to 900 mm x 1500 mm
- More Rigid than 0.5" Thick Solid Aluminum Breadboards (See Construction Tab for
- Matte Black Painted Surface Reduces Reflectivity and Backscatter
- High-Density Honeycomb Core Provides Static and Dynamic Rigidity
- · Custom Sizes Available; Contact Tech Support for Details

General Specifications<sup>a</sup> 25 mm (0.98") **Breadboard Thickness** Top Skin Flatness ±0.15 mm (±0.006") Over Any 0.3 m<sup>2</sup> Double-Plate, Single-Honeycomb Core, Construction Athermalized Aluminum Design Top Plate 6 mm Thick Aluminum **Bottom Plate** 3 mm Thick Aluminum Core High-Density Plated Aluminum Honeycomb Finish Matte Black Paint 6 mm (0.24") from Top Surface Maximum Screw Depth 1/4"-20 (M6) Taps on Bottom Plate **Breadboard Mounting** 

· For additional specifications that include specific breadboard dimensions and weights, see the tables below.

Thorlabs' UltraLight™ Honeycomb Breadboards offer a high strength-to-weight ratio and all-aluminum plates and core. Due to this construction, each breadboard has similar coefficients of

thermal expansion, which minimizes 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 The T-Slot located on the as for applications demanding a totally nonmagnetic surface. Additionally, breadboards ending in "F" or "A" feature a t-slot that is compatible with our 25 mm rails and accessories. This allows for construction of rail systems or optical enclosures without the loss of taps. These breadboards

also have plastic covers on the corners; two have labels with either the item number or serial

for Details sides is compatible with our 25 mm rails and accessories.



Click to Enlarge [APPLIST] [APPLIST]

An optical enclosure can be constructed and attached to the side of a 25 mm rail compatible breadboard for easy placement of the enclosure. Please note this application requires the use of drop-in T-Nuts and standard 8-32 cap screws for attaching the hinges to the breadboard.

#### **Choosing an Optical Breadboard**

number.

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.

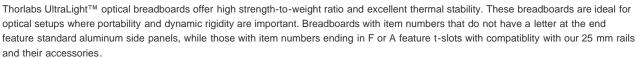
#### Frame and Isolation Options

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.

### **Hide Construction**

### CONSTRUCTION

## Ultralight<sup>™</sup> Honeycomb Aluminum Breadboard Construction





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. This all-aluminum construction minimizes thermal bowing effects caused by temperature variations.

### **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<sup>2</sup> 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.

### 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 19.0 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 23.49 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.

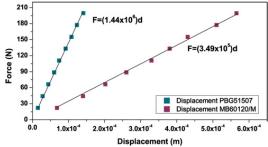


Figure 2: Plot Showing the Overall Displacement of the PBG51507 and MB60120/M After a Uniform Force was Applied to the Center of the Breadboard (See Diagram to the Left)

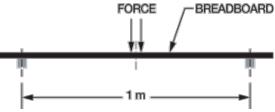


Figure 1: Both breadboards were reinforced at two defined fulcrum points. A uniform force was then applied to the center of each board and deflection measured.

**Results:** The result shown in figure 2 shows that the PBG51507 honeycomb aluminum breadboard, which is 19% lighter than the MB60120/M solid aluminum breadboard, is 4.1 times stiffer. This can be found by dividing the two stiffness values,  $1.44 \times 10^6$  and  $3.49 \times 10^5$ .

**Conclusions:** As can be seen in Figure 2, it is clear that the PBG51507 UltraLight honeycomb aluminum breadboards, though lighter by 4.49 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.

### Hide BB Selection Guide

### 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")	7.0 mm (0.28") 9.5 mm (0.375") 12.7 mm (0.5")	12.7 mm (0.5")
Working Surface	430 Grade Stainless Steel or 304L Grade Nonmagnetic Steel Top Plate	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 Honeycom	nb, 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
Thread Options	1/4"-20 (M6) Tapped Holes	1/4"-20 (M6)	Tapped Holes	1/4"-20 (M6), 4-40 (M3), or 8-32 (M3) and 1/4"-20 (M6) Tapped Holes	1/4"-20 Tapped Holes

Spacing	1" (25 mm) Centers	m) Centers	1" (25 mm) Centers or 0.5" (12.7 mm) Centers	0.5" (12.7 mm) Centers	
Distance from Edge to First Holes	0.5" (12.5 mm) on all S	Sides	0.5" (12.5 mm) or 1.0" (25 mm) on all Sides	0.5" (12.5 mm) on all Sides	1.0" (25.4 mm) on all Sides
Damping				N/A	N/A
Stiffness	60 mm (2.4") Thick		25 mm (0.98") Thick  55 mm (2.2") Thick		

· 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.

Thorlabs also offers several unique breadboard solutions. For applications requiring temperature control, we offer anodized aluminum water cooled breadboards in several sizes, in addition to a temperature-controlled mini-series breadboard for small-scale operations. Our anodized aluminum large-area translation stages and rotating breadboards offer hand-operated positioning control, while our manual and motorized translating mounting platforms are ideal for use in microscopy applications.

	Imperial Optical Breadboard Size Options										
				Honeycomb				Solid Aluminur	n <sup>a</sup>		
Width	Length	Nexus (60 mm Thick) <sup>b</sup>	Nexus (110 mm Thick) <sup>b</sup>	Intrinsically Damped (58 mm Thick)	Aluminum (25 mm Thick)	Aluminum (55 mm Thick)	Standard	Double Density	High Density	Acrylic, Transparent	

- Solid aluminum breadboards are offered with four different thicknesses: 0.5" (Item # prefix MB), 0.75" (Item # prefix MBH), 3/8" (Item # prefix MS), or 0.28" (Item # prefix MS). Select sizes are also available in hard-coat anodized aluminum (Item #s CMMP1818 and CMMP2424) or without an anodized coating (Item #s ending with U).
- 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
- Tapped Hole Pattern Aligned at 45°
- Build-to-Order
- Includes a T-Slot in Side Panels for Compatibility with 25 mm Rail Accessories
- · This product has an access aperture.

	Metric Optical Breadboard Size Options									
				Honeycomb				Solid Aluminur	n <sup>a</sup>	
Width	Length	Nexus (60 mm Thick) <sup>b</sup>	Nexus (110 mm Thick) <sup>b</sup>	Intrinsically Damped (58 mm Thick)	Aluminum (25 mm Thick)	Aluminum (55 mm Thick)	Standard	Double Density	High Density	

- Solid aluminum breadboards are offered with four different thicknesses: 12.7 mm (Item # prefix MB), 19.05 mm (Item # prefix MBH), 9.5 mm (Item # prefix MS), or 7.0 mm (Item # prefix MS). Select sizes are also available without an anodized coating (Item #s ending with U).
- 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
- · Tapped Hole Pattern Aligned at 45°

- Build-to-Order
- Includes a T-Slot in Side Panels for Compatibility with 25 mm Rail Accessories
- · This product has an access aperture.

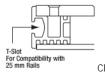
Hide Imperial Breadboards, 25 mm Rail Compatible Sides, Stocked in USA

## Imperial Breadboards, 25 mm Rail Compatible Sides, Stocked in USA

These breadboards feature sides with a t-slot that is compatible with our 25 mm rails and accessories. See the diagram to the bottom left for more information.

Item #	Size	Number of Taps	Unpackaged Mass	Unpackaged Weight	Packaged Shipping Mass <sup>a</sup>	Packaged Shipping Weight <sup>a</sup>	Distance From Edge to First Holes
PBG1212F	12" x 12"	144	2.9 kg	6.4 lbs	7.0 kg	15.4 lbs	
PBG1218F	12" x 18"	216	4.1 kg	9.0 lbs	9.0 kg	19.8 lbs	
PBG1224F	12" x 24"	288	5.5 kg	12.1 lbs	11.0 kg	24.3 lbs	
PBG1236F	12" x 36"	432	8.1 kg	17.9 lbs	17.0 kg	37.5 lbs	
PBG1818F	18" x 18"	324	6.0 kg	13.2 lbs	12.0 kg	26.5 lbs	
PBG1824F	18" x 24"	432	8.1 kg	17.9 lbs	15.0 kg	33.1 lbs	0.5"
PBG2424F	24" x 24"	576	10.7 kg	23.6 lbs	18.0 kg	39.7 lbs	0.5
PBG2436F	24" x 36"	864	15.8 kg	34.8 lbs	28.0 kg	61.7 lbs	
PBG2448F	24" x 48"	1152	20.9 kg	46.1 lbs	36.0 kg	79.4 lbs	
PBG3036F	30" x 36"	1080	19.6 kg	43.2 lbs	34.0 kg	75.0 lbs	
PBG3048F	30" x 48"	1440	26.0 kg	57.3 lbs	45.0 kg	99.2 lbs	
PBG3648F	36" x 48"	1728	31.0 kg	68.3 lbs	52.0 kg	114.6 lbs	

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



for Details
The T-Slot located on the sides is compatible with our 25 mm rails and accessories.

Part Number	Description	Price	Availability
PBG1212F	NEW! UltraLight Breadboard, 12" x 12" x 0.98", 1/4"-20 Taps	\$445.45	Today
PBG1218F	NEW! UltraLight Breadboard, 12" x 18" x 0.98", 1/4"-20 Taps	\$502.19	Today
PBG1224F	NEW! UltraLight Breadboard, 12" x 24" x 0.98", 1/4"-20 Taps	\$557.87	Today
PBG1236F	NEW! UltraLight Breadboard, 12" x 36" x 0.98", 1/4"-20 Taps	\$671.33	Today
PBG1818F	NEW! UltraLight Breadboard, 18" x 18" x 0.98", 1/4"-20 Taps	\$786.90	Today
PBG1824F	NEW! UltraLight Breadboard, 18" x 24" x 0.98", 1/4"-20 Taps	\$672.38	Today
PBG2424F	NEW! UltraLight Breadboard, 24" x 24" x 0.98", 1/4"-20 Taps	\$786.90	Today
PBG2436F	NEW! UltraLight Breadboard, 24" x 36" x 0.98", 1/4"-20 Taps	\$1,012.78	Today
PBG2448F	NEW! UltraLight Breadboard, 24" x 48" x 0.98", 1/4"-20 Taps	\$1,247.06	Today
PBG3036F	NEW! UltraLight Breadboard, 30" x 36" x 0.98", 1/4"-20 Taps	\$1,181.93	Today
PBG3048F	NEW! UltraLight Breadboard, 30" x 48" x 0.98", 1/4"-20 Taps	\$1,471.89	Today
PBG3648F	NEW! UltraLight Breadboard, 36" x 48" x 0.98", 1/4"-20 Taps	\$1,697.77	Today

Hide Imperial Breadboards, Smooth Sides, Stocked in USA

Item #	Size	Number of Taps	Unpackaged Mass	Unpackaged Weight	Packaged Shipping Mass <sup>a</sup>	Packaged Shipping Weight <sup>a</sup>	Distance From Edge to First Holes
PBG11119	12" x 18"	187	3.9 kg	8.6 lbs	9.0 kg	19.8 lbs	
PBG11102	12" x 24"	253	5.1 kg	11.2 lbs	11.0 kg	24.3 lbs	
PBG11103	12" x 36"	385	7.6kg	16.8 lbs	15.0 kg	33.1 lbs	
PBG11118	18" x 24"	391	7.5 kg	16.5 lbs	16.0 kg	35.3 lbs	
PBG11106	24" x 36"	805	14.7 kg	32.4 lbs	27.9 kg	61.6 lbs	1.0"
PBG11107	24" x 48"	1081	19.6 kg	43.2 lbs	33.9 kg	74.8 lbs	
PBG11110	30" x 36"	1015	18.3 kg	40.3 lbs	32.9 kg	72.6 lbs	
PBG11111	30" x 48"	1363	24.3 kg	53.6 lbs	41.9 kg	92.4 lbs	
PBG11112	36" x 36"	1225	21.9 kg	48.3 lbs	38.9 kg	85.8 lbs	

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

Part Number	Description	Price	Availability
PBG11119	UltraLight Breadboard, 12" x 18" x 0.98", 1/4"-20 Taps	\$451.97	Today
PBG11102	UltraLight Breadboard, 12" x 24" x 0.98", 1/4"-20 Taps	\$502.08	Today
PBG11103	UltraLight Breadboard, 12" x 36" x 0.98", 1/4"-20 Taps	\$604.20	Lead Time
PBG11118	UltraLight Breadboard, 18" x 24" x 0.98", 1/4"-20 Taps	\$605.14	Today
PBG11106	UltraLight Breadboard, 24" x 36" x 0.98", 1/4"-20 Taps	\$911.50	Today
PBG11107	UltraLight Breadboard, 24" x 48" x 0.98", 1/4"-20 Taps	\$1,123.35	Lead Time
PBG11110	UltraLight Breadboard, 30" x 36" x 0.98", 1/4"-20 Taps	\$1,063.74	Today
PBG11111	UltraLight Breadboard, 30" x 48" x 0.98", 1/4"-20 Taps	\$1,324.70	Today
PBG11112	UltraLight Breadboard, 36" x 36" x 0.98", 1/4"-20 Taps	\$1,218.80	Today

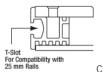
Hide Metric Breadboards, 25 mm Rail Compatible Sides, Stocked in UK

## Metric Breadboards, 25 mm Rail Compatible Sides, Stocked in UK

These breadboards feature sides with a t-slot that is compatible with our 25 mm rails and accessories. See the diagram to the bottom left for more information.

Item #	Size	Number of Taps	Unpackaged Mass	Unpackaged Weight	Packaged Shipping Mass <sup>a</sup>	Packaged Shipping Weight <sup>a</sup>	Distance From Edge to First Holes
PBG3030A	300 mm x 300 mm	144	2.8 kg	6.2 lbs	6.0 kg	13.2 lbs	
PBG3045A	300 mm x 450 mm	216	4.1 kg	9.0 lbs	9.0 kg	19.8 lbs	
PBG3060A	300 mm x 600 mm	288	5.4 kg	11.9 lbs	11.0 kg	24.3 lbs	
PBG3090A	300 mm x 900 mm	432	8.0 kg	17.6 lbs	16.0 kg	35.3 lbs	
PBG4545A	450 mm x 450 mm	324	6.0 kg	13.2 lbs	11.0 kg	24.3 lbs	
PBG4560A	450 mm x 600 mm	432	7.9 kg	17.4 lbs	14.0 kg	30.9 lbs	12.5 mm
PBG6060A	600 mm x 600 mm	576	10.2 kg	22.5 lbs	18.0 kg	39.7 lbs	12.5 111111
PBG6090A	600 mm x 900 mm	864	15.3 kg	33.7 lbs	27.0 kg	59.5 lbs	
PBG60120A	600 mm x 1200 mm	1152	20.3 kg	44.8 lbs	35.0 kg	77.2 lbs	
PBG7590A	750 mm x 900 mm	1080	19.0 kg	41.9 lbs	33.0 kg	72.8 lbs	
PBG75120A	750 mm x 1200 mm	1440	25.2 kg	55.6 lbs	44.0 kg	97.0 lbs	
PBG90120A	900 mm x 1200 mm	1728	30.1 kg	66.4 lbs	50.0 kg	110.2 lbs	

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



for Details
The T-Slot located on the sides is compatible with our 25 mm rails and accessories.

Part Number	Description	Price	Availability
PBG3030A	NEW! UltraLight Breadboard, 300 mm x 300 mm x 25 mm, M6 Taps	\$445.45	Lead Time
PBG3045A	NEW! UltraLight Breadboard, 300 mm x 450 mm x 25 mm, M6 Taps	\$502.19	Lead Time
PBG3060A	NEW! UltraLight Breadboard, 300 mm x 600 mm x 25 mm, M6 Taps	\$557.87	Lead Time
PBG3090A	NEW! UltraLight Breadboard, 300 mm x 900 mm x 25 mm, M6 Taps	\$671.33	Lead Time
PBG4545A	NEW! UltraLight Breadboard, 450 mm x 450 mm x 25 mm, M6 Taps	\$587.29	Lead Time
PBG4560A	NEW! UltraLight Breadboard, 450 mm x 600 mm x 25 mm, M6 Taps	\$672.38	Lead Time
PBG6060A	NEW! UltraLight Breadboard, 600 mm x 600 mm x 25 mm, M6 Taps	\$786.90	Lead Time
PBG6090A	NEW! UltraLight Breadboard, 600 mm x 900 mm x 25 mm, M6 Taps	\$1,012.78	Lead Time
PBG60120A	NEW! UltraLight Breadboard, 600 mm x 1200 mm x 25 mm, M6 Taps	\$1,247.06	Lead Time
PBG7590A	NEW! UltraLight Breadboard, 750 mm x 900 mm x 25 mm, M6 Taps	\$1,181.93	Lead Time
PBG75120A	NEW! UltraLight Breadboard, 750 mm x 1200 mm x 25 mm, M6 Taps	\$1,471.89	Lead Time
PBG90120A	NEW! UltraLight Breadboard, 900 mm x 1200 mm x 25 mm, M6 Taps	\$1,697.77	Lead Time

Hide Metric Breadboards, Smooth Sides, Stocked in UK

## Metric Breadboards, Smooth Sides, Stocked in UK

Item #	Size	Number of Taps	Unpackaged Mass	Unpackaged Weight	Packeged Shipping Mass <sup>a</sup>	Packaged Shipping Weight <sup>a</sup>	Distance From Edge to First Holes
PBG51501	300 mm x 300 mm	121	2.5 kg	5.5 lbs	7.0 kg	15.4 lbs	
PBG51502	300 mm x 600 mm	253	4.9 kg	10.8 lbs	11.0 kg	24.3 lbs	
PBG51503	300 mm x 900 mm	385	7.4 kg	16.3 lbs	15.0 kg	33.10 lbs	
PBG51522	450 mm x 600 mm	391	7.3 kg	16.1 lbs	15.3 kg	33.8 lbs	25 mm
PBG51505	600 mm x 600 mm	529	9.6 kg	21.2 lbs	20.0 kg	44.1 lbs	23 111111
PBG51507	600 mm x 1200 mm	1081	19.0 kg	14.9 lbs	33.9 kg	74.8 lbs	
PBG51510	750 mm x 900 mm	1015	17.8 kg	39.2 lbs	31.9 kg	70.4 lbs	
PBG51514	900 mm x 1500 mm	2065	35.2 kg	77.6 lbs	56.9 kg	125.4 lbs	

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

Part Number	Description	Price	Availability
PBG51501	UltraLight Breadboard, 300 x 300 x 25 mm, M6 Taps	\$400.91	Today
PBG51502	UltraLight Breadboard, 300 x 600 x 25 mm, M6 Taps	\$502.08	Today
PBG51503	UltraLight Breadboard, 300 x 900 x 25 mm, M6 Taps	\$604.20	Lead Time
PBG51522	UltraLight Breadboard, 450 x 600 x 25 mm, M6 Taps	\$605.14	Lead Time
PBG51505	UltraLight Breadboard, 600 x 600 x 25 mm, M6 Taps	\$708.21	Lead Time
PBG51507	UltraLight Breadboard, 600 x 1200 x 25 mm, M6 Taps	\$1,123.35	Today
PBG51510	UltraLight Breadboard, 750 x 900 x 25 mm, M6 Taps	\$1,063.74	Lead Time