

## Aluminum Extrusion Profiles

Boyd's large portfolio of extrusion profiles meets the requirements of a broad array of applications. Minimize design costs and increase turnaround time by using an existing profile.

More about Extruded Heat Sinks

Aluminum Extrusion Solutions



### Extensive Options

Meet specific installation needs with a wide variety of mounting options.



### Longer Product Lifetimes

Increase device reliability with passive air cooling.



### Wallet-Friendly Solutions

Cost-effective and readily available solutions.



### Easy Installation

Eliminate the need for mounting holes, screws or rivets while optimizing contact and thermal efficiency of heat sinks with Max Clips™.

## Fast and Cost-Effective Aluminum Extrusion Solutions with Boyd

Boyd maintains the world's largest portfolio of extruded heat sink profiles with over 1,000 shapes. Utilize our broad extrusion profile library to develop custom and semi-custom air-cooled solutions. Our extruded heat sink profiles range from simple flat-back fin structures to complex geometries for optimized cooling. Aluminum extrusions utilize alloys 6063 and 6061 for their high thermal conductivity.

### Have a Question?

First Name\*

Last Name\*

Company\*

Industry\*

Please select your closest industry

Engineered Material or Thermal Inquiry?\*

Please Select

How can we help you?\*

Please provide as much detail as possible

☐ Check this box if this is an ITAR or EAR inquiry.

☐ We'd like to stay in touch! You can unsubscribe at any time.

☐ I have read the [Privacy Policy](#) and I agree to the [Terms & Conditions](#) \*

By submitting your information, you consent to allow Boyd to store and process this information, email you directly on this inquiry.

CONTACT US

## Aluminum Extrusion Solutions

### Meet Application Requirements with the Right Aluminum Extrusion Solution

Boyd's broad array of extruded heat sink profiles and advanced manufacturing methods enable us to fabricate optimized heat sinks to meet demanding application requirements. Our aluminum extrusions utilize alloys 6063 and 6061 for their high thermal conductivity.

- Extruded Aluminum Heat Sink

Max Clip™ Heat Sink System



### Extruded Aluminum Heat Sinks

An extruded aluminum heat sink is one of the most popular and cost-efficient heat sink fabrication methods. Boyd produces a range of standard extruded heat sink options to have quick solutions optimized for board-level devices. Standard heat sinks are pre-cut. Finished heat sinks that include installation hardware are available with different mounting holes and pre-applied thermal interface materials to streamline PCB assembly. Boyd's standard DC/DC converter heat sinks are designed to cool half, quarter, and one-eighth brick sizes as well as the Vicor style footprint.

Distribution Stock Check

## Popular Extruded Aluminum Heat Sinks

Search:

| Part Number   | Downloads | Contact Us                              |
|---------------|-----------|-----------------------------------------|
| 629701B02500G |           | <a href="#">Check Distributor Stock</a> |
| 630002B02500G |           | <a href="#">Check Distributor Stock</a> |
| 375424B00034G |           | <a href="#">Check Distributor Stock</a> |
| 374324B60023G |           | <a href="#">Check Distributor Stock</a> |

Showing 1 to 4 of 4 entries





Boyd MaxClip Extrusion Profiles Catalog



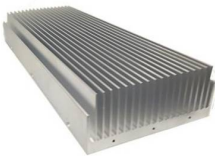
Heat Sink Fabrications Guide



How To Select A Heat Sink

Aluminum Extrusion Profiles

For applications that require more customization, we utilize our broad extrusion profile library to develop custom and semi-custom air cooled solutions. Boyd extruded heat sink profiles range from simple flat back fin structures to complex geometries for optimized cooling. If a standard profile extrusion doesn't meet your application requirements, our engineering team has spent decades designing new extrusions, balancing manufacturability with heat sink function. Contact our engineering team if you have a project that you think would benefit from a custom extruded heat sink.



Max Clip™ Heat Sink System

Boyd's Max Clip™ System is a high-performance, low-cost thermal solution for discrete power semiconductors. The thermal system combines Boyd's Max Clips with specialized extruded Max Clip Heat Sinks for optimized thermal contact, eliminating the need for mounting holes, screws, or rivets. The Max Clip™ System accommodates a variety of semiconductor packages including TO-220, TO-218, TO-247, TO-3P, and packages without mounting holes like TO-262, TO-273, TO-274, and TO-251.

Max Clips™

Max Clips™ are quick, robust attachments that save on labor and hardware costs while increasing design flexibility. Max Clips™ apply consistent, uniform pressure at the center of the semiconductor, improving contact with the heat sink for better thermal performance and maximum component reliability. With traditional hardware, mounting force is set at the time of assembly and decreases over the product's service life. Max Clips™ enable long-term reliability with sustained mounting pressure. We offer more than 50 Max Clip extrusion profiles featuring specialized geometries and groove patterns optimized for use with over 20 different Max Clips to suit a wide range of applications.



Popular Max Clips™

Search:

| Part Number | Downloads | Contact Us                              |
|-------------|-----------|-----------------------------------------|
| MAX03HNG    |           | <a href="#">Check Distributor Stock</a> |
| MAX03NG     |           | <a href="#">Check Distributor Stock</a> |
| MAX07NG     |           | <a href="#">Check Distributor Stock</a> |
| MAX08NG     |           | <a href="#">Check Distributor Stock</a> |

Have questions? We're ready to help!

Contact Us

# BOYD

TRUSTED INNOVATION

## MaxClip Extrusion Profiles and System



|                                             |       |
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# How to Use this Catalog

## Max Extrusions

Base extrusion part number  
For ordering information see page 3

Extrusion weight  
Kilograms per meter

Thermal resistance in  
natural ( $\theta_n$ ) and forced ( $\theta_f$ ) convection environments  
See notes on page 5 for thermal resistance definitions

78015      kg/m: 1.38 •  $\theta_n = 2.46\text{ }^{\circ}\text{C/W}$  •  $\theta_f = 0.65\text{ }^{\circ}\text{C/W}$

• One slot for vertical mounting to board

Bullet illustrates differentiating features for each Max profile

Mechanical drawing illustrating cross section of an extrusion  
Dimensions are mm (inches)

## Max Clips

Clip part numbers  
For ordering information see page 3

Clip force equation  
(clip width) x (thickness) = force in newtons

Max03-H      

|       |           |        |
|-------|-----------|--------|
| Width | Thickness | Force  |
| 18 mm | x 0.6     | = 80 N |

Clip width (not shown in profile view below)

Mechanical drawing showing profile of clip, extrusion and device with contact point dimensions

To select a clip appropriate for the device cooled and the selected profile see the Clip Index on pages 23–25.

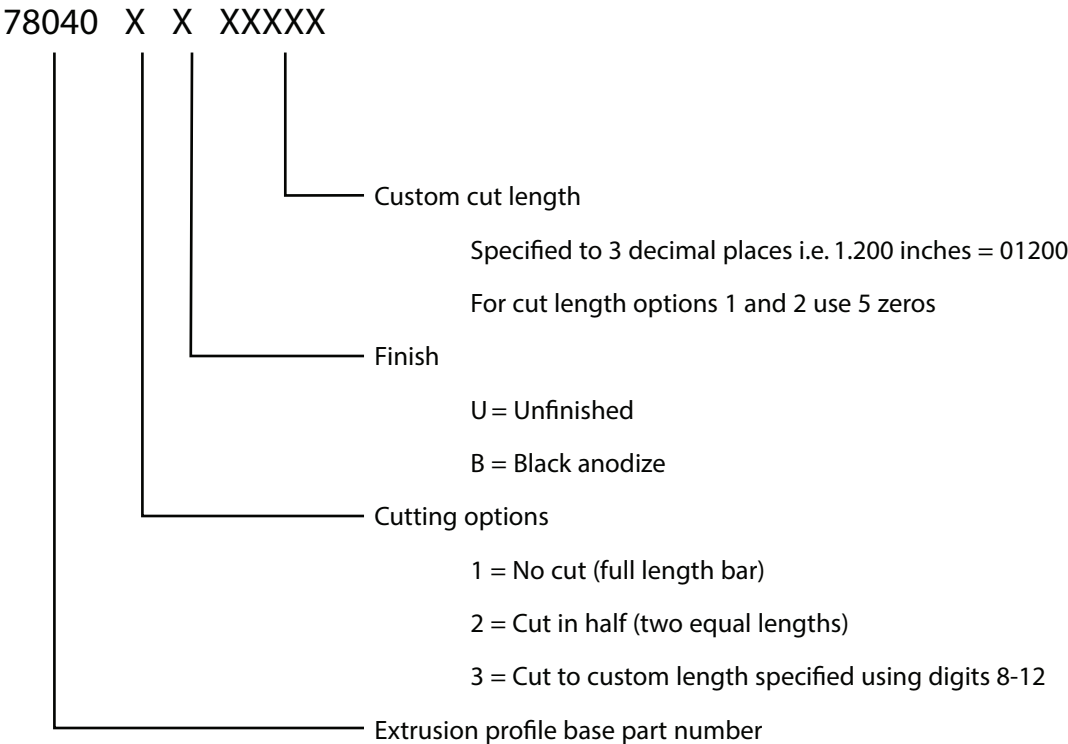
# How to Order The Max Clip System™

## General Information:

Extrusions are available in standard bar lengths of 2.5 meters/8.2 feet.  
Extrusions are unfinished and may be ordered with a black anodize finish.  
The standard tolerance of all cut to length extrusions is ±0.015 inches.

## Max Extrusion Profiles

Extrusions are ordered using a 12 digit part number as shown below.



## Max Clips

Clips are ordered separately using the part number shown in the mechanical drawing header information. See How to Use this Catalog on page 2.

## Potential Max Profiles

The Max Clip System™ is only limited by the imagination. For custom solutions or more information on the Potential Max Profiles listed on pages 21 and 22, please contact your local sales representative.

## The Max Clip System™

### MINIMIZE LABOR...MAXIMIZE PERFORMANCE

The Max Clip System™ for discrete power semiconductors is a high performance, low cost thermal solution that eliminates mounting holes, screws, rivets, and the thermal inefficiency associated with using loose hardware to attach components to a heat sink. This quick, robust attachment method saves on labor and hardware costs while increasing performance and design flexibility.

The Max Clip System™ is also the most effective system for mounting power devices in packages that have no mounting holes. Max Clips apply consistent optimum pressure at the center of the semiconductor, improving contact with the heat sink for better thermal performance and maximum component reliability. Boyd offers approximately 50 extrusion profiles that accept over 20 different Max Clips to suit your application. The Max Clip System™ is designed to accommodate a variety of semiconductor packages including TO-220, TO-218, TO-247, TO-3P, and packages without mounting holes like TO-262, TO-273, TO-274, and TO-251.

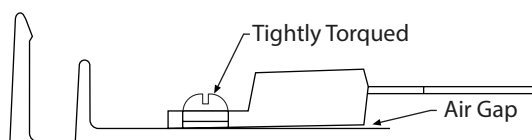
Features and Benefits of The Max Clip System™ include:

- Optimizes thermal management of power transistors
- Provides mounting for discrete power devices with or without mounting holes
- Reduce labor costs by eliminating the need for drilled or tapped holes in heat sinks
- Allows flexibility for moving or changing devices
- Provides consistent mounting force for reduced thermal resistivity (over lifetime)
- Assembly costs using The Max Clip System are lower than with conventional hardware such as screws/nuts

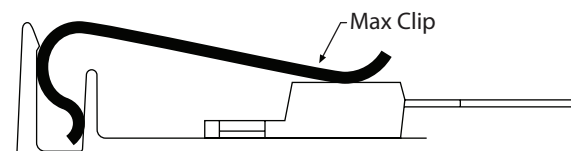
The Max Clip System™ provides ideal product lifetime contact to the center of the device package resulting in even force across the interface material. Max Clips maintain a constant assembly force even when interface material deteriorates over time. With conventional nuts, bolts and rivets mounting force is set at the time of assembly and can lessen over the product's service life with changes in interface material thickness. Nuts and bolts also impart force at one end of the package creating uneven pressure over the length of the device, actually creating thermal inefficiency. See Figure 1.

Figure 1

Poor Contact



Maximum Contact



| Part Number | Page | Weight kg/m | Weight lb/ft | Width mm (in)  | Height mm (in) | Perimeter mm (in) | Θn   | Θf   | Type |
|-------------|------|-------------|--------------|----------------|----------------|-------------------|------|------|------|
| 78010       | 7    | 2.48        | 1.663        | 34.00 (1.338)  | 75.00 (2.953)  | 948.99 (37.362)   | 1.45 | 0.39 | 1    |
| 78015       | 7    | 1.38        | 0.925        | 27.00 (1.063)  | 50.02 (1.969)  | 499.99 (19.685)   | 2.46 | 0.65 | 1    |
| 78020       | 14   | 1.23        | 0.825        | 30.00 (1.181)  | 47.20 (1.850)  | 372.99 (14.685)   | 3.02 | 0.84 | 2    |
| 78025       | 12   | 0.99        | 0.664        | 39.00 (1.535)  | 31.48 (1.239)  | 310.01 (12.205)   | 3.10 | 1.02 | 1    |
| 78030       | 20   | 3.42        | 2.293        | 73.54 (2.895)  | 60.00 (2.362)  | 1002.00 (39.449)  | 1.10 | 0.36 | 5    |
| 78035       | 8    | 2.53        | 1.697        | 74.50 (2.933)  | 40.01 (1.575)  | 808.99 (31.850)   | 1.23 | 0.42 | 1    |
| 78040       | 14   | 4.64        | 3.111        | 102.00 (4.016) | 71.20 (2.803)  | 1410.00 (55.512)  | 0.81 | 0.28 | 2    |
| 78045       | 8    | 1.59        | 1.066        | 40.00 (1.575)  | 40.00 (1.575)  | 475.99 (18.740)   | 2.12 | 0.64 | 1    |
| 78050       | 21   | 3.47        | 2.327        | 82.00 (3.228)  | 50.00 (1.968)  | 1161.62 (45.733)  | 0.63 | 0.25 | 6    |
| 78060       | 9    | 1.18        | 0.791        | 30.00 (1.181)  | 45.01 (1.772)  | 424.99 (16.732)   | 2.33 | 0.76 | 1    |
| 78070       | 13   | 2.57        | 1.723        | 40.00 (1.575)  | 75.00 (2.953)  | 783.00 (30.827)   | 1.55 | 0.41 | 2    |
| 78075       | 9    | 1.64        | 1.100        | 38.00 (1.496)  | 54.00 (2.126)  | 581.99 (22.913)   | 1.71 | 0.57 | 1    |
| 78080       | 7    | 1.74        | 1.167        | 27.00 (1.063)  | 60.00 (2.362)  | 604.01 (23.780)   | 2.27 | 0.55 | 1    |
| 78085       | 16   | 1.32        | 0.885        | 28.70 (1.230)  | 41.00 (1.614)  | 142.01 (5.591)    | -    | -    | 4    |
| 78090       | 16   | 0.84        | 0.563        | 17.00 (0.669)  | 37.28 (1.468)  | 143.00 (5.630)    | -    | -    | 4    |
| 78095       | 18   | 1.89        | 1.267        | 29.00 (1.142)  | 36.80 (1.449)  | 140.00 (5.512)    | -    | -    | 4    |
| 78105       | 20   | 6.10        | 4.090        | 206.00 (8.110) | 90.00 (3.543)  | 1526.99 (60.118)  | 0.55 | 0.27 | 5    |
| 78110       | 20   | 5.13        | 3.440        | 155.00 (6.102) | 85.00 (3.346)  | 1291.99 (50.866)  | 0.70 | 0.25 | 5    |
| 78185       | 18   | 2.14        | 1.435        | 40.00 (1.575)  | 57.00 (2.244)  | 246.98 (9.724)    | -    | -    | 4    |
| 78190       | 10   | 2.37        | 1.589        | 58.00 (2.283)  | 66.50 (2.618)  | 648.00 (25.512)   | 1.25 | 0.50 | 1    |
| 78195       | 11   | 1.10        | 0.738        | 34.00 (1.338)  | 36.60 (1.441)  | 313.99 (12.362)   | 2.70 | 0.93 | 1    |
| 78200       | 18   | 0.89        | 0.597        | 25.00 (0.984)  | 35.98 (1.416)  | 181.00 (7.126)    | -    | -    | 4    |
| 78205       | 13   | 1.57        | 1.053        | 30.00 (1.181)  | 57.00 (2.244)  | 437.99 (17.244)   | 2.42 | 0.75 | 2    |
| 78215       | 8    | 1.32        | 0.885        | 61.21 (2.410)  | 28.00 (1.102)  | 386.99 (15.236)   | 2.50 | 0.85 | 1    |
| 78220       | 13   | 1.66        | 1.113        | 30.00 (1.181)  | 60.00 (2.362)  | 488.01 (19.213)   | 2.49 | 0.74 | 2    |
| 78225       | 17   | 1.75        | 1.173        | 23.00 (0.905)  | 45.00 (1.772)  | 178.00 (7.008)    | -    | -    | 4    |
| 78230       | 18   | 1.39        | 0.932        | 28.00 (1.102)  | 45.00 (1.772)  | 211.98 (8.346)    | -    | -    | 4    |
| 78245       | 7    | 1.67        | 1.120        | 27.00 (1.063)  | 60.00 (2.362)  | 596.01 (23.465)   | 2.29 | 0.56 | 1    |
| 78250       | 14   | 2.15        | 1.442        | 60.00 (2.362)  | 56.00 (2.205)  | 632.99 (24.921)   | 1.42 | 0.52 | 2    |
| 78255       | 17   | 0.68        | 0.456        | 27.00 (1.063)  | 27.00 (1.063)  | 154.00 (6.063)    | 3.43 | 1.59 | 4    |
| 78260       | 19   | 0.12        | 0.080        | 10.50 (0.413)  | 11.50 (0.453)  | 59.99 (2.362)     | -    | -    | 3    |
| 78265       | 12   | 0.48        | 0.322        | 22.00 (0.866)  | 28.50 (1.122)  | 199.99 (7.874)    | 4.12 | 1.68 | 1    |
| 78270       | 18   | 0.95        | 0.637        | 27.00 (1.063)  | 29.50 (1.161)  | 156.99 (6.181)    | 3.43 | 1.59 | 4    |
| 78275       | 12   | 1.78        | 1.194        | 31.75 (1.250)  | 58.70 (2.311)  | 483.00 (19.016)   | 2.35 | 0.67 | 1    |
| 78280       | 18   | 0.75        | 0.503        | 22.98 (0.905)  | 38.00 (1.496)  | 165.98 (6.535)    | 3.11 | 1.50 | 4    |
| 78285       | 10   | 2.41        | 1.616        | 34.00 (1.338)  | 75.00 (2.953)  | 908.98 (35.787)   | 1.47 | 0.40 | 1    |
| 78290       | 21   | 9.64        | 6.464        | 240.80 (9.480) | 77.00 (3.031)  | 1362.43 (53.639)  | -    | -    | 6    |
| 78295       | 11   | 2.18        | 1.462        | 35.00 (1.378)  | 60.00 (2.362)  | 688.00 (27.087)   | 1.67 | 0.47 | 1    |
| 78300       | 21   | 4.51        | 3.024        | 165.00 (6.496) | 62.00 (2.441)  | 499.82 (19.678)   | -    | -    | 6    |
| 78305       | 21   | 1.62        | 1.086        | 120.76 (4.754) | -              | 659.10 (25.949)   | -    | -    | 6    |
| 78310       | 21   | 1.50        | 1.006        | -              | -              | 628.01 (24.725)   | -    | -    | 6    |
| 78315       | 9    | 3.14        | 2.106        | 48.00 (1.890)  | 80.00 (3.150)  | 1010.00 (39.764)  | 1.06 | 0.34 | 1    |
| 78335       | 19   | 0.31        | 0.208        | 30.10 (1.185)  | 12.50 (0.492)  | 138.98 (5.472)    | 6.34 | 2.38 | 3    |
| 78345       | 15   | 2.21        | 1.482        | 68.00 (2.677)  | 39.00 (1.535)  | 670.00 (26.378)   | 1.64 | 0.49 | 2    |
| 78350       | 9    | 3.45        | 2.313        | 49.50 (1.949)  | 85.50 (3.366)  | 1153.00 (45.394)  | 0.93 | 0.29 | 1    |
| 78355       | 12   | 1.15        | 0.771        | 32.30 (1.272)  | 49.00 (1.929)  | 456.99 (17.992)   | 2.34 | 0.76 | 1    |
| 78360       | 15   | 3.29        | 2.206        | 108.00 (4.252) | 39.00 (1.535)  | 1054.98 (41.535)  | 1.18 | 0.41 | 2    |
| 78370       | 21   | 0.55        | 0.372        | 29.97 (1.180)  | 29.21 (1.150)  | 183.28 (7.216)    | -    | -    | 6    |
| 78375       | 10   | 1.49        | 0.999        | 54.50 (2.146)  | 38.60 (1.520)  | 445.00 (17.520)   | 1.82 | 0.78 | 1    |
| 78380       | 21   | 16.17       | 10.843       | 241.48 (9.507) | 140.00 (5.512) | 3230.29 (127.177) | -    | -    | 6    |
| 78385       | 21   | 4.27        | 2.863        | 240.00 (9.449) | 60.00 (2.362)  | 914.19 (35.992)   | -    | -    | 6    |
| 78390       | 20   | 6.02        | 4.037        | 179.98 (7.086) | 51.00 (2.008)  | 1737.00 (68.386)  | 0.44 | 0.19 | 5    |

## Notes:

Θn: Thermal resistance—Natural convection. Length = 150 mm  
 Θf: Thermal resistance—Forced convection. Air Speed Inlet Tunnel = 2 m/s  
 Black anodized or unfinished  
 Ambient T = 25 °C  
 Heat sink T = 100 °C

## Type definitions:

1= Single Mounting Surface Style  
 2= Dual Mounting Surface Style  
 3= Single Mounting Surface with Flatback Style  
 4= Max Heat Connector Style  
 5= U-Channel/Multiple Screw Boss Style  
 6= Potential Max Profiles

## Max Extrusion Index

| Part Number | Page | Weight kg/m | Weight lb/ft | Width mm (in)  | Height mm (in) | Perimeter mm (in) | Θn   | Θf   | Type |
|-------------|------|-------------|--------------|----------------|----------------|-------------------|------|------|------|
| 78405       | 11   | 1.36        | 0.912        | 49.00 (1.929)  | 40.00 (1.575)  | 554.99 (21.850)   | 1.32 | 0.56 | 1    |
| 81400       | 20   | 5.51        | 3.695        | 124.16 (3.160) | 80.26 (3.160)  | 1065.50 (41.949)  | 0.98 | 0.38 | 5    |
| 82005       | 15   | 2.60        | 1.743        | 71.12 (2.800)  | 38.81 (1.528)  | 610.69 (24.043)   | -    | -    | 2    |
| 82870       | 10   | 3.09        | 2.072        | 35.00 (1.378)  | 90.10 (3.547)  | 1062.99 (41.850)  | 1.35 | 0.32 | 1    |
| 82875       | 16   | 0.95        | 0.637        | 23.00 (0.905)  | 36.90 (1.453)  | 127.99 (5.039)    | -    | -    | 4    |
| 82880       | 17   | 1.72        | 1.153        | 30.00 (1.181)  | 49.70 (1.957)  | 226.99 (8.937)    | -    | -    | 4    |
| 82885       | 16   | 0.85        | 0.570        | 21.40 (0.842)  | 34.00 (1.338)  | 121.99 (4.803)    | -    | -    | 4    |
| 82890       | 16   | 1.40        | 0.939        | 15.00 (0.590)  | 56.60 (2.228)  | 159.00 (6.260)    | -    | -    | 4    |
| 82895       | 19   | 1.08        | 0.724        | 22.00 (0.866)  | 48.00 (1.890)  | 248.99 (9.803)    | 3.42 | 1.57 | 3    |
| 82900       | 16   | 1.18        | 0.791        | 28.00 (1.102)  | 35.00 (1.378)  | 170.99 (6.732)    | -    | -    | 4    |
| 82905       | 14   | 2.02        | 1.355        | 49.50 (1.949)  | 50.00 (1.968)  | 672.00 (26.457)   | 1.92 | 0.57 | 2    |
| 82910       | 8    | 2.45        | 1.643        | 50.00 (1.968)  | 69.00 (2.716)  | 800.98 (31.535)   | 1.28 | 0.44 | 1    |
| 82920       | 10   | 2.38        | 1.596        | 35.00 (1.378)  | 75.00 (2.953)  | 899.00 (35.394)   | 1.56 | 0.41 | 1    |
| 82925       | 17   | 1.69        | 1.133        | 38.00 (1.496)  | 30.00 (1.181)  | 180.00 (7.087)    | -    | -    | 4    |
| 82930       | 8    | 2.04        | 1.368        | 50.00 (1.968)  | 47.00 (1.850)  | 532.99 (20.984)   | 1.71 | 0.58 | 1    |
| 82935       | 7    | 2.51        | 1.683        | 34.00 (1.338)  | 75.00 (2.953)  | 878.00 (34.567)   | -    | -    | 1    |
| 82940       | 11   | 1.14        | 0.764        | 55.00 (2.165)  | 43.00 (1.693)  | 280.00 (11.024)   | 1.96 | 1.00 | 1    |
| 82945       | 17   | 1.89        | 1.267        | 27.00 (1.063)  | 38.00 (1.496)  | 146.98 (5.787)    | -    | -    | 4    |
| 82950       | 8    | 5.52        | 3.701        | 45.00 (1.772)  | 120.00 (4.724) | 1162.99 (45.787)  | -    | -    | 1    |
| 82955       | 13   | 1.41        | 0.945        | 30.00 (1.181)  | 49.80 (1.961)  | 378.00 (14.882)   | 2.99 | 0.83 | 2    |
| 82960       | 20   | 2.75        | 1.844        | 73.50 (2.894)  | 50.00 (1.968)  | 721.00 (28.386)   | 1.30 | 0.46 | 5    |
| 82965       | 19   | 0.90        | 0.604        | 15.00 (0.590)  | 54.00 (2.126)  | 264.00 (10.394)   | 3.43 | 1.12 | 3    |
| 82970       | 19   | 0.41        | 0.275        | 33.00 (1.300)  | 21.00 (0.827)  | 186.99 (7.362)    | 4.38 | 2.10 | 3    |
| 82975       | 9    | 0.74        | 0.496        | 25.00 (0.984)  | 37.50 (1.476)  | -                 | 3.31 | 1.55 | 1    |
| 82980       | 17   | 0.81        | 0.543        | 27.00 (1.063)  | 27.00 (1.063)  | 135.00 (5.315)    | -    | -    | 4    |
| 82985       | 14   | 2.24        | 1.502        | 55.00 (2.165)  | 65.40 (2.575)  | -                 | 1.52 | 0.62 | 2    |
| 82990       | 9    | 1.18        | 0.791        | 35.00 (1.378)  | 37.50 (1.476)  | -                 | 2.49 | 0.95 | 1    |
| 83000       | 11   | 1.45        | 0.972        | 38.00 (1.496)  | 54.00 (2.126)  | 381.00 (15.000)   | 1.83 | 0.77 | 1    |
| 83005       | 7    | 1.73        | 1.160        | 27.00 (1.063)  | 60.00 (2.362)  | 581.99 (22.913)   | 2.30 | 0.59 | 1    |
| 83010       | 14   | 4.36        | 2.924        | 50.00 (1.968)  | 73.00 (2.874)  | -                 | 1.17 | 0.35 | 2    |
| 83015       | 11   | 1.49        | 0.999        | 46.90 (1.846)  | 51.60 (2.031)  | -                 | 1.73 | 0.69 | 1    |
| 83020       | 12   | 3.57        | 2.394        | 75.00 (2.953)  | 50.00 (1.968)  | -                 | -    | -    | 1    |
| OSA24       | 21   | -           | -            | -              | -              | -                 | -    | -    | 6    |
| OSA55       | 21   | -           | -            | -              | -              | -                 | -    | -    | 6    |
| OSA61       | 21   | -           | -            | -              | -              | -                 | -    | -    | 6    |
| OS567       | 21   | -           | -            | -              | -              | -                 | -    | -    | 6    |
| OSA69       | 21   | -           | -            | -              | -              | -                 | -    | -    | 6    |
| OSA74       | 21   | -           | -            | -              | -              | -                 | -    | -    | 6    |
| OSA79       | 22   | -           | -            | -              | -              | -                 | -    | -    | 6    |
| OSA80       | 22   | -           | -            | -              | -              | -                 | -    | -    | 6    |
| OSY94       | 22   | -           | -            | -              | -              | -                 | -    | -    | 6    |
| BS014       | 22   | -           | -            | -              | -              | -                 | -    | -    | 6    |
| BS034       | 22   | -           | -            | -              | -              | -                 | -    | -    | 6    |
| BS060       | 22   | -           | -            | -              | -              | -                 | -    | -    | 6    |
| BS070       | 22   | -           | -            | -              | -              | -                 | -    | -    | 6    |
| BS093       | 22   | -           | -            | -              | -              | -                 | -    | -    | 6    |
| BS094       | 22   | -           | -            | -              | -              | -                 | -    | -    | 6    |
| BS105       | 22   | -           | -            | -              | -              | -                 | -    | -    | 6    |
| BS121       | 22   | -           | -            | -              | -              | -                 | -    | -    | 6    |
| BS138       | 22   | -           | -            | -              | -              | -                 | -    | -    | 6    |
| BS202       | 22   | -           | -            | -              | -              | -                 | -    | -    | 6    |

### Notes:

Θn: Thermal resistance—Natural convection. Length = 150 mm  
 Θf: Thermal resistance—Forced convection. Air speed inlet Tunnel = 2 m/s  
 Black anodized or unfinished  
 Ambient T = 25 °C  
 Heat sink T = 100 °C

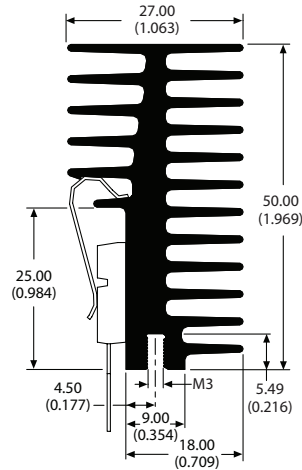
### Type definitions:

1= Single Mounting Surface Style  
 2= Dual Mounting Surface Style  
 3= Single Mounting Surface with Flatback Style  
 4= Max Heat Connector Style  
 5= U-Channel/Multiple Screw Boss Style  
 6= Potential Max Profiles

The Single Mounting Surface style provides a flat component mounting surface on one side of the profile. The back side of the extrusion is covered with fins creating additional surface area to aid in cooling. The component retaining clip interlocks between the first and second fin above the flat component mounting surface.

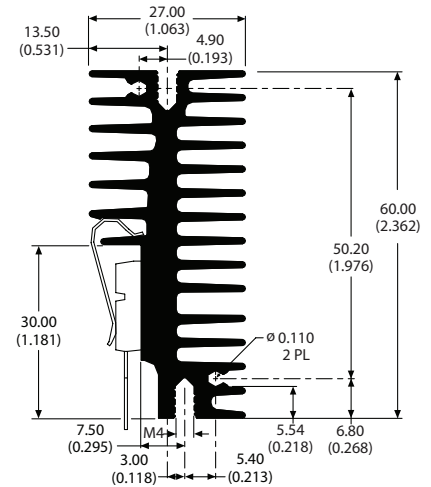
**78015** kg/m: 1.38 •  $\theta_n = 2.46$  °C/W •  $\theta_f = 0.65$  °C/W

- One slot for vertical mounting to board



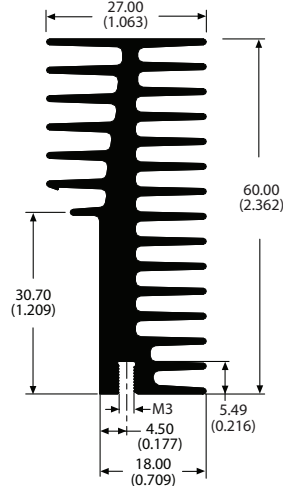
**78245** kg/m: 1.66 •  $\theta_n = 2.29$  °C/W •  $\theta_f = 0.56$  °C/W

- One slot for vertical mounting to board



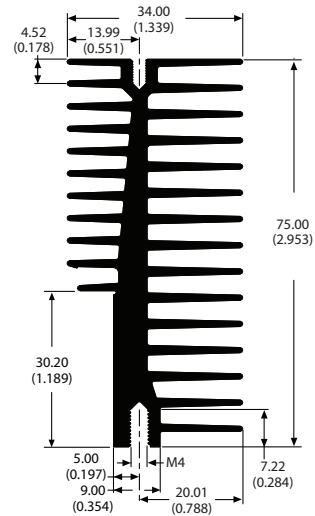
**78080** kg/m: 1.74 •  $\theta_n = 2.27$  °C/W •  $\theta_f = 0.55$  °C/W

- One slot for vertical mounting to board



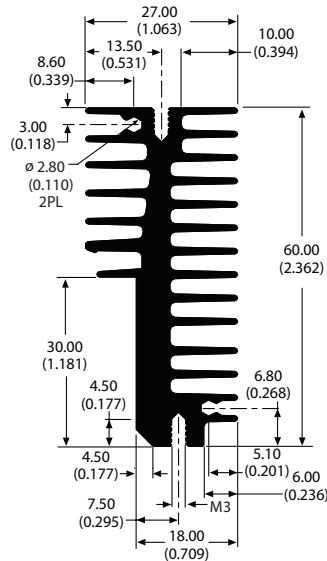
**78010** kg/m: 2.48 •  $\theta_n = 1.45$  °C/W •  $\theta_f = 0.39$  °C/W

- One slot for vertical mounting to board



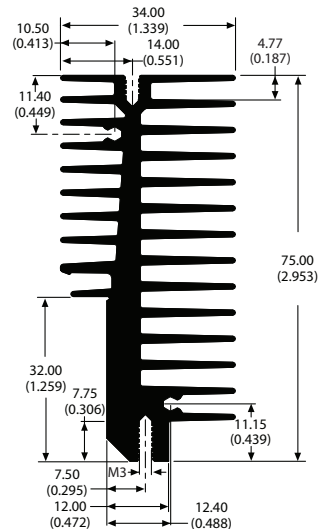
**83005** kg/m: 1.73 •  $\theta_n = 2.30$  °C/W •  $\theta_f = 0.59$  °C/W

- One slot for vertical mounting to board



**82935** kg/m: 2.51 •  $\theta_n = 1.45$  °C/W •  $\theta_f = 0.39$  °C/W

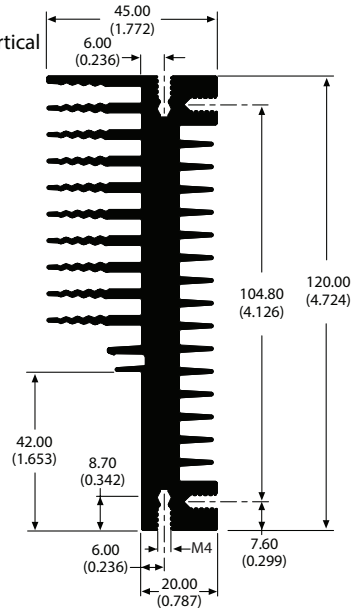
- One slot for vertical mounting to board



82950

kg/m:5.52

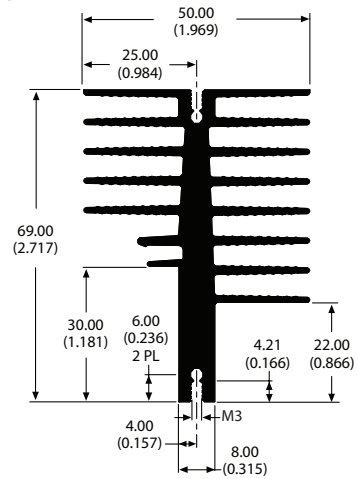
- One screw boss for vertical mounting to board



82910

kg/m:2.45 •  $\theta_n = 1.28^\circ\text{C/W}$  •  $\theta_f = 0.44^\circ\text{C/W}$ 

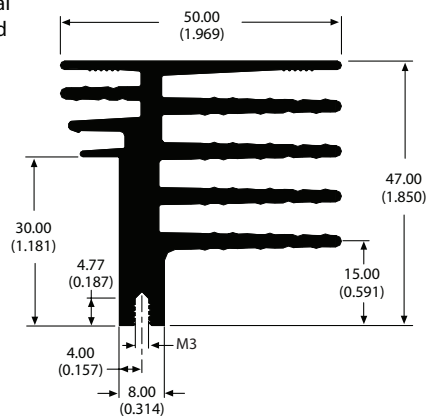
- One screw boss for vertical mounting to board



82930

kg/m:2.04 •  $\theta_n = 1.71^\circ\text{C/W}$  •  $\theta_f = 0.58^\circ\text{C/W}$ 

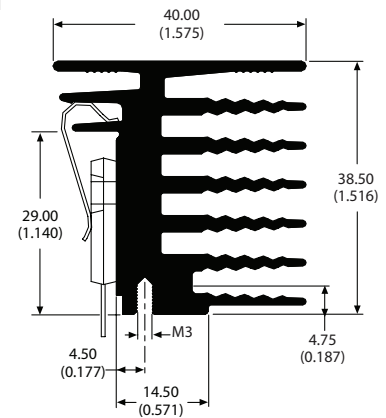
- One slot for vertical mounting to board



78045

kg/m:1.59 •  $\theta_n = 2.12^\circ\text{C/W}$  •  $\theta_f = 0.64^\circ\text{C/W}$ 

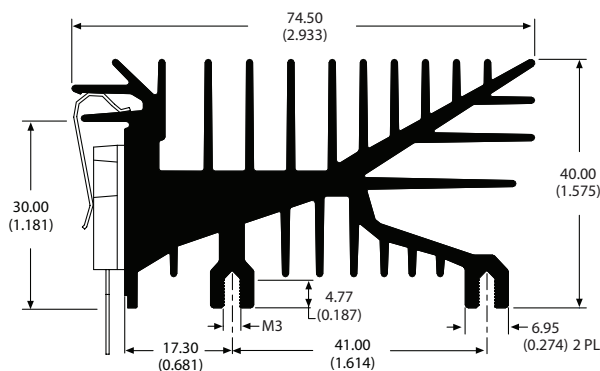
- One slot for vertical mounting to board



78035

kg/m:2.53 •  $\theta_n = 1.23^\circ\text{C/W}$  •  $\theta_f = 0.42^\circ\text{C/W}$ 

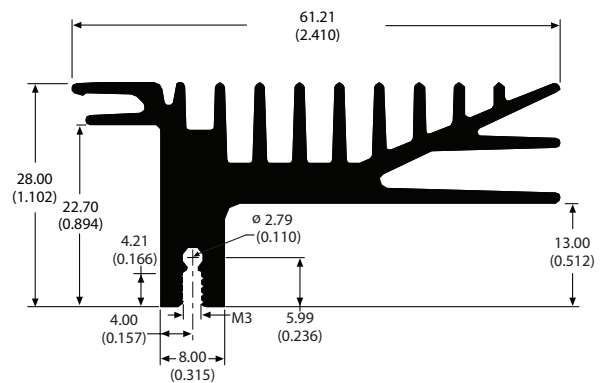
- Two slots for vertical mounting to board



78215

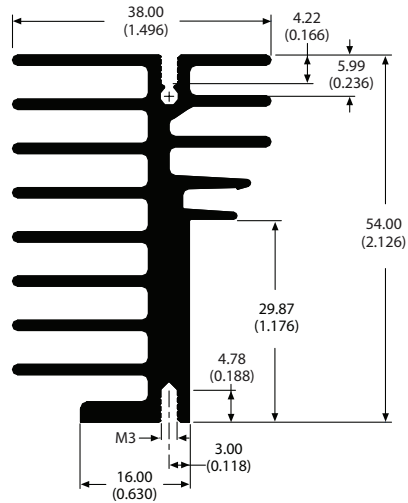
kg/m:1.32 •  $\theta_n = 2.50^\circ\text{C/W}$  •  $\theta_f = 0.85^\circ\text{C/W}$ 

- One screw boss for vertical mounting to board

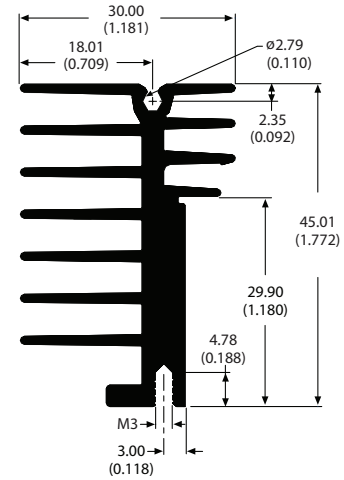


$$\text{kg/m: } 1.18 \cdot \theta_n = 2.33 \text{ } ^\circ\text{C/W} \cdot \theta_f = 0.76 \text{ } ^\circ\text{C/W}$$

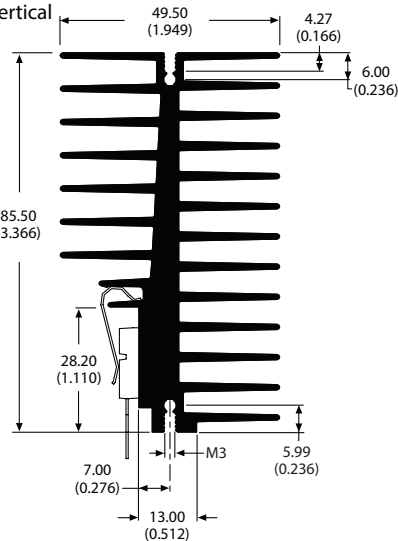
- One slot for vertical mounting to board



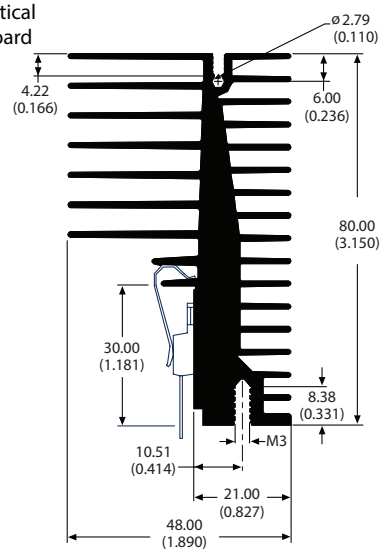
- One slot for vertical mounting to board


$$\text{kg/m: } 3.45 \cdot \theta_n = 0.93 \text{ } ^\circ\text{C/W} \cdot \theta_f = 0.29 \text{ } ^\circ\text{C/W}$$

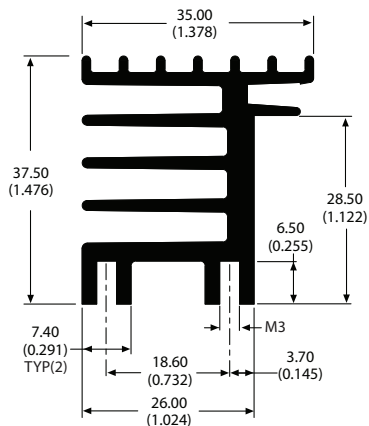
- One screw boss for vertical mounting to board


$$\text{kg/m: } 3.14 \cdot \theta_n = 1.06 \text{ } ^\circ\text{C/W} \cdot \theta_f = 0.34 \text{ } ^\circ\text{C/W}$$

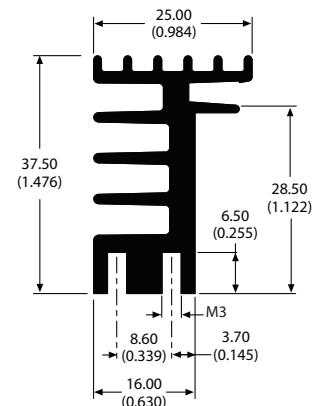
- One slot for vertical mounting to board


$$\text{kg/m: } 1.18 \cdot \theta_n = 2.49 \text{ } ^\circ\text{C/W} \cdot \theta_f = 0.95 \text{ } ^\circ\text{C/W}$$

- Two slots for vertical mounting to board


$$\text{kg/m: } 0.74 \cdot \theta_n = 3.31 \text{ } ^\circ\text{C/W} \cdot \theta_f = 1.55 \text{ } ^\circ\text{C/W}$$

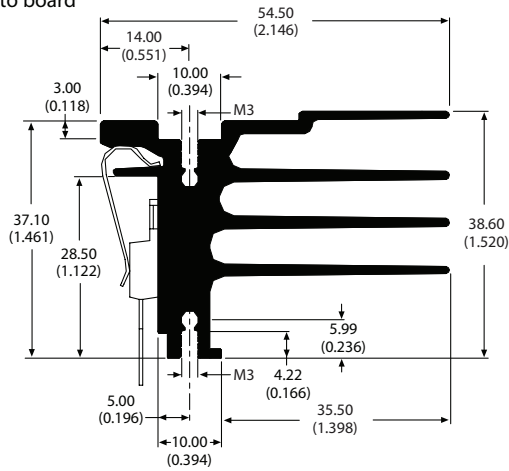
- Two slots for vertical mounting to board



**78375**

kg/m:1.49 •  $\theta_n = 1.82\text{ }^{\circ}\text{C/W}$  •  $\theta_f = 0.78\text{ }^{\circ}\text{C/W}$

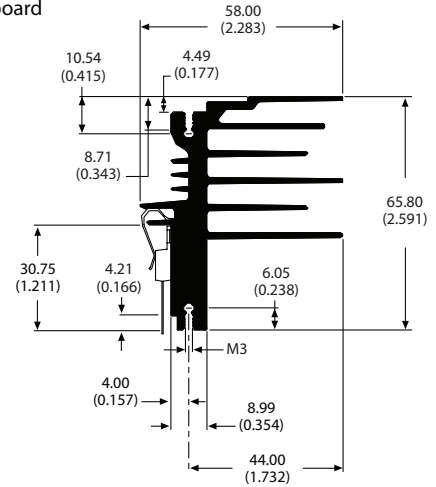
- One screw boss for vertical mounting to board



**78190**

kg/m:2.37 •  $\theta_n = 1.25\text{ }^{\circ}\text{C/W}$  •  $\theta_f = 0.50\text{ }^{\circ}\text{C/W}$

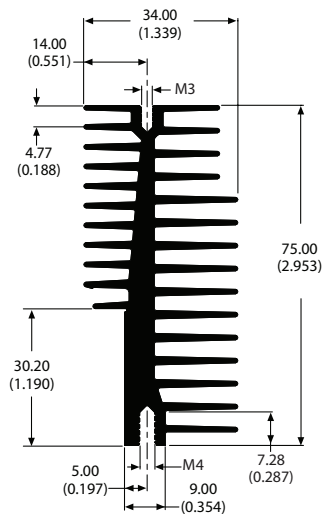
- One screw boss for vertical mounting to board



**78285**

kg/m:2.41 •  $\theta_n = 1.47\text{ }^{\circ}\text{C/W}$  •  $\theta_f = 0.40\text{ }^{\circ}\text{C/W}$

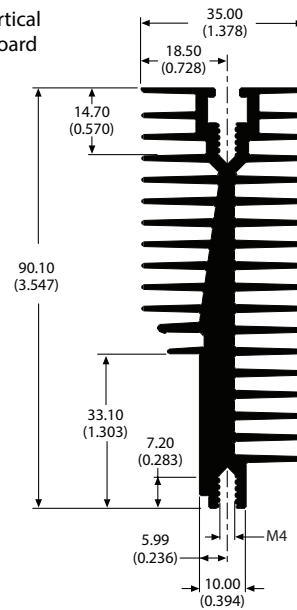
- One slot for vertical mounting to board



**82870**

kg/m:3.09 •  $\theta_n = 1.35\text{ }^{\circ}\text{C/W}$  •  $\theta_f = 0.32\text{ }^{\circ}\text{C/W}$

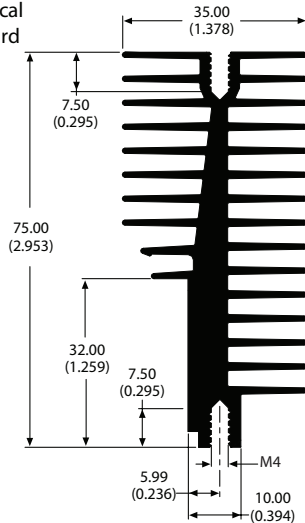
- One slot for vertical mounting to board



**82920**

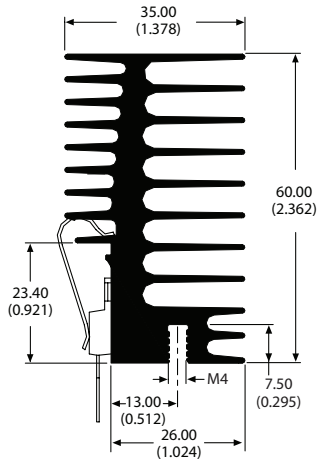
kg/m:2.38 •  $\theta_n = 1.56\text{ }^{\circ}\text{C/W}$  •  $\theta_f = 0.41\text{ }^{\circ}\text{C/W}$

- One slot for vertical mounting to board

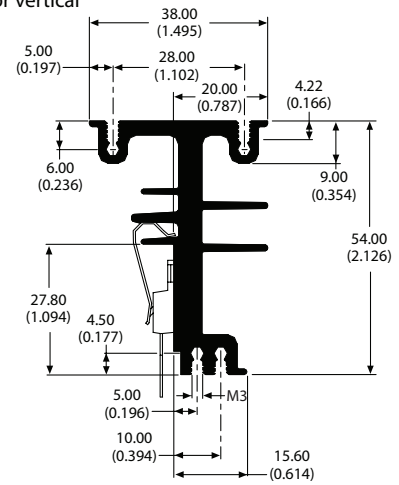


**78295**
 $\text{kg/m: } 2.18 \cdot \theta_n = 1.67 \text{ } ^\circ\text{C/W} \cdot \theta_f = 0.47 \text{ } ^\circ\text{C/W}$ 

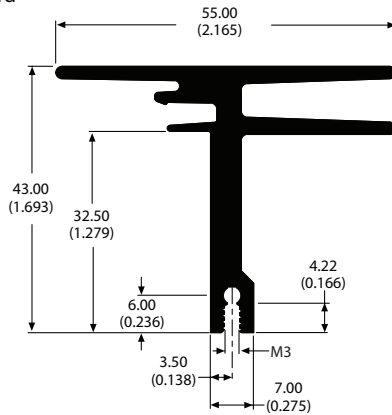
- One slot for vertical mounting to board


**83000**
 $\text{kg/m: } 1.45 \cdot \theta_n = 1.83 \text{ } ^\circ\text{C/W} \cdot \theta_f = 0.77 \text{ } ^\circ\text{C/W}$ 

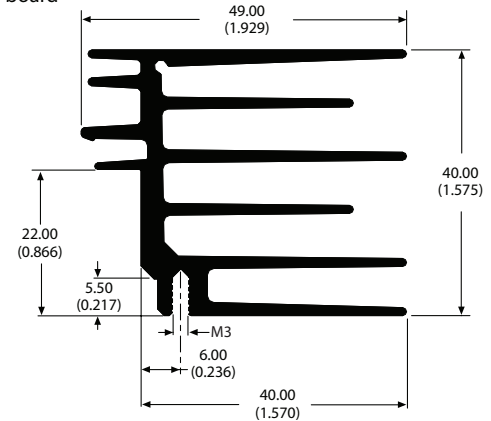
- Two screw bosses for vertical mounting to board


**82940**
 $\text{kg/m: } 1.14 \cdot \theta_n = 1.96 \text{ } ^\circ\text{C/W} \cdot \theta_f = 1.00 \text{ } ^\circ\text{C/W}$ 

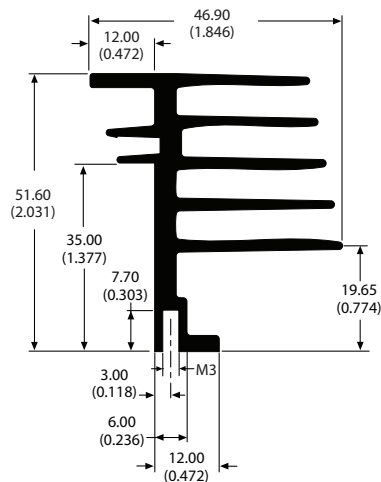
- One screw boss for vertical mounting to board


**78405**
 $\text{kg/m: } 1.30 \cdot \theta_n = 1.32 \text{ } ^\circ\text{C/W} \cdot \theta_f = 0.56 \text{ } ^\circ\text{C/W}$ 

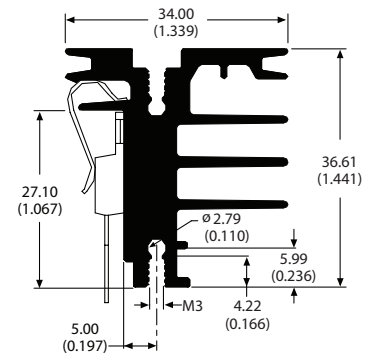
- One slot for vertical mounting to board


**83015**
 $\text{kg/m: } 1.49 \cdot \theta_n = 1.73 \text{ } ^\circ\text{C/W} \cdot \theta_f = 0.69 \text{ } ^\circ\text{C/W}$ 

- One slot for vertical mounting to board

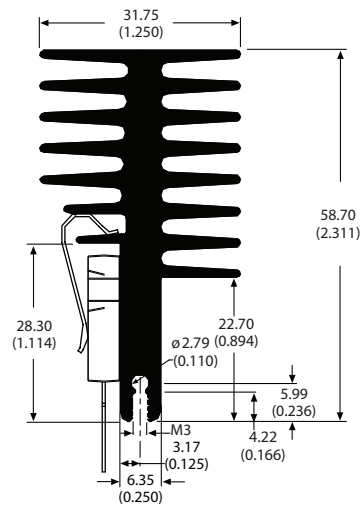

**78195**
 $\text{kg/m: } 1.10 \cdot \theta_n = 2.70 \text{ } ^\circ\text{C/W} \cdot \theta_f = 0.93 \text{ } ^\circ\text{C/W}$ 

- One screw boss for vertical mounting to board



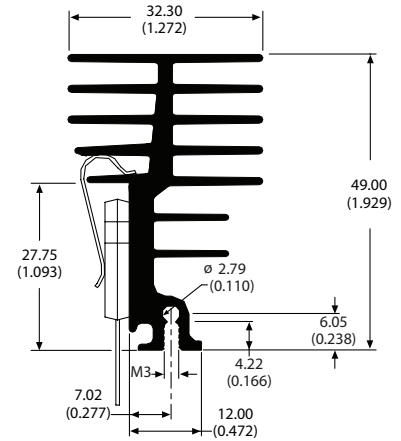
**78275** kg/m:1.78 •  $\theta_n = 2.35 \text{ }^\circ\text{C/W}$  •  $\theta_f = 0.67 \text{ }^\circ\text{C/W}$

- One screw boss for vertical mounting to board



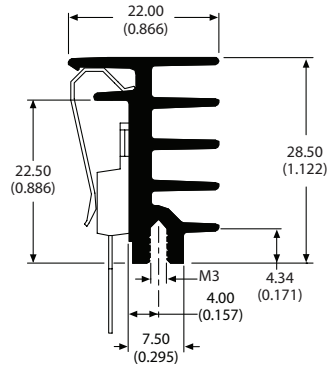
**78355** kg/m:1.15 •  $\theta_n = 2.34 \text{ }^\circ\text{C/W}$  •  $\theta_f = 0.76 \text{ }^\circ\text{C/W}$

- One screw boss for vertical mounting to board



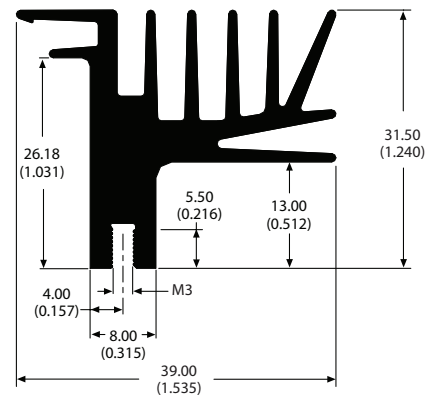
**78265** kg/m:0.48 •  $\theta_n = 4.12 \text{ }^\circ\text{C/W}$  •  $\theta_f = 1.68 \text{ }^\circ\text{C/W}$

- One slot for vertical mounting to board



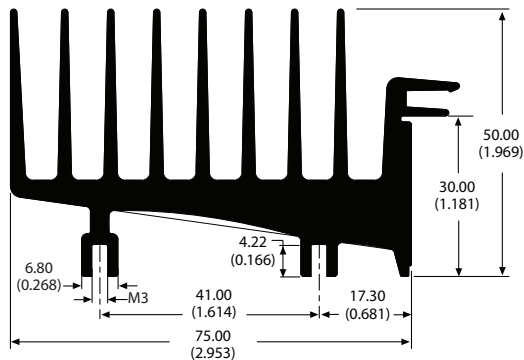
**78025** kg/m:0.99 •  $\theta_n = 3.10 \text{ }^\circ\text{C/W}$  •  $\theta_f = 1.02 \text{ }^\circ\text{C/W}$

- One slot for vertical mounting to board



**83020** kg/m:3.57

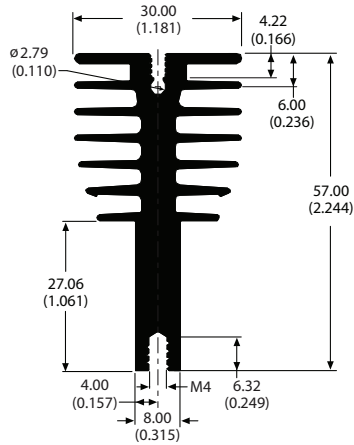
- Two slots for vertical mounting to board



The Dual Mounting Surface style provides a flat component mounting surface on two sides of the profile. Some profiles allow back to back mounting of components on the circuit board permitting the sharing of a centrally mounted heat sink. Other profiles create a bridge configuration allowing components to be attached to each leg with a raised center section to clear adjacent components or create a tunnel for airflow. The clip used to retain the component interlocks between the first and second fin above the flat component mounting surface.

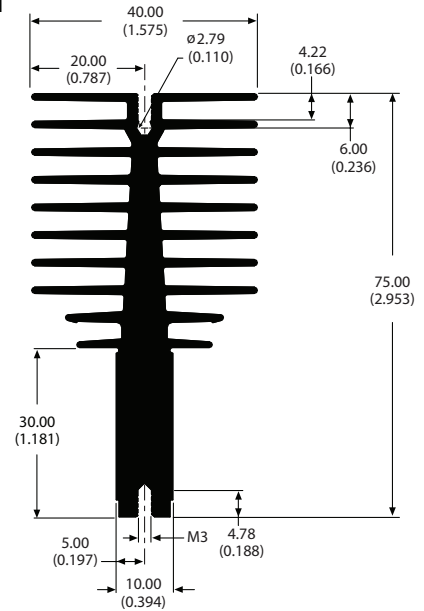
**78205** kg/m: 1.57 •  $\theta_n = 2.42$  °C/W •  $\theta_f = 0.75$  °C/W

- One slot for vertical mounting to board



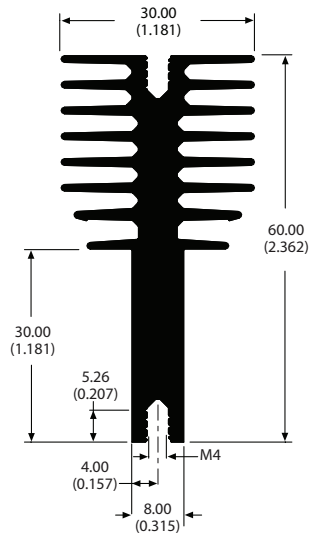
**78070** kg/m: 2.57 •  $\theta_n = 1.55$  °C/W •  $\theta_f = 0.41$  °C/W

- One slot for vertical mounting to board



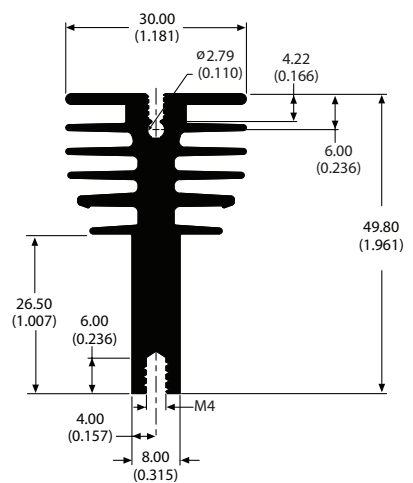
**78220** kg/m: 1.66 •  $\theta_n = 2.49$  °C/W •  $\theta_f = 0.74$  °C/W

- One slot for vertical mounting to board



**82955** kg/m: 1.41 •  $\theta_n = 2.99$  °C/W •  $\theta_f = 0.83$  °C/W

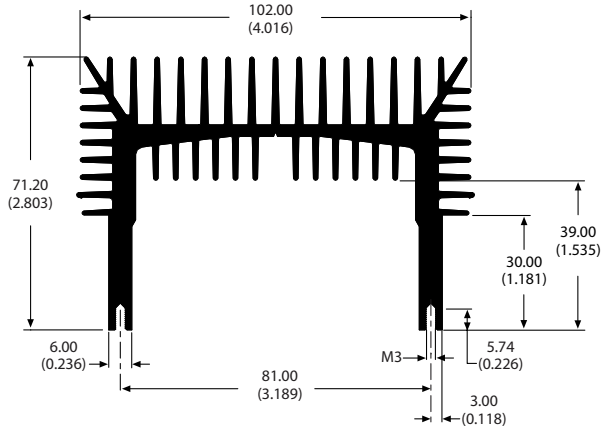
- One slot for vertical mounting to board



**78040**

kg/m:4.64 •  $\theta_n = 0.81$  °C/W •  $\theta_f = 0.28$  °C/W

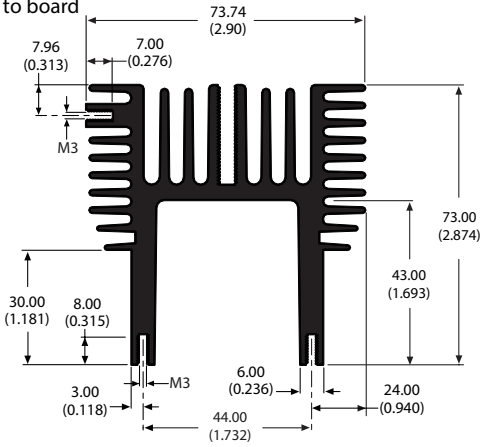
- Two slots for vertical mounting to board



**83010**

kg/m:4.36 •  $\theta_n = 1.17$  °C/W •  $\theta_f = 0.35$  °C/W

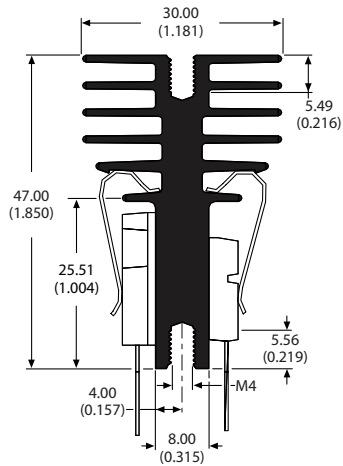
- Two slots for vertical mounting to board



**78020**

kg/m:1.23 •  $\theta_n = 3.02$  °C/W •  $\theta_f = 0.84$  °C/W

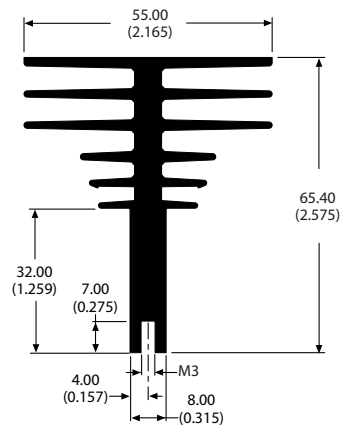
- One slot for vertical mounting to board



**82985**

kg/m:2.24 •  $\theta_n = 1.52$  °C/W •  $\theta_f = 0.62$  °C/W

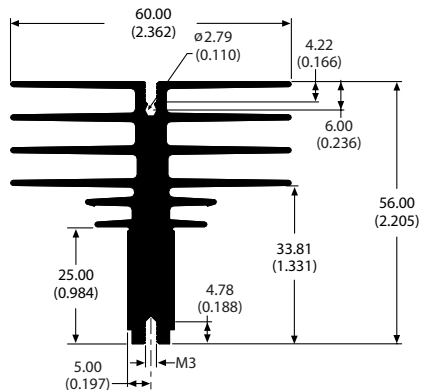
- One slot for vertical mounting to board



**78250**

kg/m:2.15 •  $\theta_n = 1.42$  °C/W •  $\theta_f = 0.52$  °C/W

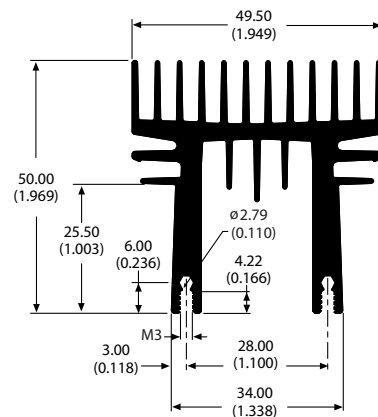
- One slot for vertical mounting to board



**82905**

kg/m:2.02 •  $\theta_n = 1.92$  °C/W •  $\theta_f = 0.57$  °C/W

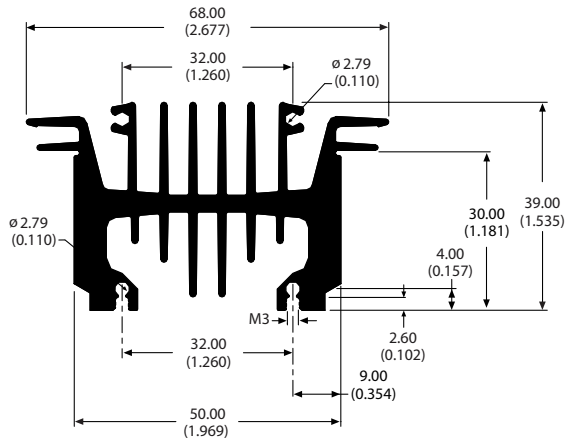
- Two screw bosses for vertical mounting to board



**78345**

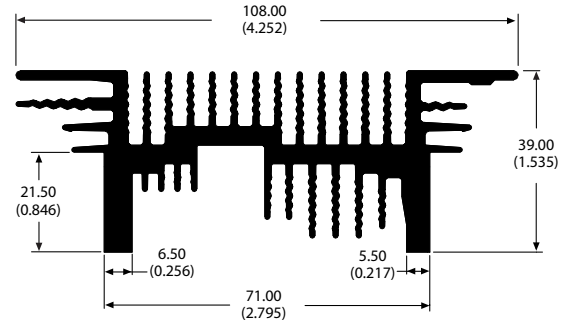
kg/m: 2.21 •  $\theta_n = 1.64$  °C/W •  $\theta_f = 0.49$  °C/W

- Two screw bosses for vertical mounting to board


**78360**

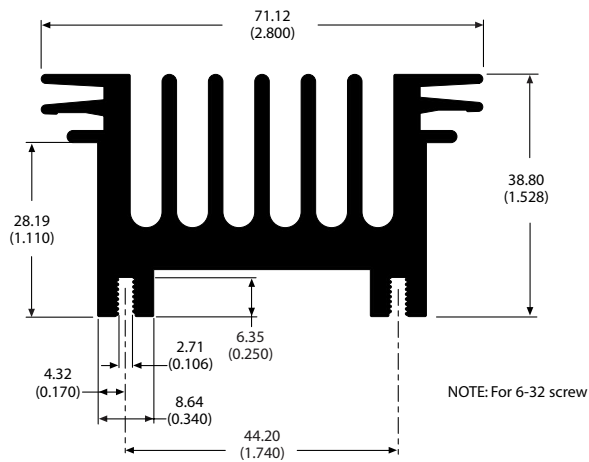
kg/m: 3.29 •  $\theta_n = 1.18$  °C/W •  $\theta_f = 0.41$  °C/W

- Secondary operation needed for mounting to board


**82005**

kg/m: 2.60

- Two slots for vertical mounting to board



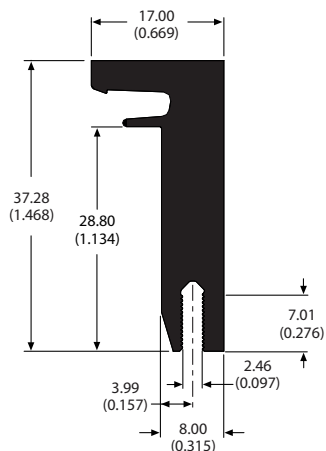
# The Max Clip System™ Max Heat Connector

The Max Heat Connector styles include single and dual component mounting surface profiles. Max Heat Connector profiles are designed to be fastened to conventional extruded heat sink or chassis surfaces providing a thermal conduction path for heat dissipation. Application examples are shown on page 29. Like other Max Extrusion Profiles, the clip used to retain the component interlocks between the first and second fin above the flat component mounting surface.

**78090**

kg/m:0.84

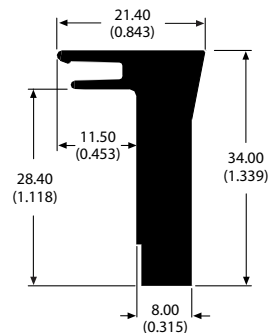
- One slot for vertical mounting to board



**82885**

kg/m:0.85

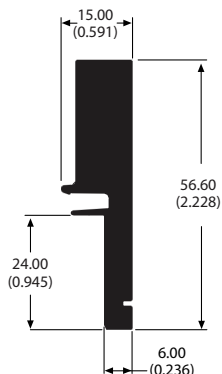
- Secondary operation needed for mounting to board



**82890**

kg/m: 1.40

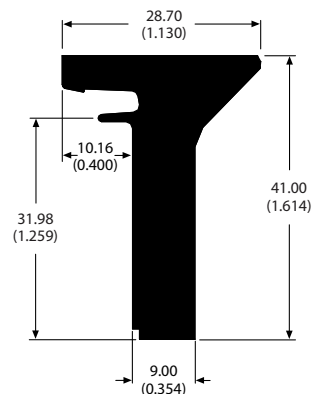
- Secondary operation needed for mounting to board



**78085**

kg/m:1.32

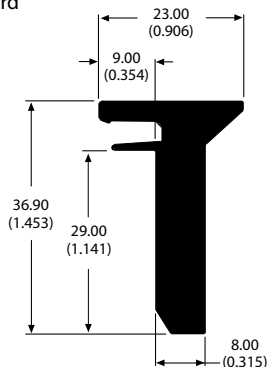
- Secondary operation needed for mounting to board



**82875**

kg/m:0.95

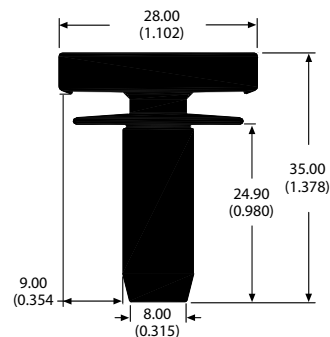
- Secondary operation needed for mounting to board



**82900**

kg/m:1.18

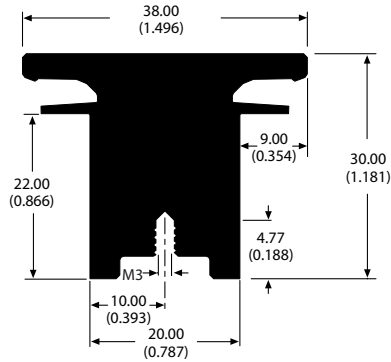
- Secondary operation needed for mounting to board



82925

kg/m: 1.69

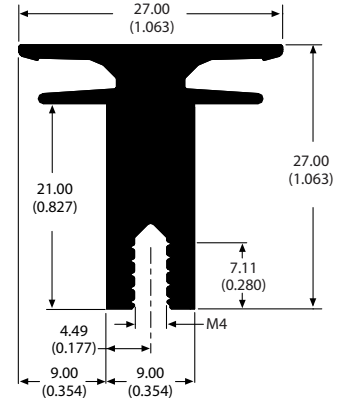
- One slot for vertical mounting to board



78255

kg/m: 0.690 n=3.43 °C/W 0.6=1.59 °C/W

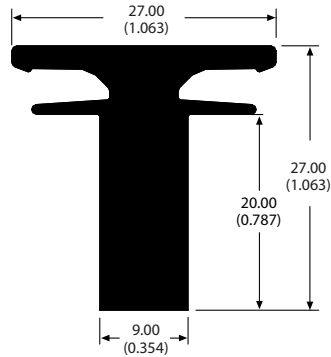
- One slot for vertical mounting to board



82980

kg/m: 0.81

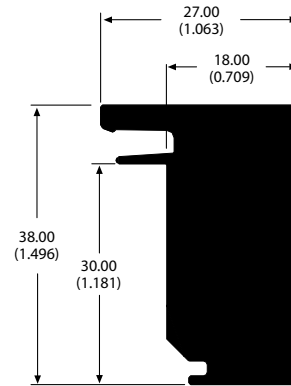
- Secondary operation needed for mounting to board



82945

kg/m: 1.89

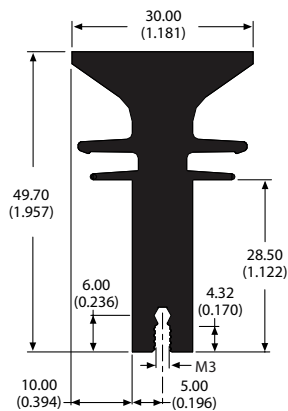
- Secondary operation needed for mounting to board



82880

kg/m: 1.72

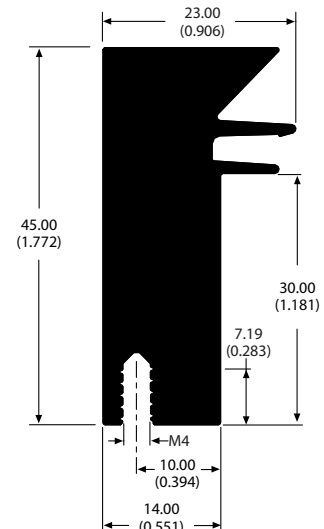
- One screw boss for vertical mounting to board



78225

kg/m: 1.75

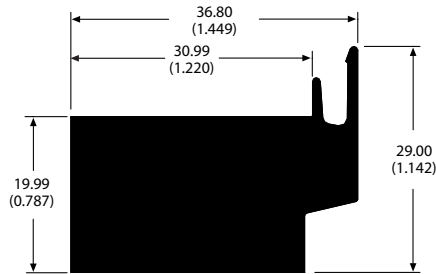
- One slot for vertical mounting to board



**78095**

kg/m: 1.89

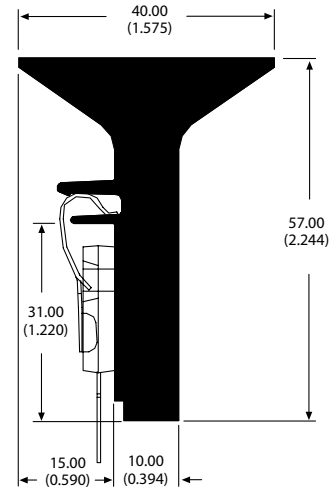
- Secondary operation needed for mounting to board



**78185**

kg/m: 2.14

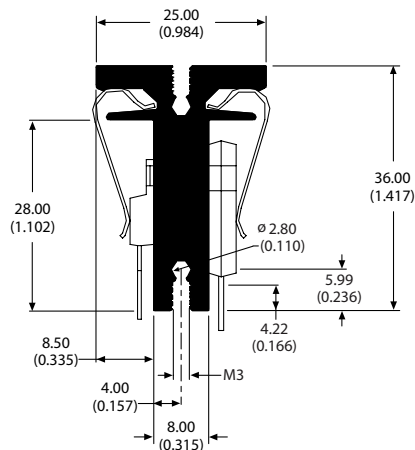
- Secondary operation needed for mounting to board



**78200**

kg/m: 0.89

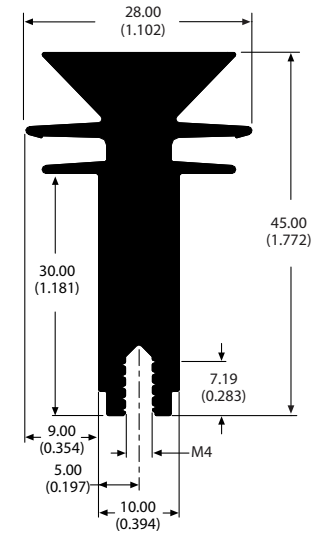
- One screw boss for vertical mounting to board



**78230**

kg/m: 1.39

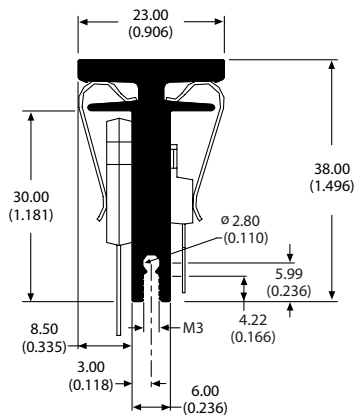
- One slot for vertical mounting to board



**78280**

kg/m: 0.75 •  $\theta_n = 3.11$  °C/W •  $\theta_f = 1.50$  °C/W

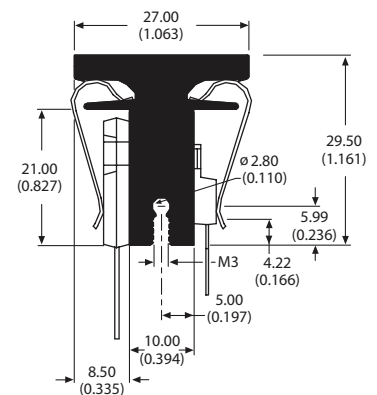
- One screw boss for vertical mounting to board



**78270**

kg/m: 0.95 •  $\theta_n = 3.43$  °C/W •  $\theta_f = 1.59$  °C/W

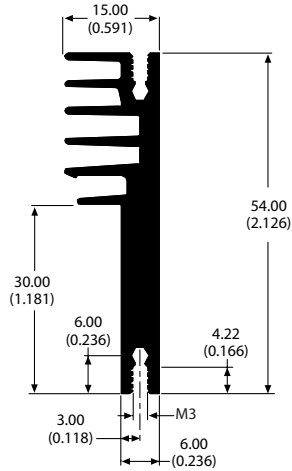
- One screw boss for vertical mounting to board



Single Mounting Surface with Flat Back styles feature profiles with one side dedicated to a single component mounting surface and cooling fins with a flat surface on the back side of the profile. This style is suitable in applications with tight space requirements or where the Max Extrusion will be mounted horizontally. The clip used to retain the component interlocks between the first and second fin above the flat component mounting surface.

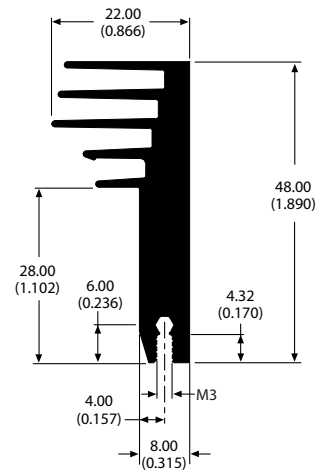
**82965** kg/m:0.90 •  $\theta_n = 3.43$  °C/W •  $\theta_f = 1.12$  °C/W

- One screw boss for vertical mounting to board



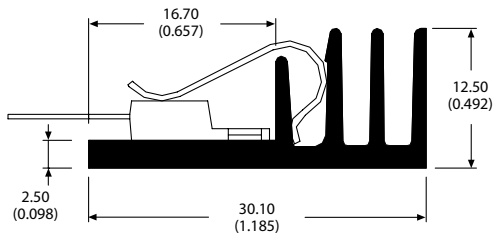
**82895** kg/m:1.08 •  $\theta_n = 3.42$  °C/W •  $\theta_f = 1.57$  °C/W

- One screw boss for vertical mounting to board



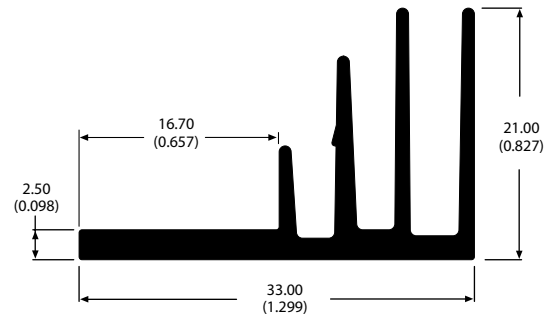
**78335** kg/m:0.31 •  $\theta_n = 6.34$  °C/W •  $\theta_f = 2.38$  °C/W

- Horizontally mounted



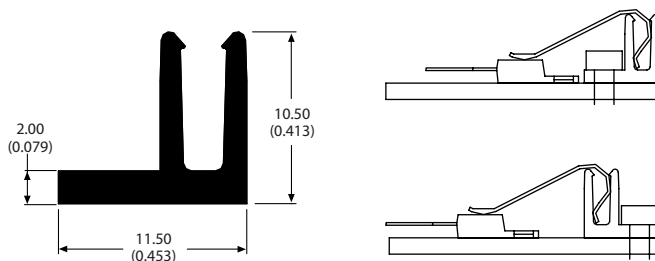
**82970** kg/m:0.41 •  $\theta_n = 4.38$  °C/W •  $\theta_f = 2.10$  °C/W

- Horizontally mounted



**78260** kg/m:0.12

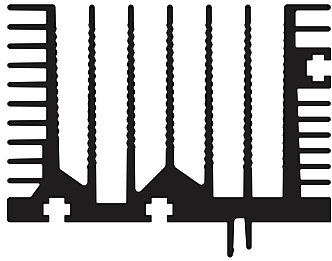
- Horizontally mounted



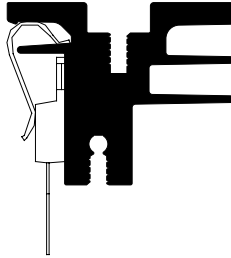


Application of The Max Clip System™ is limited only by the imagination. The following pages illustrate some examples of custom Max Extrusions. The system's flexibility allows the creation of shapes designed for specific thermal or mechanical system requirements. Please contact Boyd application engineering to discuss any of the shapes shown below or your custom application specifications.

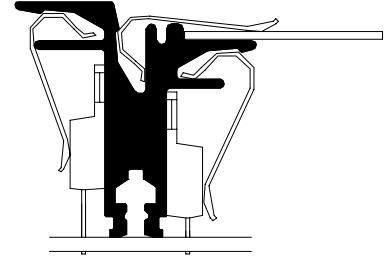
78050



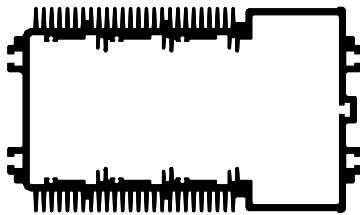
0S567



78370



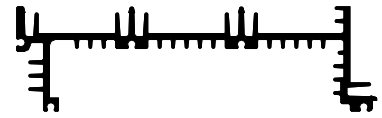
78380



78300



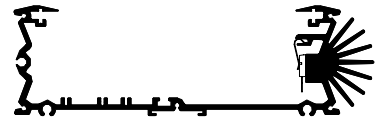
78305



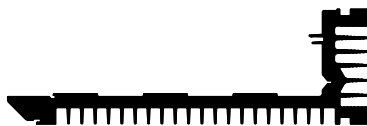
78310



0SA24



78290



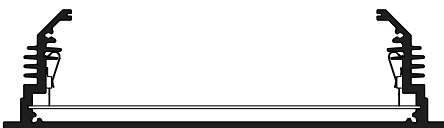
78385



0SA55



0SA61



0SA69



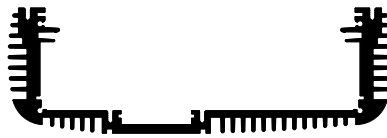
0SA74



OSA79



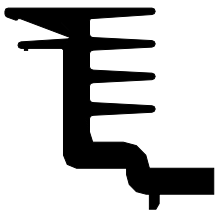
OSA80



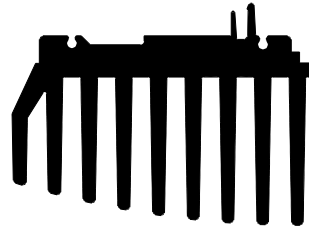
OSY94



BS014



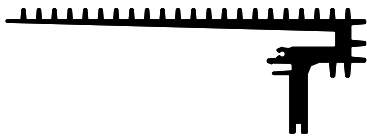
BS034



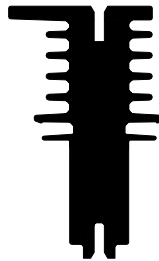
BS060



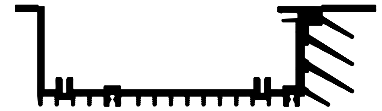
BS070



BS093



BS094



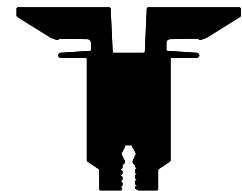
BS105



BS121



BS138



BS202



| Part Number | Normal Force<br>20N-40N<br>TO-220<br>TO-218<br>TO-251<br>TO-262<br>TO-273 | Short Clip<br>TO-220<br>TO-218<br>TO-251<br>TO-262<br>TO-273 | Long Clip<br>TO-220<br>TO-218<br>TO-251<br>TO-262<br>TO-273 | High Force<br>50N +<br>TO-220<br>TO-218<br>TO-251<br>TO-262<br>TO-273 | Normal Force<br>30N-50N<br>TO-247<br>TO-274 | High Force<br>60N +<br>TO-247<br>TO-274<br>TO-3P | Sensors Small<br>Component | Special D61<br>TO-247J<br>TO-274 | Special Thick Isolators<br>Solid State Relay* |
|-------------|---------------------------------------------------------------------------|--------------------------------------------------------------|-------------------------------------------------------------|-----------------------------------------------------------------------|---------------------------------------------|--------------------------------------------------|----------------------------|----------------------------------|-----------------------------------------------|
| 78010       | Max01NG<br>Max02NG                                                        | -                                                            | Max10<br>Max11                                              | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78015       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | Max10NG                                                     | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | -                                | Max23NG                                       |
| 78020       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | Max10NG                                                     | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max15NG                          | Max23NG                                       |
| 78025       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | Max10NG                                                     | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max15NG                          | Max23NG                                       |
| 78030       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78035       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78040       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78045       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | Max10NG                                                     | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78060       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78070       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG                                                     | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78075       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78080       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78085       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78090       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78095       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78105       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78110       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78185       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78190       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG                                                     | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78195       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | -                                                           | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | -                          | Max04<br>Max15                   | Max23NG                                       |
| 78200       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78205       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | Max10NG                                                     | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78215       | Max01NG<br>Max02NG                                                        | -                                                            | -                                                           | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | -                          | -                                | Max23NG                                       |
| 78220       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78225       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |

\* Special thick isolator clips are used to fix components with a total thickness from 7 mm or greater. For example, fastening a TO-247 device and 3mm thick ceramic insulator would result in a total thickness of 8mm. A standard Max Clip does not deform sufficiently to accommodate the total thickness. The Max23 Clip was developed to exert the necessary force in these applications.

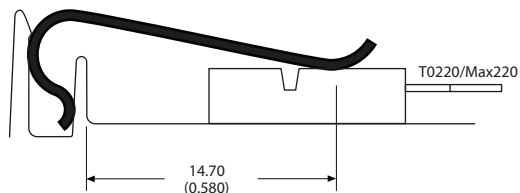
| Part Number | Normal Force<br>20N-40N<br>TO-220<br>TO-218<br>TO-251<br>TO-262<br>TO-273 | Short Clip<br>TO-220<br>TO-218<br>TO-251<br>TO-262<br>TO-273 | Long Clip<br>TO-220<br>TO-218<br>TO-251<br>TO-262<br>TO-273 | High Force<br>50N +<br>TO-220<br>TO-218<br>TO-251<br>TO-262<br>TO-273 | Normal Force<br>30N-50N<br>TO-247<br>TO-274 | High Force<br>60N +<br>TO-247<br>TO-274<br>TO-3P | Sensors Small<br>Component | Special D61<br>TO-247J<br>TO-274 | Special Thick Isolators<br>Solid State Relay* |
|-------------|---------------------------------------------------------------------------|--------------------------------------------------------------|-------------------------------------------------------------|-----------------------------------------------------------------------|---------------------------------------------|--------------------------------------------------|----------------------------|----------------------------------|-----------------------------------------------|
| 78230       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG                                                     | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78245       | Max01NG<br>Max02NG                                                        | -                                                            | -                                                           | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | -                          | Max04NG<br>Max15NG               | Max23NG                                       |
| 78250       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | -                                                           | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max15NG                          | Max23NG                                       |
| 78255       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | -                                                           | -                                                                     | Max03NG                                     | Max02-H                                          | -                          | -                                | Max23NG                                       |
| 78260       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78265       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | -                                                           | -                                                                     | Max03NG                                     | Max02-H                                          | -                          | -                                | Max23NG                                       |
| 78270       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | -                                                           | -                                                                     | Max03NG                                     | Max02-H                                          | -                          | -                                | Max23NG                                       |
| 78275       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | Max10NG                                                     | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78280       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG                                                     | Max01-HNNG                                                            | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78285       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78295       | Max01NG<br>Max02NG                                                        | -                                                            | -                                                           | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | -                          | -                                | Max23NG                                       |
| 78315       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78335       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | -                                                           | -                                                                     | -                                           | Max02-H                                          | -                          | -                                | -                                             |
| 78345       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78350       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | Max10NG                                                     | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78355       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | Max10NG                                                     | Max01-HNG                                                             | Max03NG                                     | Max02-H<br>Max03-H                               | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78360       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | -                                                           | -                                                                     | Max03NG                                     | Max02-H                                          | -                          | -                                | Max23NG                                       |
| 78375       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | Max10NG                                                     | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78390       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 78405       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | -                                                           | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | -                          | -                                | Max23NG                                       |
| 81400       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 82005       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 82870       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 82875       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | Max10NG                                                     | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 82880       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | Max10NG<br>Max11NG                                          | Max01-HNG<br>Max04-HNG                                                | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 82885       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | -                                                           | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |

\* Special thick isolator clips are used to fix components and insulators with a total thickness of 7 mm or greater. For example, fastening a TO-247 device and 3mm thick ceramic insulator would result in a total thickness of 8mm. A standard Max Clip does not deform sufficiently to accommodate the total thickness. The Max23NG Clip was developed to exert the necessary force in these applications.

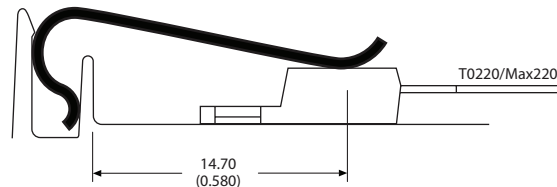
| Part Number | Normal Force<br>20N-40N<br>TO-220<br>TO-218<br>TO-251<br>TO-262<br>TO-273 | Short Clip<br>TO-220<br>TO-218<br>TO-251<br>TO-262<br>TO-273 | Long Clip<br>TO-220<br>TO-218<br>TO-251<br>TO-262<br>TO-273 | High Force<br>50N +<br>TO-220<br>TO-218<br>TO-251<br>TO-262<br>TO-273 | Normal Force<br>30N-50N<br>TO-247<br>TO-274 | High Force<br>60N +<br>TO-247<br>TO-274<br>TO-3P | Sensors Small<br>Component | Special D61<br>TO-247J<br>TO-274 | Special Thick Isolators<br>Solid State Relay* |
|-------------|---------------------------------------------------------------------------|--------------------------------------------------------------|-------------------------------------------------------------|-----------------------------------------------------------------------|---------------------------------------------|--------------------------------------------------|----------------------------|----------------------------------|-----------------------------------------------|
| 82890       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | -                                                           | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max15NG                          | Max23NG                                       |
| 82895       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | Max10NG                                                     | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 82900       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | -                                                           | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max15NG                          | Max23NG                                       |
| 82905       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | Max10NG                                                     | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max15NG                          | Max23NG                                       |
| 82910       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 82920       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 82925       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | -                                                           | -                                                                     | Max03NG                                     | Max02-HNG                                        | -                          | -                                | Max23NG                                       |
| 82930       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 82935       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 82940       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 82945       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | -                                                           | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max15NG                          | Max23NG                                       |
| 82950       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 82955       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | Max10NG                                                     | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 82960       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 82965       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 82970       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | -                                                           | -                                                                     | -                                           | Max02-HNG                                        | -                          | -                                | -                                             |
| 82975       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max04NG<br>Max15NG               |                                               |
| 82980       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | -                                                           | -                                                                     | Max03NG                                     | Max02-HNG                                        | -                          | -                                | Max23NG                                       |
| 82985       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 82990       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 83000       | Max01NG<br>Max02NG                                                        | Max09NG                                                      | Max10NG                                                     | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 83005       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 83010       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 83015       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |
| 83020       | Max01NG<br>Max02NG                                                        | -                                                            | Max10NG<br>Max11NG                                          | Max01-HNG                                                             | Max03NG                                     | Max02-HNG<br>Max03-HNG                           | Max12NG                    | Max04NG<br>Max15NG               | Max23NG                                       |

\* Special thick isolator clips are used to fix components and insulators with a total thickness of 7 mm or greater. For example, fastening a TO-247 device and 3mm thick ceramic insulator would result in a total thickness of 8mm. A standard Max Clip does not deform sufficiently to accommodate the total thickness. The Max23 Clip was developed to exert the necessary force in these applications.

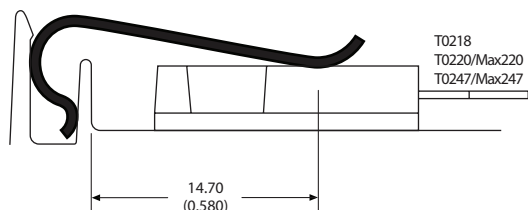
|                |       |           |        |
|----------------|-------|-----------|--------|
| <b>Max01NG</b> | Width | Thickness | Force  |
|                | 10 mm | x 0.5     | = 22 N |



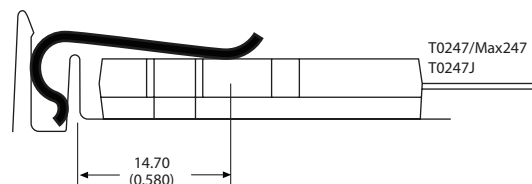
|                |       |           |        |
|----------------|-------|-----------|--------|
| <b>Max02NG</b> | Width | Thickness | Force  |
|                | 12 mm | x 0.5     | = 35 N |



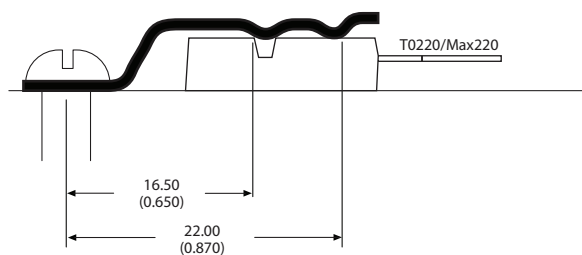
|                |       |           |        |
|----------------|-------|-----------|--------|
| <b>Max03NG</b> | Width | Thickness | Force  |
|                | 15 mm | x 0.5     | = 45 N |



|                |       |           |        |
|----------------|-------|-----------|--------|
| <b>Max04NG</b> | Width | Thickness | Force  |
|                | 20 mm | x 0.5     | = 60 N |

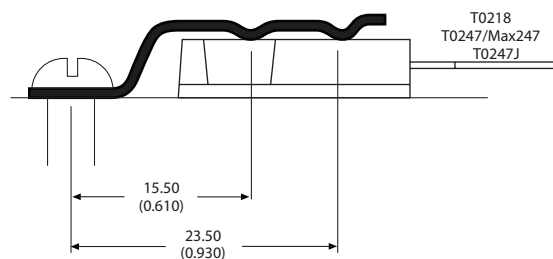


|                |       |           |        |
|----------------|-------|-----------|--------|
| <b>Max07NG</b> | Width | Thickness | Force  |
|                | 12 mm | x 0.6     | = 50 N |



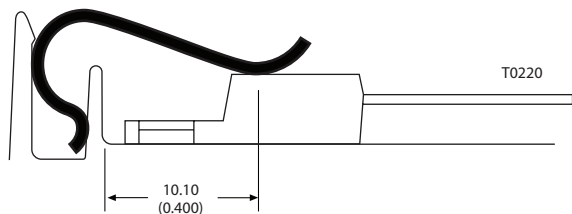
With Screws

|                |       |           |        |
|----------------|-------|-----------|--------|
| <b>Max08NG</b> | Width | Thickness | Force  |
|                | 18 mm | x 0.6     | = 75 N |

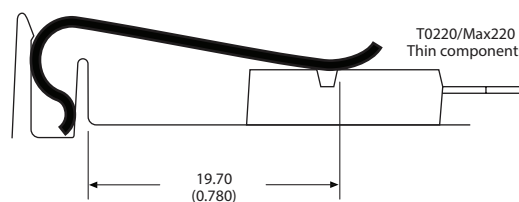


With Screws

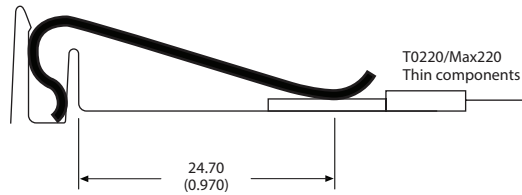
|                |       |           |        |
|----------------|-------|-----------|--------|
| <b>Max09NG</b> | Width | Thickness | Force  |
|                | 10 mm | x 0.5     | = 45 N |



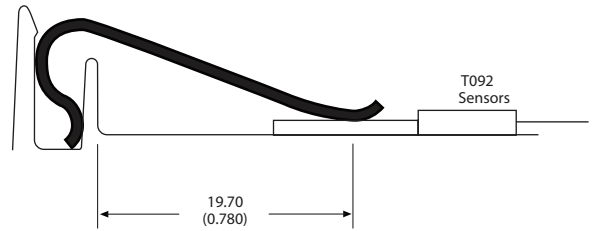
|                |       |           |        |
|----------------|-------|-----------|--------|
| <b>Max10NG</b> | Width | Thickness | Force  |
|                | 12 mm | x 0.6     | = 40 N |



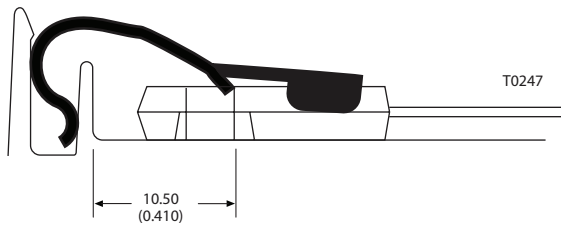
| Max11NG | Width | Thickness | Force  |
|---------|-------|-----------|--------|
|         | 12 mm | x 0.6     | = 35 N |



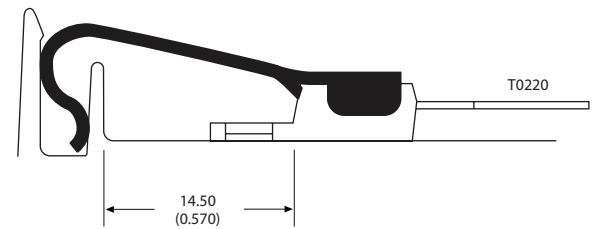
| Max12NG | Width | Thickness | Force  |
|---------|-------|-----------|--------|
|         | 6 mm  | x 0.6     | = 25 N |



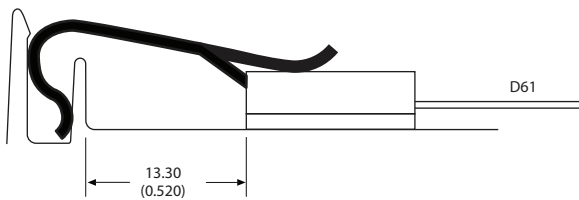
| Max13NG | Width | Thickness | Force  |
|---------|-------|-----------|--------|
|         | 17 mm | x 0.5     | = 45 N |



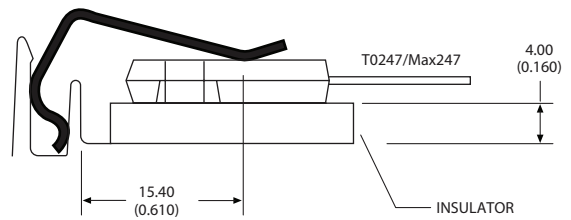
| Max14NG | Width | Thickness | Force  |
|---------|-------|-----------|--------|
|         | 13 mm | x 0.5     | = 20 N |



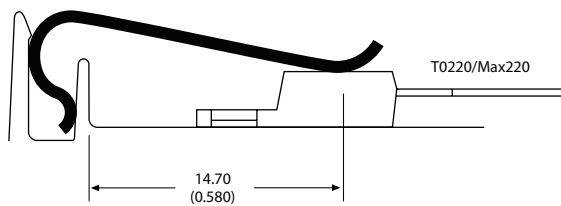
| Max15NG | Width | Thickness | Force  |
|---------|-------|-----------|--------|
|         | 18 mm | x 0.6     | = 60 N |



| Max23NG | Width | Thickness | Force   |
|---------|-------|-----------|---------|
|         | 18 mm | x 0.6     | = 100 N |

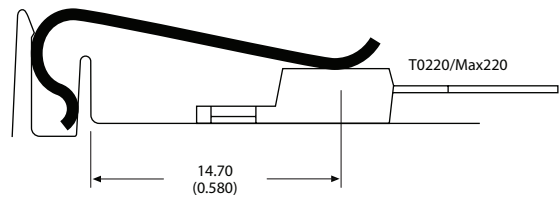


| Max01-HNG | Width | Thickness | Force  |
|-----------|-------|-----------|--------|
|           | 10 mm | x 0.7     | = 80 N |



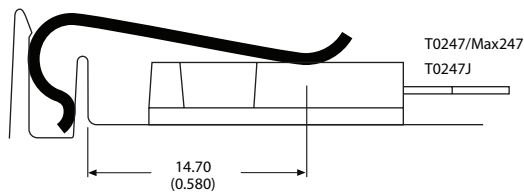
H = High Force

| Max02-HNG | Width | Thickness | Force  |
|-----------|-------|-----------|--------|
|           | 13 mm | x 0.6     | = 60 N |



H = High Force

| Max03-HNG | Width | Thickness | Force  |
|-----------|-------|-----------|--------|
|           | 18 mm | x 0.6     | = 80 N |

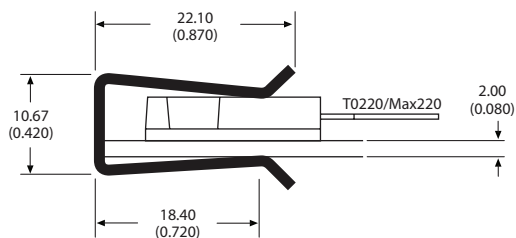


H = High Force

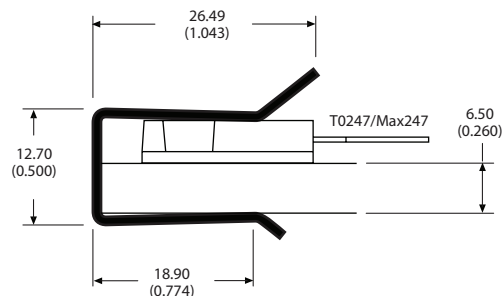
# The Max Clip System™ U-Clips

U-Clips can be used to attach semiconductors to conventional extrusions or plates. These clips provide the necessary force to maintain proper thermal performance.

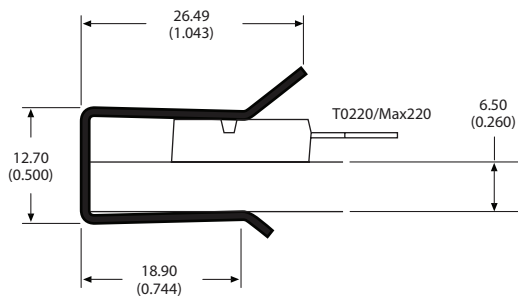
| CLP212G | Width   | Thickness | Force  |
|---------|---------|-----------|--------|
|         | 10.1 mm | x 0.5     | = 21 N |



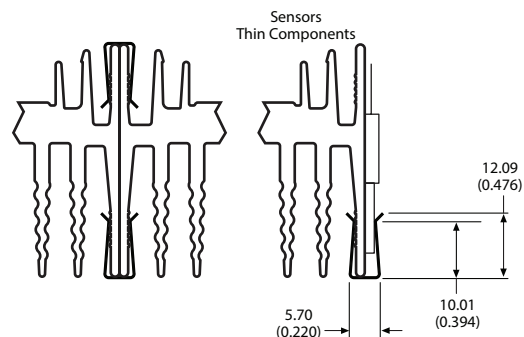
| CLP212MG | Width | Thickness | Force  |
|----------|-------|-----------|--------|
|          | 15 mm | x 0.5     | = 36 N |



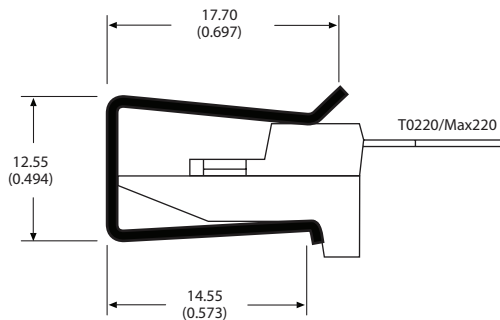
| CLP212PG | Width | Thickness | Force  |
|----------|-------|-----------|--------|
|          | 10 mm | x 0.5     | = 21 N |



| CLP212SG | Width | Thickness | Force  |
|----------|-------|-----------|--------|
|          | 7 mm  | x 0.5     | = 20 N |



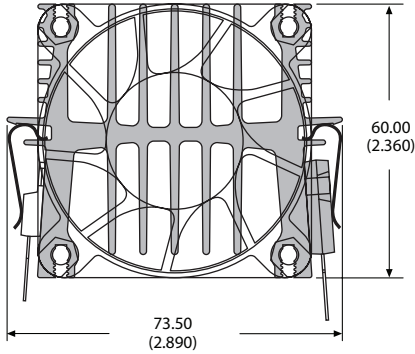
| CLP212TG | Width | Thickness | Force  |
|----------|-------|-----------|--------|
|          | 10 mm | x 0.6     | = 34 N |



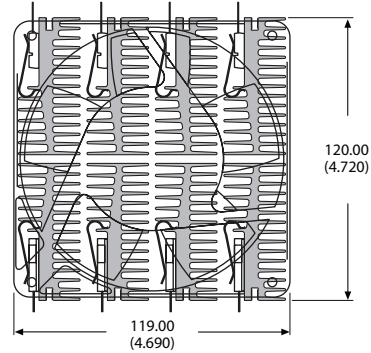
Below are examples of Assembly Ideas, using Boyd Max Clip System™. The illustrations show the use of multi-ple extrusion profiles, fans and clips to assemble cost effective high performance thermal solutions.

## Forced Convection Assemblies (using customer supplied fans)

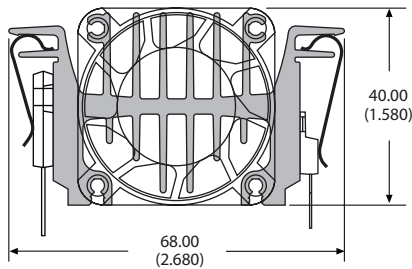
78030 Extrusion with fan  $\theta_f = 0.36 \text{ } ^\circ\text{C/W}$



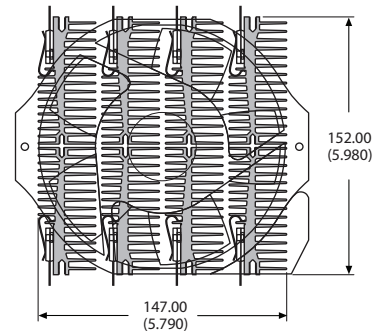
78080 8 Piece extrusion with fan  $\theta_f = 0.069 \text{ } ^\circ\text{C/W}$



78345 Extrusion with fan  $\theta_f = 0.49 \text{ } ^\circ\text{C/W}$

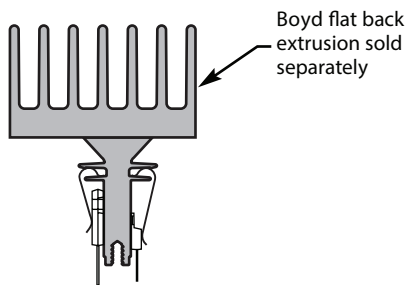


78010 8 Piece extrusion with fan  $\theta_f = 0.049 \text{ } ^\circ\text{C/W}$

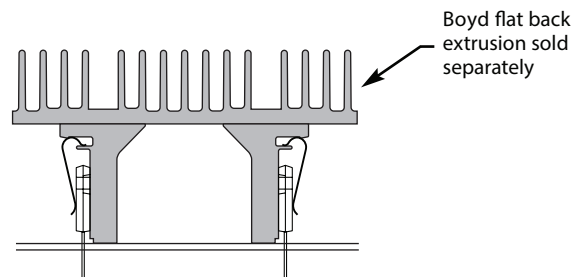


## Max Heat Connector Assemblies

78315 Max heat sink support

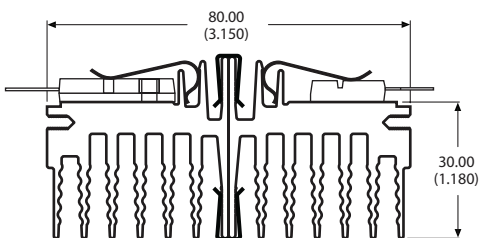


78085 Max heat sink support



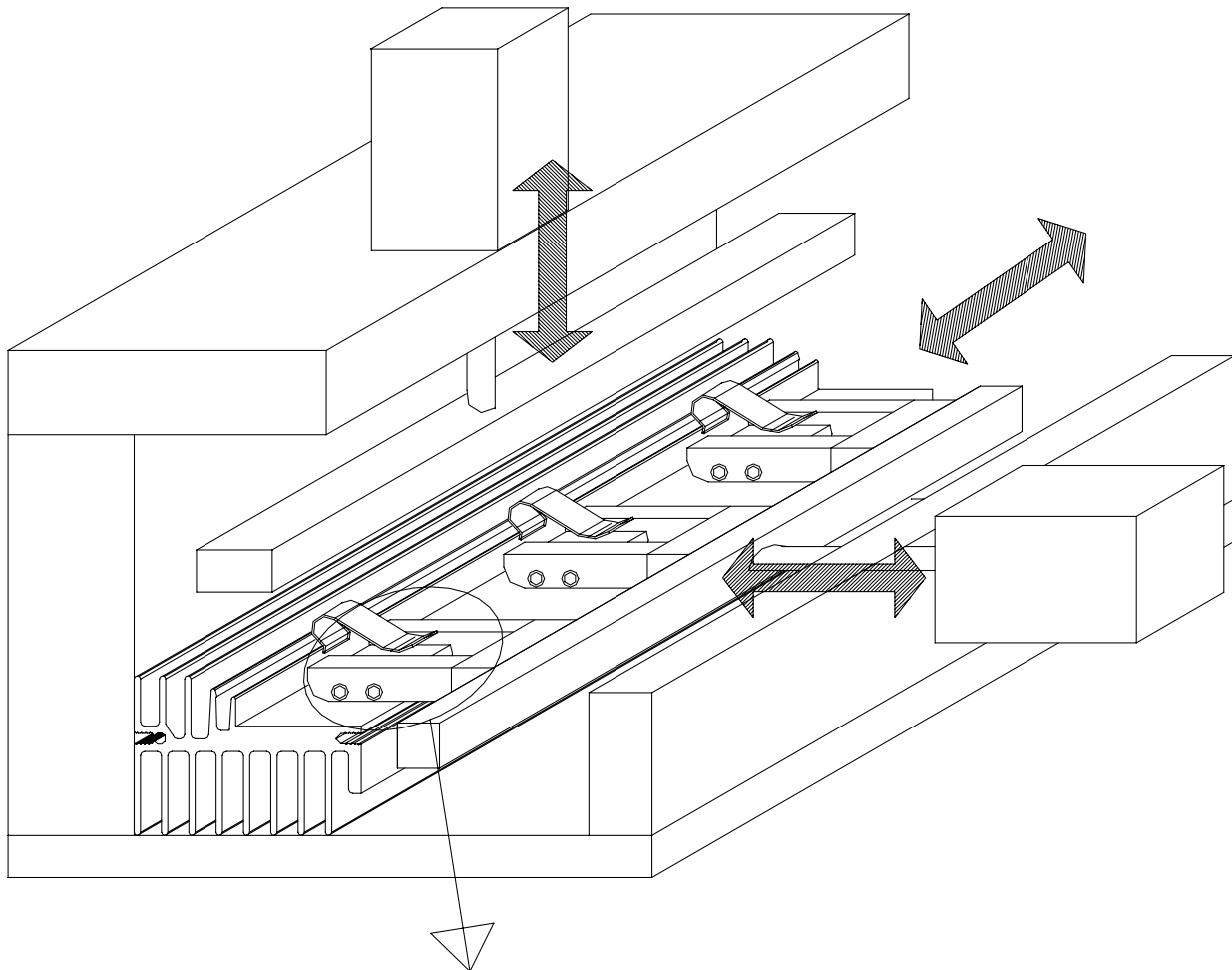
## Connecting Max Profiles with U-Clips

78045 Extrusion with Clip CLP212S

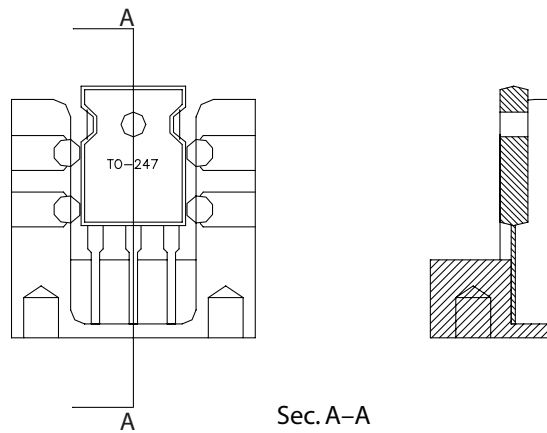


## Semi-Automated Assembly (1)

One way of optimizing The Max Clip System™ for volume manufacturing is through the use of semi-automated assembly. The Max Clip System™ is suitable for pick and place machines and the following diagrams illustrate a method for automating the semiconductor and clip attachment to Max Extrusions.

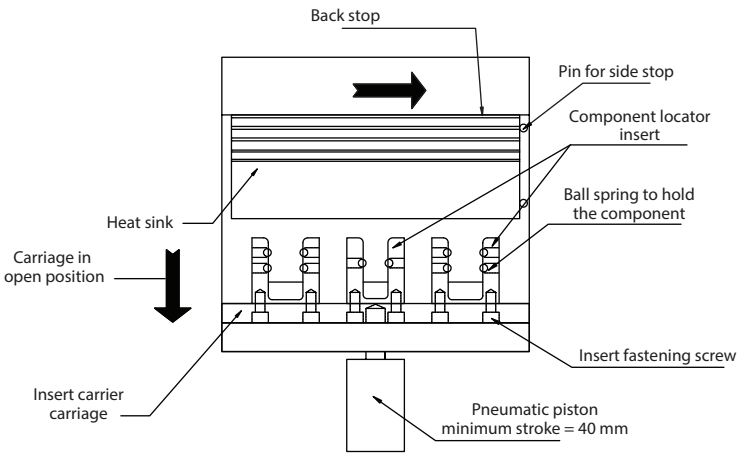


DETAIL OF COMPONENT  
LOCATOR INSERT

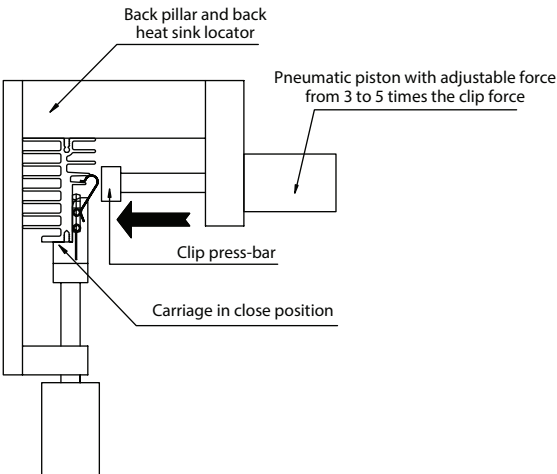


Sec. A-A

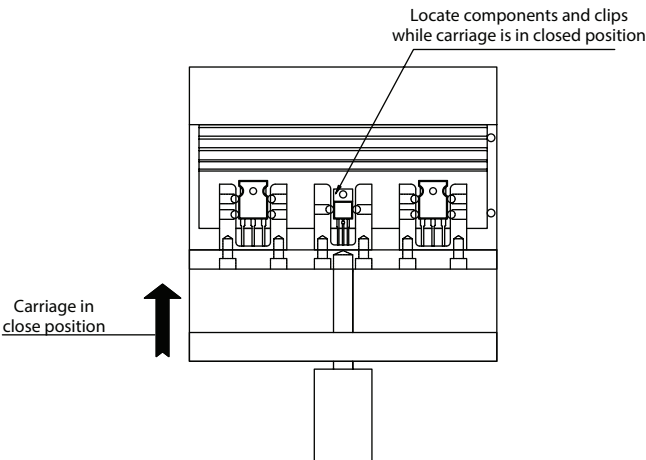
HEAT SINK LOCATING



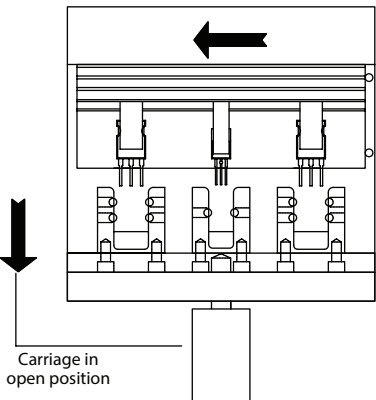
CLIP PRESSING



COMPONENTS AND CLIP LOCATING



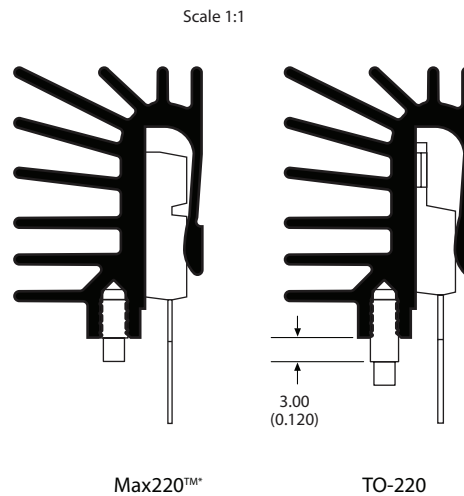
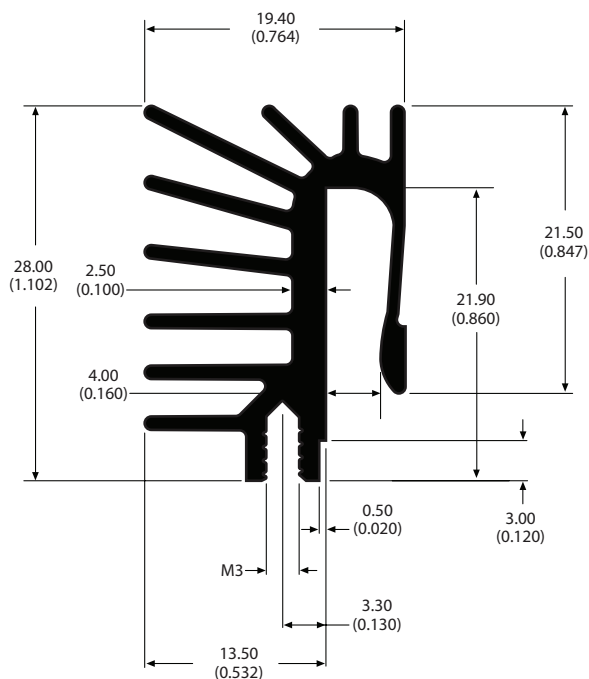
HEAT SINK REMOVAL



## 78065 Integrated Clip Profiles (TO-220, TO-252, TO-262)

kg/m: 0.493 •  $\theta_n = 2.15\text{ }^{\circ}\text{C/W}$  •  $\theta_f = 0.73\text{ }^{\circ}\text{C/W}$ 

The Integrated Clip Profile style uses a unique extrusion profile with an integrated clip. Extrusion 78065 shares all the advantages of The Max Clip System™ without the use of a discrete clip. The profiles are compact and suited for board level cooling requirements. These profiles are designed to accept packages with or without mounting tabs.



See page 34 for options on solderable pins

Black anodized heat sink thermal resistance ( $^{\circ}\text{C/W}$ )

| Part number  | Length     | Natural convection | Forced convection |       |       | Force on component (N) |
|--------------|------------|--------------------|-------------------|-------|-------|------------------------|
|              |            |                    | 1 m/s             | 2 m/s | 3 m/s |                        |
| 780653B00590 | 15 (0.590) | 13.31              | 5.46              | 4.09  | 3.35  | 54                     |
| 780653B00790 | 20 (0.790) | 10.66              | 4.30              | 3.20  | 2.60  | 70                     |
| 780653B00980 | 25 (0.980) | 8.97               | 3.58              | 2.65  | 2.15  | 85                     |
| 780653B01180 | 30 (1.18)  | 7.77               | 3.08              | 2.27  | 1.84  | 100                    |

Unfinished heat sink thermal resistance ( $^{\circ}\text{C/W}$ )

| Part number  | Length     | Natural convection | Forced convection |       |       | Force on component (N) |
|--------------|------------|--------------------|-------------------|-------|-------|------------------------|
|              |            |                    | 1 m/s             | 2 m/s | 3 m/s |                        |
| 780653U00590 | 15 (0.59)  | 16.18              | 6.05              | 4.41  | 3.56  | 54                     |
| 780653U00790 | 20 (0.790) | 13.02              | 4.76              | 3.44  | 2.77  | 70                     |
| 780653U00980 | 25 (0.98)  | 10.98              | 3.96              | 2.85  | 2.28  | 85                     |
| 780653U01180 | 30 (1.18)  | 9.55               | 3.41              | 2.45  | 1.96  | 100                    |

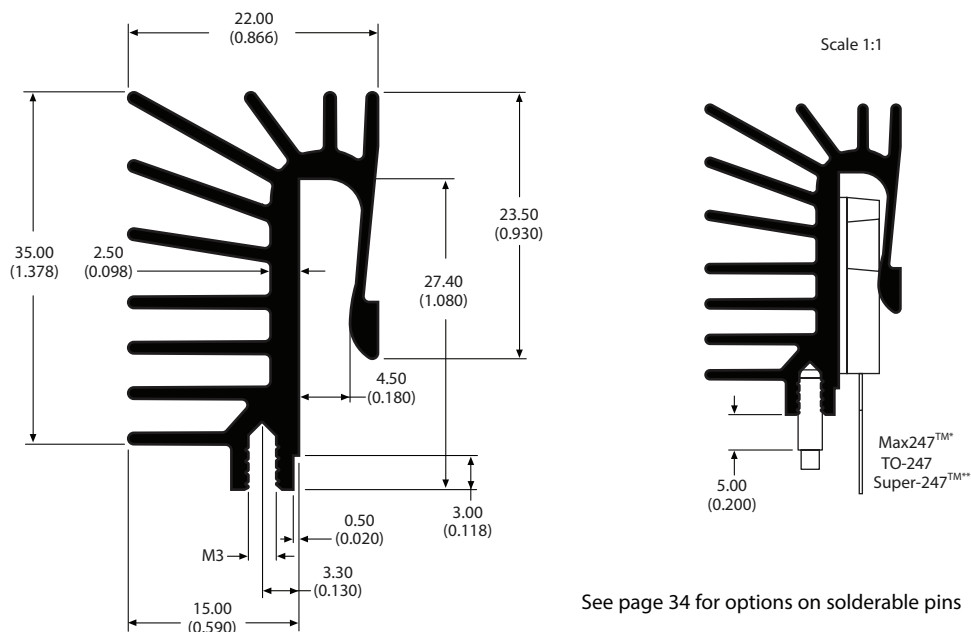
The heat sink thermal performance is evaluated in the vertical mode at a  $\Delta T$  of  $70^{\circ}\text{C}$ .

\* Max220™ is a registered trademark of STMicroelectronics

## 78240 Integrated Clip Profiles (TO-247, TO-218)

kg/m: 0.627 •  $\theta_n = 1.74\text{ }^{\circ}\text{C/W}$  •  $\theta_f = 0.58\text{ }^{\circ}\text{C/W}$

The Integrated Clip Profile style uses a unique extrusion profile with an integrated clip. Extrusion 78240 shares all the advantages of The Max Clip System™ without the use of a discrete clip. The profiles are compact and suited for board level cooling requirements. These profiles are designed to accept packages with or without mounting tabs.



### Black anodized heat sink thermal resistance ( $^{\circ}\text{C/W}$ )

| Part number  | Length     | Natural convection | Forced convection |       |       | Force on component (N) |
|--------------|------------|--------------------|-------------------|-------|-------|------------------------|
|              |            |                    | 1 m/s             | 2 m/s | 3 m/s |                        |
| 782403B00590 | 15 (0.590) | 10.71              | 4.49              | 3.40  | 2.80  | 54                     |
| 782403B00790 | 20 (0.790) | 8.58               | 3.53              | 2.65  | 2.17  | 70                     |
| 782403B00980 | 25 (0.980) | 7.22               | 2.93              | 2.19  | 1.79  | 85                     |
| 782403B01180 | 30 (1.18)  | 6.26               | 2.53              | 1.88  | 1.53  | 100                    |

### Unfinished heat sink thermal resistance ( $^{\circ}\text{C/W}$ )

| Part number  | Length     | Natural convection | Forced convection |       |       | Force on component (N) |
|--------------|------------|--------------------|-------------------|-------|-------|------------------------|
|              |            |                    | 1 m/s             | 2 m/s | 3 m/s |                        |
| 782403U00590 | 15 (0.590) | 12.96              | 5.02              | 3.69  | 2.99  | 54                     |
| 782403U00790 | 20 (0.790) | 10.42              | 3.94              | 2.88  | 2.32  | 70                     |
| 782403U00980 | 25 (0.980) | 8.79               | 3.28              | 2.38  | 1.91  | 85                     |
| 782403U01180 | 30 (1.18)  | 7.66               | 2.82              | 2.04  | 1.68  | 100                    |

The heat sink thermal performance is evaluated in the vertical mode at a  $\Delta T$  of  $70^{\circ}\text{C}$ .

\* Max247™ is a registered trademark of STMicroelectronics

\*\* Super-247™ is a registered trademark of International Rectifier

## How to add solderable pins for easy attachment in circuit board applications

The Max Clip System™ can be mounted directly to printed circuit boards by installing tin plated pins in the base of the heat sink and then creating a pattern of plated through holes in the circuit card to accept the pins. The heat sink assembly can then be inserted into the circuit board holes and soldered into place during wave solder operations. These pins come in a variety of stand-off lengths as illustrated below. Since placement of the pins is specific to the application, a customer supplied drawing is required when ordering. The drawing should contain the information shown in Figure A.

### Pin Dimensions

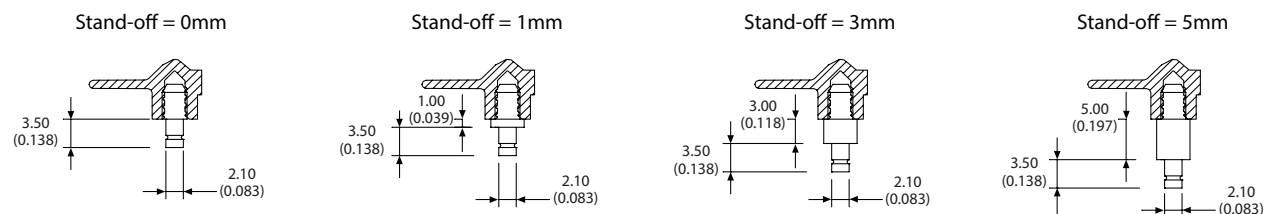
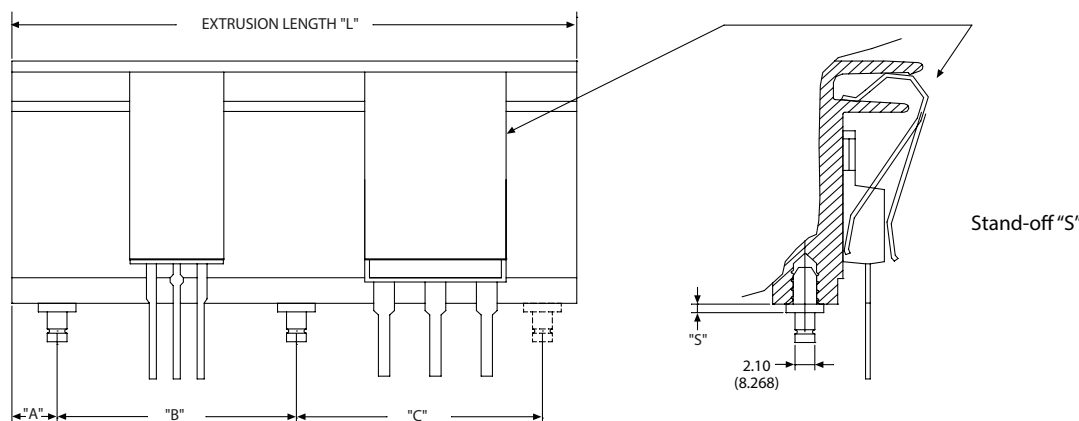


Figure A

The Max Clip System™

View from component side



The suggested hole dia. in the PCB is  $2.7 \pm 0.1$  mm with a pitch tolerance of  $\pm 0.15$  mm.

Dimensions "B" and "C" are not required for a heat sink with only 1 solderable pin

Dimension "C" is not required for a heat sink with 2 solderable pins

Tolerance  $\pm 0.2$  mm

Standard Stand-off = 0 mm

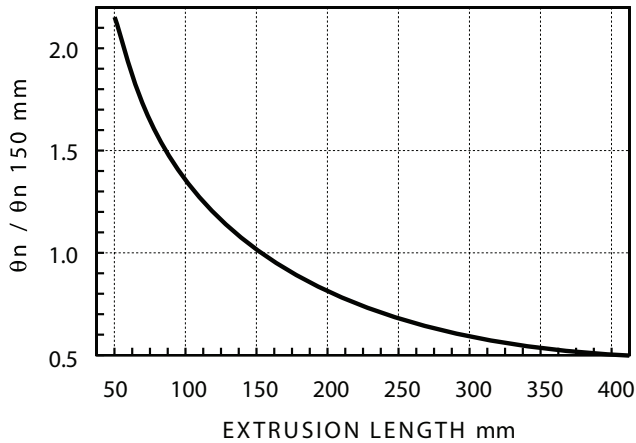
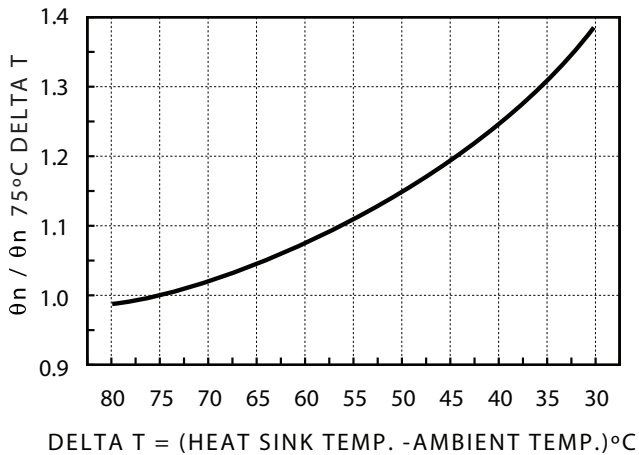
1 mm

3 mm

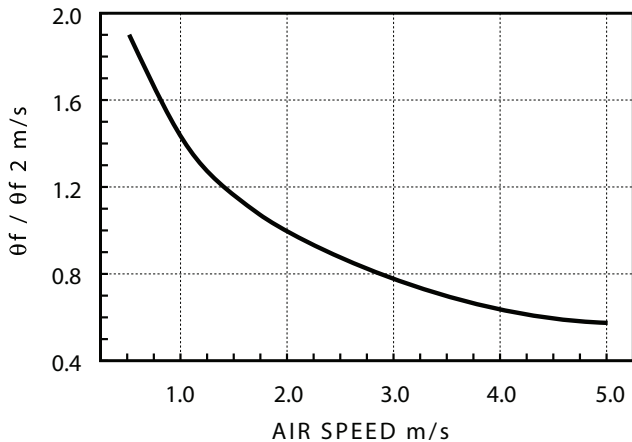
5 mm

NOTE: We suggest that soldering and mechanical resistance tests are made by customer before full production.

THERMAL RESISTANCE vs LENGTH

THERMAL RESISTANCE vs ( $T_s - T_a$ )

THERMAL RESISTANCE vs AIR SPEED



## HOW TO INTERPRET THERMAL PERFORMANCE

The extrusions are presented in order by shape and size. Dimensions are in mm with (inches) following in parenthesis. On pages 5-6 there is an index sorted by extrusion part number. The part number, weight in kg/m, thermal resistance ( $\theta_n$  with natural convection, thermal resistance  $\theta_f$  with forced convection) at an air speed of 2.0 m/s is shown for each extrusion. The thermal resistances have been calculated using 150 mm long vertical anodized heat sinks with a sink-to-ambient temperature difference of 75°C and a uniform thermal load on the heat sink base.

## LENGTH CORRECTION FACTOR

Because the air heats up while circulating through the extrusion, the convection coefficient is not constant throughout the extrusion length. Therefore, the thermal resistance changes nonlinearly as the length changes. To calculate the correct thermal resistance for extrusion lengths other than the standard 150 mm length, multiply the given thermal resistance data by the appropriate factor taken from the thermal resistance vs length graph shown. The same correction factor must be used for thermal resistance in both natural convection and forced convection.

## TEMPERATURE CORRECTION FACTOR

Both natural convection and radiation coefficients are related to the sink-to-ambient temperature difference. To evaluate the thermal performance of a heat sink for an application requiring a sink-to-ambient temperature rise other than 75°C, use the correction factor from the thermal resistance vs ( $T_s - T_a$ ) graph shown. This factor must be used only for thermal resistance in natural convection.

## AIR SPEED CORRECTION FACTOR

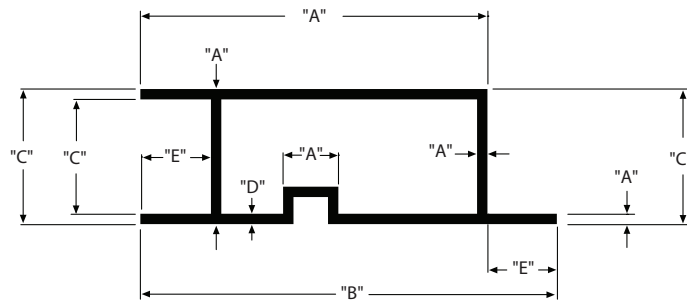
The convection coefficient is also closely related to the air speed through the fins. Since evaluation of air speed through the fins is difficult to evaluate under normal circumstances, we show the thermal resistance of an extrusion in forced convection evaluated using a tunnel the same size as the extrusion. For a tunnel airflow other than 2 m/s, refer to the factor in the thermal resistance vs air speed graph shown. Use this factor to figure thermal resistance in forced convection.

Provided by PENNY + GILES • Test Certificate No. 3318

1. TEST CONDUCTED
  - 1.1 Sine Vibration and 1/2 Sine Shock
2. SPECIMEN DATA
  - 2.1 No. Off: 4 off
  - 2.2 Identification: Heat sink S509/40 with MAX Clips retaining 4 off semiconductors
  - 2.3 Reference No.(s): MAX 01, MAX 02, MAX 03, MAX 04
  - 2.4 Serial No.(s): 1, 2, 3, and 4
  - 2.5 Condition received: OK
3. SPECIFICATIONS AND/OR NATIONAL STANDARDS
  - 3.1 Equipment Specification
    - 3.1.1 Authority: N/A
    - 3.1.2 Title: N/A
    - 3.1.3 Issue: N/A
    - 3.1.4 Data: N/A
    - 3.1.5 Requirements: N/A
  - 3.2 RELATED NATIONAL STANDARD
    - 3.2.1 Authority: BSI
    - 3.2.2 Title: BS2011
    - 3.2.3 Issue: As date
    - 3.2.4 Data: Test Ea: 1988, Test Fc: 1983.
    - 3.2.5 Requirement(s): Tests Ea and Fc, as modified by Request To Test form 3318
4. CLIENT
  - 4.1 El.Bo.Mec Thermalloy - Via Del Tipografo, 4 - 40138 Bologna, Italy
5. RECEIPT OF TEST SPECIMEN
  - 5.1 Specimen received 28.05.98 under request to test form No. 3318, dated 28.05.98.
6. DATE OF TEST
  - 6.1 Test commenced and completed 01.06.98.
7. DISPOSAL OF TEST SPECIMEN
  - 7.1 Specimen returned to client under delivery note 1362 dated 02.06.98.
8. TEST METHOD/PROCEDURE
  - 8.1 The heat sink assembly was mounted onto the shaker table and subjected to a sinusoidal vibration test as follows:
 

|                              |                     |
|------------------------------|---------------------|
| Frequency Range:             | 8 Hz to 100 Hz      |
| Vibration Amplitude:         | ± 3g pk             |
| Rate of Change of Frequency: | 1 Octave per minute |
| Test Duration:               | 20 minutes          |
  - 8.2 During the above 20 minute period the heat sink assembly was observed visually for evidence of the max mounts becoming detached.
  - 8.3 The procedures described in 8.1 and 8.2 above were repeated such that vibration test was conducted in all three mutually perpendicular axes.
  - 8.4 The heat sink assembly was then subjected to a shock test as follows:
 

|                       |                             |
|-----------------------|-----------------------------|
| Shock Pulse Envelope: | 112 sine                    |
| Period:               | 6 ms                        |
| Amplitude:            | 5 g                         |
| Number of Shocks:     | 3                           |
| Application:          | 3 shocks per sense per axis |
  - 8.5 During the above 20 minute period the heat sink assembly was observed visually for evidence of the max mounts becoming detached.
9. TEST RESULTS
  - 9.1 The max clips did not break free from the heat sink assembly. No physical degradation was observed.



- (1) for "A" Dim or "B" Dim = 300 mm  
tolerances supplied by customer  
(2) for "E" Dim = 5 mm, tolerances equal "B"

| "D" Dim (mm) | Tolerances (mm) |
|--------------|-----------------|
| < 2.5        | ± 0.25          |
| = 2.5        | ± 10%           |

| "A" Dim or "B" Dim (mm) | Tolerances (mm) |
|-------------------------|-----------------|
| < "A" or "B" = 2        | ± 0.15          |
| 2 < "A" ≤ 3             | ± 0.20          |
| 3 < "A" ≤ 5             | ± 0.25          |
| 5 < "A" ≤ 10            | ± 0.30          |
| 10 < "A" ≤ 15           | ± 0.35          |
| 15 < "A" ≤ 30           | ± 0.40          |
| 30 < "A" ≤ 50           | ± 0.50          |
| 50 < "A" < 80           | ± 0.80          |
| 80 < "A" < 100          | ± 1.00          |
| 100 < "A" ≤ 120         | ± 1.20          |
| 120 < "A" ≤ 150         | ± 1.30          |
| 150 < "A" ≤ 200         | ± 1.50          |
| 200 < "A" ≤ 250         | ± 1.80          |
| 250 < "A" ≤ 300         | ± 2.10          |

| "C" Dim (mm)    | Tolerances (mm) |               |               |          |
|-----------------|-----------------|---------------|---------------|----------|
|                 | 5 < "E" ≤ 15    | 15 < "E" ≤ 30 | 30 < "E" ≤ 60 | "E" ≤ 60 |
| "C" = 5         | ± 0.30          | ± 0.35        | ± 0.40        | ± 0.50   |
| 5 < "C" < 10    | ± 0.35          | ± 0.40        | ± 0.45        | ± 0.55   |
| 10 < "C" < 15   | ± 0.40          | ± 0.45        | ± 0.50        | ± 0.65   |
| 15 < "C" ≤ 20   | ± 0.45          | ± 0.50        | ± 0.60        | ± 0.75   |
| 20 < "C" ≤ 30   | ± 0.50          | ± 0.60        | ± 0.75        | ± 0.90   |
| 30 < "C" < 50   | ± 0.60          | ± 0.75        | ± 0.90        | ± 1.30   |
| 50 < "C" < 70   | ± 0.85          | ± 0.95        | ± 1.10        | ± 1.45   |
| 70 < "C" ≤ 100  | ± 1.05          | ± 1.10        | ± 1.25        | ± 1.65   |
| 100 < "C" ≤ 150 | ± 1.35          | ± 1.40        | ± 1.65        | ± 2.20   |
| 150 < "C" ≤ 200 | ± 1.50          | ± 1.60        | ± 2.00        | ± 2.80   |
| 200 < "C" < 250 | ± 1.85          | ± 1.90        | ± 2.55        | ± 3.50   |
| 250 < "C" < 300 | ± 2.20          | ± 2.40        | ± 3.20        | ± 4.00   |

| Machining Standard Tolerances |                 | UNI-ISO 2768 m |
|-------------------------------|-----------------|----------------|
| Cut to length                 | L < 300         | ± 0.25         |
|                               | 300 ≤ L < 500   | ± 0.5          |
|                               | L = 500         | ± 1.0          |
| Hole center to center         | "D" < 30        | ± 0.2          |
|                               | 30 ≤ "D" < 120  | ± 0.3          |
|                               | 120 ≤ "D" < 400 | ± 0.5          |
|                               | "D" = 400       | ± 0.8          |
| Hole Diameter                 | "D" < 8         | -0.05 + 0.08   |
| Unmachined surfaces           | Flatness        | 0.5 / 100      |
|                               | Roughness       | 1.6 μm         |
| Machined surfaces             | Flatness        | 0.05 / 100     |
|                               | Roughness       | 0.8 ~ μm       |
| Anodization thickness         | 12 μm           | ± 5 μm         |

| Parameters                      | Tolerance (mm) |               |
|---------------------------------|----------------|---------------|
|                                 | Size           | Maximum depth |
| Threaded holes<br>maximum depth | M2             | 6             |
|                                 | M2.5           | 7.5           |
|                                 | M3             | 10            |
|                                 | M4             | 12            |
|                                 | M5             | 15            |
|                                 | M6             | 18            |
|                                 | M8             | 24            |

| Parameter | Quantity (q)  | Tolerance |
|-----------|---------------|-----------|
| Quantity  | q < 10        | - 1 pc    |
|           | 10 ≤ q < 50   | ± 1 pc    |
|           | 50 ≤ q < 200  | ± 2 pcs   |
|           | 200 < q < 500 | ± 5 pcs   |
|           | 500 < q < 100 | ± 10 pcs  |
|           | q = 1000      | ± 30 pcs  |

Our products are typically made using  
Al 6060 T5 (Aluminum Alloy 9006/1).