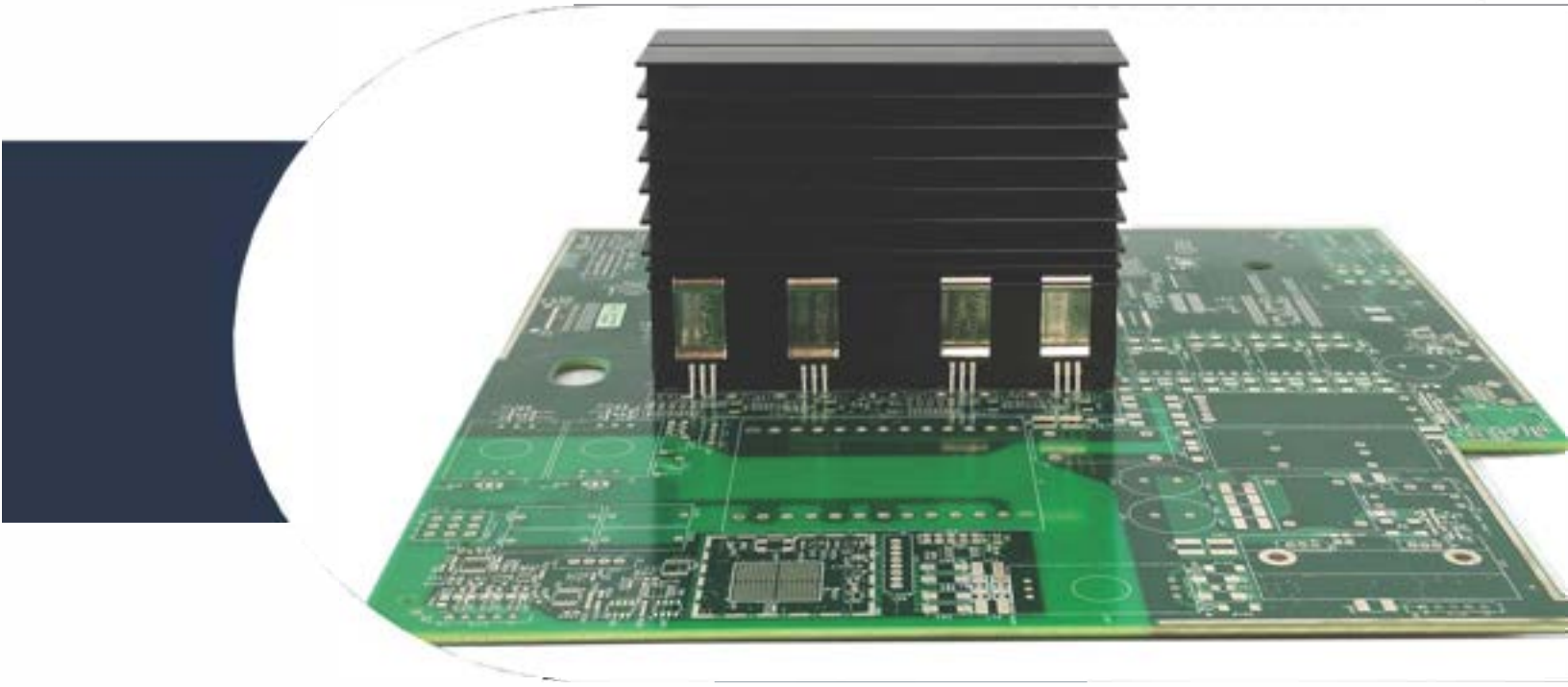
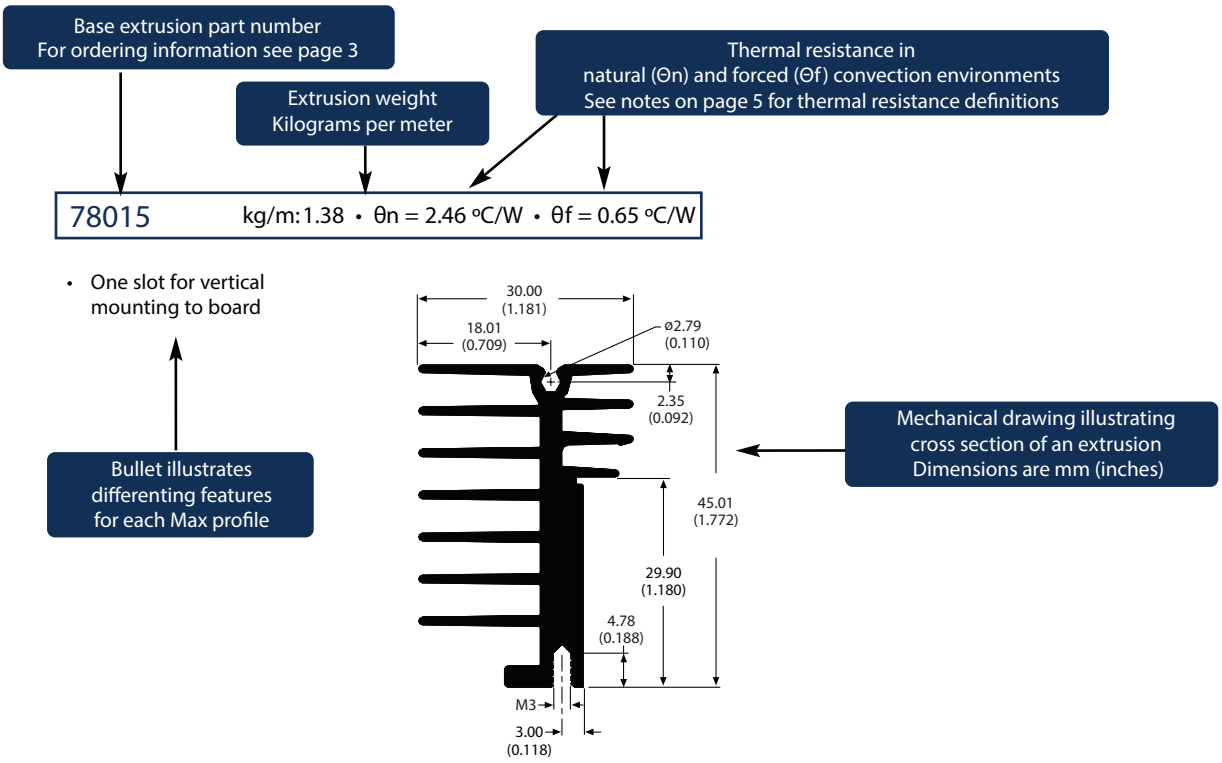
BOYD

TRUSTED INNOVATION

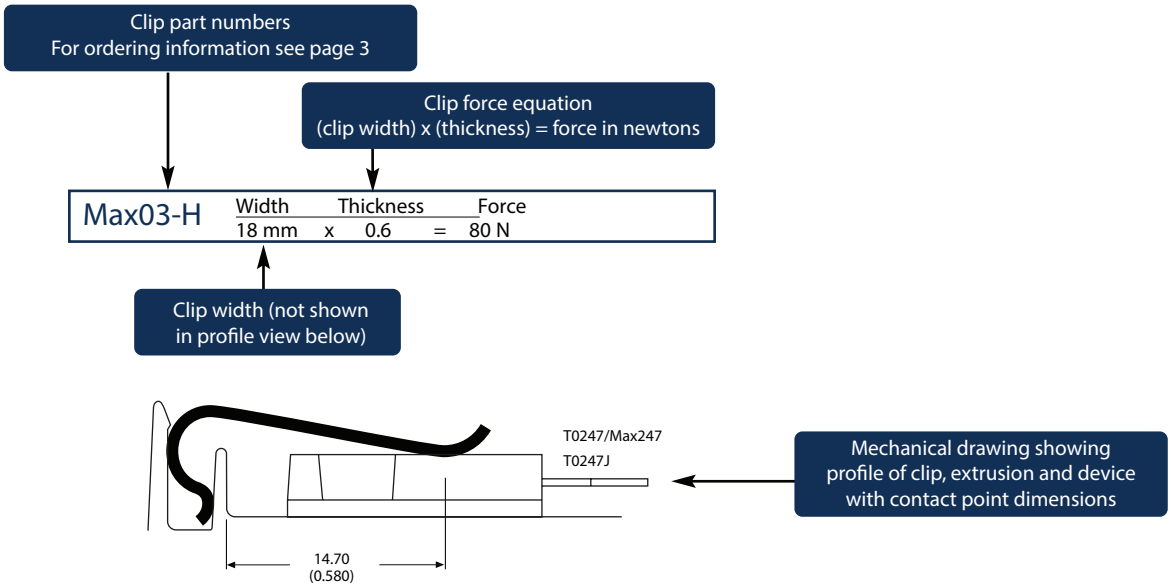
MaxClip Extrusion Profiles and System



Max Extrusions



Max Clips



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.

78040 X X XXXXX

- XXXXX — Custom cut length
  - Specified to 3 decimal places i.e. 1.200 inches = 01200
  - For cut length options 1 and 2 use 5 zeros
- X — Finish
  - U = Unfinished
  - B = Black anodize
- X — Cutting options
  - 1 = No cut (full length bar)
  - 2 = Cut in half (two equal lengths)
  - 3 = Cut to custom length specified using digits 8-12
- 78040 — Extrusion profile base part number

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.

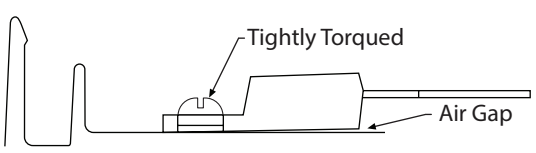
Features and Benefits of The Max Clip System ™ include:

- 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

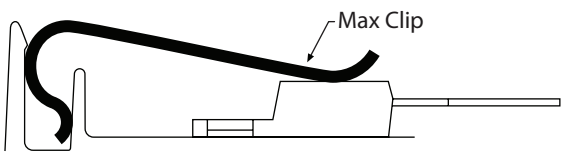
The Max Clip System™ provides ideal product lifetime contact to the center of the device package resulting in even force across the interface material. Max Clips maintain a constant assembly force even when interface material deteriorates over time. With conventional nuts, bolts and rivets mounting force 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 ºC
Heat sink T = 100 ºC

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
0SA24	21	-		-	-	-	-	-	6
0SA55	21	-		-	-	-	-	-	6
0SA61	21	-		-	-	-	-	-	6
0S567	21	-		-	-	-	-	-	6
0SA69	21	-		-	-	-	-	-	6
0SA74	21	-		-	-	-	-	-	6
0SA79	22	-		-	-	-	-	-	6
0SA80	22	-		-	-	-	-	-	6
0SY94	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 ºC
Heat sink T = 100 ºC

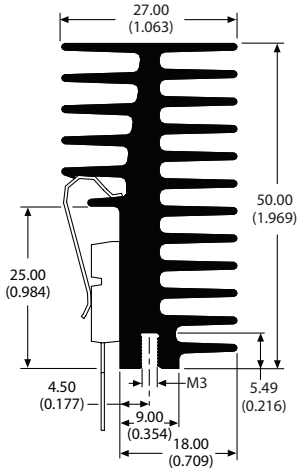
Type definitions:
1= Single Mounting Surface Style
2= Dual Mounting Surface Style
3= Single Mounting Surface with Flatback Style
4= Max Heat Connector Style
5= U-Channel/Multiple Screw Boss Style
6= Potential Max Profiles

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 • θn = 2.46 °C/W • θf = 0.65 °C/W

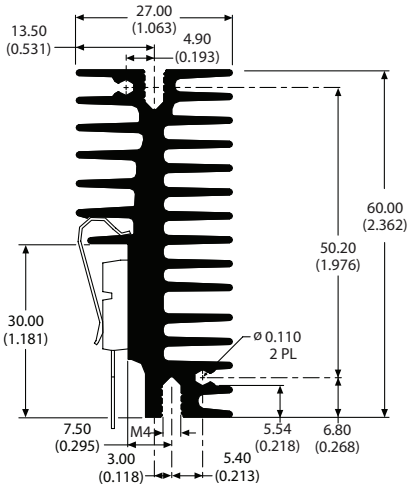
- One slot for vertical mounting to board



78245

kg/m: 1.66 • θn = 2.29 °C/W • θf = 0.56 °C/W

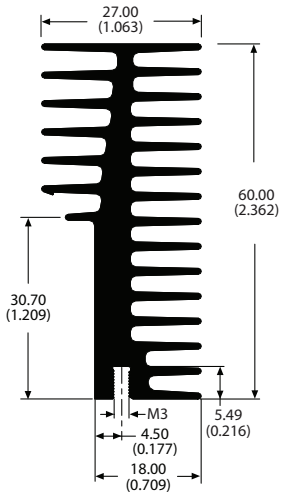
- One slot for vertical mounting to board



78080

kg/m: 1.74 • θn = 2.27 °C/W • θf = 0.55 °C/W

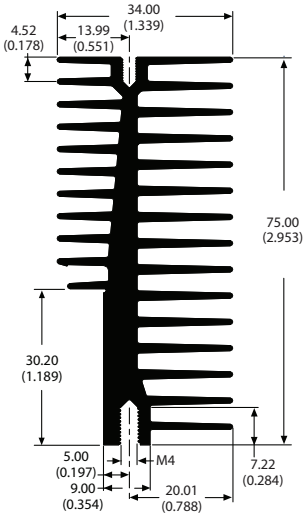
- One slot for vertical mounting to board



78010

kg/m: 2.48 • θn = 1.45 °C/W • θf = 0.39 °C/W

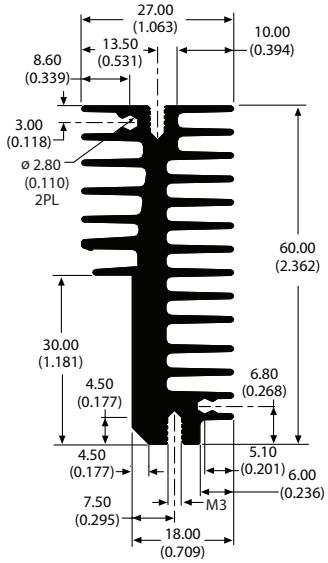
- One slot for vertical mounting to board



83005

kg/m: 1.73 • θn = 2.30 °C/W • θf = 0.59 °C/W

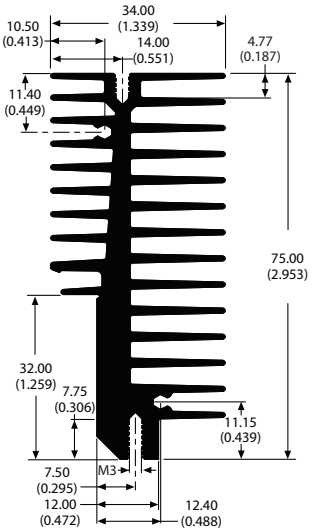
- One slot for vertical mounting to board



82935

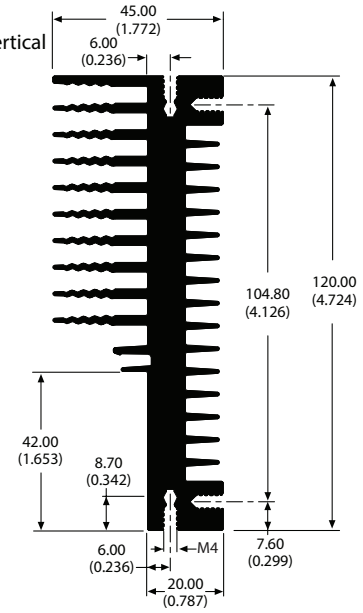
kg/m: 2.51 • θn = 1.45 °C/W • θf = 0.39 °C/W

- One slot for vertical mounting to board



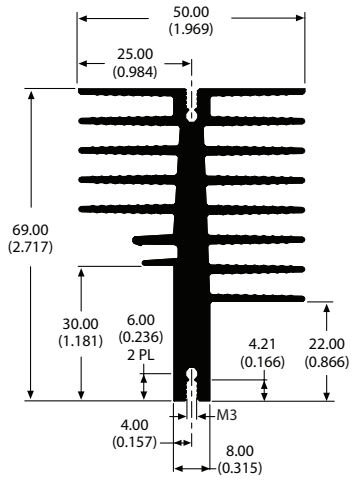
82950 kg/m: 5.52

- One screw boss for vertical mounting to board



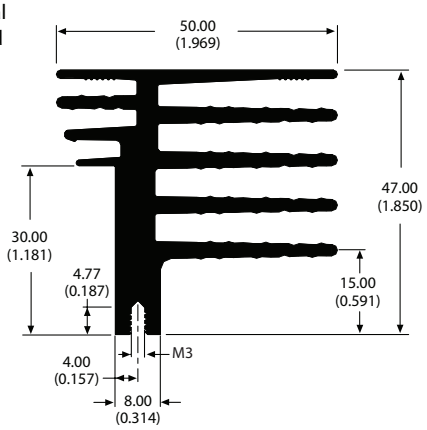
82910 kg/m: 2.45 • θn = 1.28 °C/W • θf = 0.44 °C/W

- One screw boss for vertical mounting to board



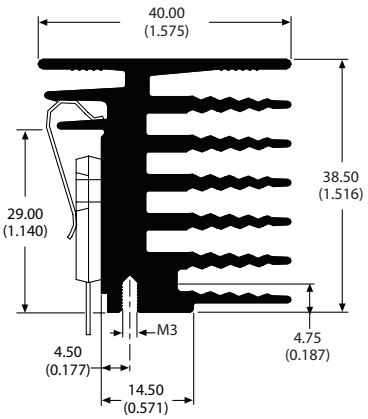
82930 kg/m: 2.04 • θn = 1.71 °C/W • θf = 0.58 °C/W

- One slot for vertical mounting to board



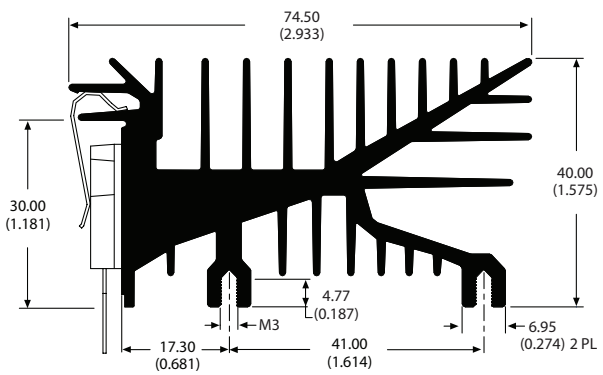
78045 kg/m: 1.59 • θn = 2.12 °C/W • θf = 0.64 °C/W

- One slot for vertical mounting to board



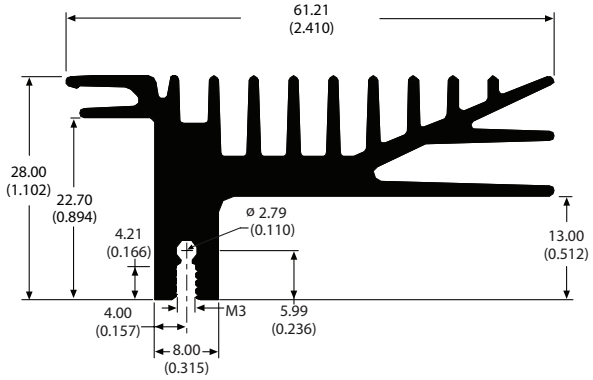
78035 kg/m: 2.53 • θn = 1.23 °C/W • θf = 0.42 °C/W

- Two slots for vertical mounting to board



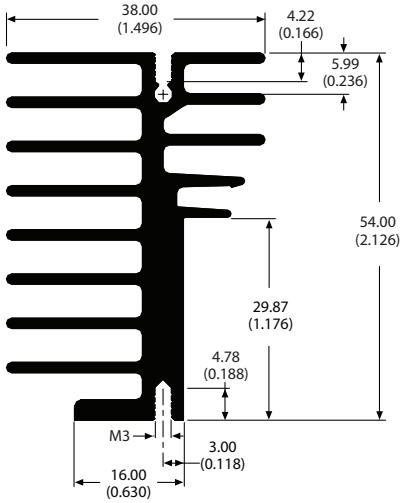
78215 kg/m: 1.32 • θn = 2.50 °C/W • θf = 0.85 °C/W

- One screw boss for vertical mounting to board



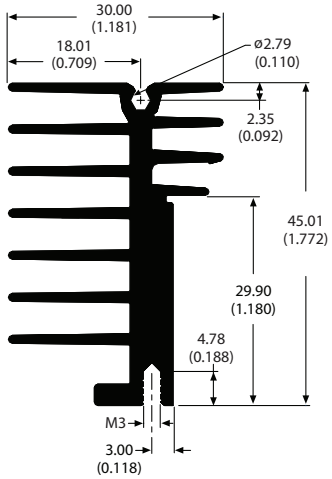
78075 kg/m: 1.64 • θn = 1.71 °C/W • θf = 0.57 °C/W

- One slot for vertical mounting to board



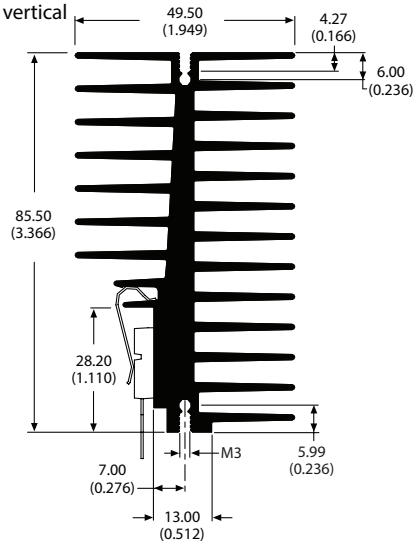
78060 kg/m: 1.18 • θn = 2.33 °C/W • θf = 0.76 °C/W

- One slot for vertical mounting to board



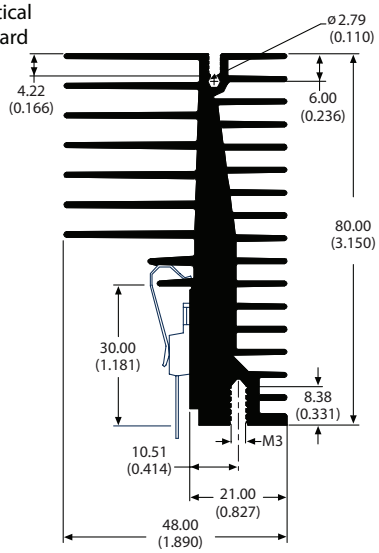
78350 kg/m: 3.45 • θn = 0.93 °C/W • θf = 0.29 °C/W

- One screw boss for vertical mounting to board



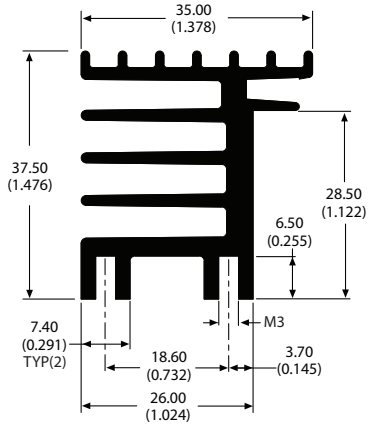
78315 kg/m: 3.14 • θn = 1.06 °C/W • θf = 0.34 °C/W

- One slot for vertical mounting to board



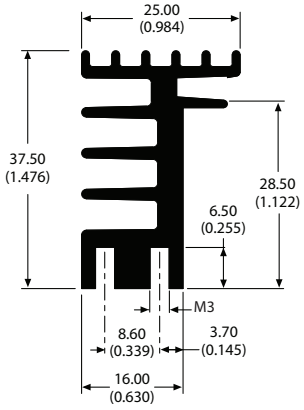
82990 kg/m: 1.18 • θn = 2.49 °C/W • θf = 0.95 °C/W

- Two slots for vertical mounting to board



82975 kg/m: 0.74 • θn = 3.31 °C/W • θf = 1.55 °C/W

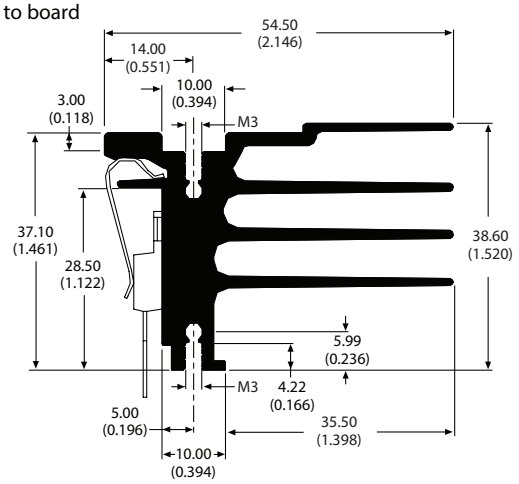
- Two slots for vertical mounting to board



78375

kg/m: 1.49 • θn = 1.82 °C/W • θf = 0.78 °C/W

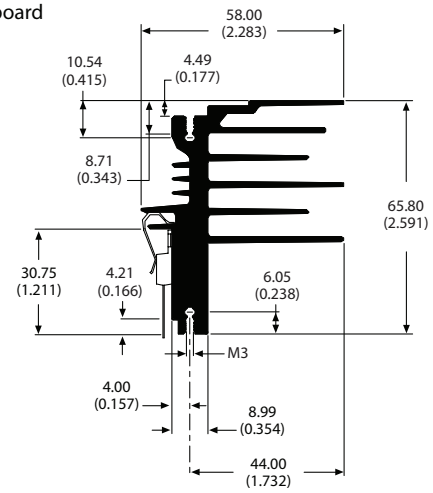
- One screw boss for vertical mounting to board



78190

kg/m: 2.37 • θn = 1.25 °C/W • θf = 0.50 °C/W

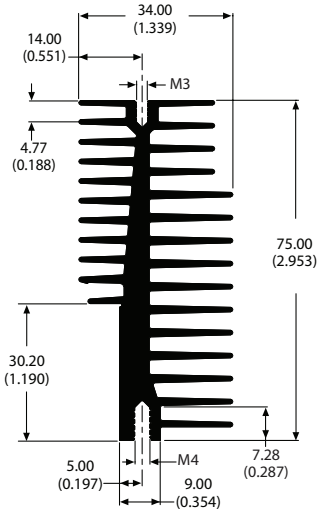
- One screw boss for vertical mounting to board



78285

kg/m: 2.41 • θn = 1.47 °C/W • θf = 0.40 °C/W

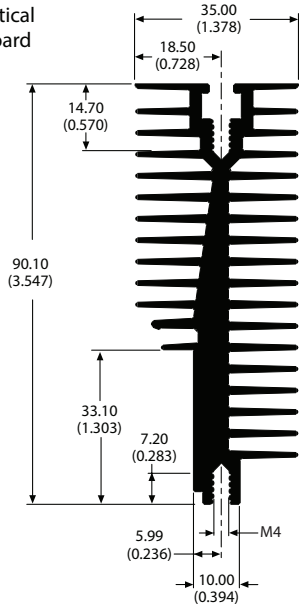
- One slot for vertical mounting to board



82870

kg/m: 3.09 • θn = 1.35 °C/W • θf = 0.32 °C/W

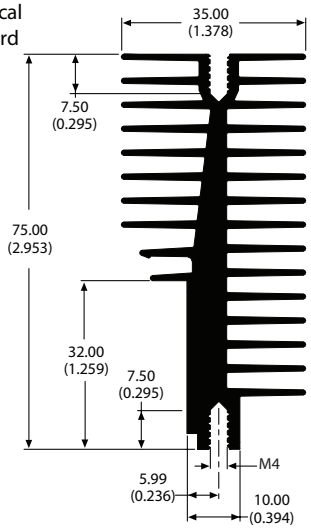
- One slot for vertical mounting to board



82920

kg/m: 2.38 • θn = 1.56 °C/W • θf = 0.41 °C/W

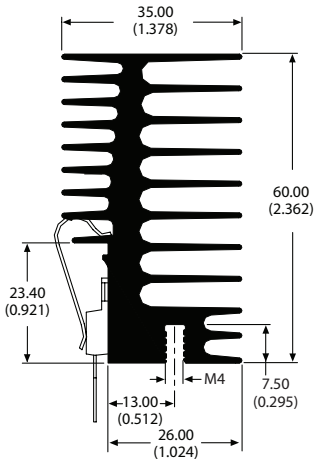
- One slot for vertical mounting to board



78295

kg/m: 2.18 • θn = 1.67 °C/W • θf = 0.47 °C/W

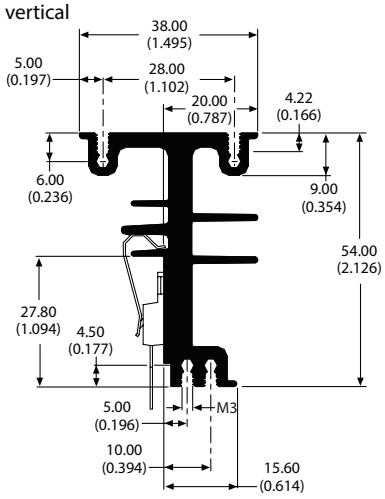
- One slot for vertical mounting to board



83000

kg/m: 1.45 • θn = 1.83 °C/W • θf = 0.77 °C/W

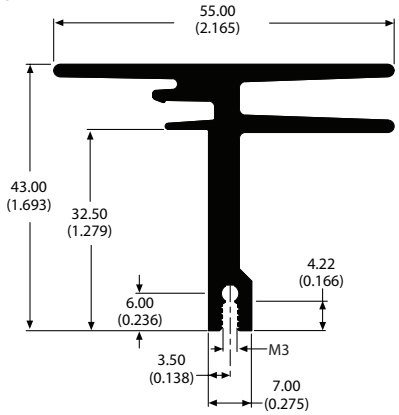
- Two screw bosses for vertical mounting to board



82940

kg/m: 1.14 • θn = 1.96 °C/W • θf = 1.00 °C/W

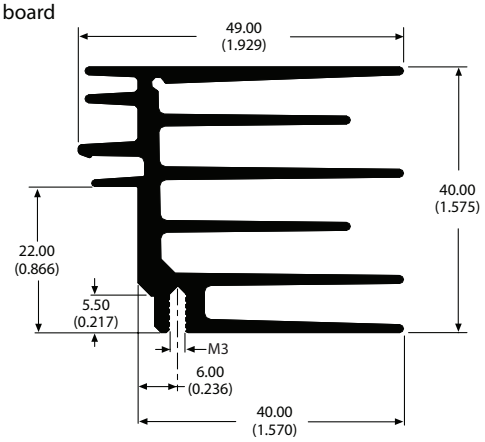
- One screw boss for vertical mounting to board



78405

kg/m: 1.36 • θn = 1.32 °C/W • θf = 0.56 °C/W

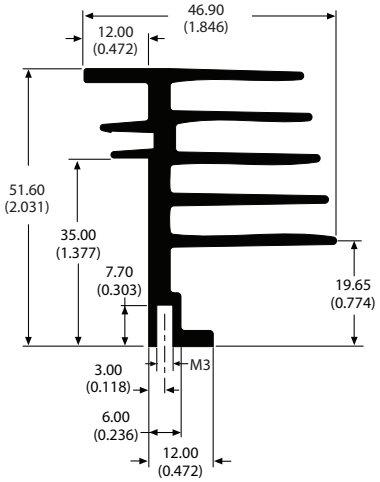
- One slot for vertical mounting to board



83015

kg/m: 1.49 • θn = 1.73 °C/W • θf = 0.69 °C/W

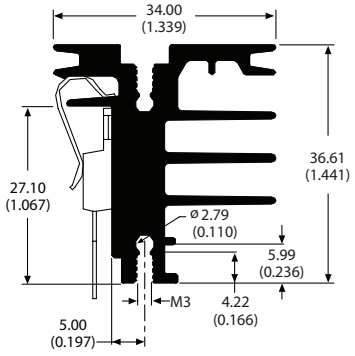
- One slot for vertical mounting to board



78195

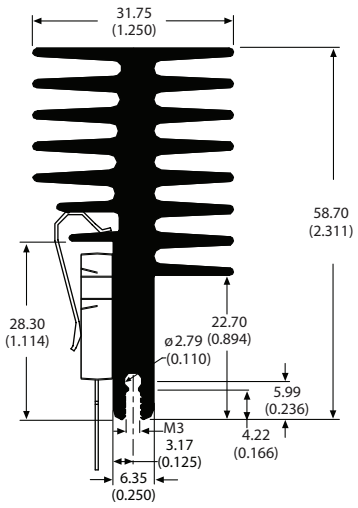
kg/m: 1.10 • θn = 2.70 °C/W • θf = 0.93 °C/W

- One screw boss for vertical mounting to board



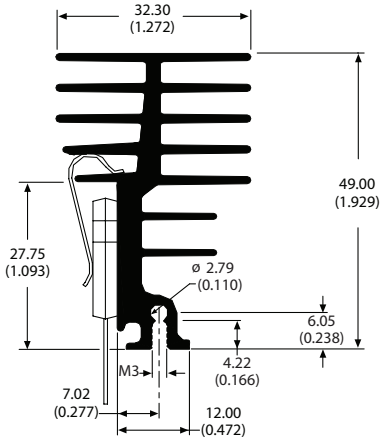
78275 kg/m: 1.78 • θn = 2.35 °C/W • θf = 0.67 °C/W

- One screw boss for vertical mounting to board



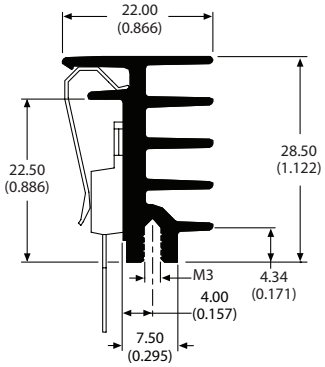
78355 kg/m: 1.15 • θn = 2.34 °C/W • θf = 0.76 °C/W

- One screw boss for vertical mounting to board



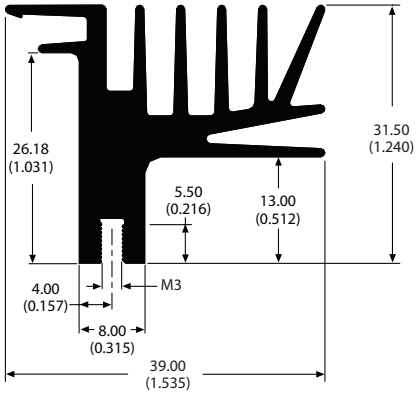
78265 kg/m: 0.48 • θn = 4.12 °C/W • θf = 1.68 °C/W

- One slot for vertical mounting to board



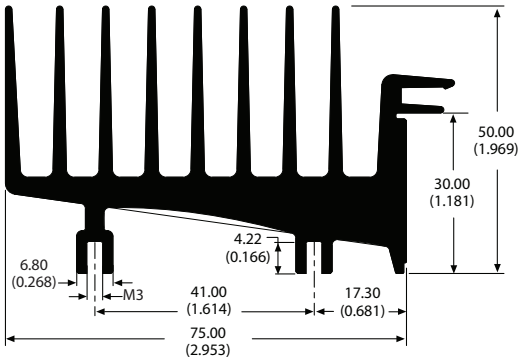
78025 kg/m: 0.99 • θn = 3.10 °C/W • θf = 1.02 °C/W

- One slot for vertical mounting to board



83020 kg/m: 3.57

- Two slots for vertical mounting to board

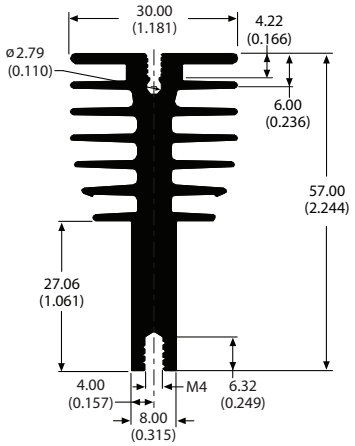


The Dual Mounting Surface style provides a flat component mounting surface on two sides of the profile. Some profiles allow back to back mounting of components on the circuit board permitting the sharing of a centrally mounted heat sink. Other profiles create a bridge configuration allowing components 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 • θn = 2.42 °C/W • θf = 0.75 °C/W

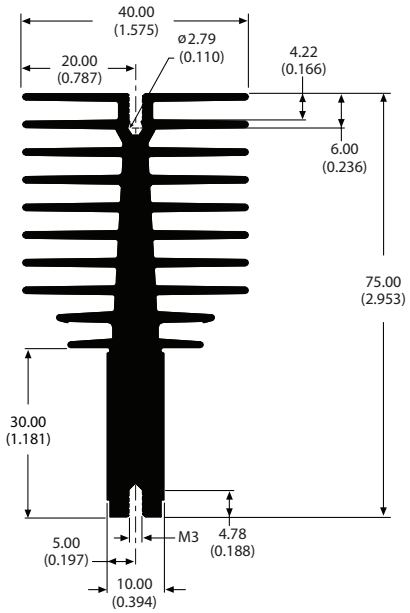
- One slot for vertical mounting to board



78070

kg/m: 2.57 • θn = 1.55 °C/W • θf = 0.41 °C/W

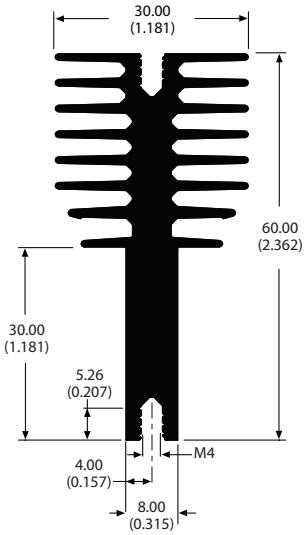
- One slot for vertical mounting to board



78220

kg/m: 1.66 • θn = 2.49 °C/W • θf = 0.74 °C/W

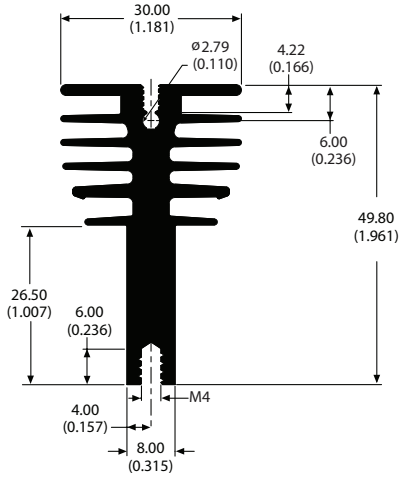
- One slot for vertical mounting to board



82955

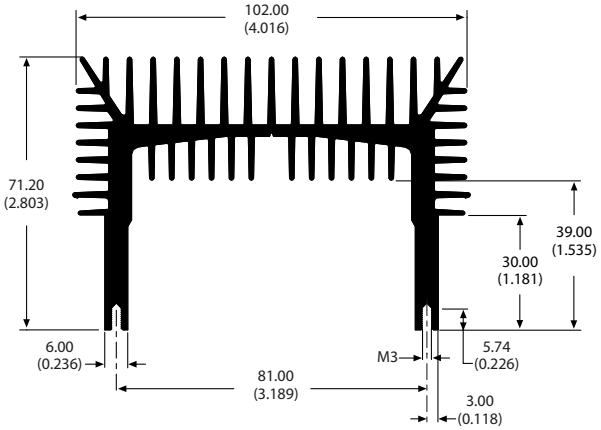
kg/m: 1.41 • θn = 2.99 °C/W • θf = 0.83 °C/W

- One slot for vertical mounting to board



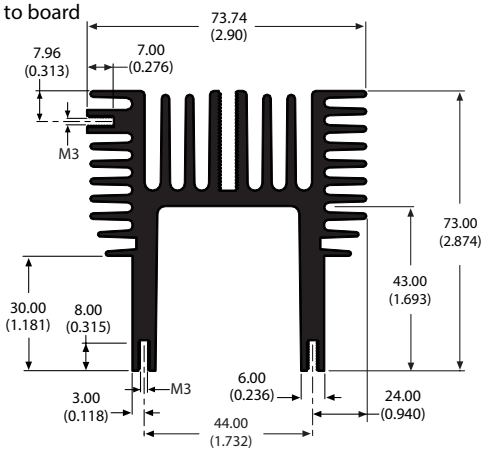
78040 kg/m: 4.64 • θn = 0.81 °C/W • θf = 0.28 °C/W

- Two slots for vertical mounting to board



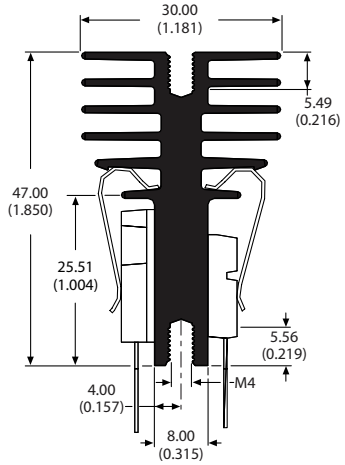
83010 kg/m: 4.36 • θn = 1.17 °C/W • θf = 0.35 °C/W

- Two slots for vertical mounting to board



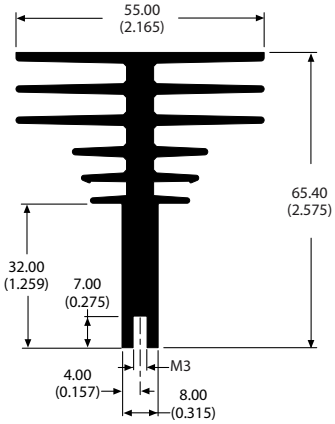
78020 kg/m: 1.23 • θn = 3.02 °C/W • θf = 0.84 °C/W

- One slot for vertical mounting to board



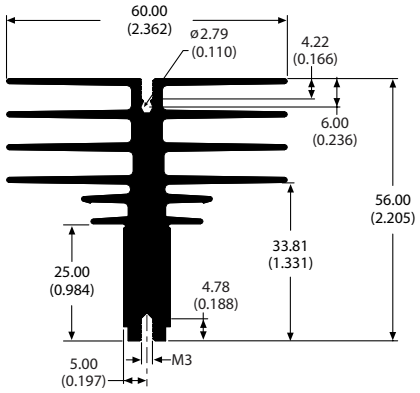
82985 kg/m: 2.24 • θn = 1.52 °C/W • θf = 0.62 °C/W

- One slot for vertical mounting to board



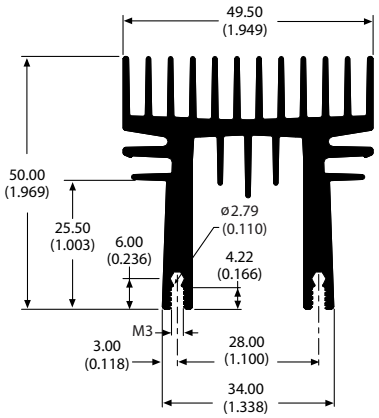
78250 kg/m: 2.15 • θn = 1.42 °C/W • θf = 0.52 °C/W

- One slot for vertical mounting to board



82905 kg/m: 2.02 • θn = 1.92 °C/W • θf = 0.57 °C/W

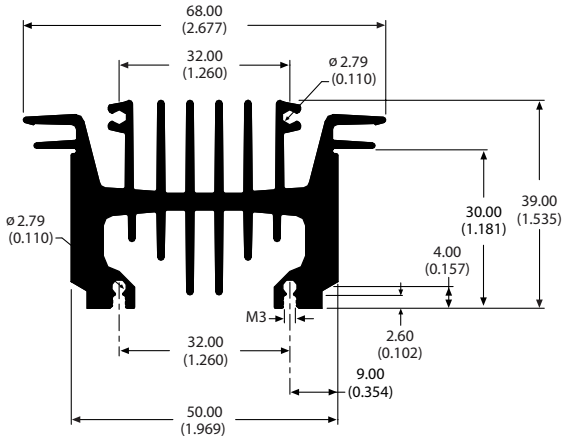
- Two screw bosses for vertical mounting to board



78345

kg/m: 2.21 • θn = 1.64 °C/W • θf = 0.49 °C/W

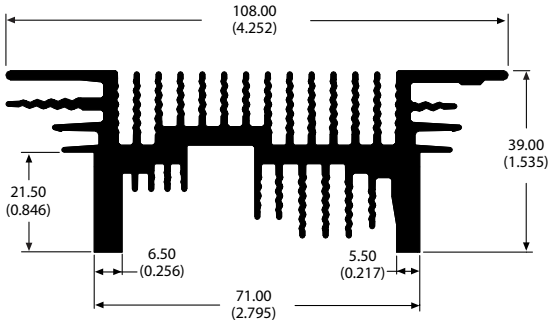
- Two screw bosses for vertical mounting to board



78360

kg/m: 3.29 • θn = 1.18 °C/W • θf = 0.41 °C/W

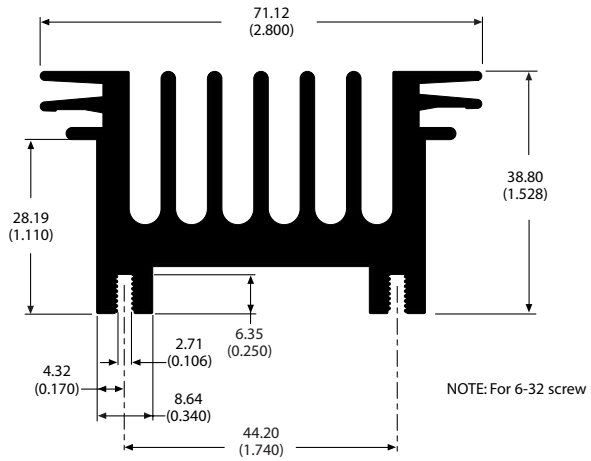
- Secondary operation needed for mounting to board



82005

kg/m: 2.60

- Two slots for vertical mounting to board

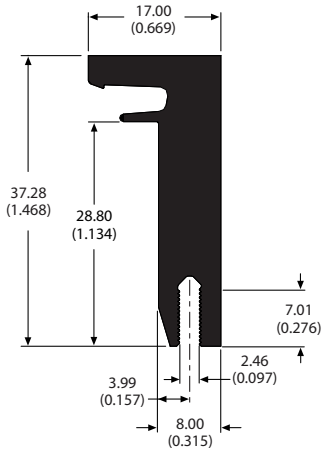


The Max Clip System™ Max Heat Connector

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.

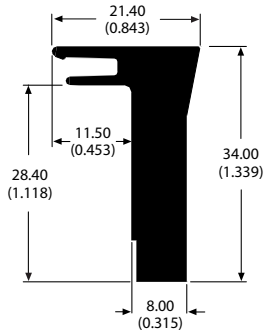
78090 kg/m:0.84

- One slot for vertical mounting to board



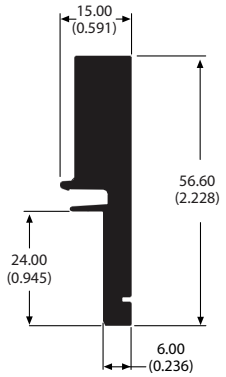
82885 kg/m:0.85

- Secondary operation needed for mounting to board



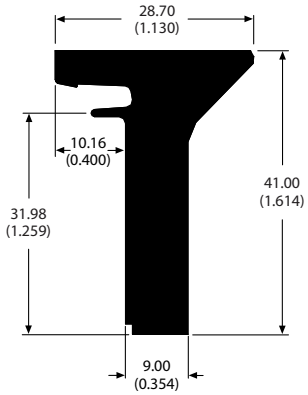
82890 kg/m:1.40

- Secondary operation needed for mounting to board



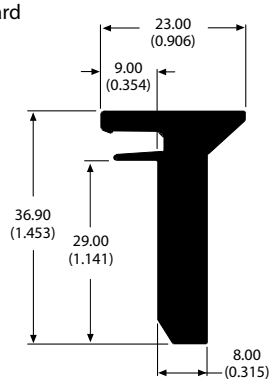
78085 kg/m:1.32

- Secondary operation needed for mounting to board



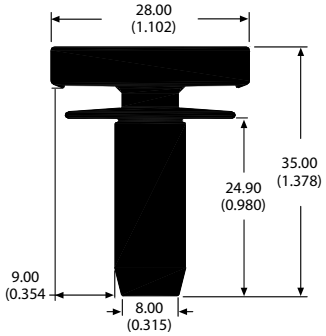
82875 kg/m:0.95

- Secondary operation needed for mounting to board



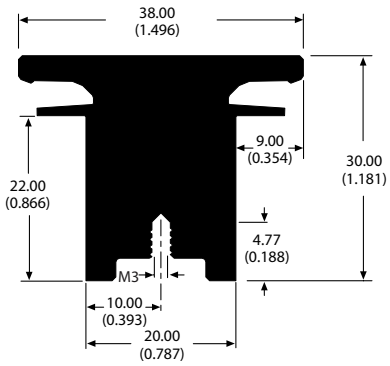
82900 kg/m:1.18

- Secondary operation needed for mounting to board



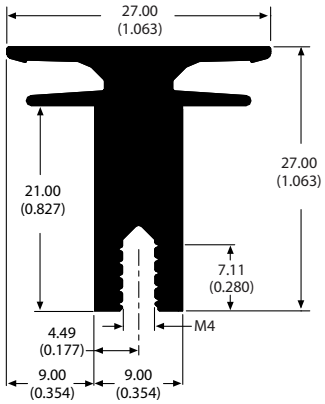
82925 kg/m: 1.69

- One slot for vertical mounting to board



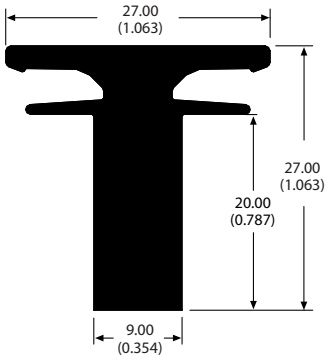
78255 kg/m: 0.690 θn=3.43 °C/W θf=1.59 °C/W

- One slot for vertical mounting to board



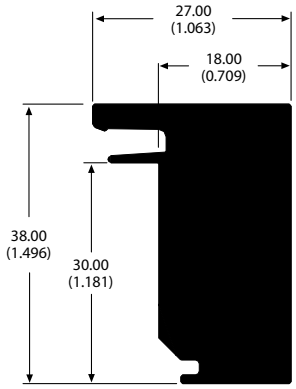
82980 kg/m: 0.81

- Secondary operation needed for mounting to board



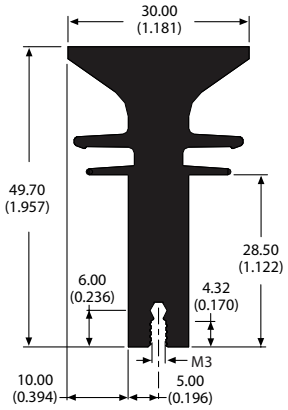
82945 kg/m: 1.89

- Secondary operation needed for mounting to board



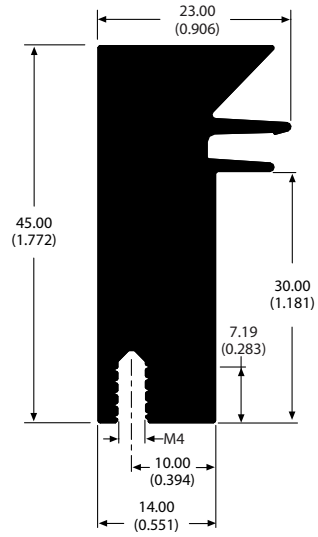
82880 kg/m: 1.72

- One screw boss for vertical mounting to board



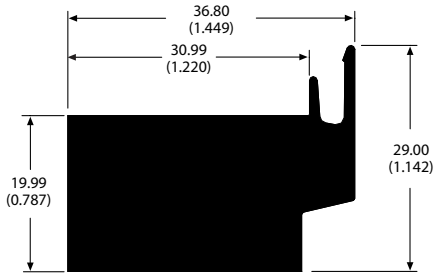
78225 kg/m: 1.75

- One slot for vertical mounting to board



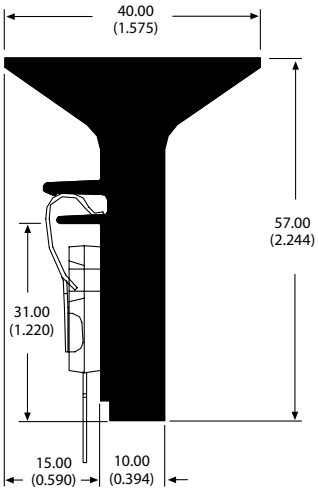
78095 kg/m: 1.89

- Secondary operation needed for mounting to board



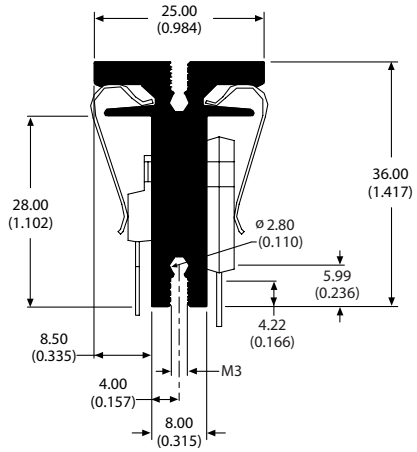
78185 kg/m: 2.14

- Secondary operation needed for mounting to board



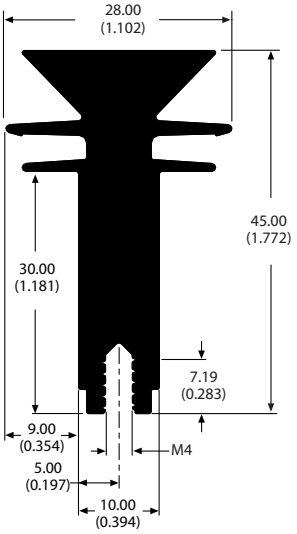
78200 kg/m: 0.89

- One screw boss for vertical mounting to board



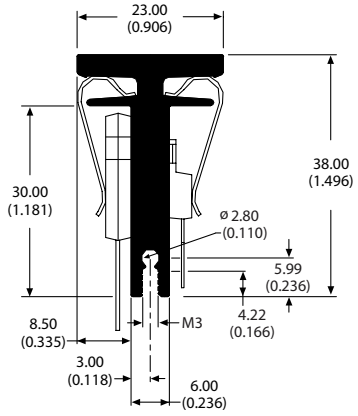
78230 kg/m: 1.39

- One slot for vertical mounting to board



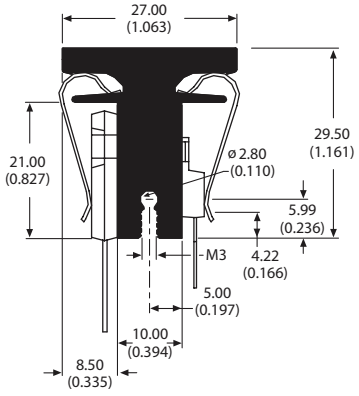
78280 kg/m: 0.75 • θn = 3.11 °C/W • θf = 1.50 °C/W

- One screw boss for vertical mounting to board



78270 kg/m: 0.95 • θn = 3.43 °C/W • θf = 1.59 °C/W

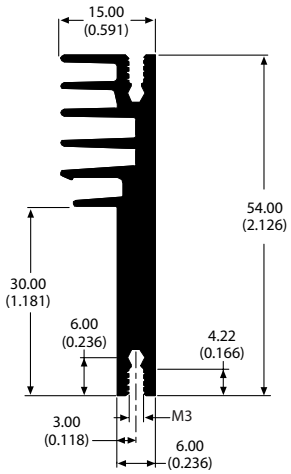
- One screw boss for vertical mounting to board



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.

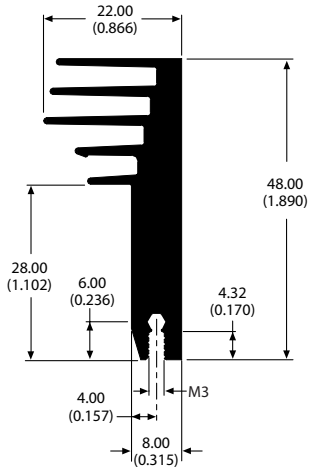
82965 kg/m:0.90 • θn = 3.43 °C/W • θf = 1.12 °C/W

- One screw boss for vertical mounting to board



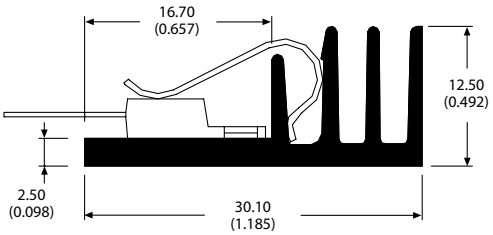
82895 kg/m:1.08 • θn = 3.42 °C/W • θf = 1.57 °C/W

- One screw boss for vertical mounting to board



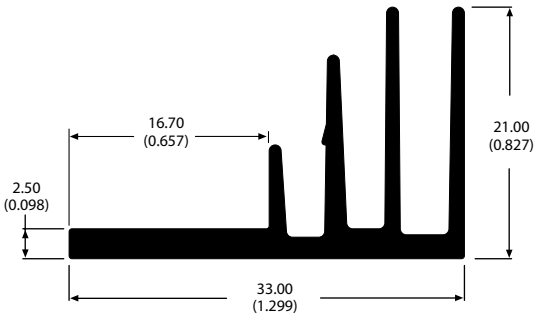
78335 kg/m:0.31 • θn = 6.34 °C/W • θf = 2.38 °C/W

- Horizontally mounted



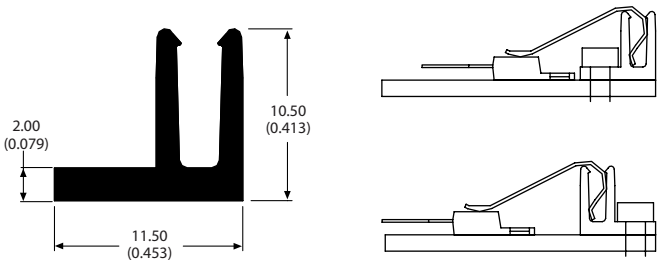
82970 kg/m:0.41 • θn = 4.38 °C/W • θf = 2.10 °C/W

- Horizontally mounted



78260 kg/m:0.12

- Horizontally mounted

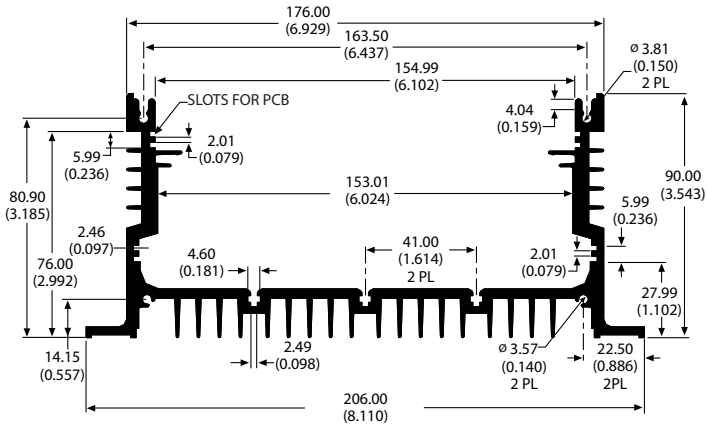


The Max Clip System™ U-Channel/Multiple Screw Boss

The U-Channel/Multiple Screw Boss section features a combination of U-Channel style and custom Max Profiles featuring multiple (2 or more) screw bosses. The U-Channel variations can accept assembled circuit cards to form the basis of a chassis. Additional screw bosses allow attachment of side and top panels completing a chassis assembly. The incorporation of Multiple Screw Boss features into a profile provides the flexibility to mount the heat sink to the board in horizontal or vertical orientation using a standard screw.

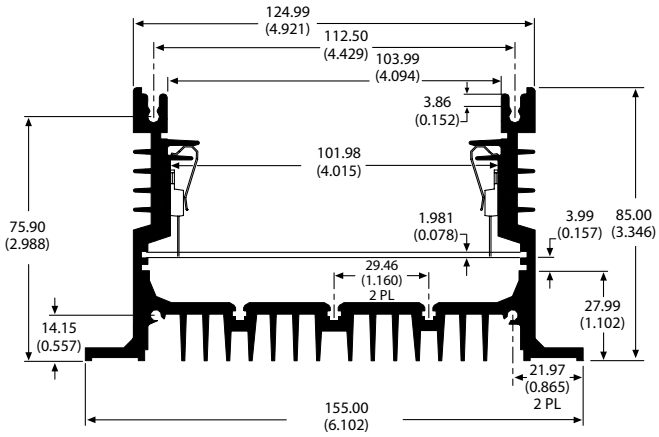
78105 kg/m: 6.10 • θn = 0.55 °C/W • θf = 0.27 °C/W

- Chassis assembly capabilities



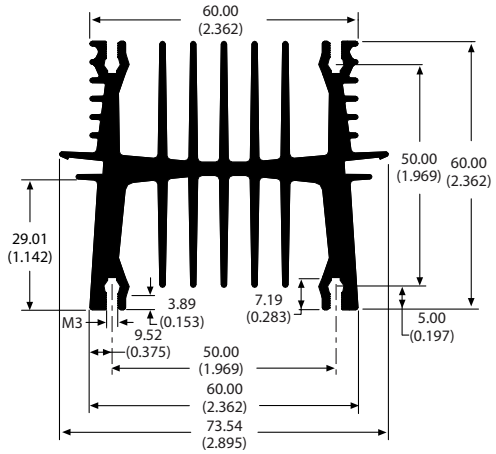
78110 kg/m: 5.13 • θn = 0.70 °C/W • θf = 0.50 °C/W

- Chassis assembly capabilities



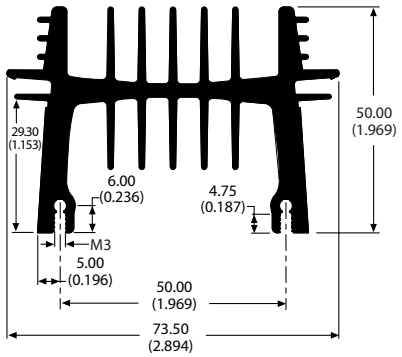
78030 kg/m: 3.42 • θn = 1.10 °C/W • θf = 0.36 °C/W

- Four screw boss slots for vertical mounting to board



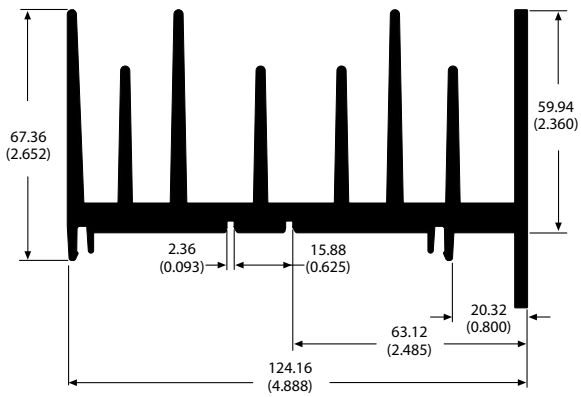
82960 kg/m: 2.75 • θn = 1.30 °C/W • θf = 0.46 °C/W

- Two screw boss slots for vertical mounting to board



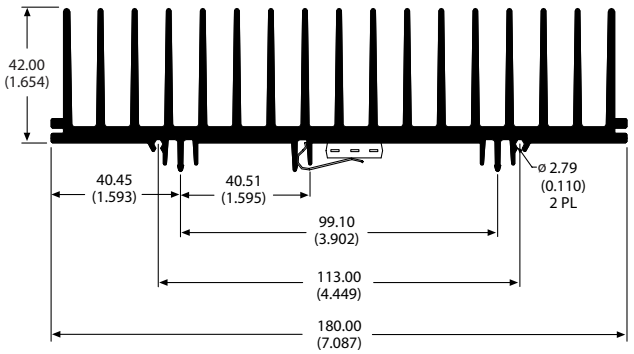
81400 kg/m: 5.51

- Two slots for circuit board mounting



78390 kg/m: 6.02 • θn = 0.44 °C/W • θf = 0.19 °C/W

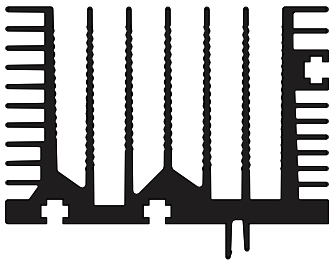
- Five slots for horizontal mounting to board



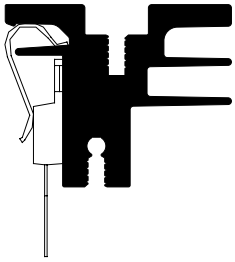
BOYD TRUSTED INNOVATION

Application of The Max Clip System™ is limited only by th e 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.

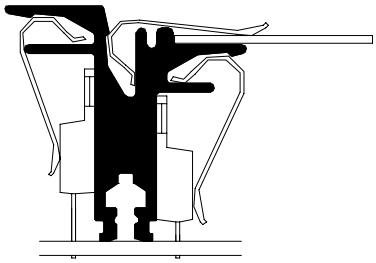
78050



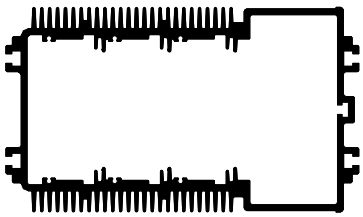
0S567



78370

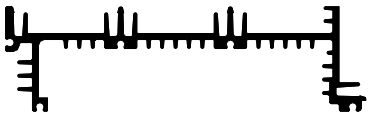


78380



78300

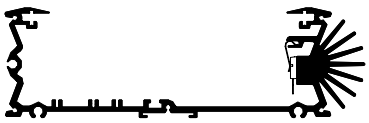
78305



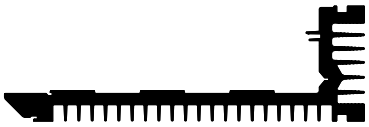
78310

POTENTIAL MAX PROFILES

0SA24



78290



78385

0SA55

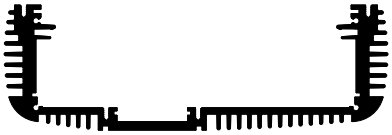
0SA61

0SA69

0SA74

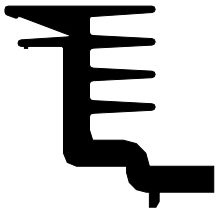
0SA79

0SA80

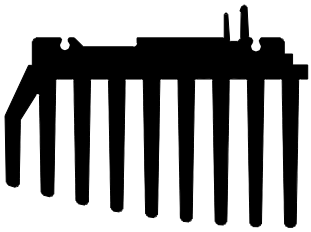


0SY94

BS014

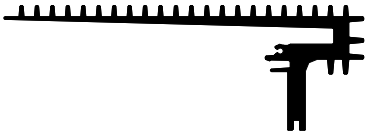


BS034

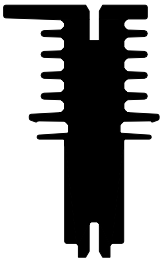


BS060

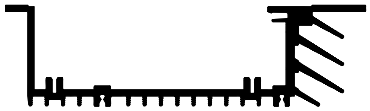
BS070



BS093



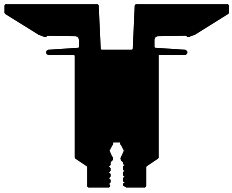
BS094



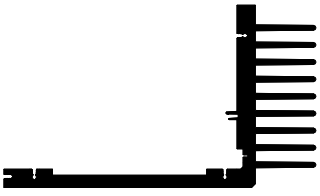
BS105

BS121

BS138



BS202



Part Number	Normal Force 20N-40N TO-220 TO-218 TO-251 TO-262 TO-273	Short Clip TO-220 TO-218 TO-251 TO-262 TO-273	Long Clip TO-220 TO-218 TO-251 TO-262 TO-273	High Force 50N+ TO-220 TO-218 TO-251 TO-262 TO-273	Normal Force 30N-50N TO-247 TO-274	High Force 60N+ TO-247 TO-274 TO-3P	Sensors Small Component	Special D61 TO-247J TO-274	Special Thick Isolators Solid State Relay*
78010	Max01NG Max02NG	-	Max10 Max11	Max01-HNG	Max03NG	Max02-HNG Max03-HNG	Max12NG	Max04NG Max15NG	Max23NG
78015	Max01NG Max02NG	Max09NG	Max10NG	Max01-HNG	Max03NG	Max02-H Max03-H	Max12NG	-	Max23NG
78020	Max01NG Max02NG	Max09NG	Max10NG	Max01-HNG	Max03NG	Max02-H Max03-H	Max12NG	Max15NG	Max23NG
78025	Max01NG Max02NG	Max09NG	Max10NG	Max01-HNG	Max03NG	Max02-H Max03-H	Max12NG	Max15NG	Max23NG
78030	Max01NG Max02NG	Max09NG	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-H Max03-H	Max12NG	Max04NG Max15NG	Max23NG
78035	Max01NG Max02NG	-	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-H Max03-H	Max12NG	Max04NG Max15NG	Max23NG
78040	Max01NG Max02NG	-	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-H Max03-H	Max12NG	Max04NG Max15NG	Max23NG
78045	Max01NG Max02NG	Max09NG	Max10NG	Max01-HNG	Max03NG	Max02-H Max03-H	Max12NG	Max04NG Max15NG	Max23NG
78060	Max01NG Max02NG	-	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-H Max03-H	Max12NG	Max04NG Max15NG	Max23NG
78070	Max01NG Max02NG	-	Max10NG	Max01-HNG	Max03NG	Max02-H Max03-H	Max12NG	Max04NG Max15NG	Max23NG
78075	Max01NG Max02NG	-	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-H Max03-H	Max12NG	Max04NG Max15NG	Max23NG
78080	Max01NG Max02NG	-	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-H Max03-H	Max12NG	Max04NG Max15NG	Max23NG
78085	Max01NG Max02NG	-	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-H Max03-H	Max12NG	Max04NG Max15NG	Max23NG
78090	Max01NG Max02NG	Max09NG	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-H Max03-H	Max12NG	Max04NG Max15NG	Max23NG
78095	Max01NG Max02NG	-	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-H Max03-H	Max12NG	Max04NG Max15NG	Max23NG
78105	Max01NG Max02NG	-	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-H Max03-H	Max12NG	Max04NG Max15NG	Max23NG
78110	Max01NG Max02NG	-	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-H Max03-H	Max12NG	Max04NG Max15NG	Max23NG
78185	Max01NG Max02NG	-	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-H Max03-H	Max12NG	Max04NG Max15NG	Max23NG
78190	Max01NG Max02NG	-	Max10NG	Max01-HNG	Max03NG	Max02-H Max03-H	Max12NG	Max04NG Max15NG	Max23NG
78195	Max01NG Max02NG	Max09NG	-	Max01-HNG	Max03NG	Max02-H Max03-H	-	Max04 Max15	Max23NG
78200	Max01NG Max02NG	Max09NG	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-H Max03-H	Max12NG	Max04NG Max15NG	Max23NG
78205	Max01NG Max02NG	Max09NG	Max10NG	Max01-HNG	Max03NG	Max02-H Max03-H	Max12NG	Max04NG Max15NG	Max23NG
78215	Max01NG Max02NG	-	-	Max01-HNG	Max03NG	Max02-H Max03-H	-	-	Max23NG
78220	Max01NG Max02NG	-	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-H Max03-H	Max12NG	Max04NG Max15NG	Max23NG
78225	Max01NG Max02NG	-	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-H Max03-H	Max12NG	Max04NG 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 accomodate the total thickness. The Max23 Clip was developed to exert the necessary force in these applications.

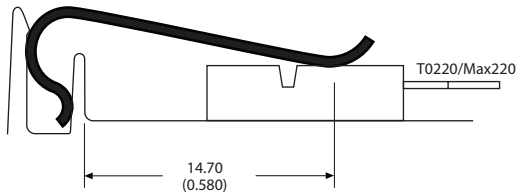
Part Number	Normal Force 20N-40N TO-220 TO-218 TO-251 TO-262 TO-273	Short Clip TO-220 TO-218 TO-251 TO-262 TO-273	Long Clip TO-220 TO-218 TO-251 TO-262 TO-273	High Force 50N+ TO-220 TO-218 TO-251 TO-262 TO-273	Normal Force 30N-50N TO-247 TO-274	High Force 60N+ TO-247 TO-274 TO-3P	Sensors Small Component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

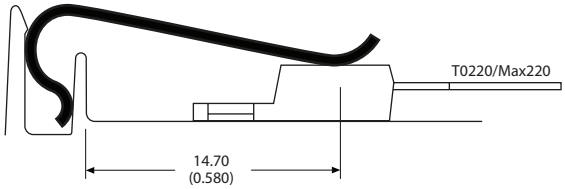
Part Number	Normal Force 20N-40N TO-220 TO-218 TO-251 TO-262 TO-273	Short Clip TO-220 TO-218 TO-251 TO-262 TO-273	Long Clip TO-220 TO-218 TO-251 TO-262 TO-273	High Force 50N+ TO-220 TO-218 TO-251 TO-262 TO-273	Normal Force 30N-50N TO-247 TO-274	High Force 60N+ TO-247 TO-274 TO-3P	Sensors Small Component	Special D61 TO-247J TO-274	Special Thick Isolators Solid State Relay*
82890	Max01NG Max02NG	Max09NG	-	Max01-HNG	Max03NG	Max02-HNG Max03-HNG	Max12NG	Max15NG	Max23NG
82895	Max01NG Max02NG	Max09NG	Max10NG	Max01-HNG	Max03NG	Max02-HNG Max03-HNG	Max12NG	Max04NG Max15NG	Max23NG
82900	Max01NG Max02NG	Max09NG	-	Max01-HNG	Max03NG	Max02-HNG Max03-HNG	Max12NG	Max15NG	Max23NG
82905	Max01NG Max02NG	Max09NG	Max10NG	Max01-HNG	Max03NG	Max02-HNG Max03-HNG	Max12NG	Max15NG	Max23NG
82910	Max01NG Max02NG	-	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-HNG Max03-HNG	Max12NG	Max04NG Max15NG	Max23NG
82920	Max01NG Max02NG	-	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-HNG Max03-HNG	Max12NG	Max04NG Max15NG	Max23NG
82925	Max01NG Max02NG	Max09NG	-	-	Max03NG	Max02-HNG	-	-	Max23NG
82930	Max01NG Max02NG	-	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-HNG Max03-HNG	Max12NG	Max04NG Max15NG	Max23NG
82935	Max01NG Max02NG	-	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-HNG Max03-HNG	Max12NG	Max04NG Max15NG	Max23NG
82940	Max01NG Max02NG	-	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-HNG Max03-HNG	Max12NG	Max04NG Max15NG	Max23NG
82945	Max01NG Max02NG	Max09NG	-	Max01-HNG	Max03NG	Max02-HNG Max03-HNG	Max12NG	Max15NG	Max23NG
82950	Max01NG Max02NG	-	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-HNG Max03-HNG	Max12NG	Max04NG Max15NG	Max23NG
82955	Max01NG Max02NG	Max09NG	Max10NG	Max01-HNG	Max03NG	Max02-HNG Max03-HNG	Max12NG	Max04NG Max15NG	Max23NG
82960	Max01NG Max02NG	Max09NG	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-HNG Max03-HNG	Max12NG	Max04NG Max15NG	Max23NG
82965	Max01NG Max02NG	Max09NG	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-HNG Max03-HNG	Max12NG	Max04NG Max15NG	Max23NG
82970	Max01NG Max02NG	Max09NG	-	-	-	Max02-HNG	-	-	-
82975	Max01NG Max02NG	Max09NG	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-HNG Max03-HNG	Max12NG	Max04NG Max15NG	
82980	Max01NG Max02NG	Max09NG	-	-	Max03NG	Max02-HNG	-	-	Max23NG
82985	Max01NG Max02NG	-	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-HNG Max03-HNG	Max12NG	Max04NG Max15NG	Max23NG
82990	Max01NG Max02NG	Max09NG	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-HNG Max03-HNG	Max12NG	Max04NG Max15NG	Max23NG
83000	Max01NG Max02NG	Max09NG	Max10NG	Max01-HNG	Max03NG	Max02-HNG Max03-HNG	Max12NG	Max04NG Max15NG	Max23NG
83005	Max01NG Max02NG	-	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-HNG Max03-HNG	Max12NG	Max04NG Max15NG	Max23NG
83010	Max01NG Max02NG	-	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-HNG Max03-HNG	Max12NG	Max04NG Max15NG	Max23NG
83015	Max01NG Max02NG	-	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-HNG Max03-HNG	Max12NG	Max04NG Max15NG	Max23NG
83020	Max01NG Max02NG	-	Max10NG Max11NG	Max01-HNG	Max03NG	Max02-HNG Max03-HNG	Max12NG	Max04NG 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 accomodate the total thickness. The Max23 Clip was developed to exert the necessary force in these applications.

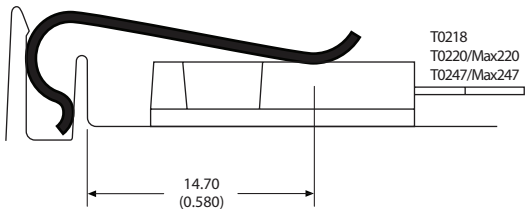
Max01NG	Width		Thickness		Force
	10 mm	x	0.5	=	22 N



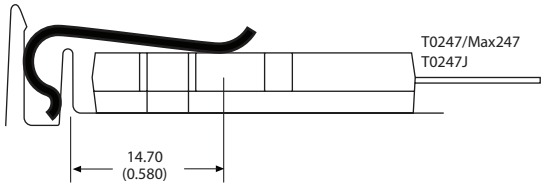
Max02NG	Width		Thickness		Force
	12 mm	x	0.5	=	35 N



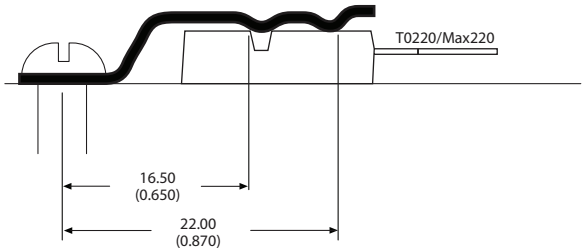
Max03NG	Width		Thickness		Force
	15 mm	x	0.5	=	45 N



Max04NG	Width		Thickness		Force
	20 mm	x	0.5	=	60 N

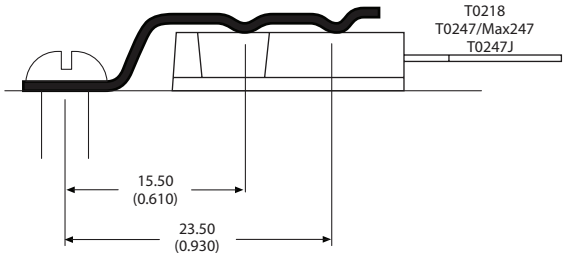


Max07NG	Width		Thickness		Force
	12 mm	x	0.6	=	50 N



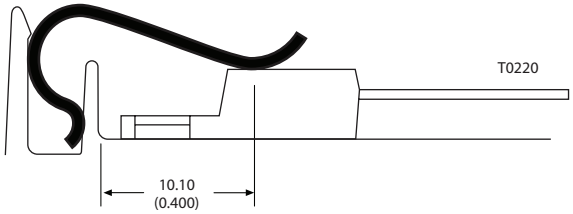
With Screws

Max08NG	Width		Thickness		Force
	18 mm	x	0.6	=	75 N

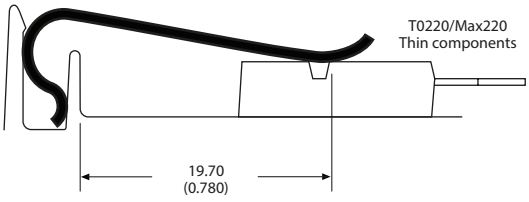


With Screws

Max09NG	Width		Thickness		Force
	10 mm	x	0.5	=	45 N

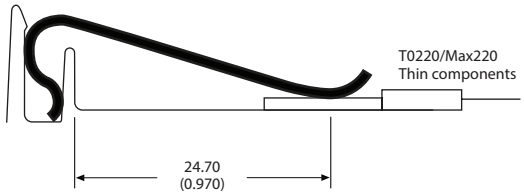


Max10NG	Width		Thickness		Force
	12 mm	x	0.6	=	40 N



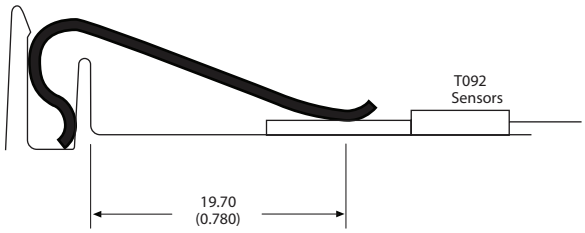
Max11NG

Width		Thickness		Force
12 mm	x	0.6	=	35 N



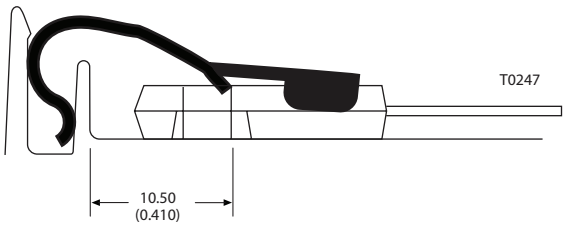
Max12NG

Width		Thickness		Force
6 mm	x	0.6	=	25 N



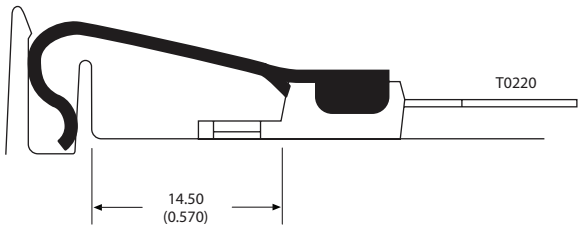
Max13NG

Width		Thickness		Force
17 mm	x	0.5	=	45 N



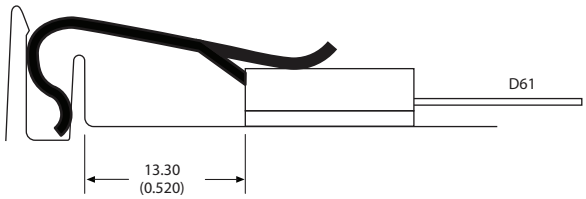
Max14NG

Width		Thickness		Force
13 mm	x	0.5	=	20 N



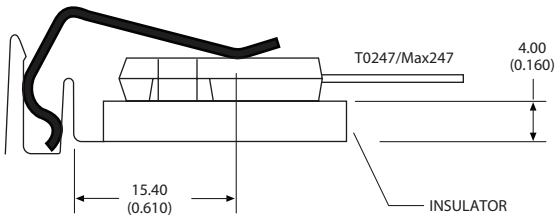
Max15NG

Width		Thickness		Force
18 mm	x	0.6	=	60 N



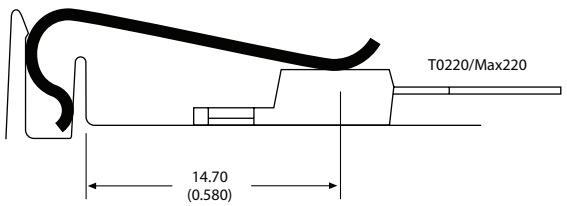
Max23NG

Width		Thickness		Force
18 mm	x	0.6	=	100 N



Max01-HNG

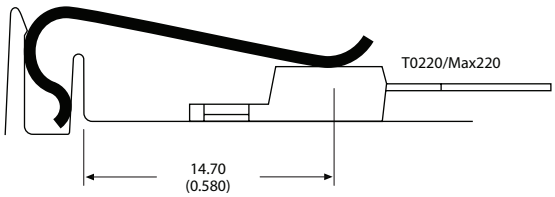
Width		Thickness		Force
10 mm	x	0.7	=	80 N



H = High Force

Max02-HNG

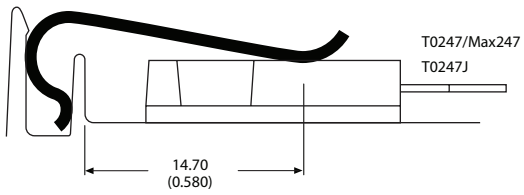
Width		Thickness		Force
13 mm	x	0.6	=	60 N



H = High Force

Max03-HNG

Width		Thickness		Force
18 mm	x	0.6	=	80 N

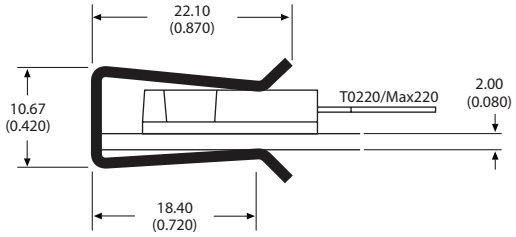


H = High Force

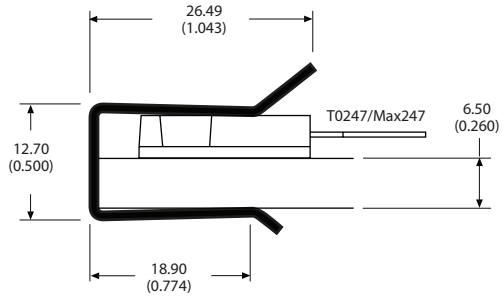
The Max Clip System™ U-Clips

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

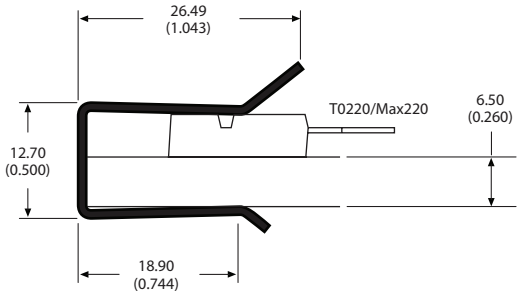
CLP212G	Width		Thickness		Force
	10.1 mm	x	0.5	=	21 N



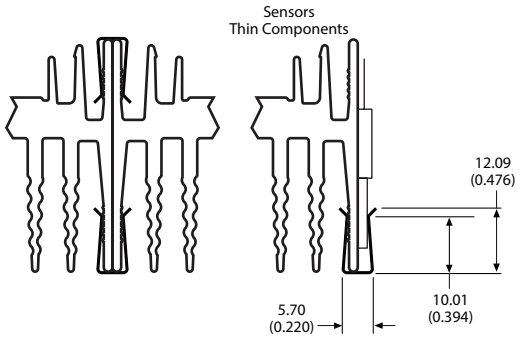
CLP212MG	Width		Thickness		Force
	15 mm	x	0.5	=	36 N



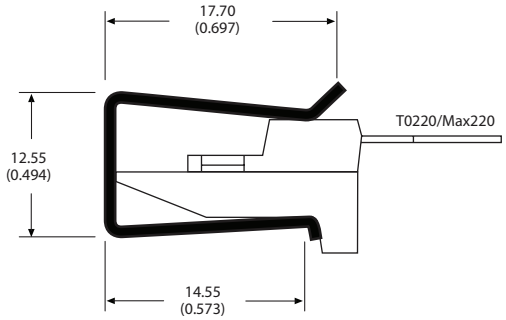
CLP212PG	Width		Thickness		Force
	10 mm	x	0.5	=	21 N



CLP212SG	Width		Thickness		Force
	7 mm	x	0.5	=	20 N



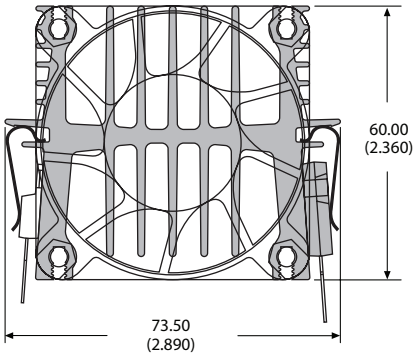
CLP212TG	Width		Thickness		Force
	10 mm	x	0.6	=	34 N



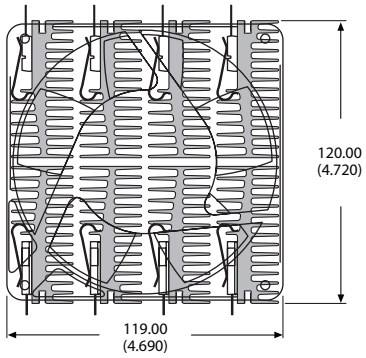
Below are examples of Assembly Ideas, using Boyd Max Clip System™. The illustrations show the use of multi-ple extrusion profiles, fans and clips to assemble cost effective high performance thermal solutions.

Forced Convection Assemblies (using customer supplied fans)

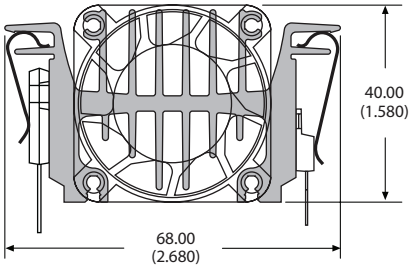
78030 Extrusion with fan θf = 0.36 °C/W



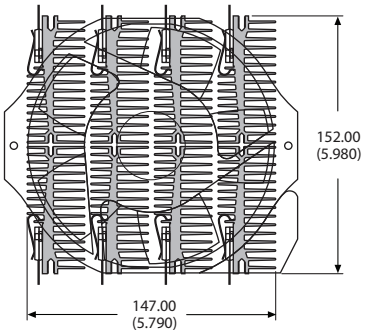
78080 8 Piece extrusion with fan θf = 0.069 °C/W



78345 Extrusion with fan θf = 0.49 °C/W

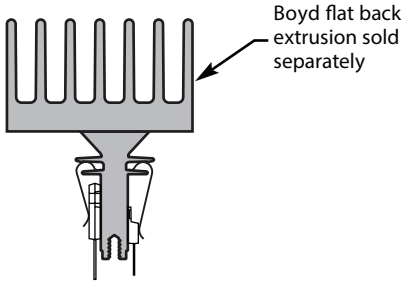


78010 8 Piece extrusion with fan θf = 0.049 °C/W

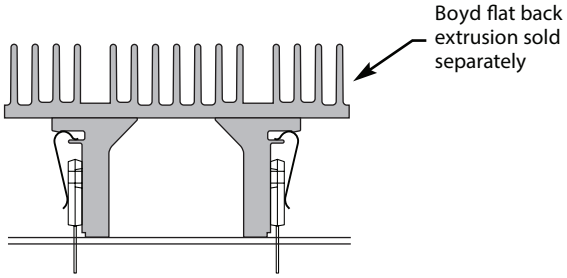


Max Heat Connector Assemblies

78315 Max heat sink support

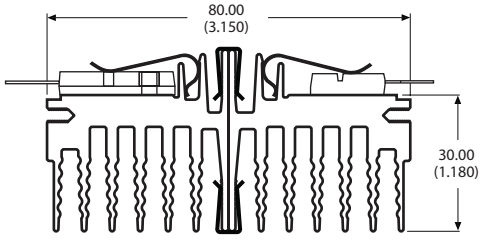


78085 Max heat sink support



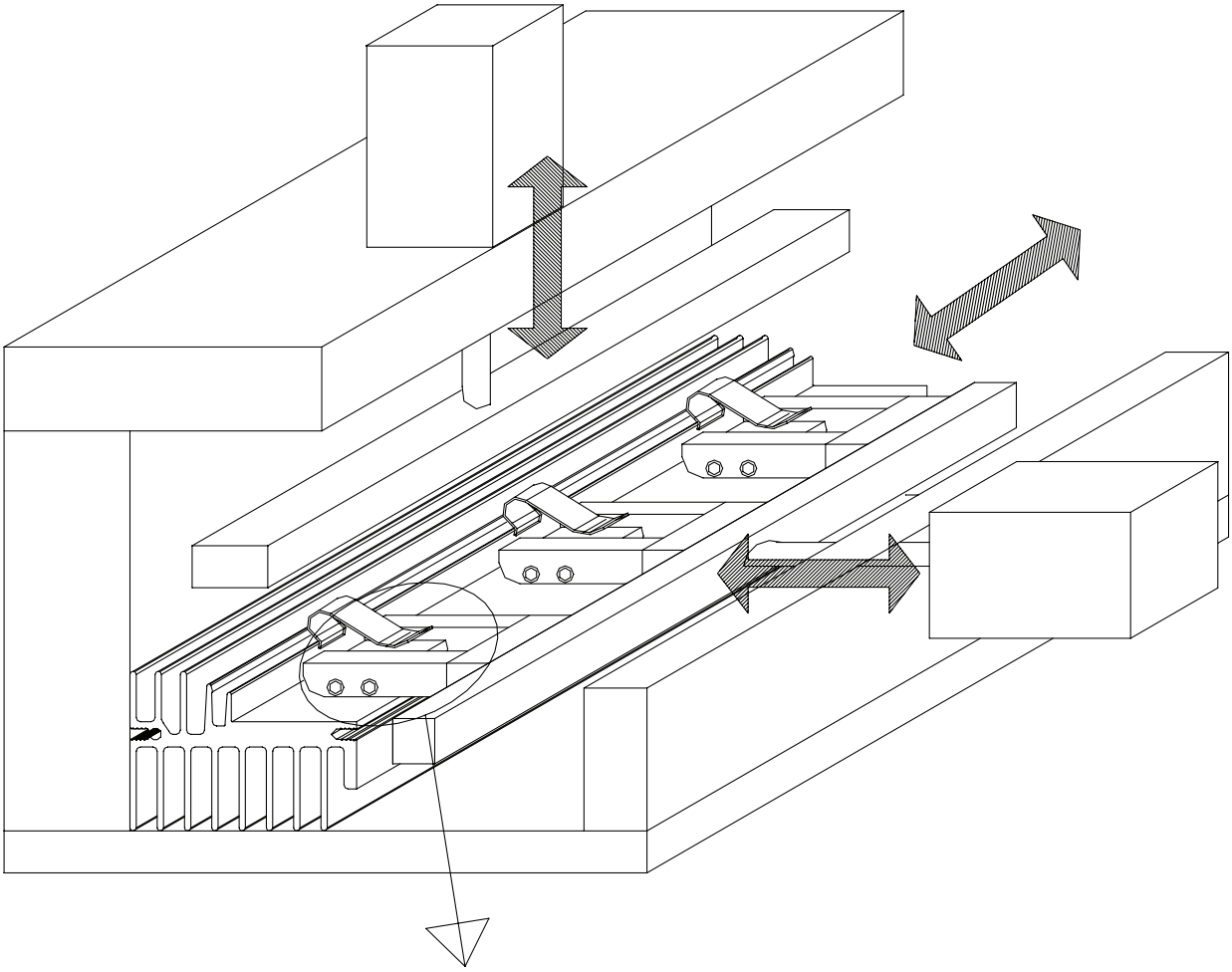
Connecting Max Profiles with U-Clips

78045 Extrusion with Clip CLP212S

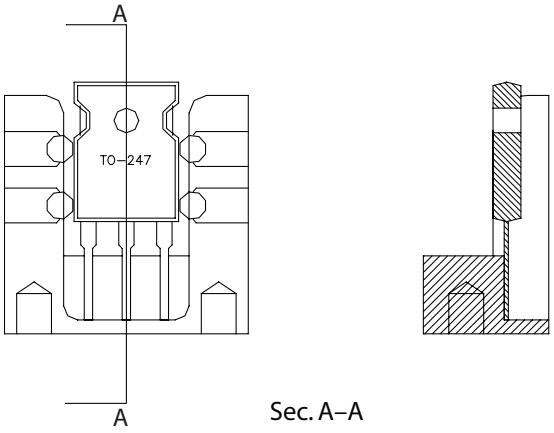


Semi-Automated Assembly (1)

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.

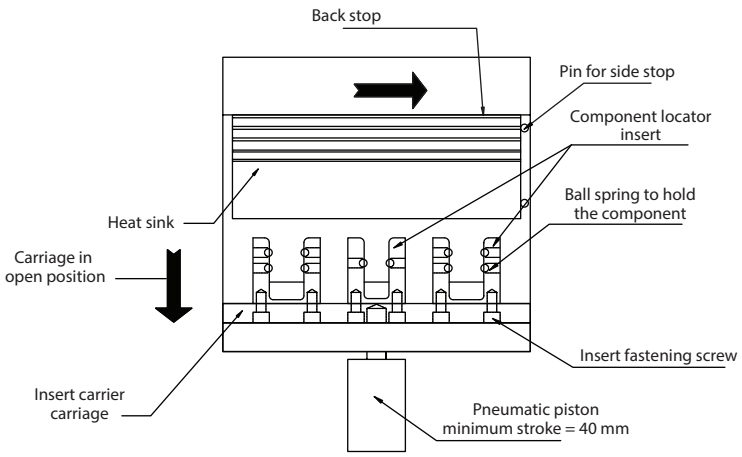


DETAIL OF COMPONENT
LOCATOR INSERT

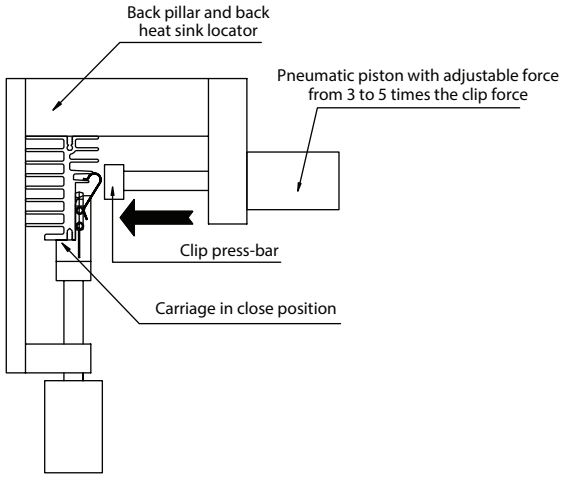


Sec. A–A

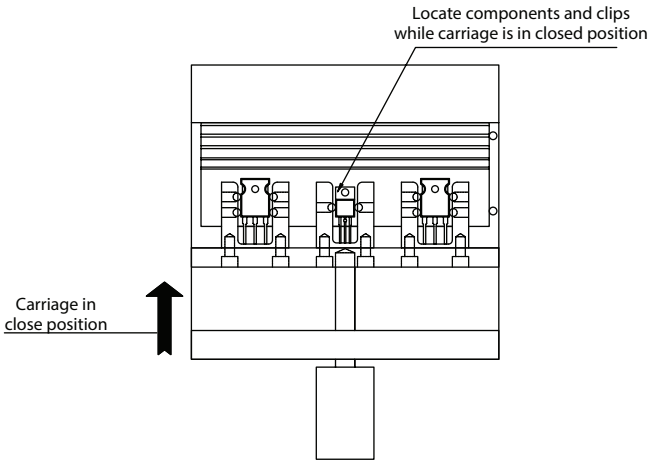
HEAT SINK LOCATING



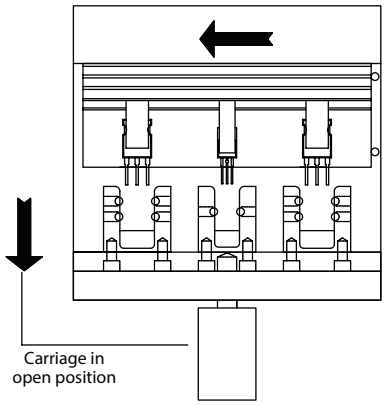
CLIP PRESSING



COMPONENTS AND CLIP LOCATING



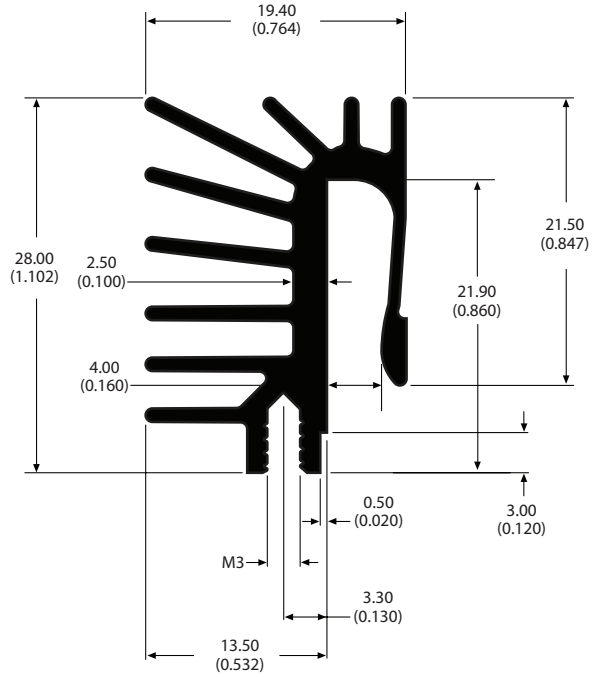
HEAT SINK REMOVAL

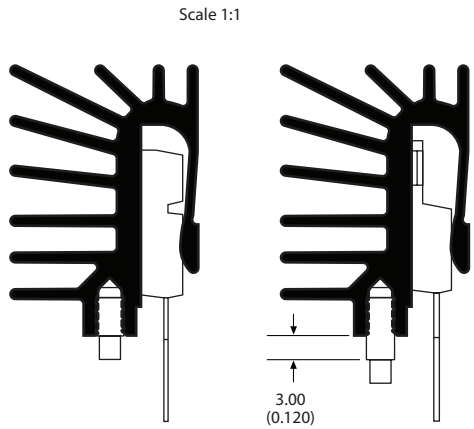


78065 Integrated Clip Profiles (TO-220, T0-252, TO-262)

kg/m: 0.493 • θn = 2.15 °C/W • θf = 0.73 °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 (°C/W)

Part number	Length	Natural convection	Forced convection 1 m/s	2 m/s	3 m/s	Force on component (N)
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 (°C/W)

Part number	Length	Natural convection	Forced convection 1 m/s	2 m/s	3 m/s	Force on component (N)
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

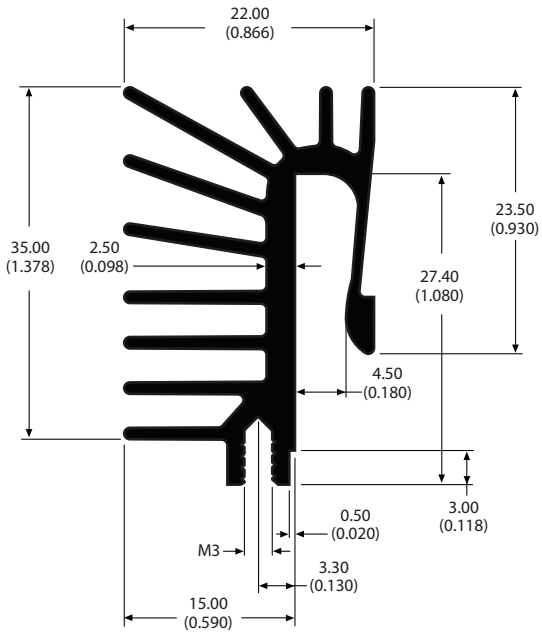
The heat sink thermal performance is evaluated in the vertical mode at a ΔT of 70°C.

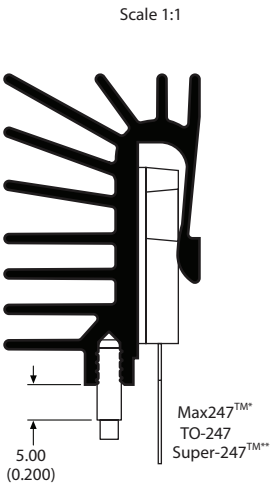
* Max220™ is a registered trademark of STMicroelectronics

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

kg/m: 0.627 • θn = 1.74 °C/W • θf = 0.58 °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.





See page 34 for options on solderable pins

Black anodized heat sink thermal resistance (°C/W)

Part number	Length	Natural convection	Forced convection 1 m/s	2 m/s	3 m/s	Force on component (N)
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

Unfinshed heat sink thermal resistance (°C/W)

Part number	Length	Natural convection	Forced convection 1 m/s	2 m/s	3 m/s	Force on component (N)
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 ΔT of 70°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

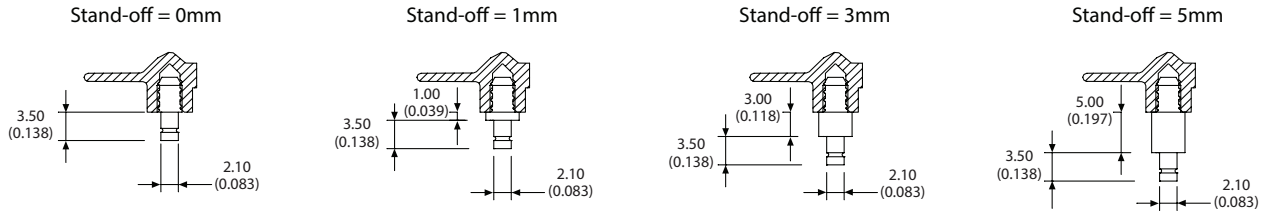
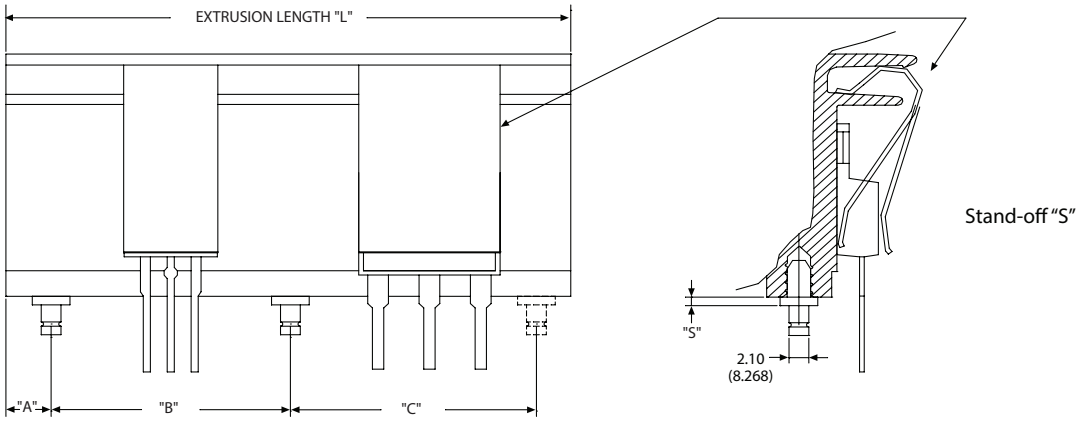


Figure A

The Max Clip System™

View from component side

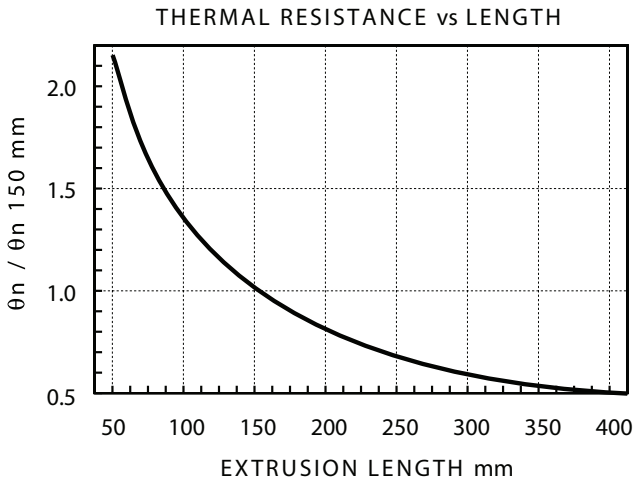


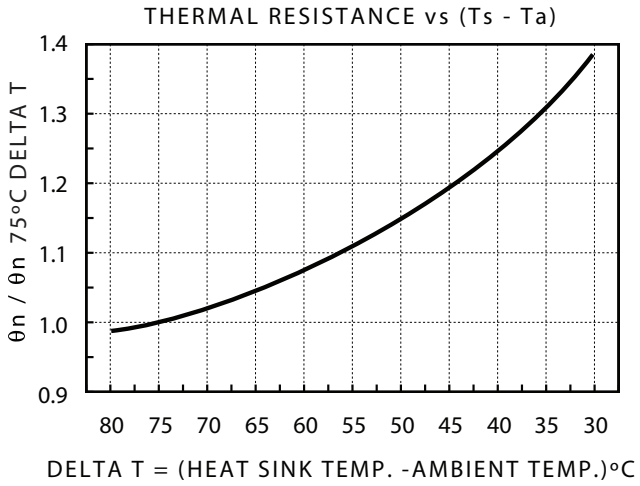
The suggested hole dia. in the PCB is 2.7 ± 0.1 mm with a pitch tolerance of ± 0.15 mm.

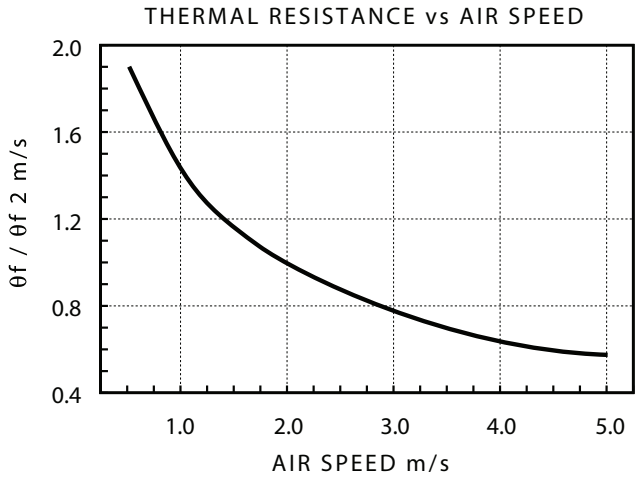
Dimensions "B" and "C" are not required for a heat sink with only 1 solderable pin
Dimension "C" is not required for a heat sink with 2 solderable pins
Tolerance ± 0.2 mm

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.







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 (θn with natural convection, thermal resistance θf 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 (Ts - Ta) 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.

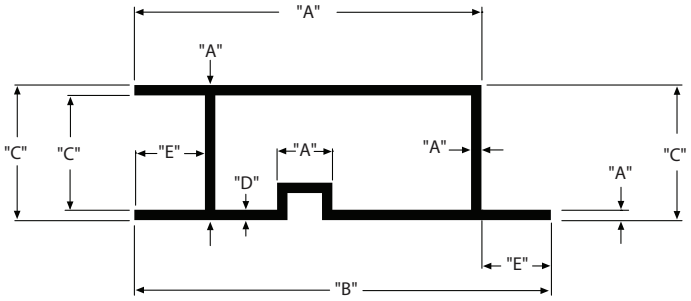
8.4 The heat sink assembly was then subjected to a shock test as follows:

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

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

Parameters	Tolerance (mm)	
	Size	Maximum depth
Threaded holes 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