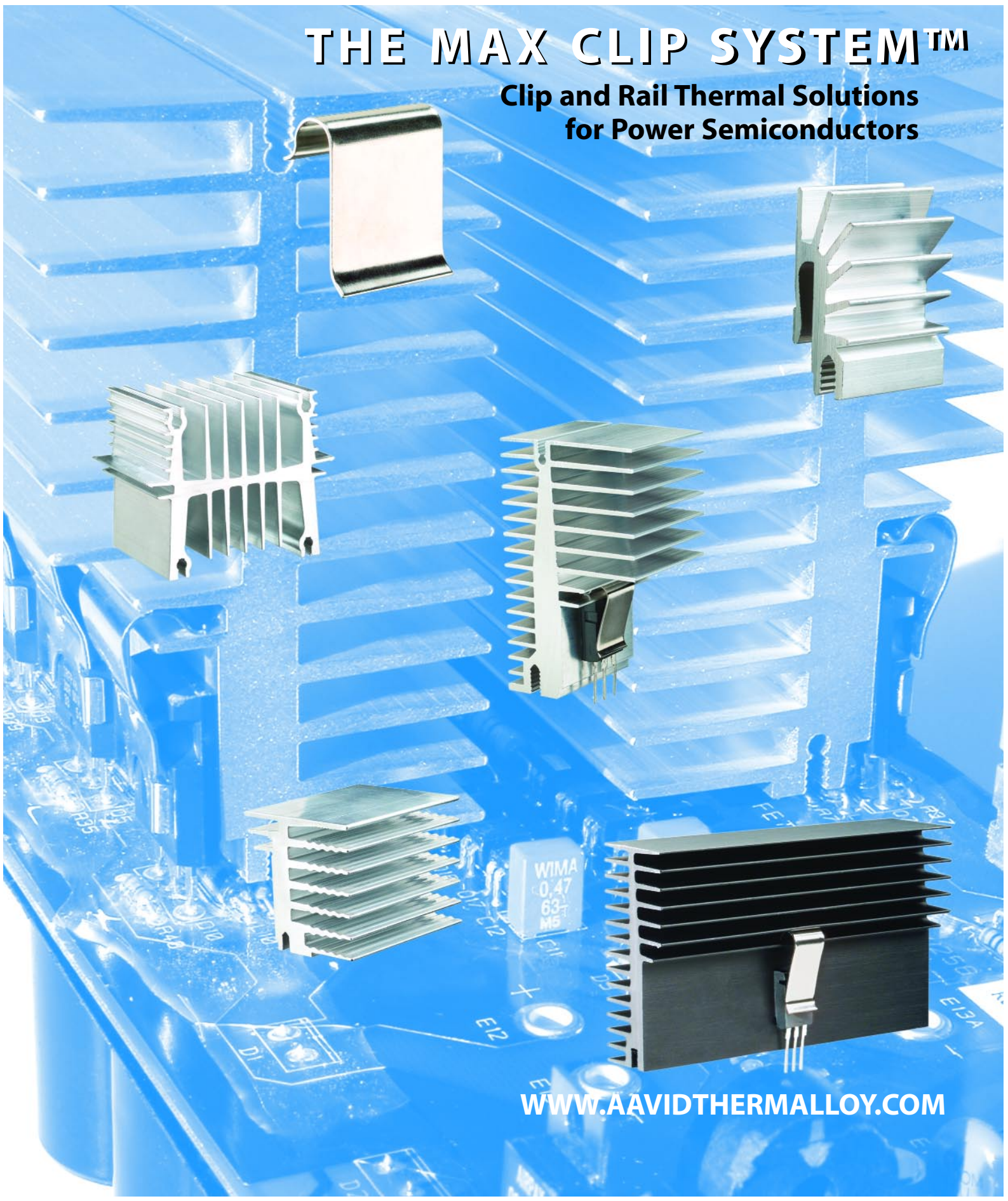




AAVID
THERMALLOY

THE MAX CLIP SYSTEM™

Clip and Rail Thermal Solutions
for Power Semiconductors



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THE MAX CLIP SYSTEM™ CLIP SOLUTIONS ONLY LIMITED BY THE IMAGINATION

The Max Clip System is approved by leading providers of power semiconductors, including: Advanced Power Technology, International Rectifier, STMicroelectronics, and IXYS



APT Advanced Power Technologies manufactures high power, high voltage, high performance power semiconductors for the internet, computers and high capacity mass storage products, wireless cellular base stations for telecommunications, advanced industrial, military and space applications.



International Rectifier is a global supplier of power semiconductors for power conversion. Its Hexfet MOSFETs are used in anti-lock braking and fuel injection systems, disk drives, printers, video cameras, power tools, electronic lighting ballasts, industrial test equipment, telephone networks/modems, and satellites.



STMicroelectronics is one of the world's leading suppliers of semiconductor integrated circuits and discrete devices. ST is especially focused on MPEG2 decoder ICs, smartcard MCUs, special automotive ICs and EPROM memories.



IXYS Corporation designs, develops and markets power semiconductors for controlling energy in motor drives, power conversion (UPS uninterruptible power supplies and SMPS switch mode power supplies), and medical electronics. IXYS focuses on high power semiconductors processing over 500 watts of power.

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The Max Clip System Advantages

Traditionally, the most common method for mounting a semiconductor to the heatsink has been through the use of rivets or screws. This approach ensures very high levels of reliability and, typically, good thermal interfaces. While such techniques are still commonplace throughout the industry, the advance in clip mounting technology and special thermal interface materials means that these solutions now not only offer the same (or improved) performance compared with screw and rivet designs but also a large number of other technical and manufacturing benefits. At the same time, the recent launch of devices where traditional rivet holes have been eliminated to improve functionality by increasing die carrying area, means that increasingly there is no alternative solution to mounting other than to use clips.

The economical and manufacturing benefits offered by clip solutions are readily apparent in that they allow for simplified and rapid automated or manual assembly offering reliable mounting without the problems sometimes associated with torque control of screws. For high-volume production, suitable jigs and high-speed pneumatic pistons will typically be used to locate the components and assemble the clip. Clip solutions can also simplify ongoing equipment maintenance as they are significantly easier to disassemble and reassemble than their rivet- and screw-based counterparts.

A well-designed clip solution will ensure that a largely homogeneous force is distributed across the surface of the component package and that pressure is placed on the centre of the component as this is the area that typically dissipates the most power. This eliminates the problem of components becoming tilted due to the non-axial pressure of a screw – a particularly common issue in cases where the component is mounted on some form of rubber insulating foil. Furthermore, if it is designed with suitable inherent flexibility and strong thermal hysteresis, then the good clip solution will also maximise reliability by ensuring a very low stress on the component throughout its operating life. And because the clip will provide a constant pressure over time, the use of clip mounting techniques eliminates the problems associated with screws loosening as a result of vibration. Finally, by using a good interface material which adapts and thins itself below the component, the clip can follow this movement to further guarantee maintenance of a steady and even pressure on the component.

By considering the points above, we can see that a well-designed clip solution will need to:

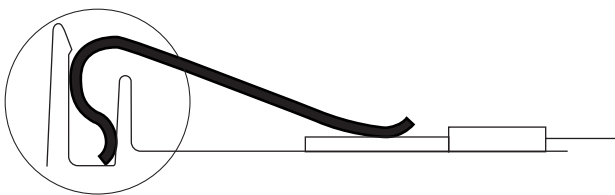
- Offer very high elasticity
- Be easy to assemble during manufacture
- Be easy to disassemble and re-assemble during operating life
- In most cases, offer high levels of resistance against corrosion
- Provide exactly the right pressure on the component according to the material interface used

The particular interface material chosen can have a significant effect on the performance of a given heatsink solution. In the past, such thermal interfaces have commonly been based on grease compounds as these offered the highest levels of thermal performance.

The key to the successful combination of clip solution and thermal interface material comes down to the pressure that needs to be applied to the particular component for optimal performance. Typically, with a good interface material such as Easy-ply™, Kon-Dux or a phase change material like Ultrastick, the ideal recommended pressure will be between 10 and 15 N/cm². Using a good insulating silicon rubber such as In-Sil-8™ is likely to require a pressure of 15 to 30 N/cm² depending on the

insulating thickness. It should be noted that increasing the pressure from the above parameters will give little improvement in overall thermal performance. As a rule of thumb, Aavid Thermalloy suggests that the optimum force on a TO220 device without an insulating interface be in the region of 20 N rising to 30 N with an insulating interface. In the case of TO247 devices, the suggested force would be 35 N and 55 N respectively.

Importantly, as with any other critical component, the heatsink, mounting technique and interface material required should be assessed at the earliest possible stage of the development process. Indeed, this is the only way to ensure an economical solution that is optimised to the given design in terms of the thermal and environmental conditions, any mechanical constraints and the final manufacturing process.

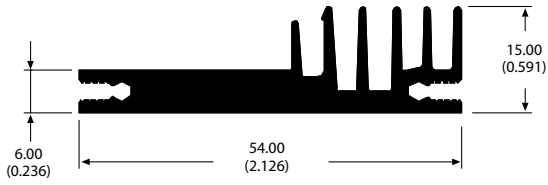


The MAX clip system comprises a proprietary reduced fin configuration incorporated into each heatsink, into which a clip is pressed for optimum retention.

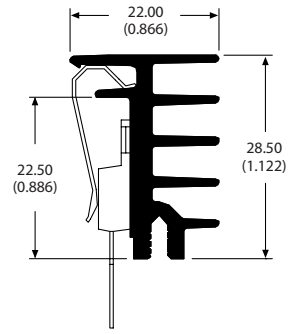
The MAX clip system is patented throughout Europe, North America and Asia
U.S. Patent # 5.991.151

THE MAX CLIP SYSTEM™ EXTRUSION PROFILES

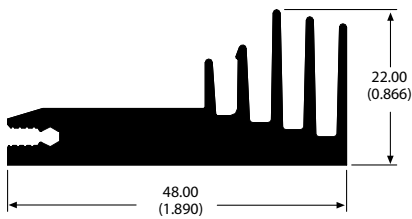
OS565 kg/m: 0.90 • Rthn = 3.43 °C/W • Rthf = 1.12 °C/W



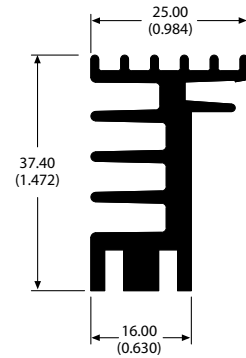
OS533 kg/m: 0.48 • Rthn = 4.12 °C/W • Rthf = 1.68 °C/W



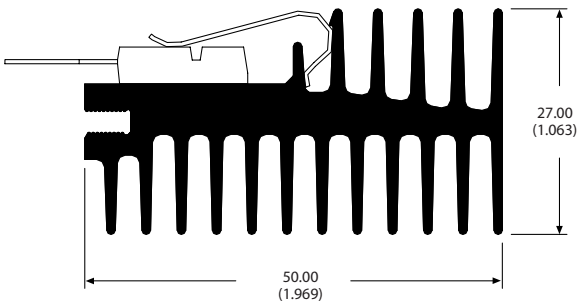
BS075 kg/m: 1.08 • Rthn = 3.42 °C/W • Rthf = 1.57 °C/W



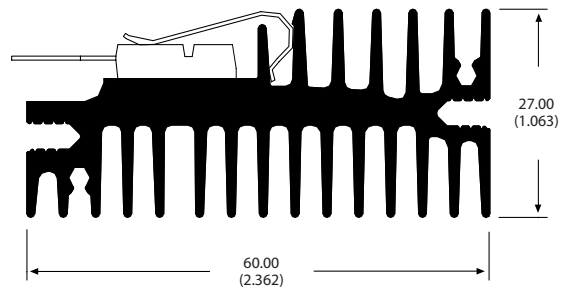
ZA5301 kg/m: 0.74 • Rthn = 3.31 °C/W • Rthf = 1.55 °C/W



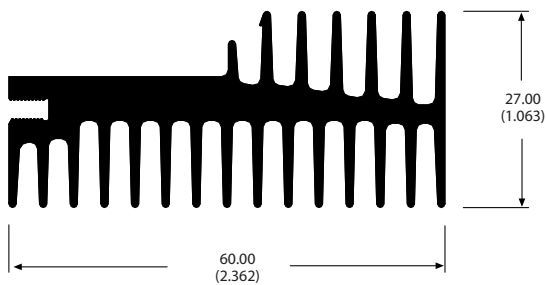
OS506 kg/m: 1.38 • Rthn = 2.46 °C/W • Rthf = 0.65 °C/W



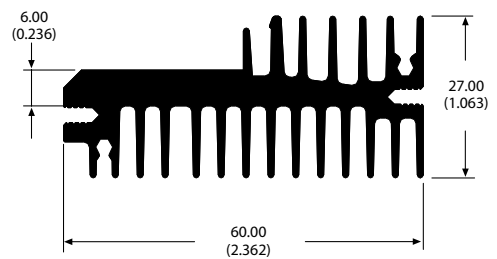
OS526 kg/m: 1.66 • Rthn = 2.29 °C/W • Rthf = 0.56 °C/W



OSY54 kg/m: 1.74 • Rthn = 2.27 °C/W • Rthf = 0.55 °C/W

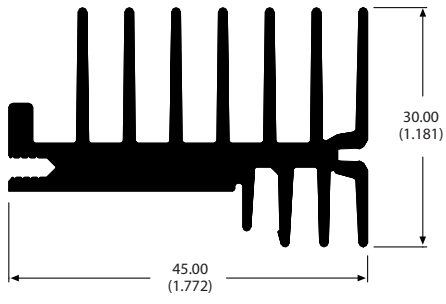


OS579 kg/m: 1.73 • Rthn = 2.30 °C/W • Rthf = 0.59 °C/W

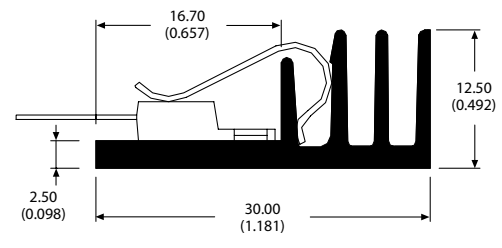


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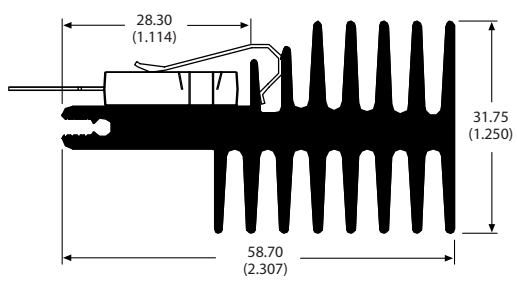
OS515 kg/m: 1.18 • Rthn = 2.33 °C/W • Rthf = 0.76 °C/W



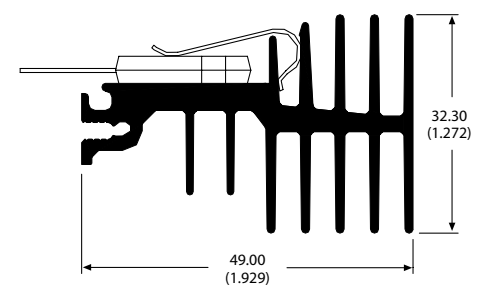
OS546 kg/m: 0.31 • Rthn = 6.34 °C/W • Rthf = 2.38 °C/W



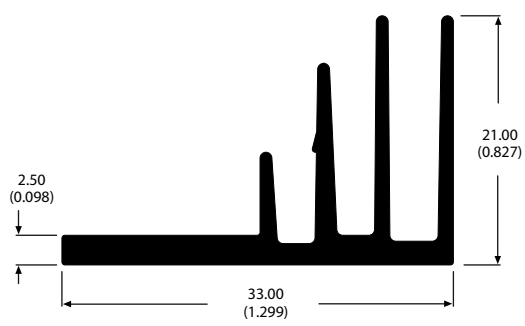
OS550 kg/m: 1.78 • Rthn = 2.35 °C/W • Rthf = 0.67 °C/W



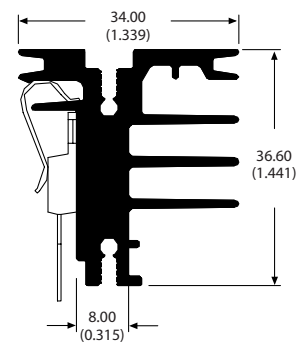
OSA21 kg/m: 1.15 • Rthn = 2.34 °C/W • Rthf = 0.76 °C/W



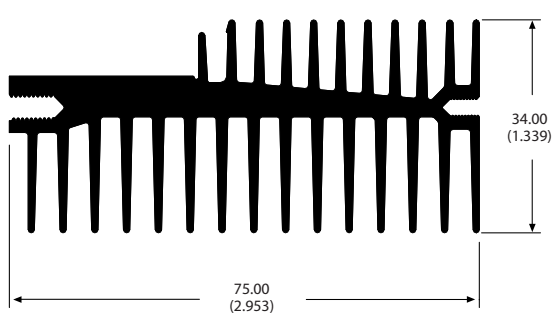
OS569 kg/m: 0.41 • Rthn = 4.38 °C/W • Rthf = 2.10 °C/W



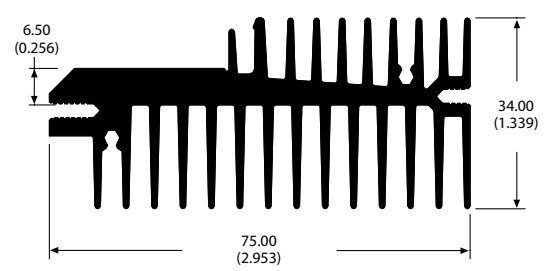
OS559 kg/m: 1.10 • Rthn = 2.70 °C/W • Rthf = 0.93 °C/W



OS505 kg/m: 2.48 • Rthn = 1.45 °C/W • Rthf = 0.39 °C/W

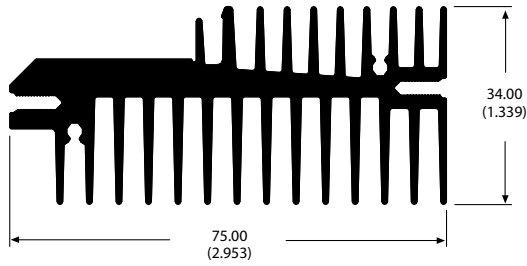


OSA65 kg/m: 2.51 • Rthn = 1.45 °C/W • Rthf = 0.39 °C/W

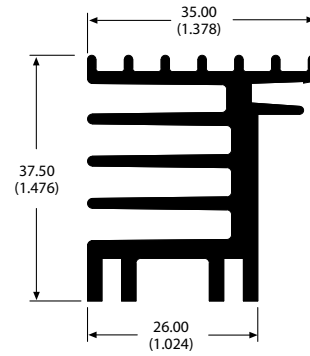


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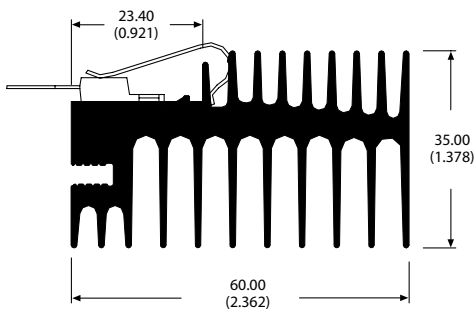
BS115 kg/m: 2.52 • R_{thn} = 1.46 °C/W • R_{thf} = 0.40 °C/W



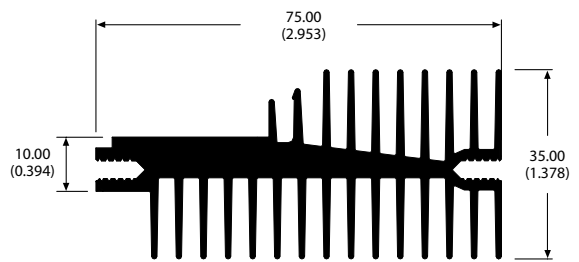
ZA5300 kg/m: 1.18



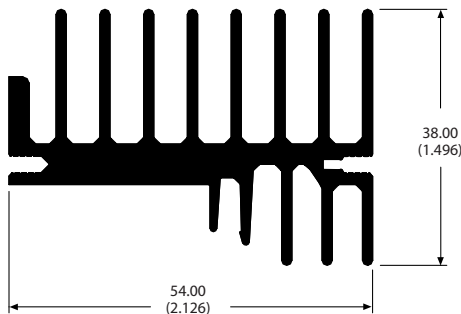
OSA06 kg/m: 2.18 • R_{thn} = 1.67 °C/W • R_{thf} = 0.47 °C/W



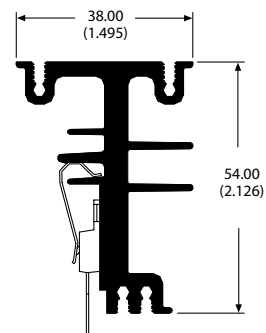
OSA35 kg/m: 2.38 • R_{thn} = 1.56 °C/W • R_{thf} = 0.411 °C/W



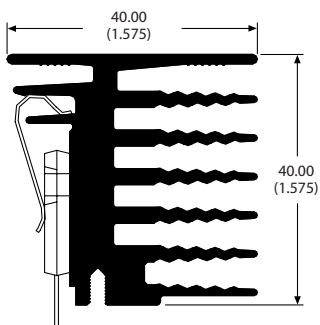
OS518 kg/m: 1.64 • R_{thn} = 1.71 °C/W • R_{thf} = 0.57 °C/W



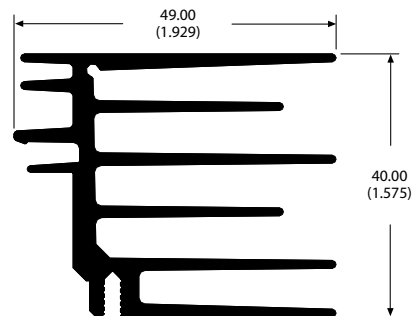
OS577 kg/m: 1.45



OS512 kg/m: 1.59 • R_{thn} = 2.12 °C/W • R_{thf} = 0.64 °C/W



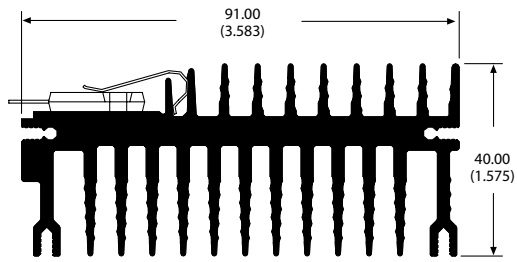
OSA53 kg/m: 1.36



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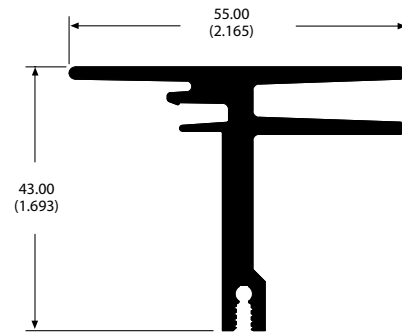
OSA37

kg/m: 3.61 • R_{thn} = 1.10 °C/W • R_{thf} = 0.31 °C/W



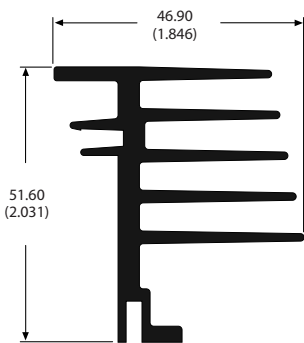
OSA75

kg/m: 1.14



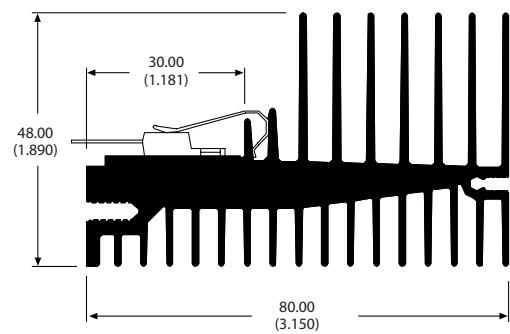
ZA5259

kg/m: 1.49



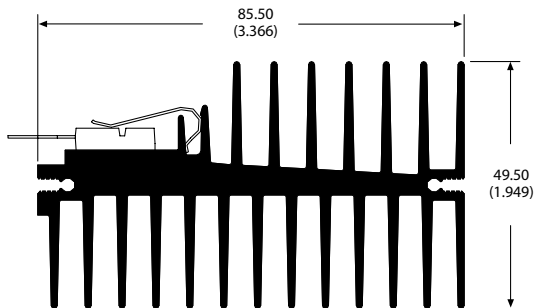
OS552

kg/m: 3.14 • R_{thn} = 1.06 °C/W • R_{thf} = 0.34 °C/W



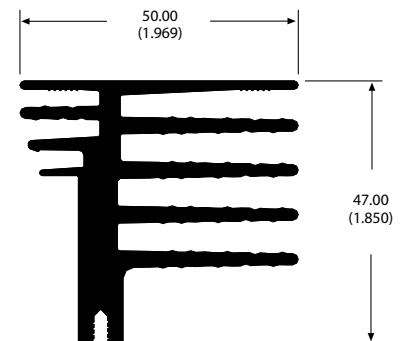
OSA36

kg/m: 3.45 • R_{thn} = 0.93 °C/W • R_{thf} = 0.29 °C/W



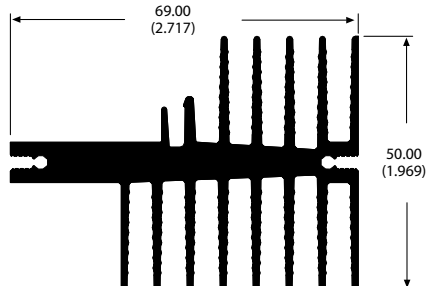
OSA60

kg/m: 2.04 • R_{thn} = 1.71 °C/W • R_{thf} = 0.58 °C/W



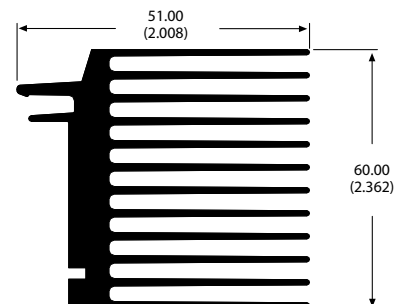
BS085

kg/m: 2.45 • R_{thn} = 1.28 °C/W • R_{thf} = 0.44 °C/W



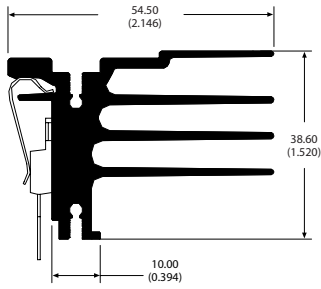
BS104

kg/m: 2.09 • R_{thn} = 1.73 °C/W • R_{thf} = 0.43 °C/W

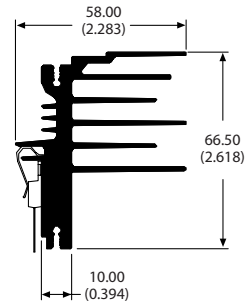


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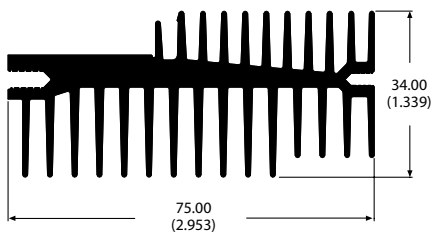
OS568 kg/m: 1.49 • Rthn = 1.82 °C/W • Rthf = 0.78 °C/W



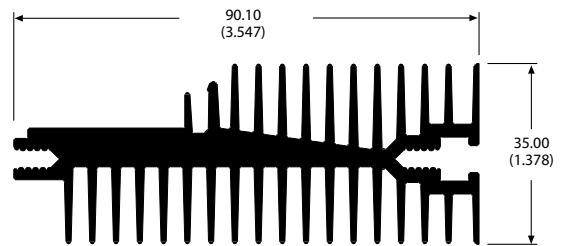
OS560 kg/m: 2.37 • Rthn = 1.25 °C/W • Rthf = 0.50 °C/W



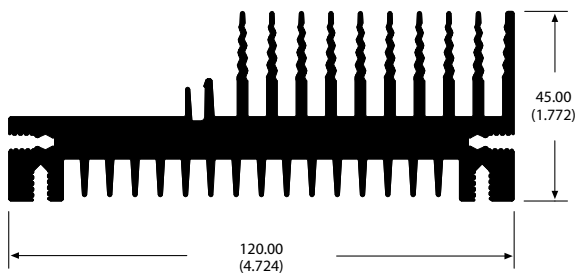
OSA25 kg/m: 2.04 • Rthn = 1.47 °C/W • Rthf = 0.40 °C/W



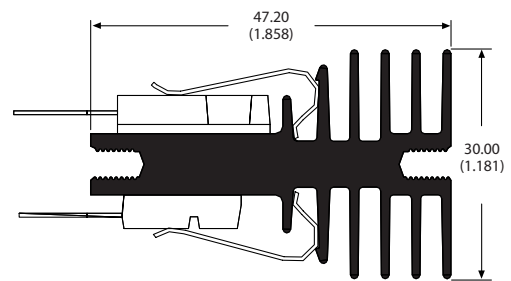
BS005 kg/m: 3.09 • Rthn = 1.35 °C/W • Rthf = 0.32 °C/W



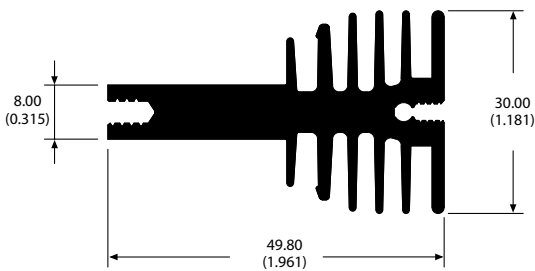
OSA58 kg/m: 5.52



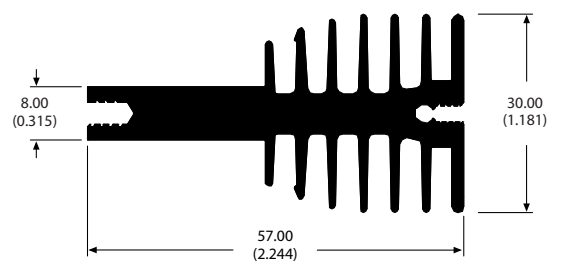
OS507 kg/m: 1.23 • Rthn = 3.02 °C/W • Rthf = 0.84 °C/W



OSA63 kg/m: 1.41 • Rthn = 2.99 °C/W • Rthf = 0.83 °C/W

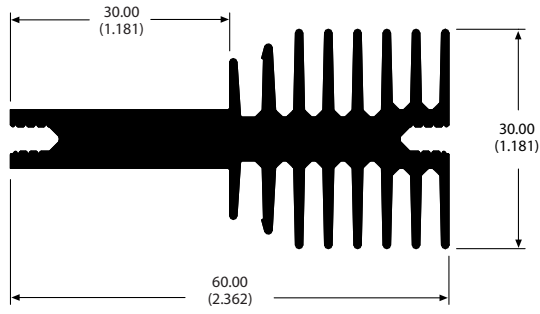


OS555 kg/m: 1.56 • Rthn = 2.42 °C/W • Rthf = 0.75 °C/W

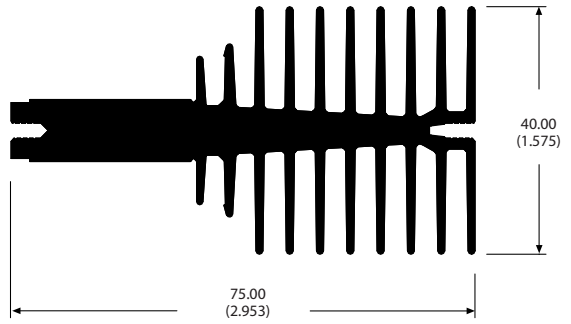


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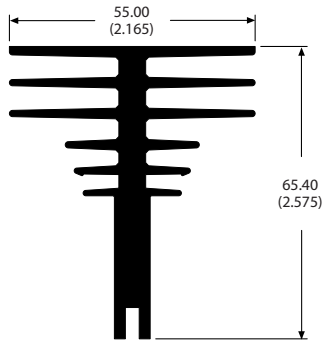
OS520 kg/m: 1.66 • Rthn = 2.49 °C/W • Rthf = 0.74 °C/W



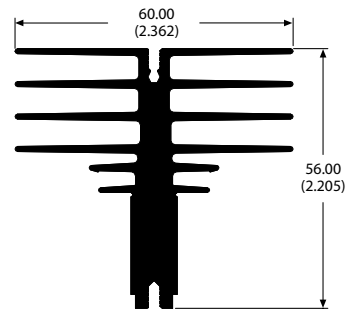
OS517 kg/m: 2.57 • Rthn = 1.55 °C/W • Rthf = 0.41 °C/W



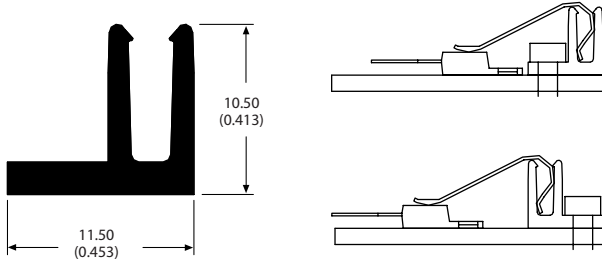
ZA5248 kg/m: 2.24



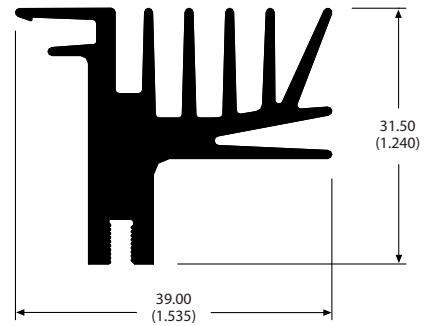
OS528 kg/m: 2.15 • Rthn = 1.42 °C/W • Rthf = 0.52 °C/W



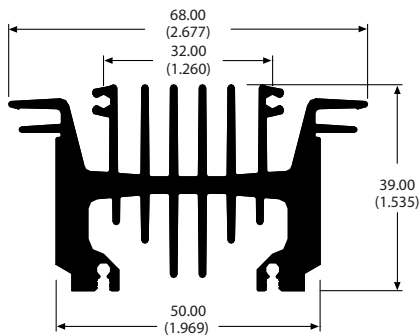
OS530 kg/m: 0.121



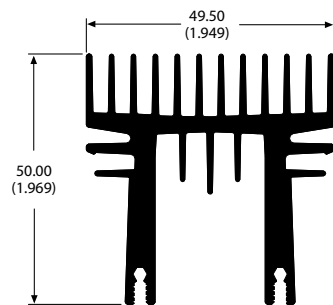
OS508 kg/m: 0.99 • Rthn = 3.10 °C/W • Rthf = 1.02 °C/W



OS527 kg/m: 2.21 • Rthn = 1.64 °C/W • Rthf = 0.49 °C/W

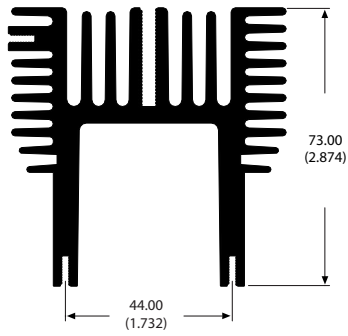


BS100 kg/m: 2.02 • Rthn = 1.92 °C/W • Rthf = 0.57 °C/W

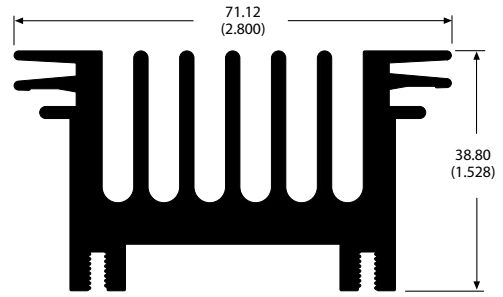


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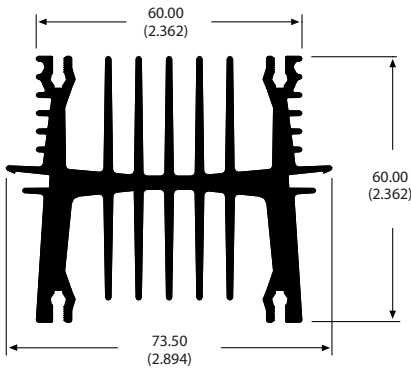
SS014 kg/m: 4.36



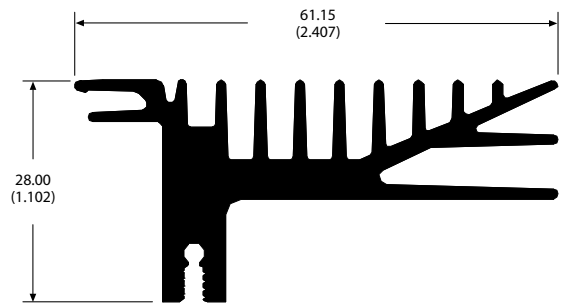
82005 kg/m: 2.60



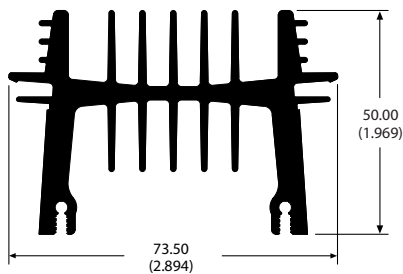
OS509 kg/m: 3.42 • R_{thn} = 1.10 °C/W • R_{thf} = 0.36 °C/W



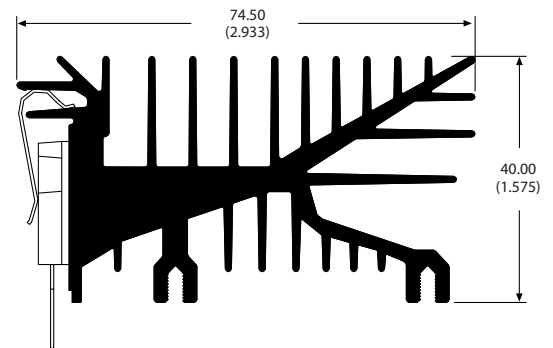
OS553 kg/m: 1.31 • R_{thn} = 2.5 °C/W • R_{thf} = 0.84 °C/W



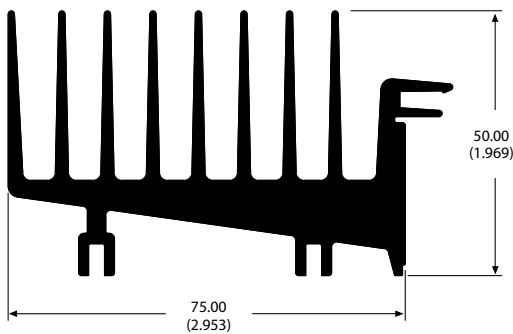
OSA66 kg/m: 2.75 • R_{thn} = 1.3 °C/W • R_{thf} = 0.46 °C/W



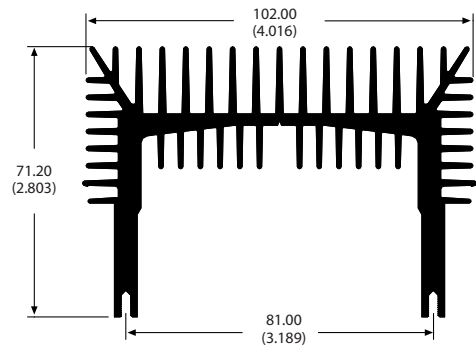
OS510 kg/m: 2.52 • R_{thn} = 1.23 °C/W • R_{thf} = 0.42 °C/W



ZA5439 kg/m: 3.57

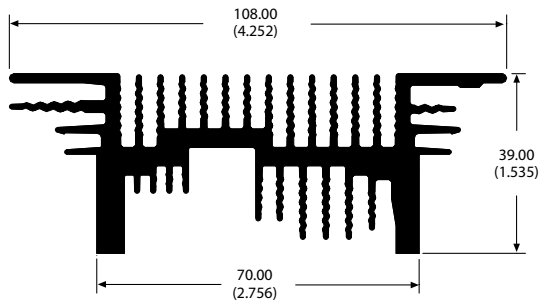


OS511 kg/m: 4.64 • R_{thn} = 0.81 °C/W • R_{thf} = 0.28 °C/W

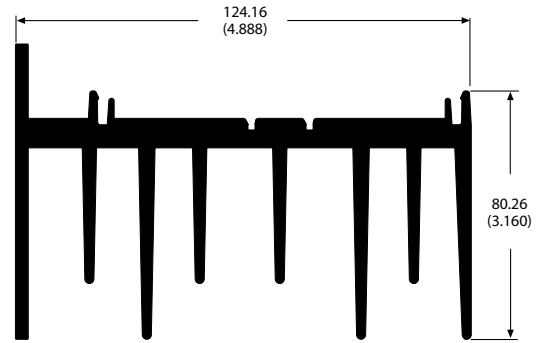


THE MAX CLIP SYSTEM™ EXTRUSION PROFILES

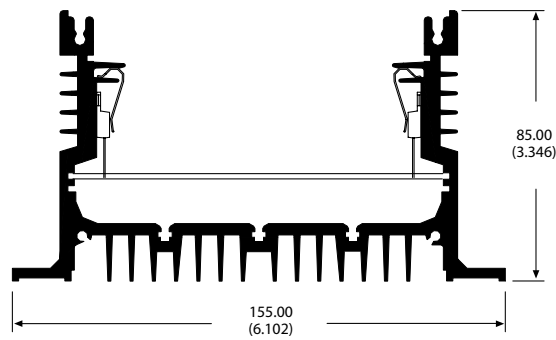
OSA30 kg/m: 3.29 • R_{thn} = 1.18 °C/W • R_{thf} = 0.41 °C/W



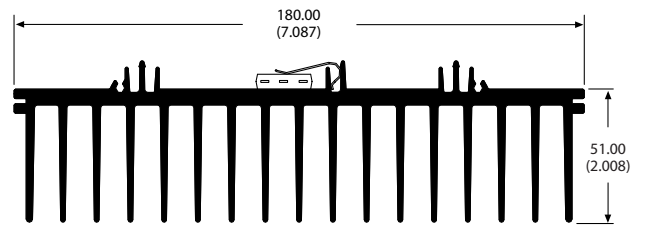
81400 kg/m: 5.51



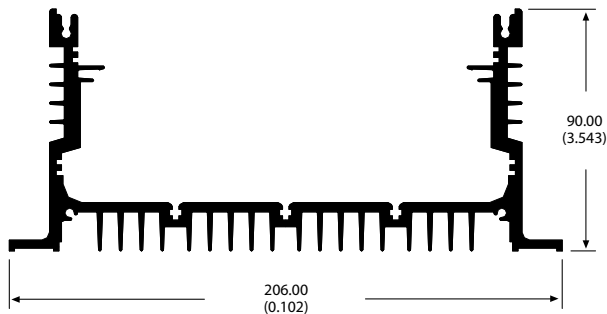
OSX96 kg/m: 5.13 • R_{thn} = 0.70 °C/W • R_{thf} = 0.50 °C/W



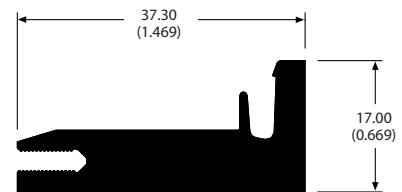
OSA39 kg/m: 6.10 • R_{thn} = 0.44 °C/W • R_{thf} = 0.19 °C/W



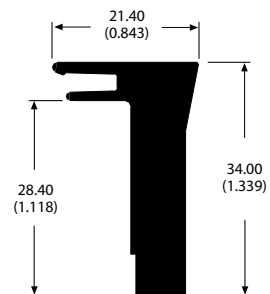
OSY73 kg/m: 6.10 • R_{thn} = 0.55 °C/W • R_{thf} = 0.27 °C/W



OSY76 kg/m: 0.83

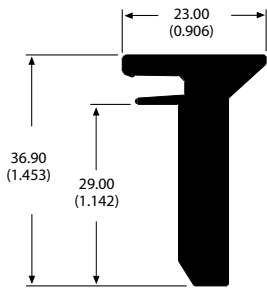


BS021 kg/m: 0.85

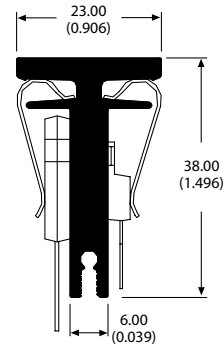


THE MAX CLIP SYSTEM™ EXTRUSION PROFILES

BS011 kg/m: 0.95



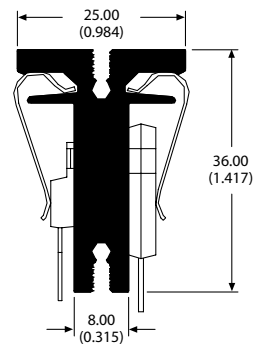
OSA15 kg/m: 0.75 • R_{thn} = 3.11 °C/W • R_{thf} = 1.50 °C/W



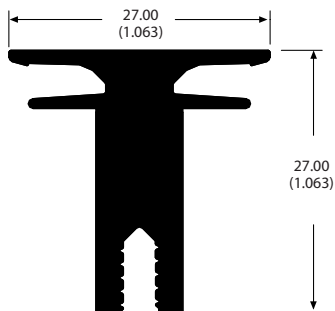
OS521 kg/m: 7.75



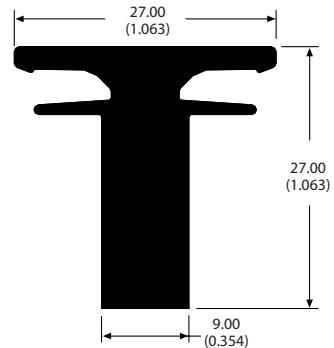
OS556 kg/m: 0.88



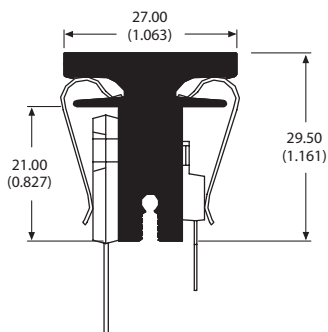
OS529 kg/m: 0.69 • R_{thn} = 3.43 °C/W • R_{thf} = 1.59 °C/W



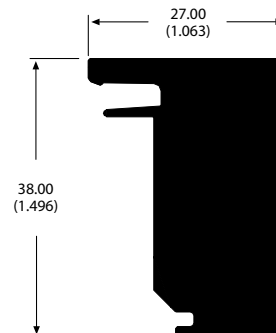
OS581 kg/m: 0.81



OS547 kg/m: 0.95 • R_{thn} = 3.43 °C/W • R_{thf} = 1.59 °C/W

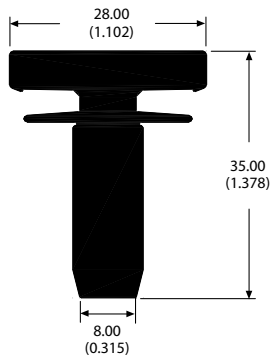


BS208 kg/m: 1.89

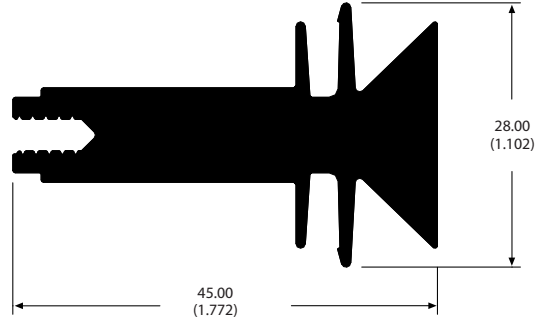


THE MAX CLIP SYSTEM™ EXTRUSION PROFILES

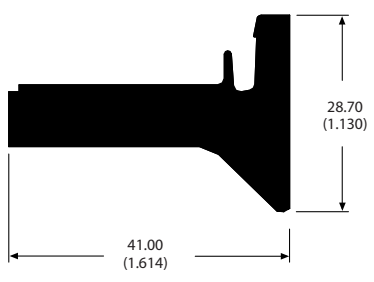
BS077 kg/m: 1.18



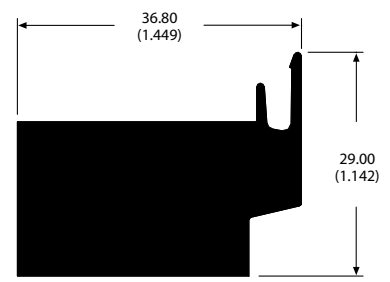
OS522 kg/m: 1.39



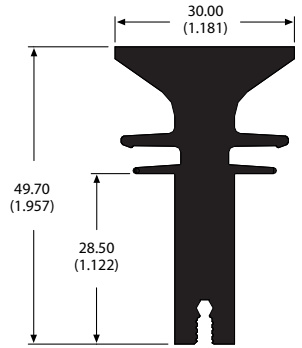
OSY67 kg/m: 1.32



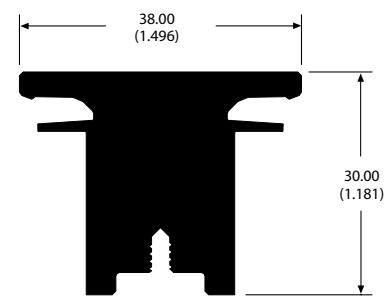
OSY77 kg/m: 1.88



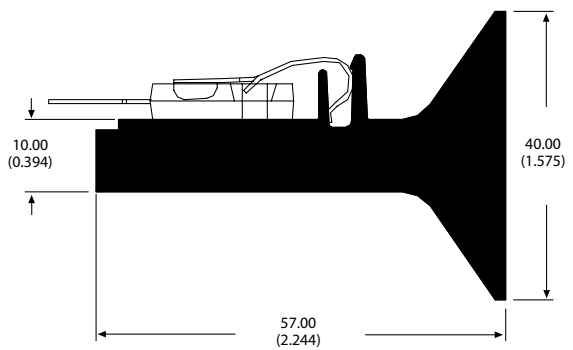
BS019 kg/m: 1.72



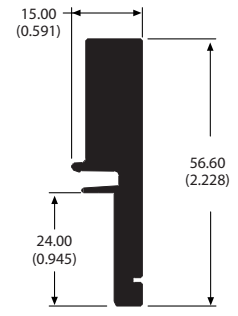
OSA57 kg/m: 1.69



OS562 kg/m: 2.15

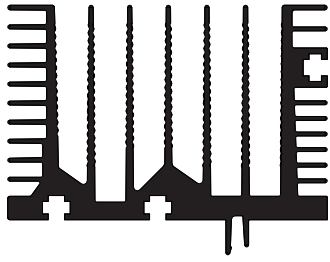


BS059 kg/m: 1.40

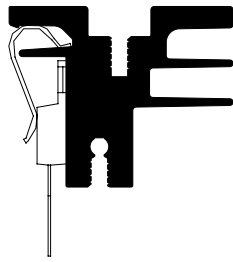


THE MAX CLIP SYSTEM™ EXTRUSION PROFILES

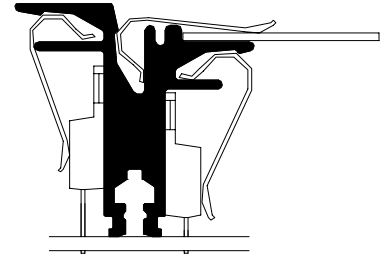
OS513



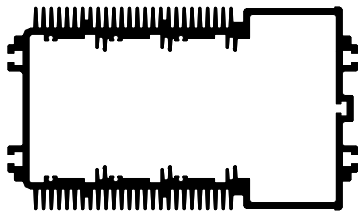
OS567



OS549



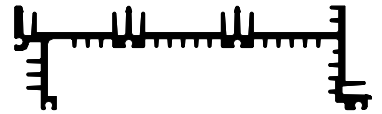
OSA11



OSA12



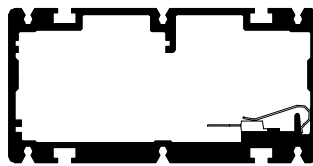
OSA16



OSA17



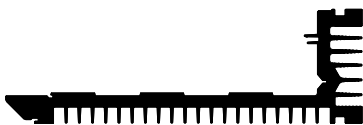
OSA22



OSA24



OSA31



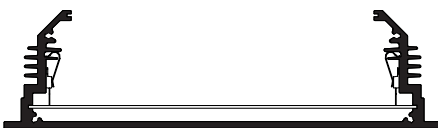
OSA34



OSA55



OSA61



OSA69



OSA74

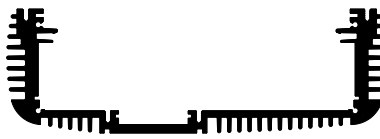


THE MAX CLIP SYSTEM™ EXTRUSION PROFILES

OSA79



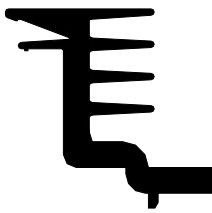
OSA80



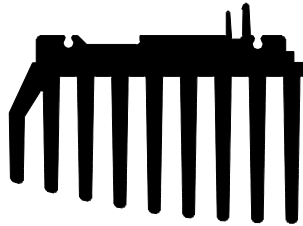
OSY94



BS014



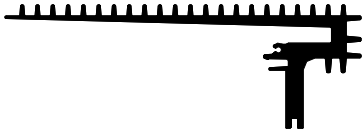
BS034



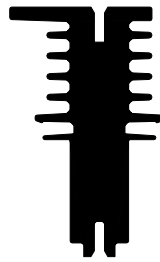
BS060



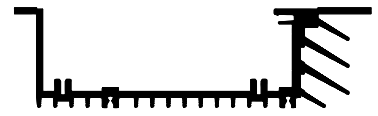
BS070



BS093



BS094



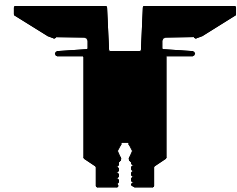
BS105



BS121



BS138



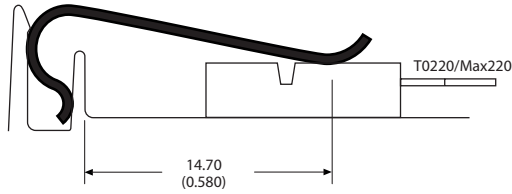
BS202



THE MAX CLIP SYSTEM™ CLIPS

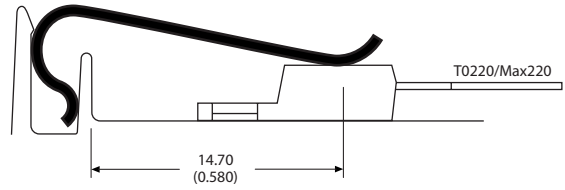
406098 10 mm x 0.5 = 22 N

Max01



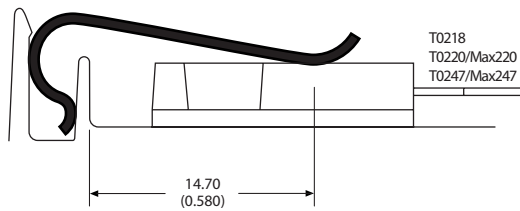
406100 12 mm x 0.5 = 35 N

Max02



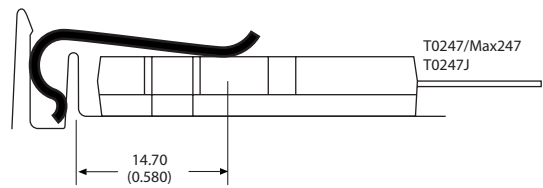
406097 15 mm x 0.5 = 45 N

Max03



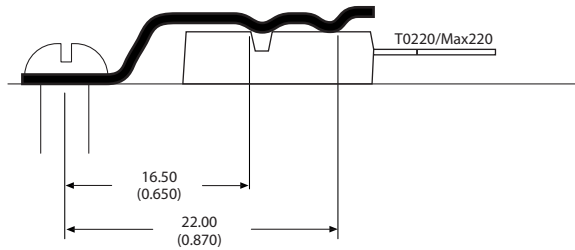
406096 20mm x 0.5 = 60 N

Max04



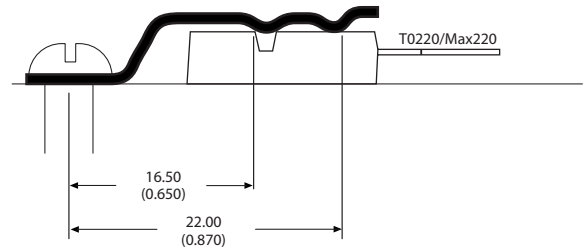
406095 12 mm x 0.6 = 50 N

Max07



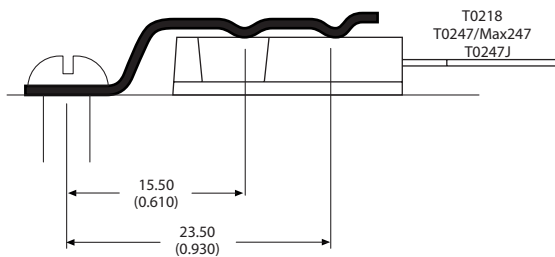
406094 12 mm x 0.5 = 30 N

Max07-L



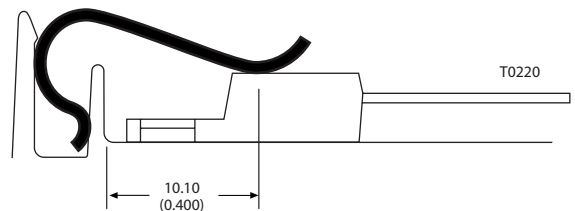
406094 18 mm x 0.6 = 75 N

Max08



406103 10 mm x 0.5 = 45 N

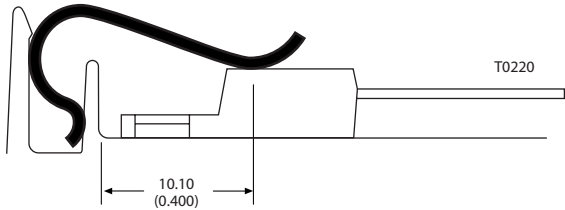
Max09



THE MAX CLIP SYSTEM™ CLIPS

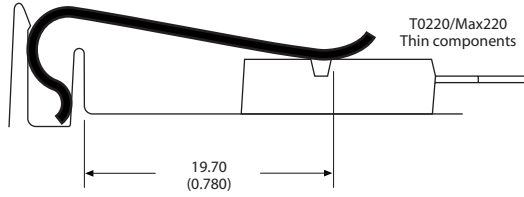
7 mm x 0.5 = 35 N

Max09-S



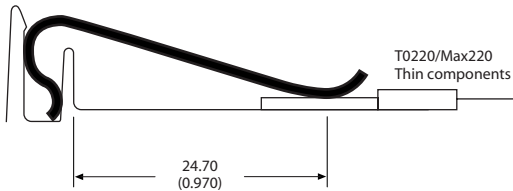
406104 12 mm x 0.6 = 40 N

Max10



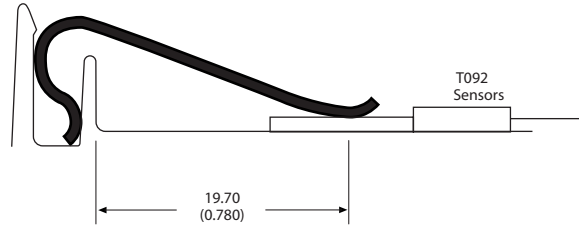
406106 12 mm x 0.6 = 35 N

Max11



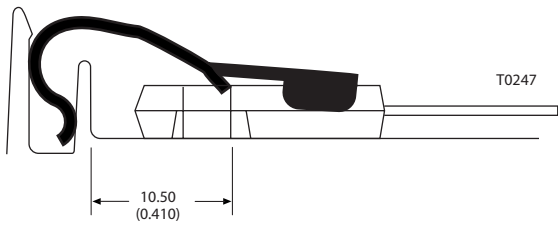
406107 6 mm x 0.6 = 25 N

Max12



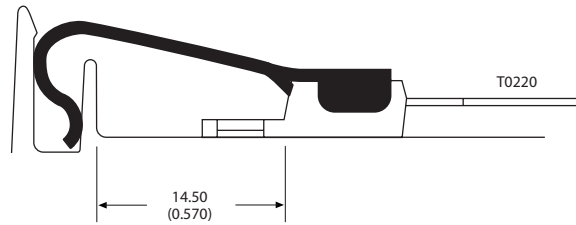
406108 17 mm x 0.5 = 45 N

Max13



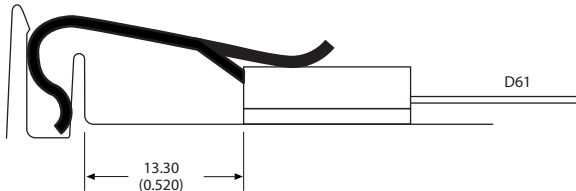
406109 13 mm x 0.5 = 20 N

Max14



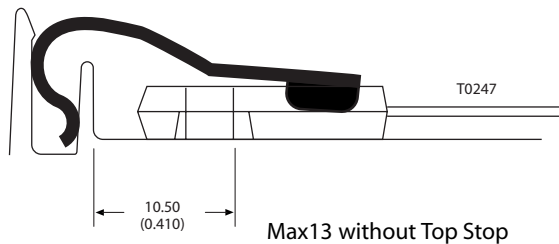
406110 18 mm x 0.6 = 60 N

Max15



406111 17 mm x 0.5 = 45 N

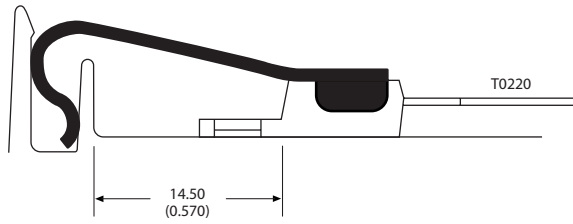
Max16



THE MAX CLIP SYSTEM™ CLIPS

406112 13 mm x 0.5 = 20 N

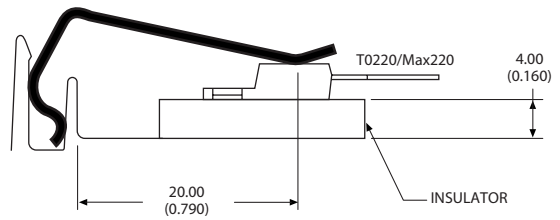
Max17



Max14 without Top Stop

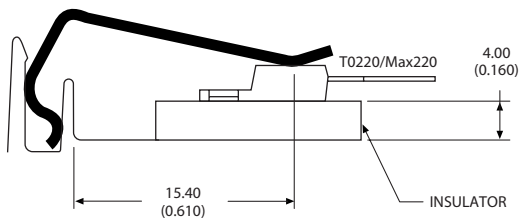
406113 12 mm x 0.6 = 47 N

Max20



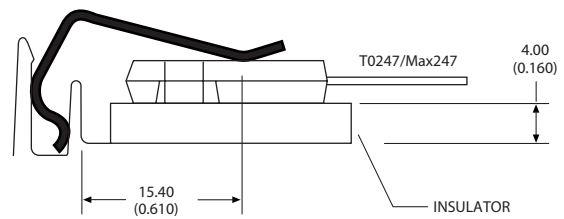
406114 12 mm x 0.6 = 48N

Max21



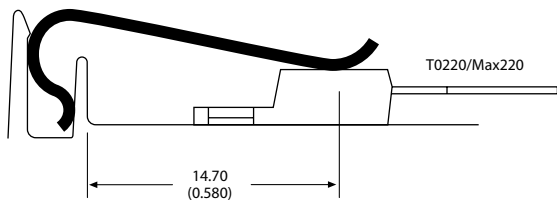
406115 18 mm x 0.6 = 100 N

Max23



406093 10 mm x 0.7 = 80 N

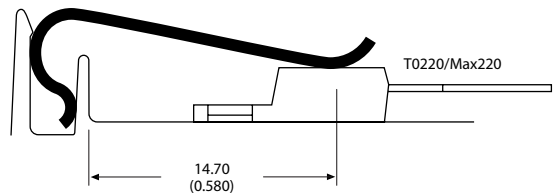
Max01-H



H = High Force

406117 13 mm x 0.6 = 60 N

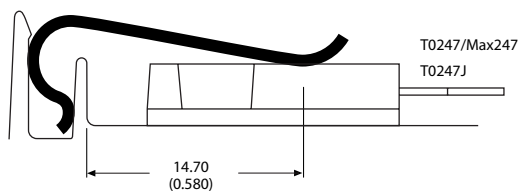
Max02-H



H = High Force

406118 18 mm x 0.6 = 80 N

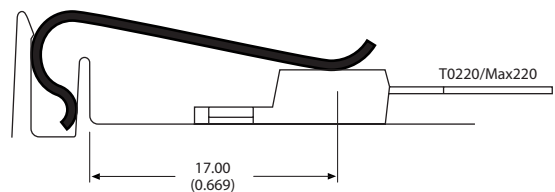
Max03-H



H = High Force

406092 10 mm x 0.7 = 60 N

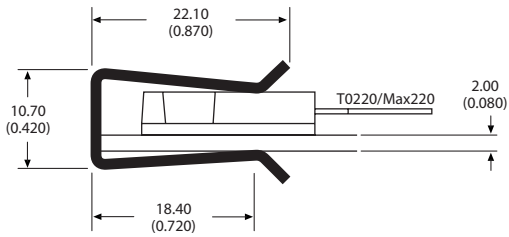
Max04-H



H = High Force

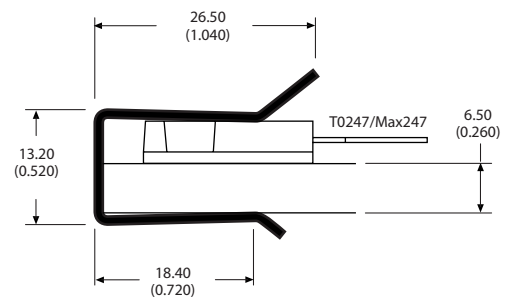
032791 10.1 mm x 0.5 = 21 N

CLP212



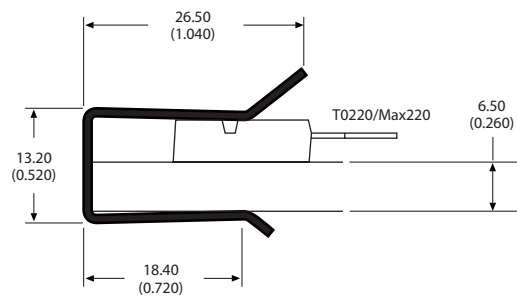
406087 15 mm x 0.5 = 36 N

CLP212M



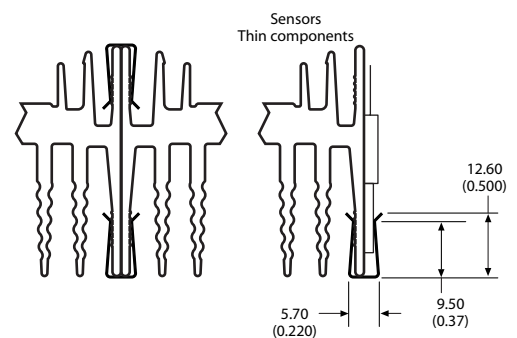
406088 10 mm x 0.5 = 21 N

CLP212P



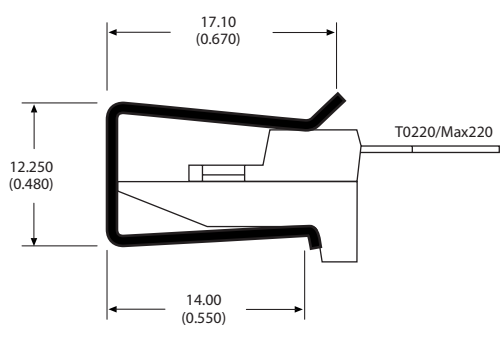
406089 7 mm x 0.5 = 20 N

CLP212S



406090 10 mm x 0.6 = 34 N

CLP212T



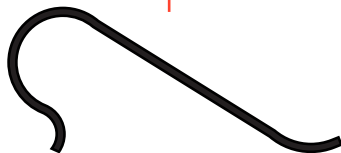
OVERVIEW: MAX CLIP SYSTEM™ CLIPS

Material: Special spring steel, nickel-plated

Clip	Force	Width	Thickness
MAX01	22 N	10	0.5
MAX02	35 N	12	0.5
MAX03	45 N	15	0.5
MAX04	60 N	20	0.5

Clip	Force	Width	Thickness
MAX01-H	80 N	10	0.7
MAX02-H	60 N	13	0.6
MAX03-H	80 N	18	0.6
MAX04-H	60 N	10	0.7

Clip	Force	Width	Thickness
MAX07	50 N	12	0.6
MAX07-L	30 N	12	0.5



with screws

Clip	Force	Width	Thickness
MAX08	75 N	18	0.6

Clip	Force	Width	Thickness
MAX09	45 N	10	0.5
MAX09-S	35 N	7	0.5

Clip	Force	Width	Thickness
MAX10	40 N	12	0.6
MAX12	25 N	6	0.6



with screws



short dip



long dip

Clip	Force	Width	Thickness
MAX11	35 N	12	0.6

Clip	Force	Width	Thickness
MAX13	45 N	17	0.5
MAX16 (MAX13 without Top Stop)			

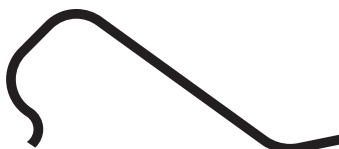
Clip	Force	Width	Thickness
MAX14	20 N	13	0.5
MAX17 (MAX14 without Top Stop)			



Clip	Force	Width	Thickness
MAX15	60 N	18	0.6

Clip	Force	Width	Thickness
MAX20	47 N	12	0.6

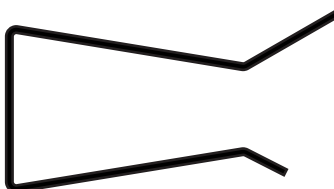
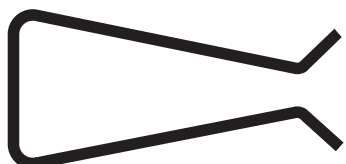
Clip	Force	Width	Thickness
MAX23	100 N	18	0.6
MAX21	48 N	12	0.6



Clip	Force	Width	Thickness
CLP212	21 N	10.1	0.5

Clip	Force	Width	Thickness
CLP212M	36 N	15	0.5
CLP212P	21 N	10	0.5

Clip	Force	Width	Thickness
CLP212S	20 N	7	0.5



Clip	Force	Width	Thickness
CLP212T	34 N	10	0.6



MAX EXTRUSION LIST

Europe	America's	Page	Weight	Base	Height	Perimeter	Rth.n	Rth.f	Type	Class
81400	81400	9	5.51	124.2	80.3	-	-	-	3	A
82005	82005	8	2.60	52.8	38.8	-	-	-	3	A
0S505	78010	3	2.48	34.0	75.0	949	1.45	0.39	1	A
0S506	78015	2	1.38	27.0	50.0	500	2.46	0.65	1	A
0S507	78020	6	1.23	30.0	47.2	373	3.02	0.84	2	A
0S508	78025	7	0.99	39.0	31.5	310	3.10	1.02	3	A
0S509	78030	8	3.42	60.0	60.0	1002	1.10	0.36	3	A
0S510	78035	8	2.53	74.5	40.0	809	1.23	0.42	3	A
0S511	78040	8	4.64	102.0	71.2	1410	0.81	0.28	3	B
0S512	78045	4	1.59	40.0	40.0	476	2.12	0.64	1	A
0S513	78050	12	-	-	-	-	-	-	-	-
0S515	78060	3	1.18	30.0	45.0	425	2.33	0.76	1	A
0S517	78070	3	2.57	40.0	75.0	783	1.55	0.41	2	A
0S518	78075	4	1.64	38.0	54.0	582	1.71	0.57	1	A
0S520	78220	7	1.66	30.0	60.0	488	2.49	0.74	2	A
0S521	78225	10	1.75	23.0	45.0	178	-	-	4	B
0S522	78230	11	1.39	28.0	45.0	212	-	-	4	B
0S526	78245	2	1.67	27.0	60.0	596	2.29	0.56	1	A
0S527	78345	7	2.21	39.0	68.0	670	1.64	0.49	3	A
0S528	78250	7	2.15	56.0	60.0	633	1.42	0.52	2	C
0S529	78255	10	0.68	27.0	27.0	154	-	-	4	A
0S530	78260	7	0.12	11.5	10.5	60	-	-	3	A
0S533	78265	2	0.48	22.0	28.5	200	4.12	1.68	1	A
0S546	78335	3	0.31	30.1	12.5	139	6.34	2.38	1	C
0S547	78270	10	0.95	27.0	29.5	157	-	-	4	A
0S549	78370	12	-	-	-	-	-	-	-	-
0S550	78275	3	1.78	31.75	58.7	483	2.35	0.67	1	A
0S552	78315	5	3.14	48.0	80.0	1010	1.06	0.34	1	B
0S553	78215	8	1.32	61.2	28.0	387	2.50	0.85	3	C
0S554	78210	9	0.74	21.4	34.0	159	-	-	4	C
0S555	78205	6	1.57	30.0	57.0	438	2.42	0.75	2	B
0S556	78200	10	0.89	25.0	36.0	181	-	-	4	B
0S559	78195	3	1.10	34.0	36.6	314	2.70	0.93	1	B
0S560	78190	6	2.37	58.0	66.5	648	1.25	0.50	1	C
0S562	78185	11	2.14	40.0	57.0	247	-	-	4	B
0S565	-	2	0.90	15.0	54.0	264	3.43	1.12	1	B
0S567	-	12	-	-	-	-	-	-	-	-
0S568	-	6	1.49	54.5	37.1	445	1.82	0.78	1	B
0S569	-	3	0.41	33.0	21.0	187	4.38	2.10	1	C
0S577	-	4	1.45	38.0	54.0	381	-	-	1	C
0S579	-	2	1.73	27.0	60.0	582	2.30	0.59	1	B
0S581	-	10	0.81	27.0	27.0	135	-	-	4	B
OSA06	78295	4	2.18	35.0	60.0	688	1.67	0.47	1	C
OSA11	78380	12	-	-	-	-	-	-	-	-
OSA12	78300	12	-	-	-	-	-	-	-	-
OSA15	78280	10	0.75	23.0	38.0	166	-	--	4	C
OSA16	78305	12	-	-	-	-	-	-	-	-
OSA17	78310	12	-	-	-	-	-	-	-	-
OSA21	78355	3	1.15	32.3	49v	457	2.34	0.76	1	C
OSA22	78180	12	-	-	-	-	-	-	-	-
OSA24	-	12	-	-	-	-	-	-	-	-
OSA25	78285	6	2.41	75.0	34.0	909	1.47	0.40	1	C
OSA30	78360	9	3.29	108.0	39.0	1055	1.18	0.41	3	C

Notes

Rthn: Length = 150 mm
 Rthf: Air speed inlet tunnel = 2 m/s
 Black anodized
 Ambient T = 25 °C
 Heat sink T = 100 °C

Type definitions:

1 = Heatsinks with Max groove on 1 side
 2 = Heatsinks with Max groove on 2 sides
 3 = Special shape Max heatsinks
 4 = Max heat connectors

Extrusion Class definitions:

A = Popular, normally in stock
 B = Moderately popular, probably in stock
 C = Used by few customers, probably not in stock

MAX EXTRUSION LIST

Europe	America's	Page	Weight	Base	Height	Perimeter	Rth.n	Rth.f	Type	Class
OSA31	78290	12	-	-	-	-	-	-	-	-
OSA34	78385	12	-	-	-	-	-	-	-	-
OSA35	-	4	2.38	35.0	75.0	899	1.56	0.41	1	C
OSA36	78350	5	3.45	49.5	85.5	1153	0.93	0.29	1	B
OSA37	78365	5	3.62	40.0	91.0	1063	1.10	0.31	1	C
OSA39	78390	9	6.02	180.0	51.0	1737	0.44	0.19	3	C
OSA53	-	4	1.36	40.0	49.0	555	-	-	1	C
OSA55	-	12	-	-	-	-	-	-	-	-
OSA57	-	11	1.69	38.0	30.0	180	-	-	4	C
OSA58	-	6	5.52	120.0	45.0	1163	-	-	1	C
OSA60	-	5	2.04	50.0	47v	533	1.71	0.58	1	C
OSA61	-	12	-	-	-	-	-	-	-	-
OSA63	-	6	1.41	30.0	49.8	378	2.99	0.83	2	C
OSA65	-	3	2.51	34.0	75.0	878	-	-	1	C
OSA66	-	8	2.75	70.0	50.0	721	1.30	0.46	3	B
OSA69	-	12	-	-	-	-	-	-	-	-
OSA74	-	12	-	-	-	-	-	-	-	-
OSA75	-	5	1.14	43.0	55.0	280	-	-	1	C
OSA79	-	13	-	-	-	-	-	-	-	-
OSA80	-	13	-	-	-	-	-	-	-	-
OSX96	78110	9	5.13	155.0	85.0	1292	0.70	0.25	3	B
OSY54	78080	2	1.74	27.0	60.0	604	2.27	0.55	1	A
OSY67	78085	11	1.32	28.7	41.0	142	-	-	4	A
OSY73	78105	9	6.10	206.0	90.0	1527	0.55	0.27	3	C
OSY76	78090	9	0.84	17.0	37.3	143	-	-	4	A
OSY77	78095	11	1.89	29.0	36.8	140	-	-	4	A
OSY94	-	13	-	-	-	-	-	-	-	-
BS005	-	6	3.09	90.1	35.0	1063	1.35	0.32	1	C
BS011	-	10	0.95	23.0	36.9	128	-	-	4	C
BS014	-	13	-	-	-	-	-	-	-	-
BS019	-	11	1.72	30.0	49.7	227	-	-	4	C
BS021	-	9	0.85	21.4	34.0	122	-	-	4	C
BS034	-	13	-	-	-	-	-	-	-	-
BS059	-	11	1.40	56.6	15.0	159	-	-	4	C
BS060	-	13	-	-	-	-	-	-	-	-
BS070	-	13	-	-	-	-	-	-	-	-
BS075	-	2	1.08	22.0	48.0	249	3.42	1.57	1	C
BS077	-	11	1.18	28.0	35.0	171	-	-	4	B
BS085	-	5	2.45	50.0	69.0	801	1.28	0.44	1	C
BS093	-	13	-	-	-	-	-	-	-	-
BS094	-	13	-	-	-	-	-	-	-	-
BS100	-	7	2.02	49.5	50.0	672	1.92	0.57	3	C
BS104	-	5	2.09	51.0	60.0	962	1.73	0.43	1	C
BS105	-	13	-	-	-	-	-	-	-	-
BS115	-	4	2.52	34.0	75v	876	1.46	0.40	1	C
BS121	-	13	-	-	-	-	-	-	-	-
BS138	-	13	-	-	-	-	-	-	-	-
BS202	-	13	-	-	-	-	-	-	-	-
BS208	-	10	1.89	27.0	38v	147	-	-	4	C
SS014	-	8	4.36	50.0	73.0	-	-	-	3	C
ZA5248	-	7	2.24	55v	65.4	-	-	-	2	C
ZA5259	-	5	1.49	46.9	51.60	-	-	-	1	C
ZA5300	-	4	1.18	35.0	37.50	-	-	-	1	C
ZA5301	-	2	0.74	25.0	37.50	-	-	-	1	C
ZA5439	-	8	3.57	75v	50.00	-	-	-	3	C

Notes

Rthn: Length = 150 mm
 Rthf: Air speed inlet tunnel = 2 m/s
 Black anodized
 Ambient T = 25 °C
 Heat sink T = 100 °C

Type definitions:

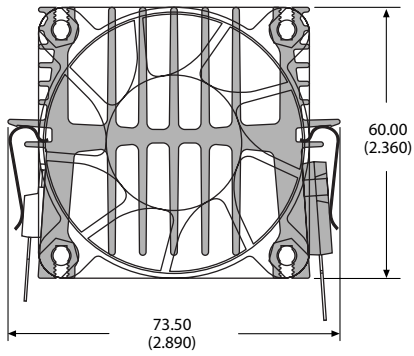
1 = Heatsinks with Max groove on 1 side
 2 = Heatsinks with Max groove on 2 sides
 3 = Special shape Max heatsinks
 4 = Max heat connectors

Extrusion Class definitions:

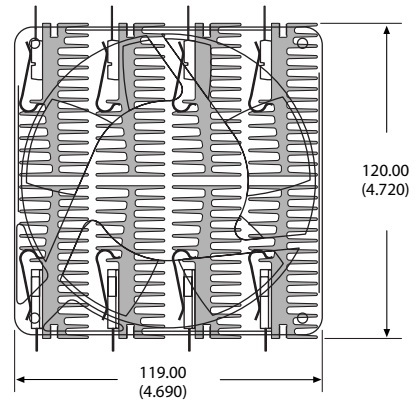
A = Popular, normally in stock
 B = Moderately popular, probably in stock
 C = Used by few customers, probably not in stock

THE MAX CLIP SYSTEM™ ASSEMBLY IDEAS

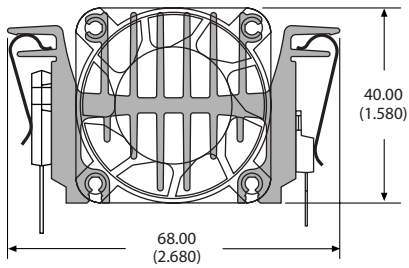
OS509 Extrusion with Fan $R_{th} = 0.36 \text{ } ^\circ\text{C/W}$



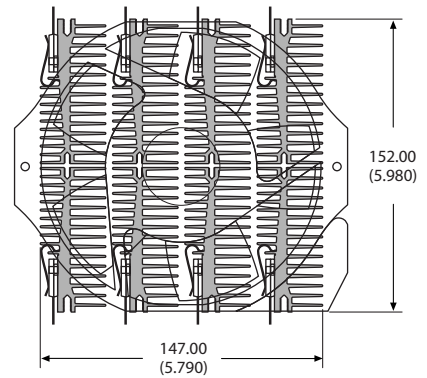
OSY54 8 Piece Extrusion with Fan $R_{th} = 0.069 \text{ } ^\circ\text{C/W}$



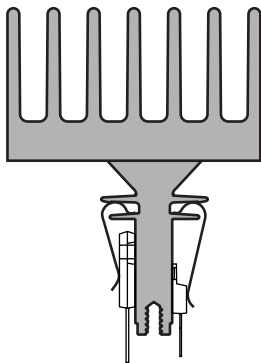
OS527 Extrusion with Fan $R_{th} = 0.49 \text{ } ^\circ\text{C/W}$



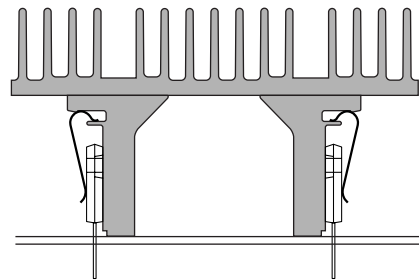
OS505 8 Piece Extrusion with Fan $R_{th} = 0.049 \text{ } ^\circ\text{C/W}$



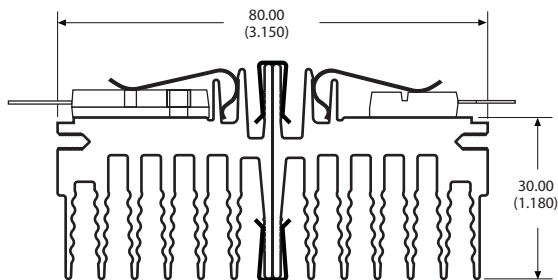
OS552 Max Heat Sink Support

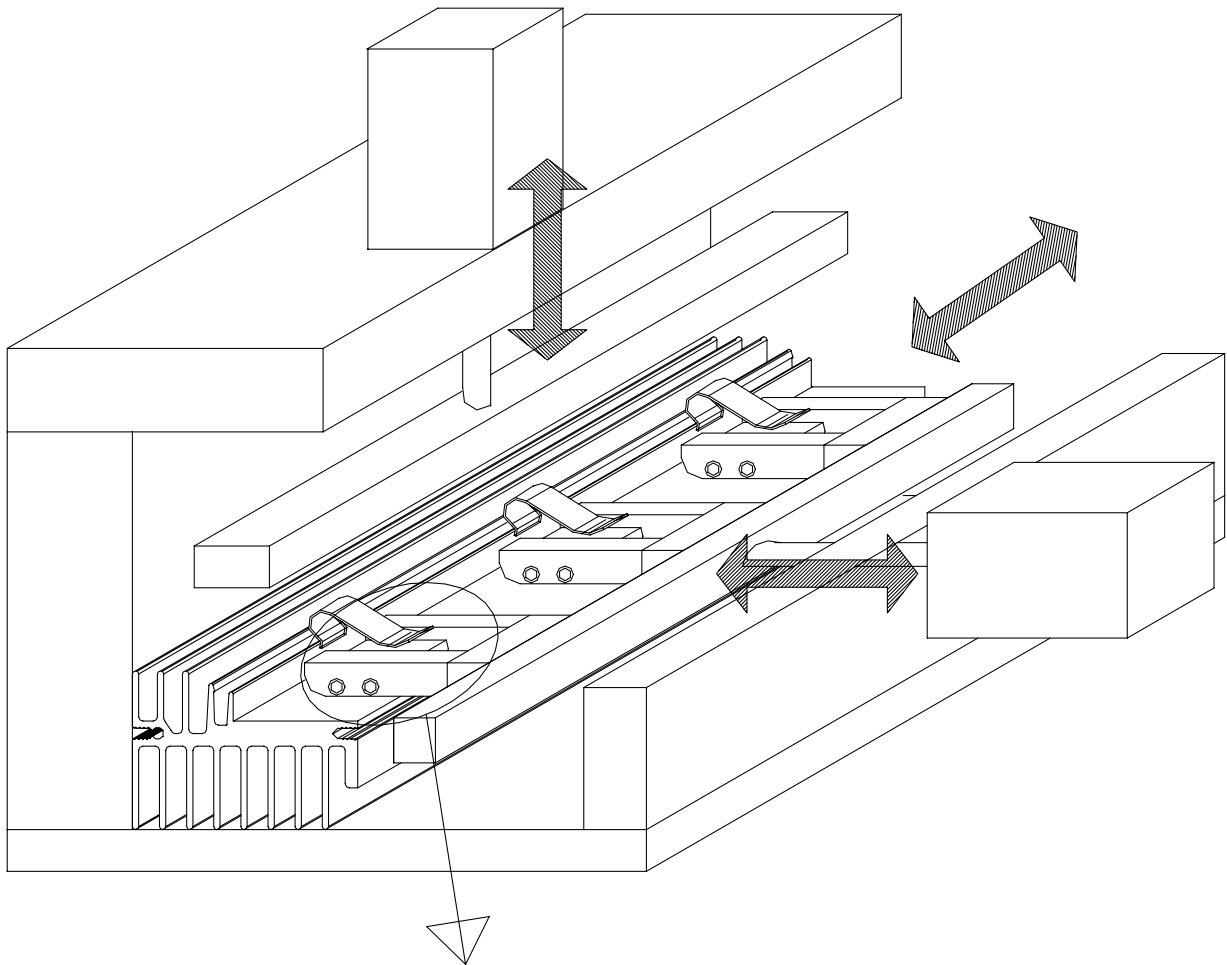


OSY67 Max Heat Sink Support

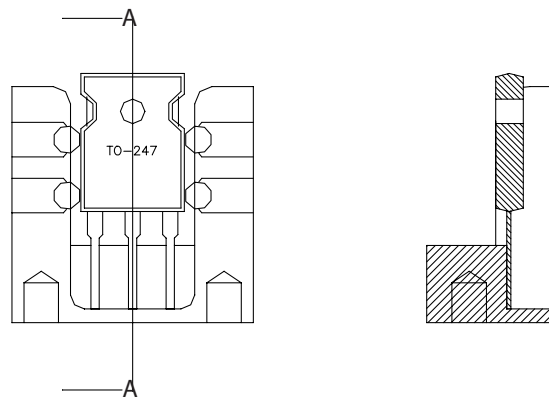


OS512 Extrusion with Clip 212S



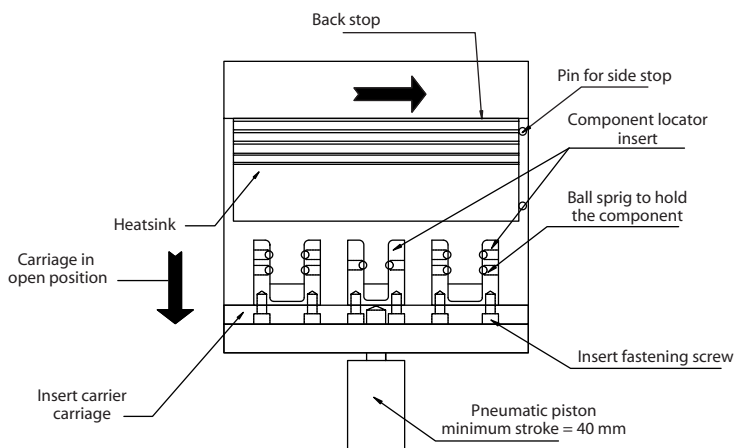


DETAIL OF COMPONENT LOCATOR INSERT

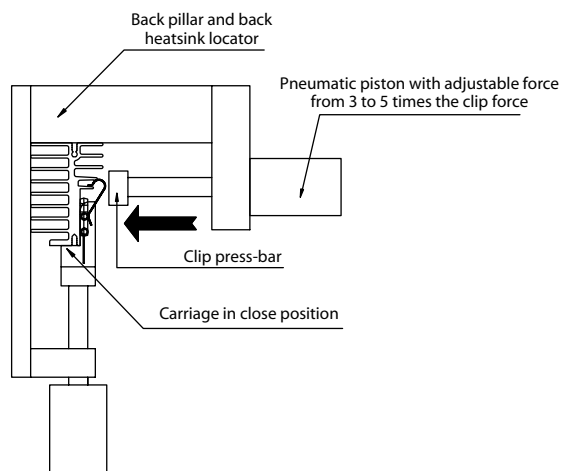


Sez. A-A

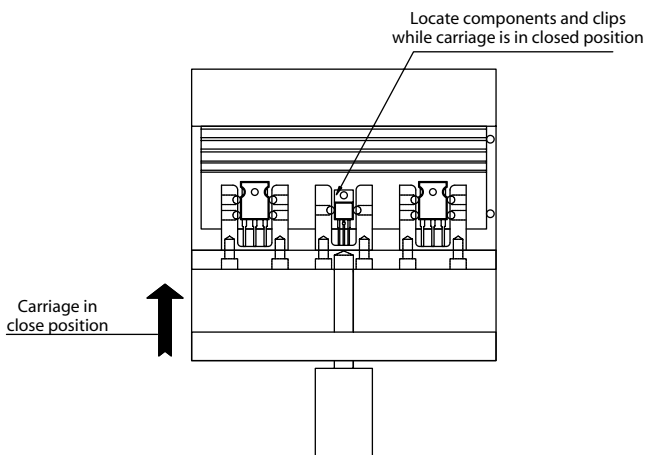
HEATSINK LOCATING



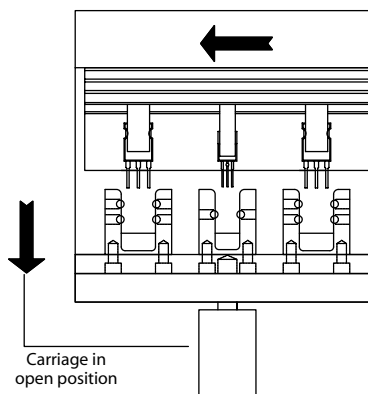
CLIP PRESSING

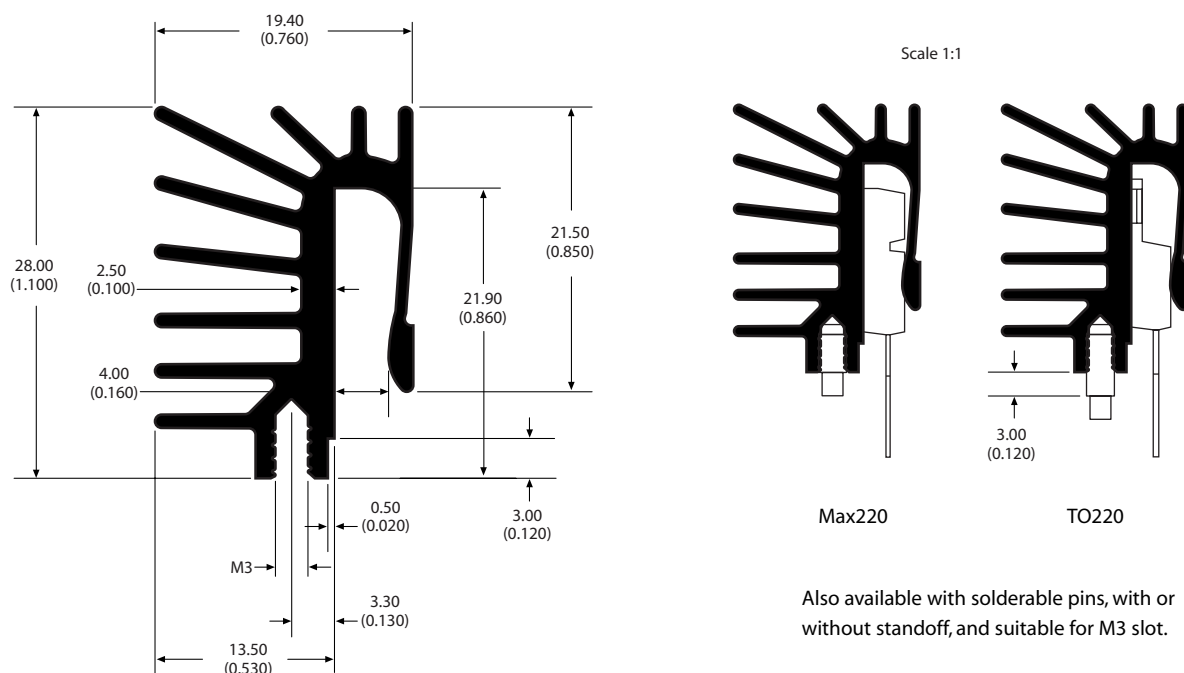


COMPONENTS AND CLIP LOCATING



HEATSINK REMOVAL





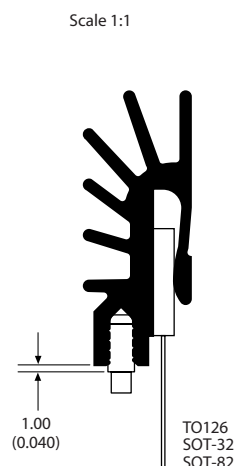
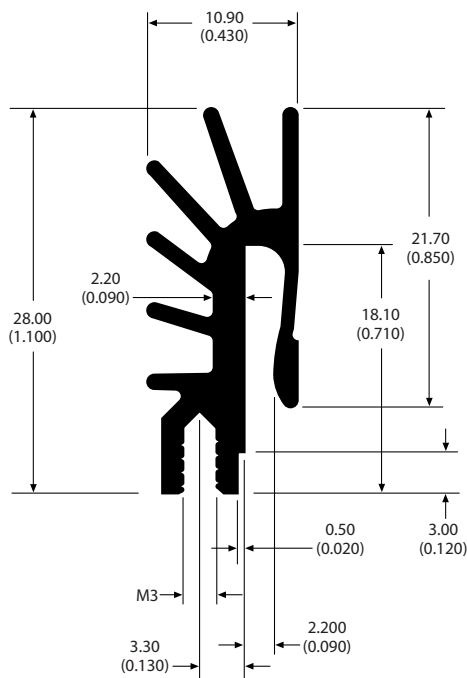
Anodized heat sink thermal resistance (°C/W)

Code	Length	Natural convection	1 m/s	2 m/s	3 m/s	Force on component (N)
L00516A	15 mm	13.31	5.46	4.09	3.35	54
L00516B	20 mm	10.66	4.30	3.20	2.60	70
L00516C	25 mm	8.97	3.58	2.65	2.15	85
L00516D	30 mm	7.77	3.08	2.27	1.84	100

Blank heat sink thermal resistance (°C/W)

Code	Length	Natural convection	1 m/s	2 m/s	3 m/s	Force on component (N)
L00516E	15 mm	16.18	6.05	4.41	3.56	54
L00516F	20 mm	13.02	4.76	3.44	2.77	70
L00516G	25 mm	10.98	3.96	2.85	2.28	85
L00516H	30 mm	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.



Also available with solderable pins, with or without standoff, and suitable for M3 slot.

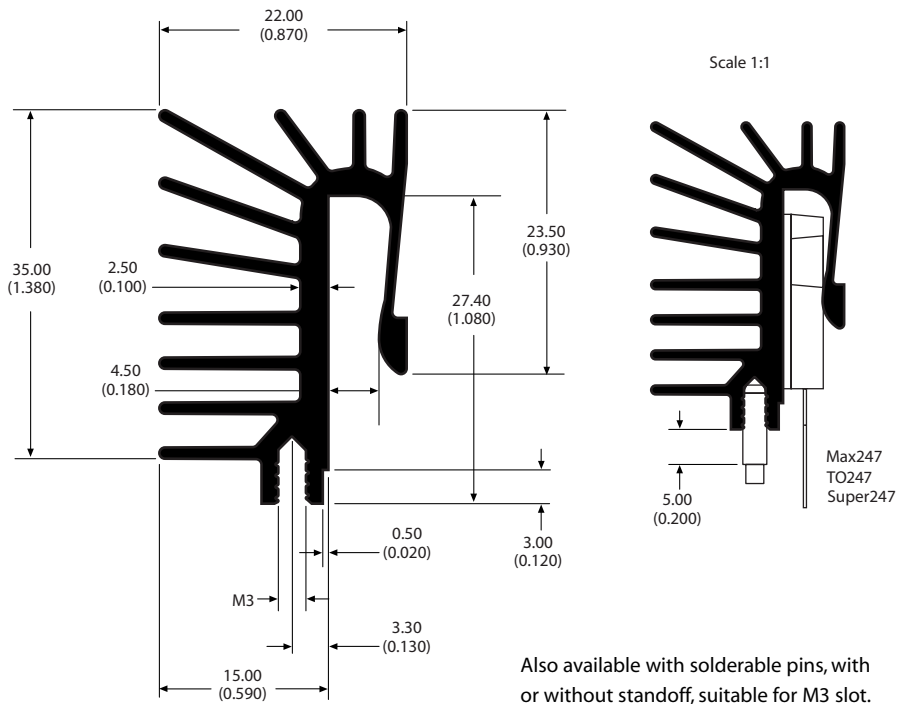
Anodized heat sink thermal resistance (°C/W)

Code	Length	Natural convection	1 m/s	2 m/s	3 m/s	Force on component (N)
L00523A	15 mm	14.93	4.52	4.23	4.13	54
L00523B	20 mm	11.93	3.62	3.33	3.22	70
L00523C	25 mm	10.00	3.07	2.77	2.66	85
L00523D	30 mm	8.65	2.69	2.40	2.29	100

Blank heat sink thermal resistance (°C/W)

Code	Length	Natural convection	1 m/s	2 m/s	3 m/s	Force on component (N)
L00523E	15 mm	18.90	4.90	4.56	4.44	54
L00523F	20 mm	15.18	3.92	3.58	3.46	70
L00523G	25 mm	12.80	3.33	2.98	2.86	85
L00523H	30 mm	11.12	2.93	2.58	2.46	100

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



Anodized heat sink thermal resistance (°C/W)

Code	Length	Natural convection	1 m/s	2 m/s	3 m/s	Force on component (N)
L00524A	15 mm	10.71	4.49	3.40	2.80	54
L00524B	20 mm	8.58	3.53	2.65	2.17	70
L00524C	25 mm	7.22	2.93	2.19	1.79	85
L00524D	30 mm	6.26	2.53	1.88	1.53	100

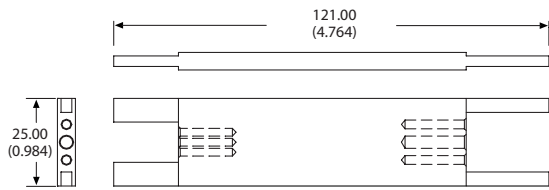
Blank heat sink thermal resistance (°C/W)

Code	Length	Natural convection	1 m/s	2 m/s	3 m/s	Force on component (N)
L00524E	15 mm	12.96	5.02	3.69	2.99	54
L00524F	20 mm	10.42	3.94	2.88	2.32	70
L00524G	25 mm	8.79	3.28	2.38	1.91	85
L00524H	30 mm	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.

Insertion for Indian Chiefs

F010001

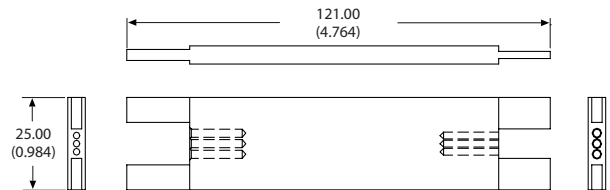


TO220

ML516
ML524

TO126

F010002

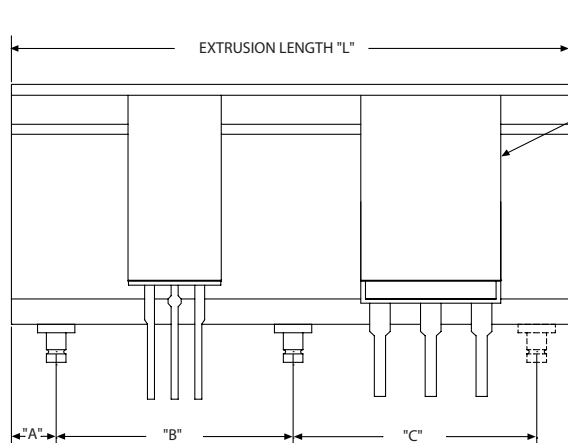
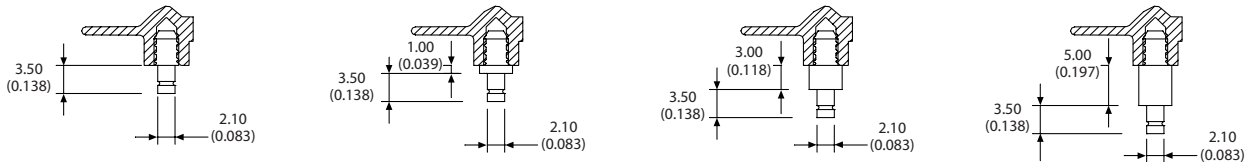


TO220

ML516
ML523

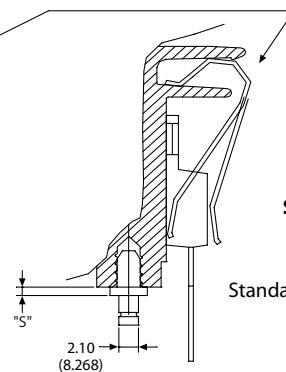
TO126

How to order solderable pins



View from component side

The Max Clip System – patented



Standoff "S"

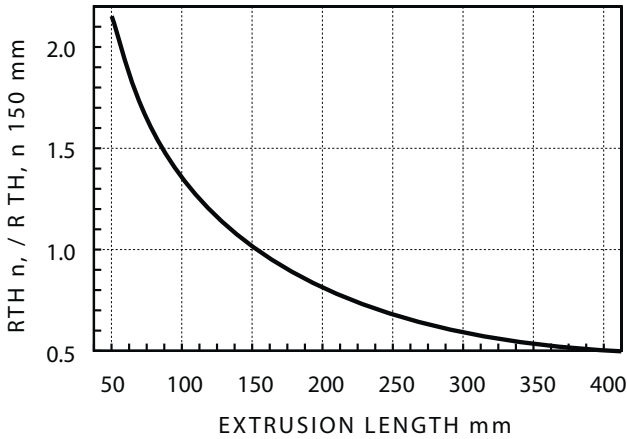
- Standard Standoff =
- 0 mm
 - 1 mm
 - 3 mm
 - 5 mm

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

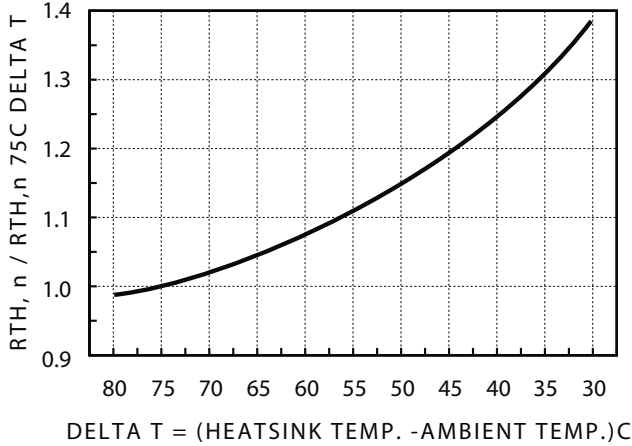
Dimensions "B" and "C" are not required for a heatsink with only 1 solderable pin
 Dimension "C" is not required for a heatsink with 2 solderable pins
 Tolerance ± 0.2 mm

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

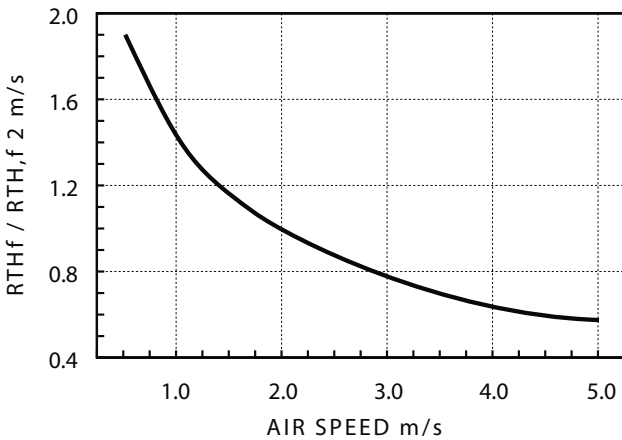
THERMAL RESISTANCE vs LENGTH



THERMAL RESISTANCE vs (Ts - Ta)



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 the previous page there is an index sorted by extrusion part number. The part number, weight in kg/m, thermal resistance ($R_{th,n}$ with natural convection, thermal resistance $R_{th,f}$ 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 (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.

SHOCK AND VIBRATION TESTING

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. : 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 Requirement/s : 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 $\pm 3g$ 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:

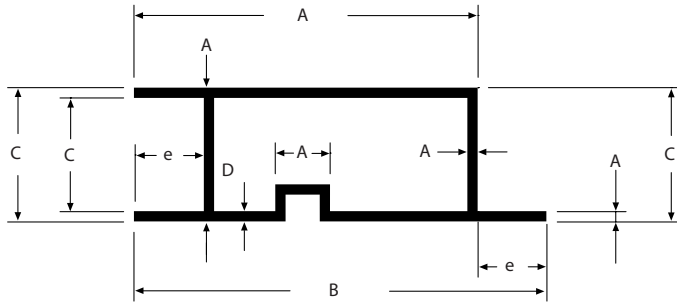
Shock Pulse Envelope 112 sine
Period 6 ms
Amplitude 5 g
Number of Shocks 3
Application 3 shocks per sense per axis

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.

Extrusion Standard Tolerances UNI EN755 (very similar to DIN 1748)



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

A (or B)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

D mm	Tolerances mm
< 2.5	± 0.25
= 2.5	± 10%

C 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

Matching 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 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	± 5 pcs
	200 < q < 500	± 10 pcs
	500 < q < 1000	± 30 pcs
	q = 1000	± 30 pcs

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



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Aavid Thermalloy will lead the electronics thermal management industry worldwide. We will be the first company customers call to enable their thermal designs anywhere in the world. We will respond with extraordinary speed and will provide them with timely and cost effective solutions because we understand their needs, their industry, and their culture.

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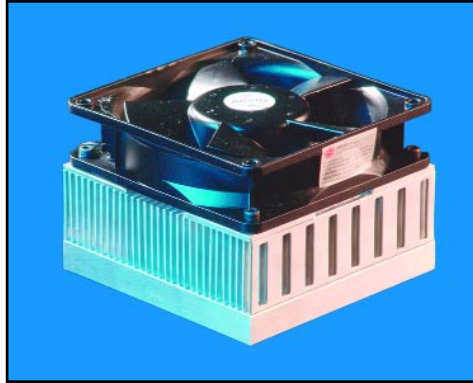
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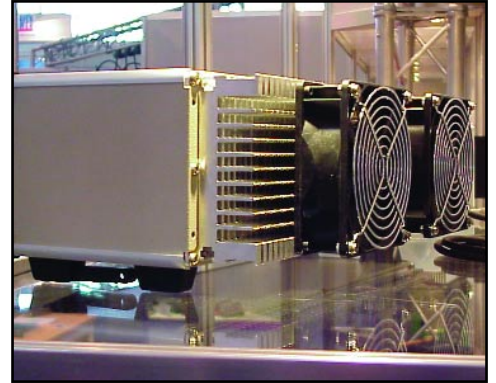
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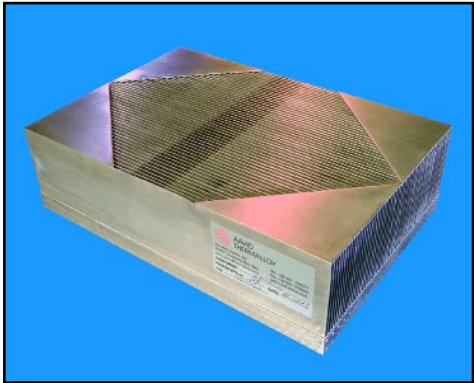
Blister Liquid Cold Plate



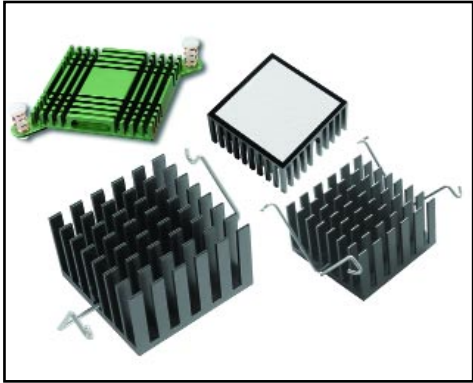
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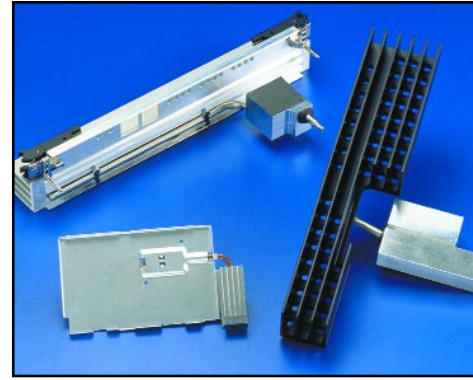
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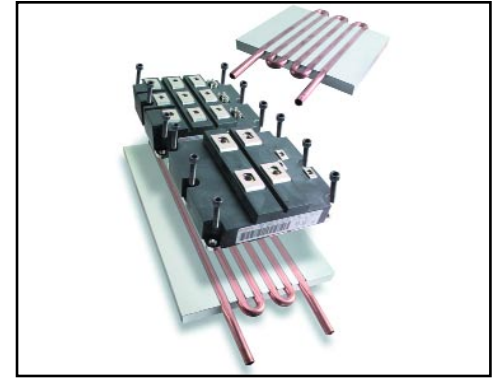
CPU Coolers



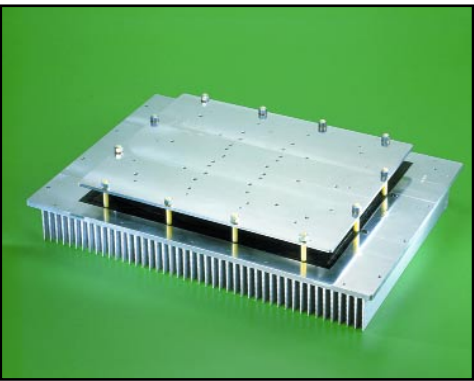
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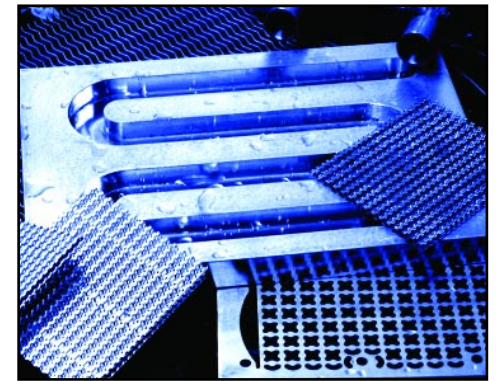
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