PRODUCT SELECTION GUIDE
Condensed

AAVID THERMALLOY

This condensed catalog features the more popular devices and configurations that Aavid Thermalloy produces today to cool high speed microprocessors and other commonly used semi conductors. We offer a broad range of products and consulting services. These are the most popular parts and we are adding new ones on a regular basis. Contact Aavid's application engineering for the latest designs.

More information is also available 24 hours a day by using our FastFacts™ System, fax retrieval system at 603 223-1750, or see our web-site, http://www.aavid.com.

AAVID AROUND THE WORLD: COMPLETE COOLING SOLUTIONS

Aavid Thermal Technologies, Inc. is the global leader in advanced thermal management products, engineering services, and design analysis software. Aavid has been developing and delivering cutting-edge thermal management products for more than 30 years. As a result of this unfailing dedication, Aavid ranks as the leader in providing totally integrated cooling solutions for an ever expanding array of multi-national blue chip companies.

Aavid provides complete cooling solutions for a wide variety of customers including the computer, consumer entertainment, communications, medical, power supply, controls, instrumentation, and transporation industries.

Applications that use Aavid designed thermal solutions range from cooling discrete semiconductors and microprocessors to diesel-electric locomotives and from motor drives to wireless cellular base stations.

Aavid Thermal Technologies, Inc. is comprised of 3 separate operating companies working together to solve complex thermal problems.

Aavid Thermalloy, an ISO certified manufacturing company is recognized worldwide for the exceptional quality of its cutting-edge thermal management products offered in a vast selection of standard and custom shapes, sizes, and options to fit any thermal challenge.

Aavid provides not only original designs for heat sinks, fan heat sinks, heat exchangers, attachment features, interface materials, and liquid cold plate devices, but also comprehensive applications engineering services.

With over 8 factories strategically located worldwide, Aavid can supply you locally, wherever you are.

Applied Thermal Technologies, located in the heart of Silicon Valley, California, provides consulting design and analytical services to augment your in-house thermal engineering expertise by developing problem-solution concepts and first article prototypes. Using sophisticated computer design tools Applied's consultants become members of your design team to reduce time to market while minimizing costs.

Fluent Incorporated is the world's leader in sophisticated computational fluid dynamic (CFD) software used to provide complete, highly accurate system and component heat sink analysis. Fluent's unique analysis capabilities allows designers to examine alternative designs for airflow, heat transfer and mass flow without the expense of building exact physical models.

Aavid's complete thermal solutions are reinforced by a global network of sales, manufacturing, distribution, and customer support services in North America, Europe, India, and the Pacific Rim.

With all this in place, Aavid is ready to work with you anytime, anywhere. Please call us so we can start creating cool new options for your next generation products.

For more information on how to put our strengths to work for you, contact your local sales representative:
http://www.aavid.com/atp/globalSalesRep/globalSales.html or a distributor near you:
http://www.aavid.com/atp/globalDistrib/globalDistrib.html
for technical assistance, or placing an order.

Global offices: http://www.aavid.com

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Global offices: http://www.aavid.com

HOW TO SELECT A HEAT SINK

Heat sinks reduce and maintain device temperature below the maximum allowable temperature of the device in its normal operating environment. In selecting a heat sink to achieve this goal, four fundamental parameters must be known about the application:

- The amount of heat, Q, being generated by the semiconductor device in watts (W).
- The maximum allowable junction temperature, Tj, of the device in degrees Celsius (°C): this information is available from the semiconductor manufacturer's data book or fact sheet.
- The maximum temperature of the ambient cooling air, Ta, in °C.
- The type of convection cooling in the area of the device: is it natural or forced? If it is forced convection, the air flow velocity, in linear feet per minute, must be known.

BASIC FORMULAS:

Heat is a form of energy that flows from a higher temperature location (i.e. the semiconductor junction at Tj) to a lower temperature location (i.e. the surrounding ambient air at Ta). In semiconductor devices, heat will flow from the device to ultimately the ambient air through many paths, each of which represents resistance to the heat flow. This resistance is called thermal resistance, denoted as θ in °C/W, and is defined as the ratio between the amount of total heat being transferred and the temperature difference that drives the heat flow. The total thermal resistance of a system for a given device can therefore be expressed as

$$\theta ja = \frac{Tj - Ta}{Q}$$

where θ is the thermal resistance in degrees C per watt, where the subscript ja represents junction-to-ambient. Thermal resistance is a measure of relative performance: a low thermal resistance represents better performance than a high thermal resistance. A system that has a lower thermal resistance can either dissipate more heat for a given temperature difference or dissipate a given amount of heat with a smaller temperature difference.

In cooling electronic devices, heat sinks lower the overall junction to ambient thermal resistance. The actual thermal path runs through the heat sink when it is mounted on the device by means of an attachment mechanism. In this case, the total thermal resistance, θja, is the sum of all the individual resistances which represent the physical aspect of the thermal path. There are three thermal resistances that are commonly used to express the total resistance: 1) the junction-to-case resistance, θjc, to account for the thermal path across the internal structure of the device, 2) the case-to-sink resistance, θcs, which is also called the interface resistance, to account for the path across the interface between the device and the heat sink, and 3) the sink-to-ambient resistance, θsa, to account for the thermal path between the base of the heat sink to the ambient air. It follows that

$$\theta ja = \theta jc + \theta cs + \theta sa$$

Realistically, a typical thermal designer has no access to the internal structure of the device, and can only control two resistances outside of the device: θcs and θsa. Therefore, for a device with a known θjc obtained from the device manufacturer's data book, these become the main design variables in selecting a heat sink.

Thermal interface between the case and the heat sink is controlled in a variety of manners, with different heat conducting materials. The interface resistance associated with Aavid standard interface materials can be found on pages 8-10 of this catalog. However, when standard materials are not used, the following information is useful: The interface resistance between the case and heat sink is dependent on three variables: the thermal resistivity of the interface material (ρ, °C/W•inch), the average material thickness (t, inches) and the area of the thermal contact footprint (A, $inch^2$).
The interface thermal resistance is then expressed as:

$$\theta cs = \frac{\rho \cdot t}{A}$$

NOTE: The thermal resistivity (ρ), of any material, is the reciprocal of its thermal conductivity (k). Therefore, if the conductivity is known, its resistivity can be calculated. The expression is:

$$\rho = \frac{273.2}{k} \text{ when k is in units of}$$

$$\frac{Btu \cdot inch}{hr \cdot ft^2 \cdot {}^\circ F}$$

TYPICAL VALUES FOR THERMAL RESISTIVITY ρ (°C/W•INCH):

copper (pure)	0.10
aluminum (1100 series)	0.19
aluminum (5000 series)	0.28
aluminum (6000 series)	0.17
beryllium oxide	0.32
carbon steel	0.84
alumina	1.15
anodized finish	5.60
silicon rubber	81.00
mica	66.00
mylar	236.00
silicone grease	204.00
dead air	1200.00

Once the θcs is calculated, the required thermal resistance from the sink to ambient (θsa) is easily calculated by the following equation:

$$\theta sa = \frac{Tj - Ta}{Q} - (\theta jc + \theta cs)$$

The above information will allow you to use the catalog's performance graphs in choosing a standard, ready to use, heat sink to meet your requirements. When your heat sink application requires a custom fabricated extrusion, the thermal resistance (θsa) of any profile can be calculated by using the performance factors shown in table on page 35. The heat sink's performance factor (PF) is determined by its expected length and air flow conditions. Then, θsa is obtained using the PF and the extrusion profile's perimeter.

In conclusion, the lower the thermal resistance, the better the cooling, and the larger the overall surface area (or perimeter), the better the cooling.

Example

A TO-220 to dissipate 13 watts:

Tj max = 150°C

Ta max = 50°C

θjc = 3.0°C/W

Air Velocity = 400 ft/min

Find a suitable heat sink.

Assume the use of a Kon-Dux™ pad with a torque of 2 in-lb. From Aavid data for this type of semiconductor, we know that θcs = 0.5°C/W.

Aavid 504222 has a thermal resistance of 4.0°C/watt at an air velocity of 400 ft/min and therefore complies with the requirements.

INTRODUCTION

AAVID'S CORE/70® PC BOARD LEVEL STANDARD PRODUCTS

With ever-increasing demands to shorten time-to market, Aavid's highly responsive distribution network makes readily available to its global audience of PC board level designers CORE/70 - a proven, versatile core of more than seventy of Aavid's most sought after standard PC board level products.

A full array of Aavid's most popular installation options, including a variety of tabs, pins, interface materials, mounts and clips are part of the CORE/70 product offering to enhance manufacturability in your applications.

To quickly find the exact answers you need now, simply consult this condensed catalog. The CORE/70 ordering system is quick and easy to use. Remember, for thermal problem-solving at its fastest and most dependable, ask your distributor for Aavid's CORE/70 solutions - a flexible system of products and options designed to keep you in the lead.

AAVID'S EXTRUSION BASICS GET YOU UP AND RUNNING IN RECORD TIME

When your thermal design solutions call for the highest quality extruded parts, call for Aavid immediately. Aavid has assembled for easy reference and rapid response a core of approximately 150 extrusions - a virtual guarantee that you will find the answer you need in stock.

These are all popular extrusions that Aavid constantly maintains in stock for rapid response. There's no long development process to factor in, no design surprises; and small minimum orders - only the assurance that Aavid can deliver exactly what you want, now.

Keep in mind too, these extrusions are just the tip of the Aavid cooling solution iceberg. The current family of Aavid extrusions expands far beyond the 3,000 mark, and Aavid is constantly adding new, innovative items to the list. Aavid truly is one cool idea after another. We built our worldwide reputation on it, now let us help build yours.

ORDERING INFORMATION

Ordering by Part Number - A twelve digit part number defines Aavid's standard parts.

To order a part from this catalog, you need to construct a 12 digit ordering code/part number using the following options. Digits 1 through 4 are the part numbers listed on the catalog pages. Digits 5, and 6, designate the type of device. The 7th digit is for the finish, the 8th digit is for the interface material, the 9th and 10th digits indicate the type of mounting and the 11th digit defines the method of attachment to the device.

Many of the parts in the catalog show their most popular options. If you require an option not listed here, contact our applications engineering group at any of our worldwide offices.

DIGIT #	1	2	3	4	5	6	7	8	9	10	11	12
Ordering Codes	5	7	6	8	0	2	B	0	0	0	0	0
DESIGNATION	**Basic Part #**				**Device Type**		**Finish**	**Pads**	**PC Board Mounting**		**Device Mounting**	

Device Type (DIGITS 5, 6)

CODE	DEVICE
00	Blank
01	TO-218
02	TO-220, TO-216, TO-217
03	TO-3
04	TO-202
05	TO-5, TO-39
06	TO-66
08	TO-247

Finish (DIGIT 7)

CODE	DESCRIPTION
B	Black Anodize
C	Gold Chromate
D	Tin Plated
S	AavGard Corrosion Protection
L	Clear Chromate
N	Clear Anodize
T	Dielectric Coated with Tin Plated Tabs
U	Unfinished

Pads (DIGIT 8)
Interface Heat Sink to Device

CODE	DESCRIPTION
0	None
1	One Kon-Dux™ Pad
2	Two Kon-Dux™Pads
3	One In-Sil-8™ Pad
4	Two In-Sil-8™ Pad
5	One A-Dux™ Pad

Kon-Dux™ is both thermally and electrically conductive.

In-Sil-8™ and A-Dux™ are thermally conducting and electrically isolating.

PC Board Mounting (DIGITS 9, 10)
Heat Sink to Board Mounting
Tinned Wave-On™ Mounts

CODE	STAND-OFF	THREAD
01	.100"	#6-32
02	.100"	#4-40
03	.045"	#4-40
04*	.100"	#6-32
05	.045"	#6-32
07	.100"	3.5mm
08*	.100"	3.5mm
09	.200"	#6-32

Tinned Steel Solder Pins for Board Mounted Extrusions

25	.093" dia. x.156" exposed

* .090 PCB (Others .062")

PC Board Mounting (DIGITS 9, 10)
Tinned Staked on **Tabs™

CODE	PART#
28	Shur-Lock™ Tab (.130 for .062" PC Boards)
30	Vertical triangular (.093O/.125 L)
31	Centered horizontal (.050 W x .130 L)
32	Centered vertical (.062 W x .125 L)
33	Centered vertical (.062 W x .340 L)
34	Vertical pair L & R (.075 W x .170 L)
35	Vertical pair L & R (.097 W x .200 L)
36	Centered vertical (.095 W x .150 L)
37	Centered step (.062 W x .250 L with .125 wide step)
38	Centered horizontal (.032 W x .130 L)
39	Centered vertical (.050 W x .340 L)
40	Centered vertical (.050 W x .220 L)

**See individual parts for tab code

Device Mounting (DIGITS 11, 12) to PCB Semiconductor Mounts

CODE	PART#	DESCRIPTION
01	n/a	#6-32 female
02	n/a	#4-40 female
03	n/a	3mm female
04	n/a	#6-32 male
05	n/a	#4-40 male

Kool-Klips™

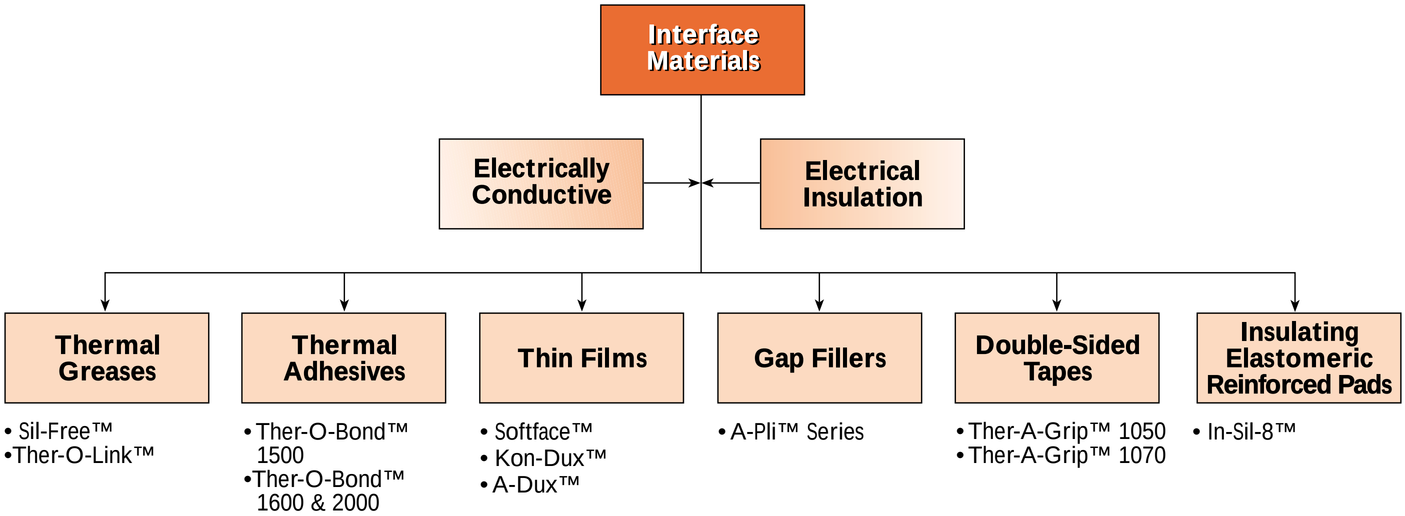
CODE	PART#
50	115000
51	115100
52	115200
53	115300
54	115400

For Rail Extrusions / TO Case

CODE	PART#	DEVICE	SIDES
55	115500	TO-220	tapered

THERMAL INTERFACE MATERIALS

Mechanical Aspects of Thermal Materials



A-Dux, when you need thermal conductivity but electrical isolation is important too, A-Dux fits the bill. With the performance of a grease, A-Dux has a breakdown voltage of 250 volts/mil of thickness. This material significantly enhances thermal conductivity between semiconductor packages and heat sinks, and withstands aqueous washing that may occur during the manufacturing process. For faster manufacturing time, have Aavid pre-install A-Dux on your heat sink.

A-Pli Gap Filler, when you need to transfer heat across an irregular opening, the A-Pli series fills the gap. The flexible, elastic nature of A-Pli allows it to blanket extremely uneven surfaces, either individually or as a group. A-Pli conducts heat away from the individual components, or an entire PCB, into metal covers, frames, or spreader plates.

The size of the gap that can be filled depends upon the amount of mounting pressure used. Aavid offers a range of A-Pli products with different compression rates to solve your thermal needs.

This low durometer product comes with a slightly tacky surface (A-Pli 200), or a very tacky surface (A-Pli 200S).

There are A-Pli products to meet your requirements when your gap filler needs specific electric properties, too. A-Pli 274 silicone elastomer materials conform to irregular gaps with good thermal conductivity, while providing electrical insulation (A-Pli 274T) or electrical conductivity (A-Pli 274A).

In-Sil-8 Pads, when you need thermal conductance and electrical isolation in one package, In-Sil-8 Pads offer you the best of both. These silicone-based insulators come with thermally conductive fillers to isolate up to 6000 volts. In-Sil-8 pads withstand the rigors of assembly, harsh environments, and aging under continuous use. You'll save time with these cost-effective pads too: installation is 4 times faster than mica and grease, and they won't contaminate solder baths. Order In-Sil-8 Pads with or without pressure-sensitive adhesive, and in standard or custom shapes.

Kon-Dux interface pads are a cost-effective alternative to thermally conductive grease compounds. Aavid pre-applies Kon-Dux to your heat sink to enhance heat conductance from the semiconductor case and speed your manufacturing process. Kon-Dux pads are the equivalent of Softface™ for low-volume applications. This material is ideal for use with small, discrete semiconductors.

Sil-Free Grease, when you need to enhance heat transfer between a semiconductor case and a heat sink without the migration or contamination associated with silicone-based products, Sil-Free Grease offers an easy-to-apply solution. This metal-oxide filled, synthetic grease reduces dry interface thermal resistance by 50% to 70% with proper application. Sil-Free will not dry out, harden, melt, or run, even after long-term, continuous exposure to temperatures up to 200° C. Even in a vacuum atmosphere (24 hours at 5-10 Torr and 100° C), Sil-Free exhibits virtually no "bleed" or evaporation.

Softface™ is a cost-effective alternative to thermally conductive grease compounds. Once applied to a heat sink, Softface™ speeds installation of the semiconductor device. Applied with commercial hot-stamping equipment, Softface™ yields excellent thermal performance with no need for adhesive. For the best value of any interface material, allow Aavid to pre-apply Softface™ to your heat sink at any one of its worldwide locations.

Ther-O-Bond Adhesives, when you need a thermally conductive adhesive, Ther-O-Bond Adhesives offer excellent heat transfer and high voltage isolation. Ther-O-Bond 1500 and 1600 series epoxy adhesives offer low shrinkage, and coefficients of thermal expansion comparable to copper or aluminum. They bond readily to metals, glass, ceramics, and most plastics. Ther-O-Bond 1500 is ideal for large-scale applications, providing excellent heat transfer with dimensional stability over a wide temperature range. For smaller applications, Ther-O-Bond 1600 produces a strong, durable, high-impact bond, with good heat transfer characteristics.

Ther-O-Bond 2000 Acrylic Adhesive cures rapidly at room temperature, while providing a repairable, thermally conductive bond.

Ther-A-Grip 1050 and 1070, when you need to attach a heat sink to an electrical package, consider Ther-A-Grip double-sided tape. Ther-A-Grip 1050 uses a thin, Kapton MT-filled, polydimide film coated on both sides with pressure-sensitive, acrylic adhesive loaded with aluminum oxide for good thermal performance and excellent electrical isolation. Ther-A-Grip 1070 consists of a thin aluminum foil coated with aluminum oxide-filled, acrylic adhesive for electrical conductivity and enhanced thermal conductivity.

These easy-to-install tapes reduce the need for mechanical fasteners or messy epoxy adhesives. When Aavid pre-installs the tape on your heat sink, you benefit with faster production time. With low cost and quick assembly combined with reparability, Ther-A-Grip saves you time and money.

Ther-O-Link is a silicone-based thermal compound that cost effectively enhances the heat transfer between a semiconductor case and a heat sink. Easy to apply, Ther-O-Link substantially reduces dry interface thermal resistance, while providing long life under a variety of conditions.

TECHNICAL INFORMATION

Softface™

Thickness:	0.005 inch	(ASTM D374)
Color:	Black	
Thermal Conductivity:	3.5 watt/m-°C	(ASTM D5470)
Thermal Impedance:	0.06 °C-in2/watt	(ASTM D5470)
Filler:	Graphite	
Volume Resistivity:	10 Ohm-Cm	(ASTM D4496)
Dielectric Constant:	Non-Insulating	
Dielectric Strength:	N/A	
Storage Life:	1 year (min) @ 25°C	
Cleanability:	Water and/or Isopropyl Alcohol (IPA)	
Liner:	None	

Kon-Dux

Thickness:	0.005 inch
Color:	Black (Metallic)
Thermal Impedance:	0.08 °C-in2/watt
Electrical Resistivity:	15 x 10^{-6} Ohms
Compression Strength: for 10% reduction in thickness	580 psi
Tensile Strength:	650 psi
Ultimate Compression Strength:	12500 psi
Service Temperature:	-240 to +300 °C
Liner:	None

A-Dux

Color:	Gray
Thickness:	0.004 inch
Thermal Impedance:	0.16 °C-in2/watt
Electrical Resistivity:	1 x 10^{-14} Ohm-cm
Tensile Strength:	700 psi
Service Temperature:	-50 to +200 °C
Liner:	Clear Mylar

A-Pli Gap Filler

	A-Pli 210	A-Pli 220	A-Pli 260
Color:	Pink	Blue	White
Thickness:	0.010 inch	0.020 inch	0.060 inch
Thickness Tolerance:	+/- 0.001 inch	+/- 0.002 inch	+/- 0.010 inch
Filler:	Boron Nitride	Boron Nitride	Boron Nitride
Thermal Impedance (@ 10 psi min.) °C-in2/watt	.12	.14	.28
Thermal Conductivity	6 Watt/(m-C)	8 Watt/(m-C)	10 Watt/(m-C)
Dielectric Strength	2000 Volts	4000 Volts	4000 Volts
Density	1.28 g/cc	1.28 g/cc	1.28 g/cc
Hardness (Shore A)	10	10	6
Liner:	Clear Mylar	Clear Mylar	Clear Mylar

Ther-A-Grip 1050 and 1070

	Ther-A-Grip 1050	Ther-A-Grip 1070
Electrical Function:	Insulating	Conductive
Color:	Beige	White
Thickness:	0.005 inch	0.006 inch
Carrier:	Kapton	Aluminum
Thermal Impedance	0.58°C/watt	0.54°C/watt
Breakdown Voltage	5570 VAC	N/A
Volume Resistivity	3×10^{14} Ohm-cm	N/A
UL Flammability	94V-O	94V-O
Rating	U.L. 94	U.L. 94
Lap Shear Adhesion	124 psi	134 psi
Die Shear Adhesion		
Aluminum 25°C	130 psi	125 psi
Aluminum 150°C	50 psi	55 psi
Alum. Oxide 25°C	170 psi	145 psi
Alum. Oxide 150°C	50 psi	60 psi
Creep Adhesion		
25°C @ 12 psi	> 50 days	> 50 days
150°C @ 12 psi	> 10 days	> 10 days

Ther-A-Grip passes the following Environmental testing:

- High Temperature / Humidity Resistance: 1000 hours @ 66°C, 85% relative humidity
- High Humidity: 1000 hours, 25°C, 95% relative humidity
- Conformal Coating Compatibility
- Heat Aging: 1000 hours, 150°C
- Mechanical Shock
- Potting Compound Compatibility
- Salt Spray
- Solvent Exposure
- Thermal Shock: -60°C to 150°C for 10 cycles and 100 cycles
- Heat Aging, Vibration @ 25°C, Vibration @ 150°C
- Temperature Cycling: -50°C to 150°C, 1000 cycles
- Long Term Storage

Sil-Free Grease

Color:	White
Thermal Conductivity:	0.79 watt/(m-C)
Operating Temperature Range:	-40°C to 200°C
Volume Resistivity:	2.3 x 10^{12} Ohm-cm
Dielectric Strength:	225 Volts/mil
Consistency:	Paste
Bleed (% after 24hr @ 200°C):	0.09 max
Specific Gravity	2.8
Shelf Life:	Indefinite (unopened)

Ther-O-Link

Color:	White
Thermal Conductivity:	0.73 watt/(m-K)
Operating Temperature Range:-	-40°C to 200°C
Volume Resistivity:	1.0 x 10^{15} Ohm-cm
Dielectric Strength:	250 Volts/mil
Consistency:	Paste
Bleed (% after 24hr @ 200°C):	0.6 max
Specific Gravity	2.8
Shelf Life:	Indefinite

Ther-O-Bond Adhesives

	2000	**1599**	**1600**
Color:	White	Black	Blue
Thermal Conductivity watt/(m-C):	0.48	1.26	0.85
C.T.E. (ppm/(C):	25	25	25
Tensile Strength (@25) :	2360 psi	9200 psi	9200 psi
Dielectric Strength (volts/mil):	220	800	500
Shelf Life:	12 months	12 months	12 months

In-Sil-8 Pads

	1896	**1897**	**1898**	**1899**
Color:	Grey	Rust	Grey	Grey
Thickness (in):	0.006	0.009	0.007	0.009
Thermal Res. (C/watt)				
TO-3	0.40	0.21	0.33	0.50
TO-220	1.40	0.63	1.25	1.50
TO-218	0.93	0.49	0.77	1.16
Breakdown Voltage	6000	5000	4000	5000
Dielectric Constant	5.5	4.5	5.5	5.5

PC BOARD LEVEL HEAT SINKS, OPTIONS & ACCESSORIES PART NUMBER INDEX

PC BOARD LEVEL HEAT SINKS PART NUMBER INDEX BY SEMICONDUCTOR TYPE

TO-220

SELF-LOCKING

576802†

Ordering Code: **576802B04000**
Height: 0.750
θ: 18.8°C/W @2.5W
With Solderable Tab for Horiz. Mounting: **576802B03100**

591302†

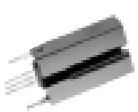
Ordering Code: **591302B02800**
Height: 0.790
θ: 26.8°C/W @2.8W
With Sure-Lock™ Tabs for Vert. Mounting.

574402†, 574102†

Ordering Code: **574402B03200**
Height: 0.395
θ: 23.2°C/W @2.5W
With Solderable Tabs for Horiz. Mounting.

Ordering Code: **574102B00000**
Height: 0.750
θ: 23.2°C/W @2.5W

574502†, 574602†, 574902†



Ordering Code: **574502B03300**
Height: 0.750
θ: 21.2°C/W @2.5W
With Solderable Tabs for Vert. Mounting.

Ordering Code: **574602B03300**
Height: 0.690
θ: 21.6°C/W @2.5W
With Solderable Tab for Vert. Mounting.

Ordering Code: **574902B03300**
Height: 1.375
θ: 16.0°C/W @2.5W
With Solderable Tabs for Vert. Mounting

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1. Thermal resistance has been evaluated in natural convection, at the power level which results in a 75°C temperature rise above ambient.

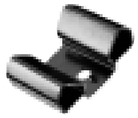
2. Height (in inches) designation is by reference to the part size, oriented to the board in its most common configuration.

† 5These products have been patented by Aavid Thermal Technologies, Inc.

507102

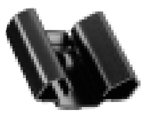
Ordering Code: **507102B00000**
Height: .700
θ: 15.6ºC/W

575102



Ordering Code: **575102B00000**
Height: 0.750
θ: 16.8°C/W @2.5W

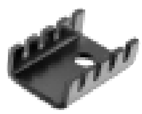
579302†



Ordering Code: **579302B00000**
Height: 0.750
θ: 16.8°C/W @2.5W

MANUAL ATTACHMENT

577002, 577102, 577202



Ordering Code: **577002B00000**
Height: 0.250
θ: 32.0°C/W @2.5W
With Solderable Tab for Vert. Mounting: **577002B04000**

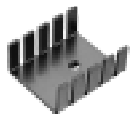
Ordering Code: **577102B00000**
Height: 0.380
θ: 25.9°C/W @2.9W
With Solderable Tab for Vert. Mounting: **577102B04000**

Ordering Code: **577202B00000**
Height: 0.500
θ: 24.4°C/W @2.5W
With Solderable Tab for Vert. Mounting: **577202B04000**

575002

Ordering Code: **575002B00000**
Height: 1.180
θ: 13.6°C/W @5.0W

530613, 530614, 530714



Ordering Code: **530613B00000**
Height: 0.500
θ: 16.7°C/W @4.5W

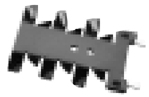
Ordering Code: **530614B00000**
Height: 0.500
θ: 16.7°C/W @4.5W

Ordering Code: **530714B00000**
Height: 0.500
θ: 20.3°C/W @3.7W

592502

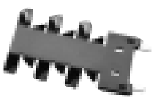
Ordering Code: **592502B03400**
Height: 1.250
θ: 22.0°C/W @2.5W
With Solderable Tabs for Vert. Mounting.

593202



Ordering Code: **593202B03500**
Height: 2.000
θ: 10.0°C/W @5.0W
With Solderable Tabs for Vert. Mounting.

534302, 594302†



Ordering Code: **534302B03553**
Height: 2.000
θ: 10.4°C/W @5.0W
With Solderable Tabs for Vert. Mounting.

Ordering Code: **594302B02853**
Height: 2.000
θ: 8.8°C/W @8.5W
With Sure-Lock™ Tabs and Kool-Klip™ #115330 for Vert. Mounting.

593002

Ordering Code: **593002B03400**
Height: 1.180
θ: 13.4°C/W @5.0W
With Sure-Lock™ Tabs for Vert. Mounting: **593002B02800**

534202

Ordering Code: **534202B03453**
Height: 1.180
θ: 13.0°C/W @5.0W
With Solderable Tabs for Vert. Mounting.

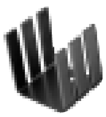
TO-220 Continued

563002, 576602

Ordering Code: **563002B00000**
Height: 1.180
θ: 13.0°C/W @5.0W

Ordering Code: **576602B00000**
Height: 0.950
θ: 16.6°C/W @5.0W

504102



Ordering Code: **504102B00000**
Height: 0.850
θ: 15.6°C/W @5.0W

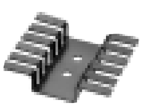
504222

Ordering Code: **504222B00000**
Height: 1.450
θ: 6.4°C/W @11.8W

507002

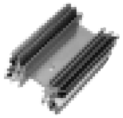
Ordering Code: **507002B00000**
Height: 0.375
θ: 15.6°C/W @5.0W

507222



Ordering Code: **507222B00000**
Height: 0.375
θ: 9.6°C/W @5.0W

529802



Ordering Code: **529802B02500**
Height: 1.500
θ: 3.7°C/W @20.0W
With Solderable Pins for Vert. Mounting.

523002

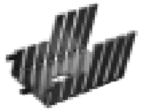
Ordering Code: **523002B00000**
Height: 1.180
θ: 13.6

579402

Ordering Code: **579402B00000**
Height: 0.750
θ: 16.8

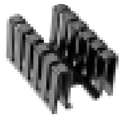
† 5These products have been patented by Aavid Thermal Technologies, Inc.

590102



Ordering Code: **590102B03600**
Height: 1.680
θ: 10.0°C/W @7.5W
With Solderable Tabs for Vert. Mounting.

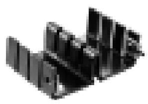
551002



Ordering Code: **551002B00000**
Height: 0.787
θ: 12.4°C/W @5.0W

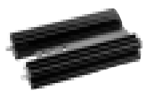
DUAL MOUNTING

578622



Ordering Code: **578622B03200**
Height: 1.030
θ: 13.2°C/W @2.5W
With Solderable Tabs for Vert. Mounting.

531002, 531102, 531202, 531302



Ordering Code: **531002B02500**
Height: 1.000
θ: 13.4°C/W @5.6W

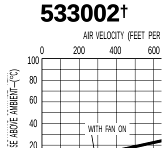
Ordering Code: **531102B02500**
Height: 1.500
θ: 10.4°C/W @7.2W

Ordering Code: **531202B02500**
Height: 2.000
θ: 8.3°C/W @9.0W

Ordering Code: **531302B02500**
Height: 2.500
θ: 8.0°C/W @5.0W

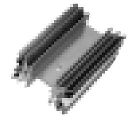
HIGH PERFORMANCE

533002†



Ordering Code: **533002B02551**
Height: 1.000
θ: 13.0°C/W @5.0W
With Solderable Pins and Kool-Klip™ #115100 for Vert. Mounting.

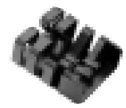
530002†



Ordering Code: **530002B02500**
Height: 2.500
θ: 3.8°C/W @10.0W

Multiwatt

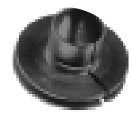
566010



Ordering Code: **566010B03400**
Height: 1.220
θ: 11.5°C/W @6.5W
With Sure-Lock™ Tabs for Vert. Mounting: **566010B02800**

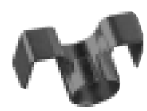
TO-5

322505



Ordering Code: **322505B00000**
Height: 0.400
θ: 56.0°C/W @1.25W

578205, 578305



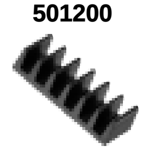
Ordering Code: **578205B00000**
Height: 0.500
θ: 38.0

† 5These products have been patented by Aavid Thermal Technologies, Inc.

Ordering Code: **578305B00000**
Height: 0.750
θ: 35.0°C/W @1.0W

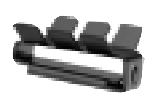
DIPs and SIPs

501200



Ordering Code: **501200B00000**
Height: 0.250
θ: 62.5°C/W @1.2W
For 14 or 16 Pin DIPs

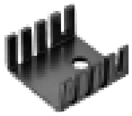
580200



Ordering Code: **580200B00000**
Height: .410
θ: 38ºC/W @0.8W

TO-126 and TO-127

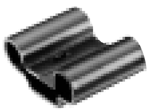
507302



Ordering Code: **507302B00000**
Height: 0.375
θ: 24.0°C/W @2.5W

For TO-126 & TO-127.

577500



Ordering Code: **577500B00000**
Height: 0.520
θ: 26.0°C/W @2.5W

For TO-126.

TO-202

579704†

Ordering Code: **579704B03300**
Height: 0.900
θ: 24.0°C/W @2.5W

With Solderable Tabs for Vert. Mounting.

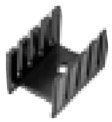
574004†

Ordering Code: **574004B00000**
Height: 0.580
θ: 28.0°C/W @2.5W

574204

Ordering Code: **574204B00000**
Height: 0.900
θ: 16.8

577304, 577404



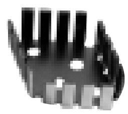
Ordering Code: **577304B00000**
Height: 0.375
θ: 27.2°C/W @2.5W

Ordering Code: **577404B00000**
Height: 0.500
θ: 24.0°C/W @2.5W

† 5These products have been patented by Aavid Thermal Technologies, Inc.

TO-3

501503. 501603



Ordering Code: **501503B00000**
Height: 1.000
θ: 6.3°C/W @12.0W

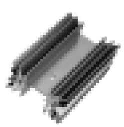
Ordering Code: **501603B00000**
Height: 1.250
θ: 5.4°C/W @14.0W

569003

Ordering Code: **569003B00000**
Height: 1.310
θ: 5.4°C/W @10.0W

TO-218

529801



Ordering Code: **529801B02500**
Height: 1.500
θ: 3.7°C/W @20.0W

This condensed catalog features the more popular devices and configurations. For other devices and configurations, contact Aavid Applications Engineering to receive our full Product Selection Guide.

More information is also available 24 hours a day by using our FastFacts System, 603 223-1750, or see our web-site, http://www.aavid.com.

TO-220/TO-218

530101†

Ordering Code: **530101B00150**
Height: 1.750
θ: 6.3°C/W@12.0W

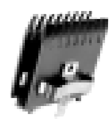
With Solderable Mounts and Kool-Klip™ #115000 for Vert. Mounting. for One TO-218

530102†

Ordering Code: **530102B00150**
Height: 1.750
θ: 6.3°C/W@12.0W

With Solderable Mounts and Kool-Klip™ #115000 for Vert. Mounting. for One TO-220

530162†

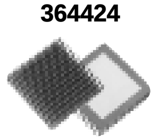


Ordering Code: **530162B00162**
Height: 1.750
θ: 4.4°C/W @17.0W

With Solderable Mounts and Two Kool-Klips™ #116200 for Vert. Mounting. for Two TO-220s

OptiPin Heat Sinks for BGA Devices

364424



Ordering Code: **364424B00032**
Height: .450
θ: 10.7°C/W

With preinstalled 1070 tape
364424B00000 without tape

Surface Mount Components

573100, 573300, 573400

Hot solder dipped coating over highly conductive copper for maximum heat transfer in surface mount applications. Tape and reel packaged per EIA-481, compatible with automatic SMT placement. 250 pieces per reel.

D-PAK/T0-252

Ordering Code: **573100D00010**
Height: .400
θ: 26ºC/W
Bulk Pkg.: 573100D00000

D²PAK/T0-263

Ordering Code: **573300D00010**
Height: .400
θ: 18ºC/W
Bulk Pkg.: 573100D00000

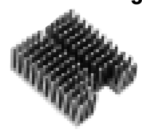
D³PAK/T0-268

Ordering Code: **573400D00010**
Height: .400
θ: 14ºC/W
Bulk Pkg.: 573400D00000

† 5These products have been patented by Aavid Thermal Technologies, Inc.

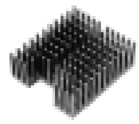
Digital

1" Morrlong



Ordering Code: **026205**
Height: 1.000
θ: 3°C/W

1.25" Morrison

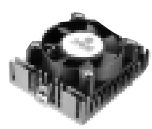


Ordering Code: **026350**
Height: 1.250
θ: 2.7°C/W

Morrlong/Morrison Clip

Ordering Code: **022938**
Height: 1.250
θ: 2.7°C/W

Fan Heat Sinks for Pentium® MMX



Ordering Code: **025417**
Height: 1.250 0.68°C/W
θ: 0.68°C/W

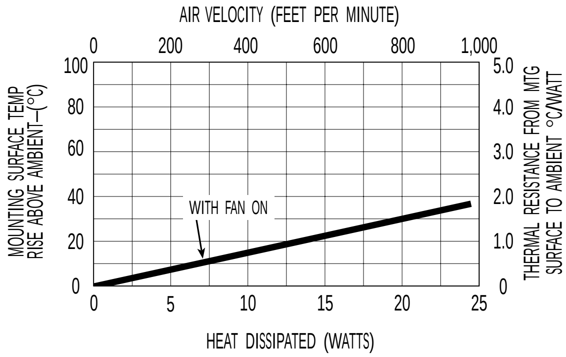
Fan Heat Sinks for AMD and Cyrix CPU's

Ordering Code: **026437**
Height: 1.200
θ: 0.66°C/W

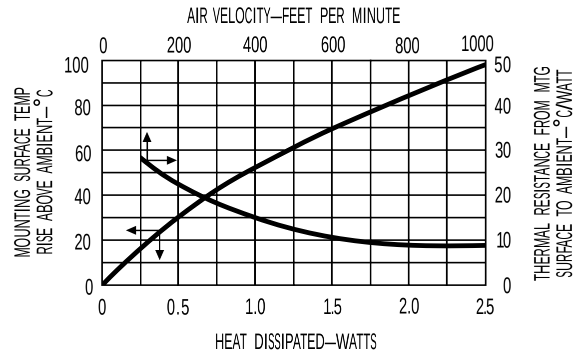
DC-DC Converters Heat Sink

Call us for our latest offering:
Chris Soule (603) 223-1722
or email soule@aavid.com

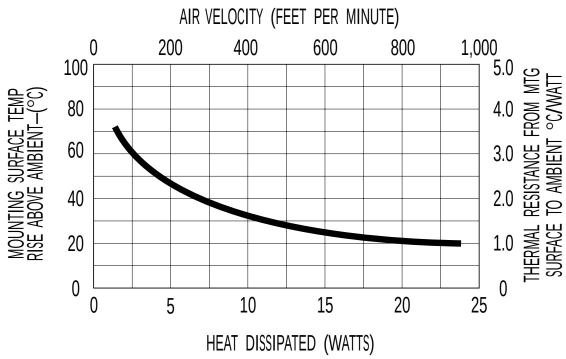
025417



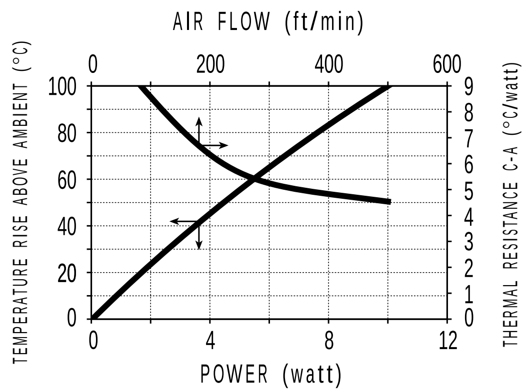
322505



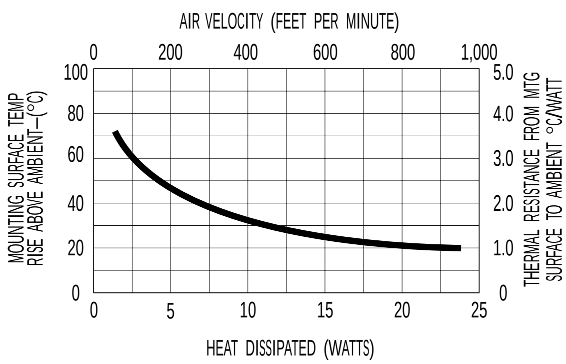
026205



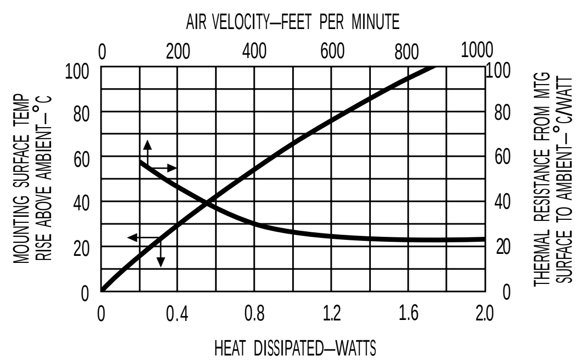
3364424



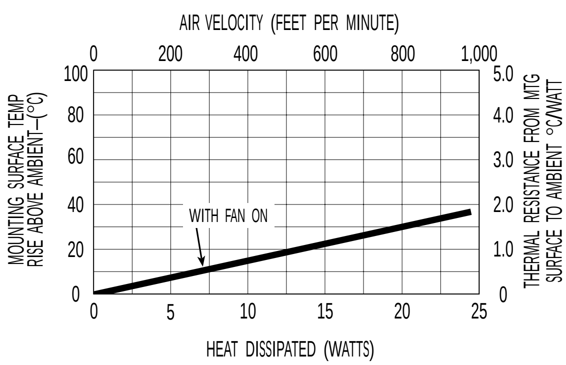
026350



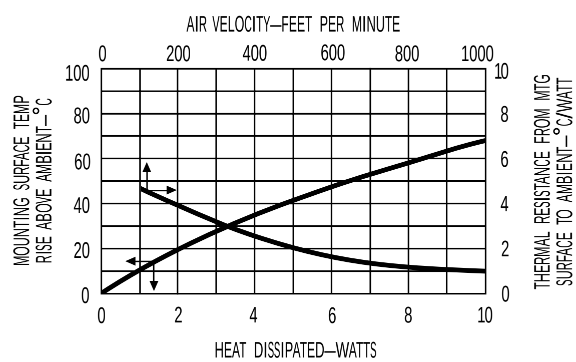
501200



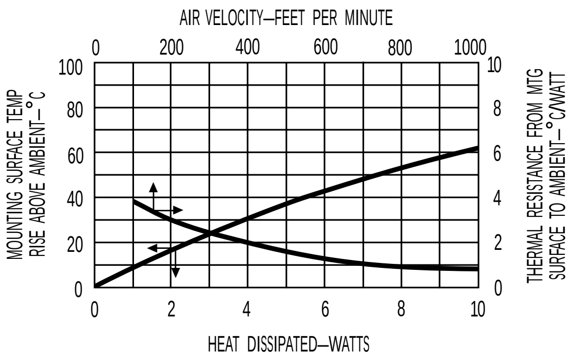
026437



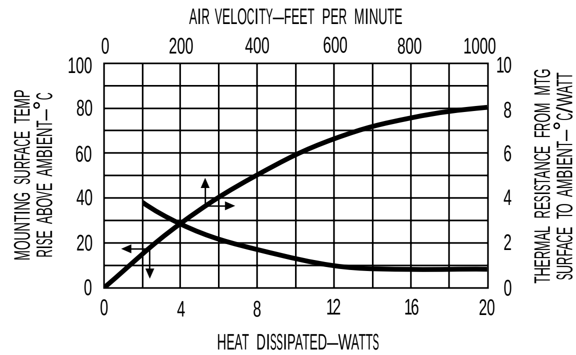
501503



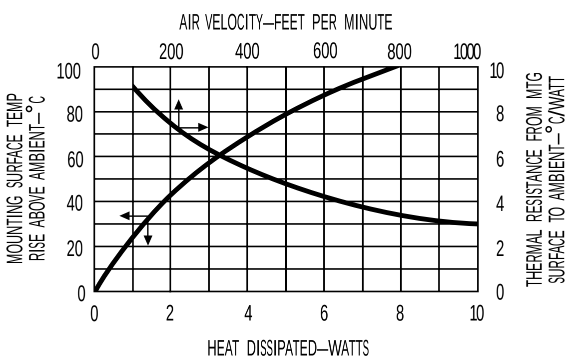
501603



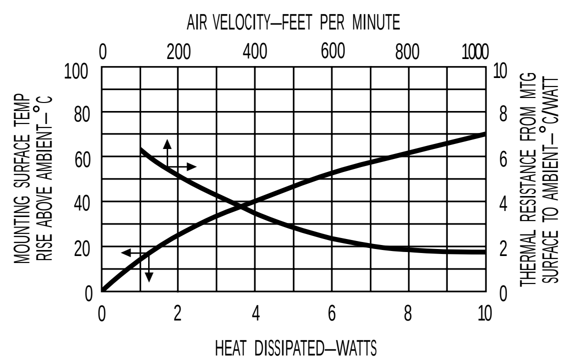
507102



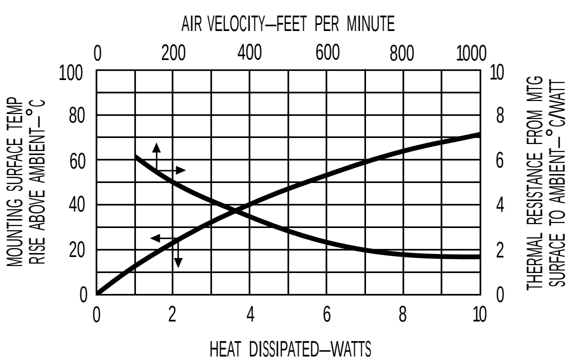
504102



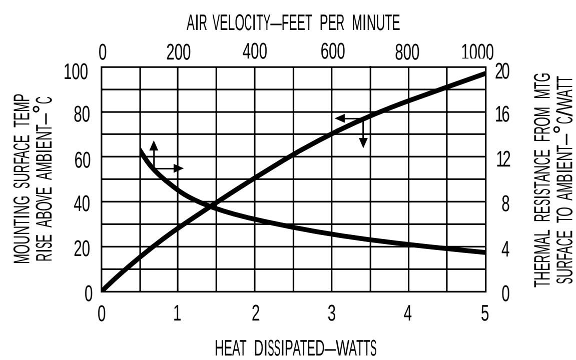
507222



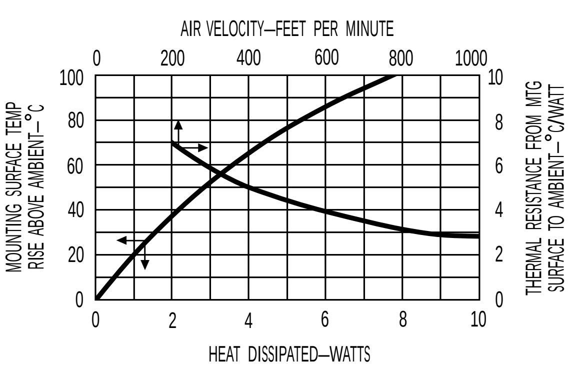
504222



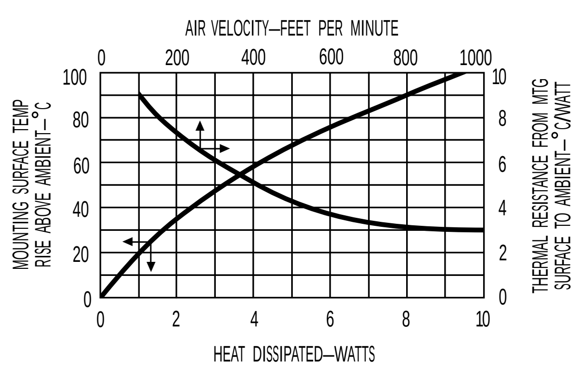
507302



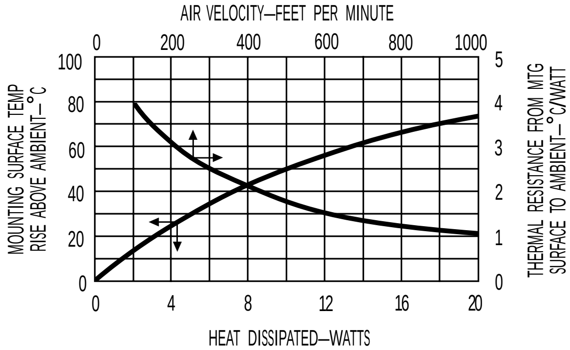
507002



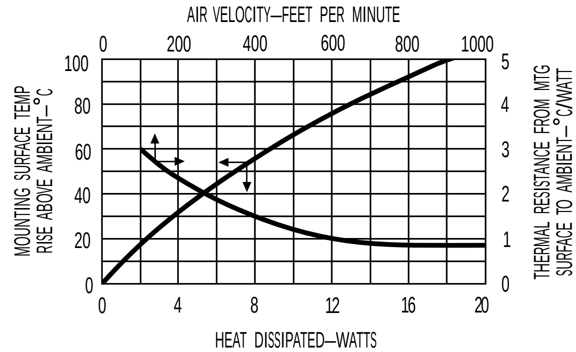
523002



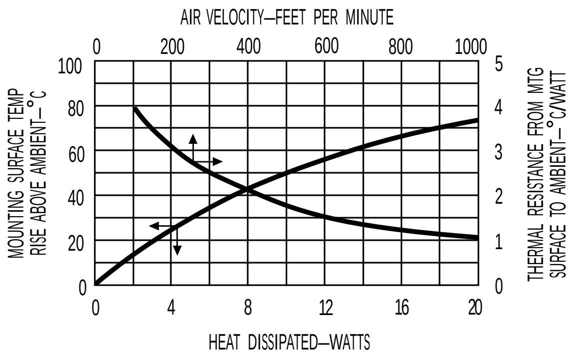
529801



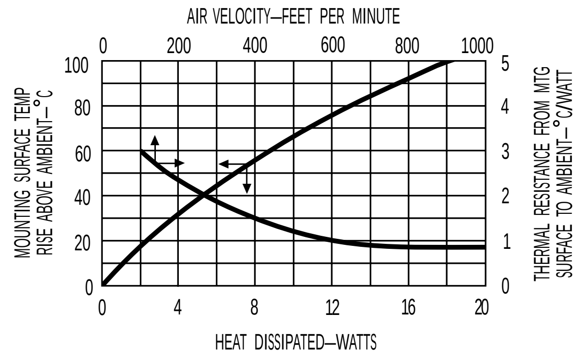
530102



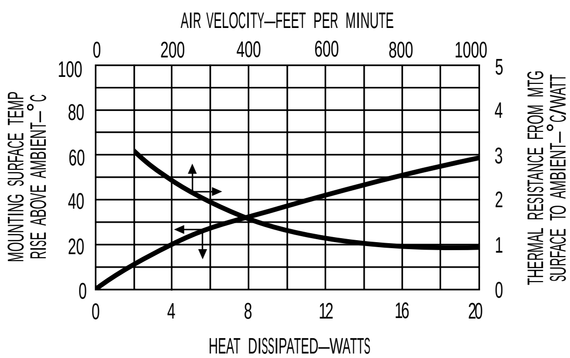
529802



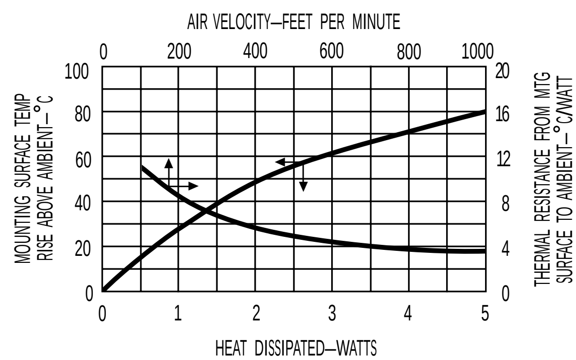
530162



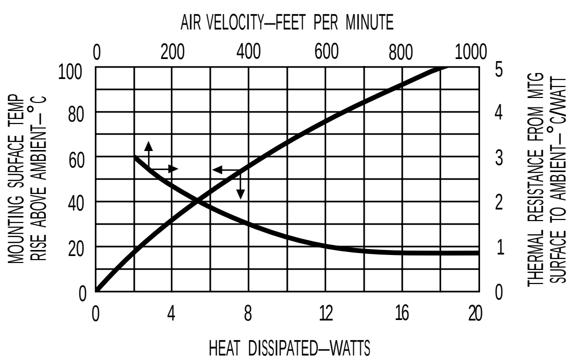
530002



530613



530101



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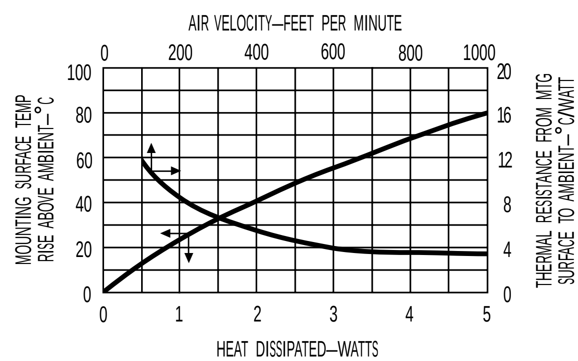

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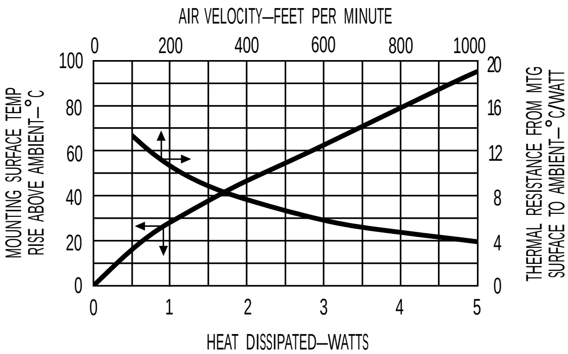

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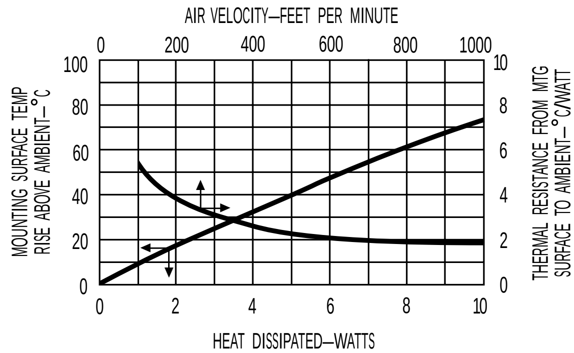

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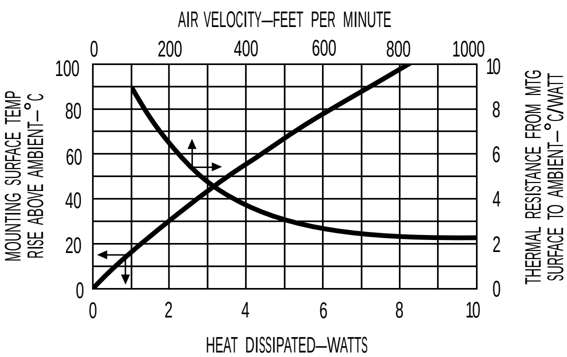

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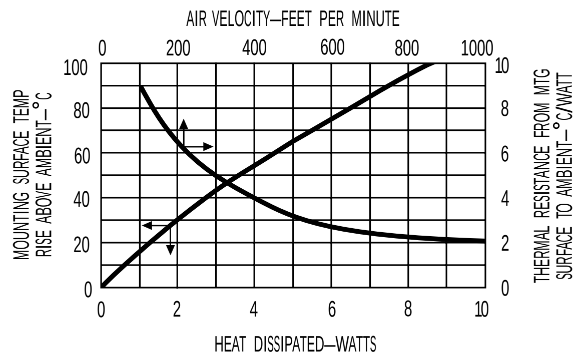

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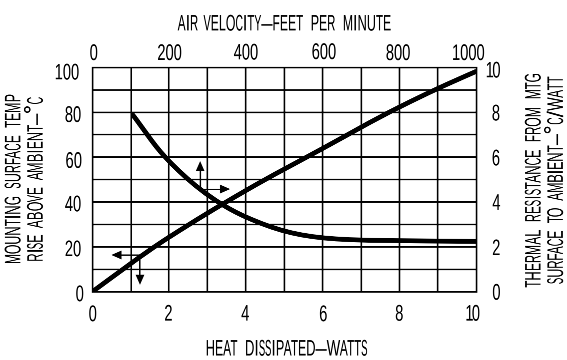

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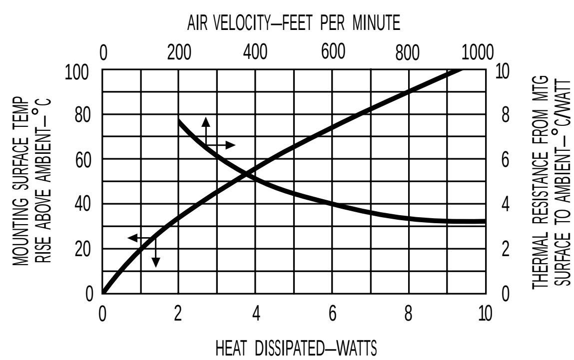

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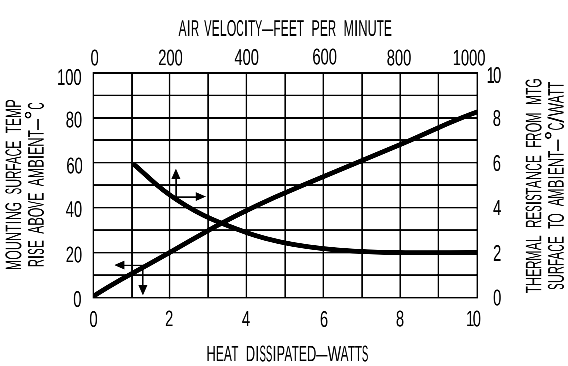

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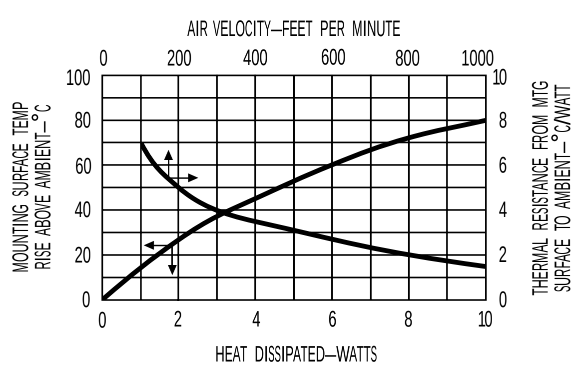

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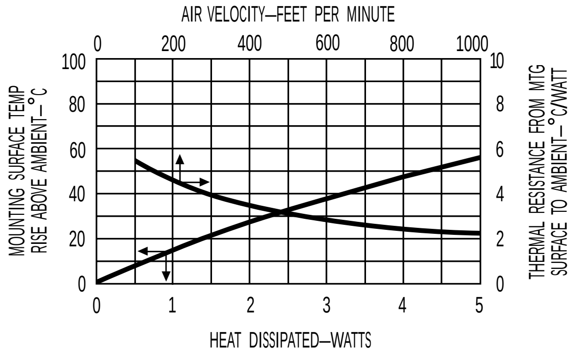

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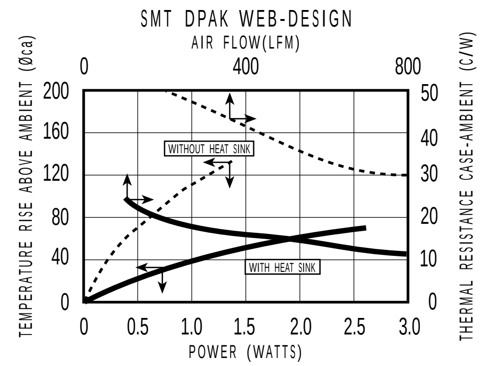

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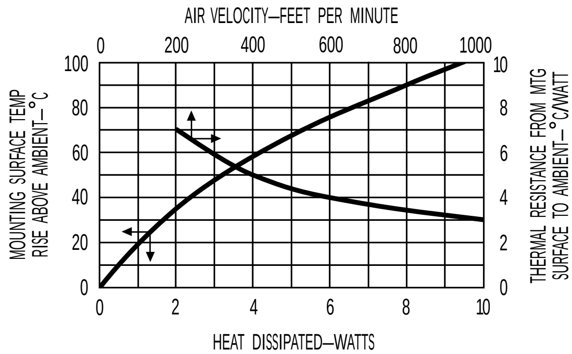

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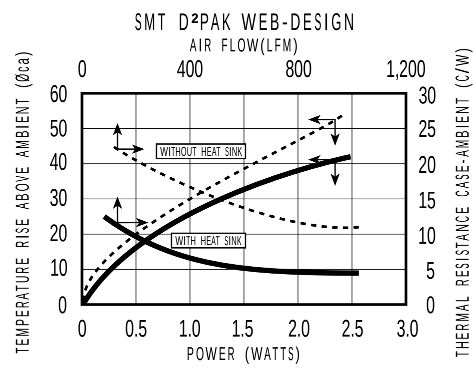

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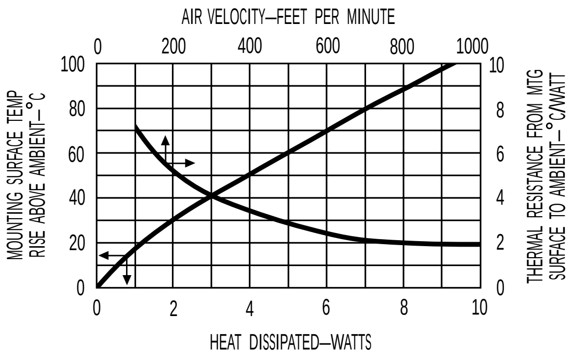

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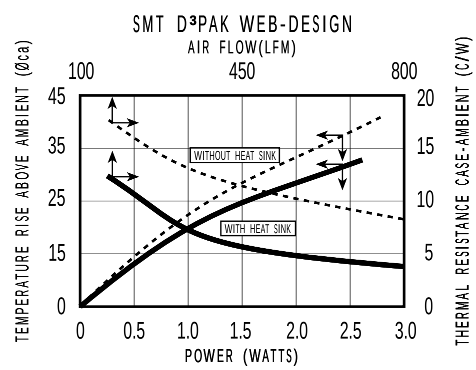

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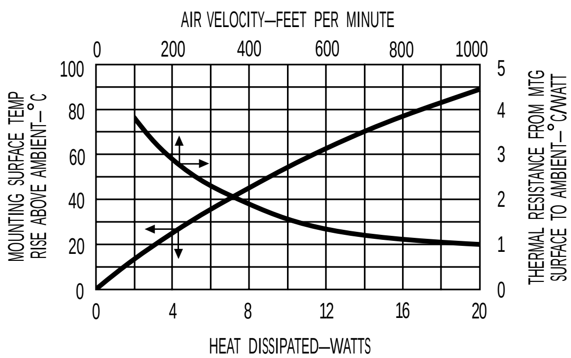

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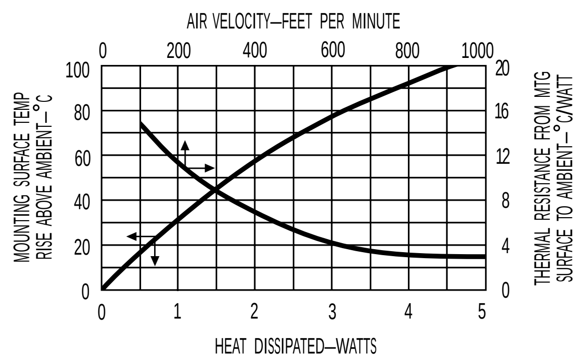

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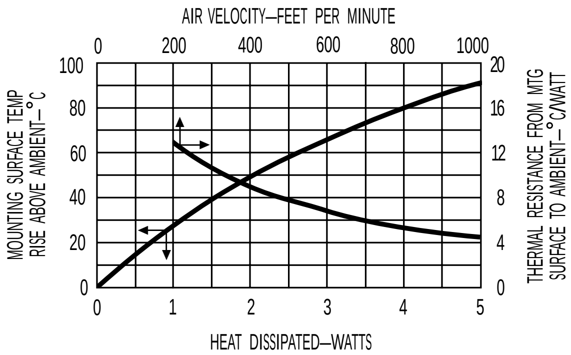

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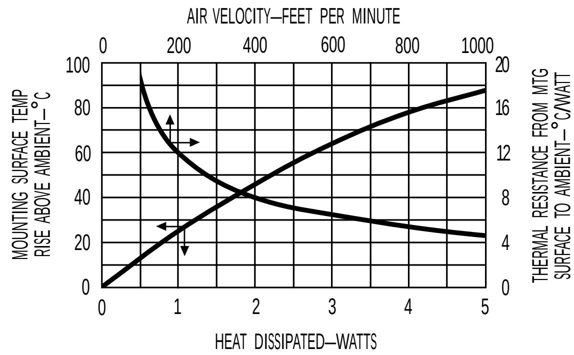

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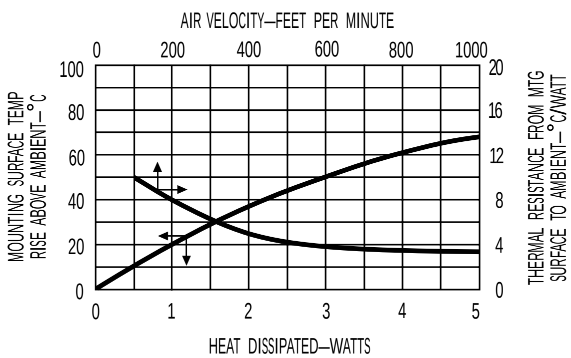

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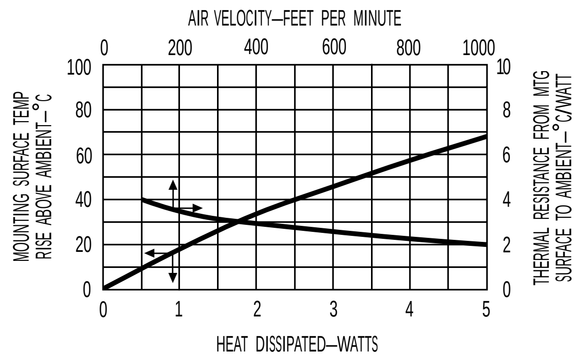

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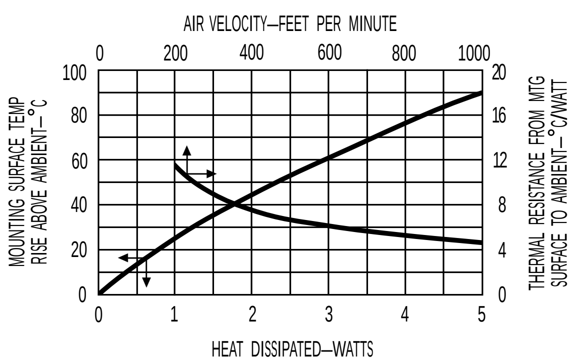

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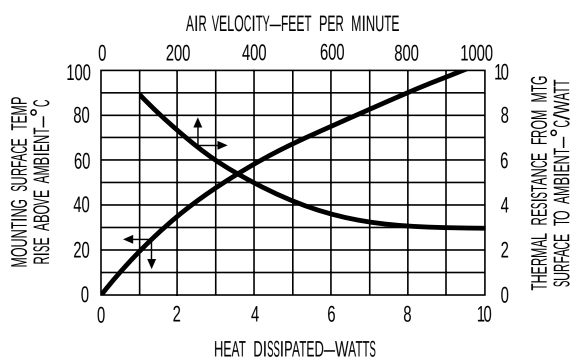

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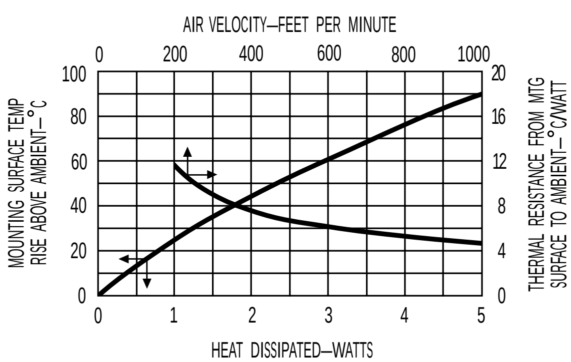

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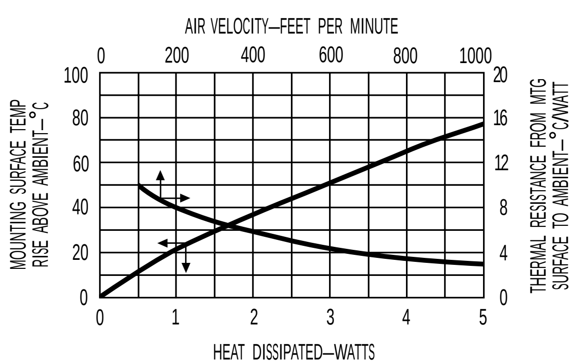

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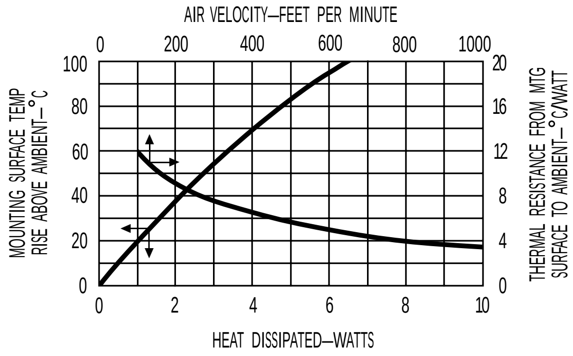

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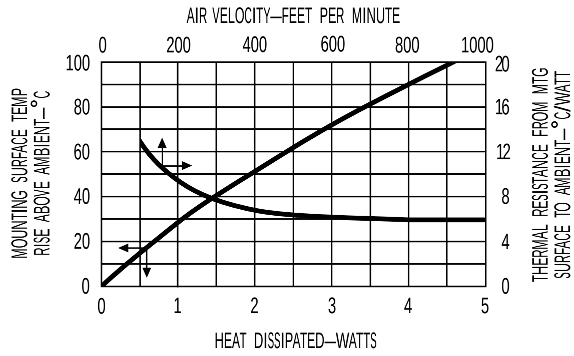

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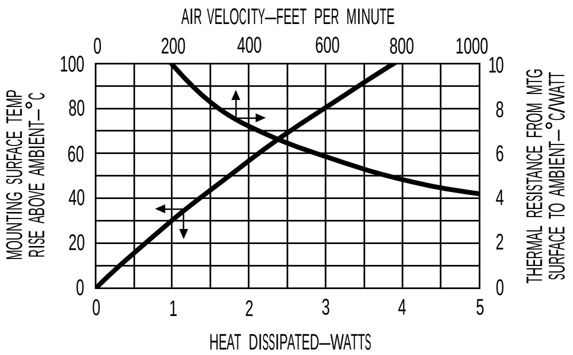

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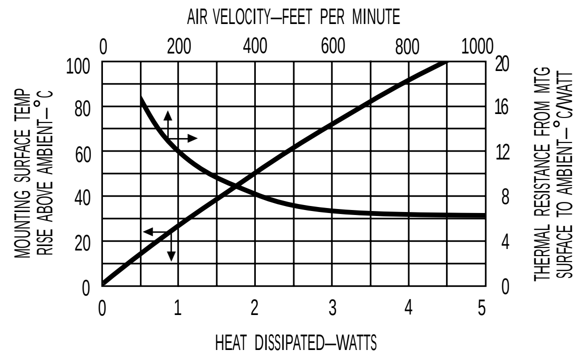

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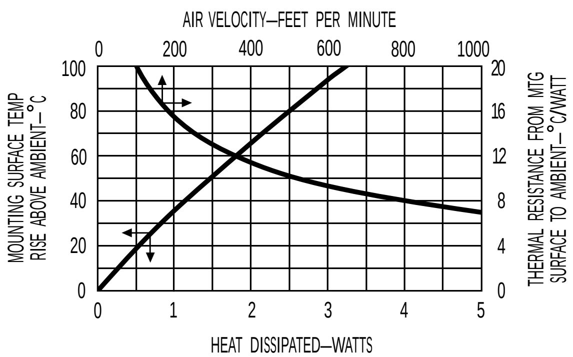

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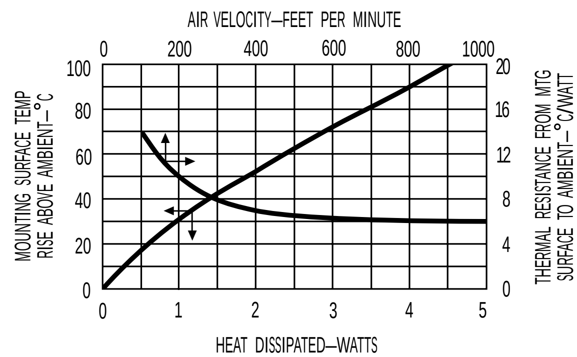

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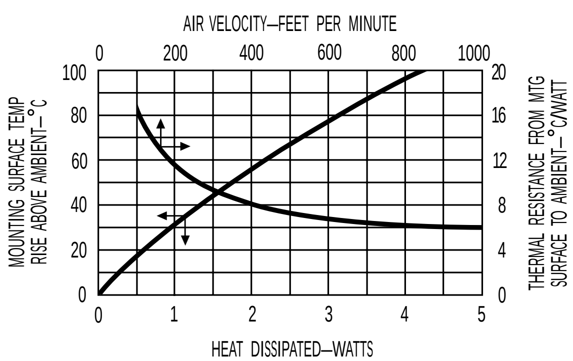

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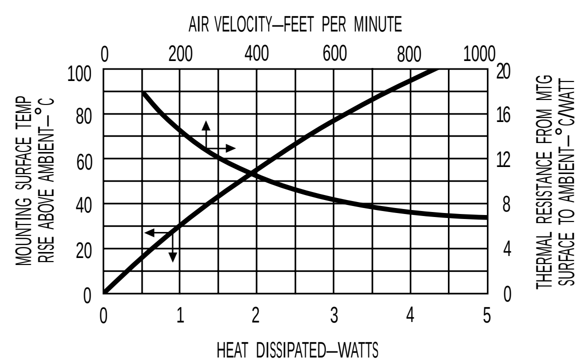

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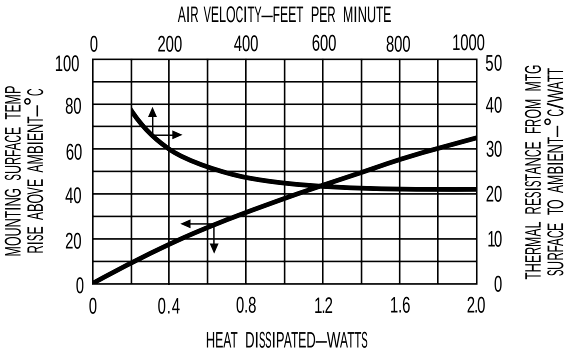

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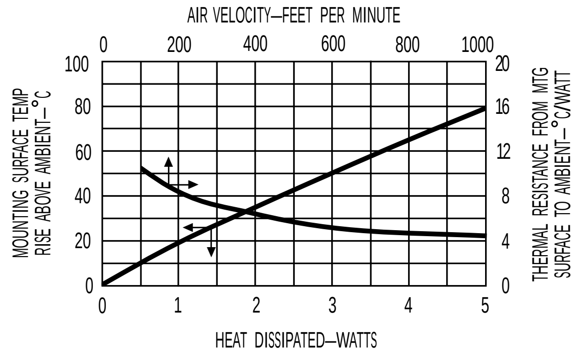

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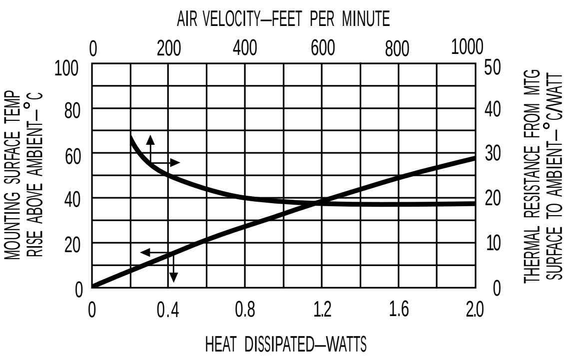

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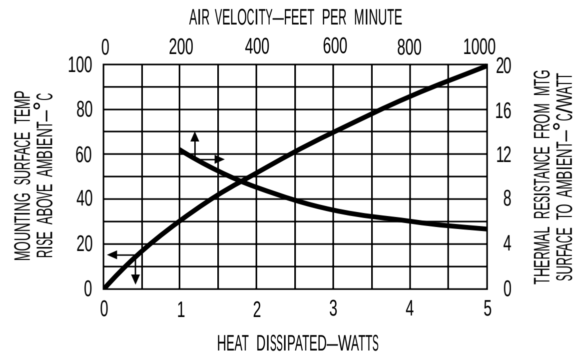

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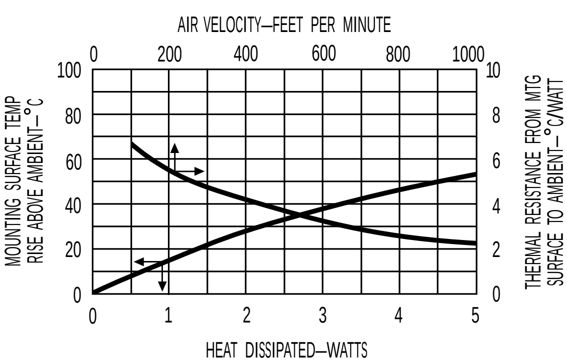

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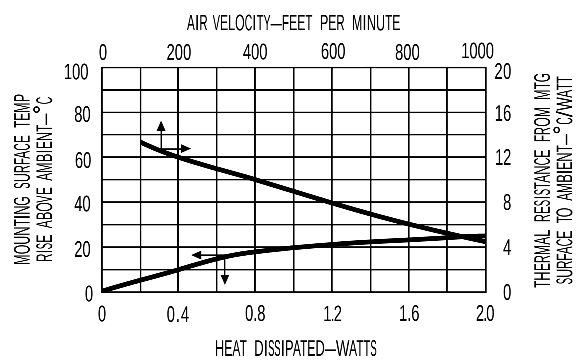

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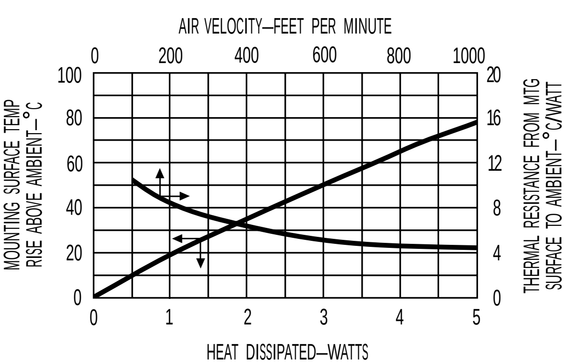

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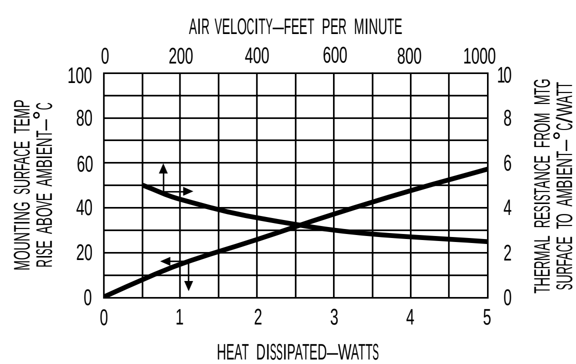

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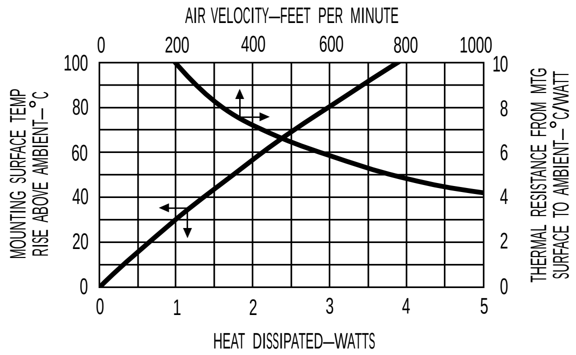

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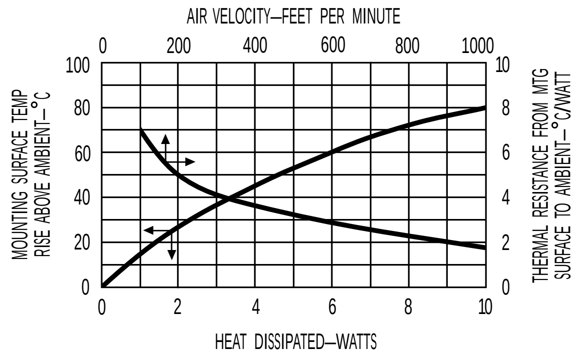

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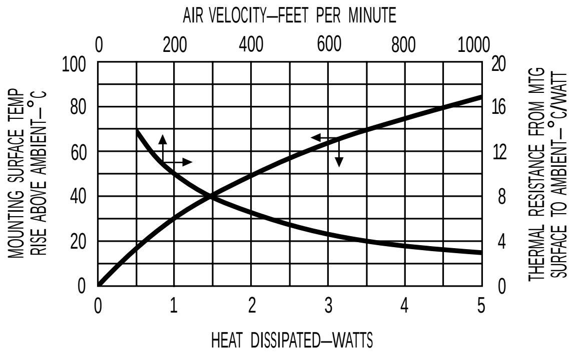

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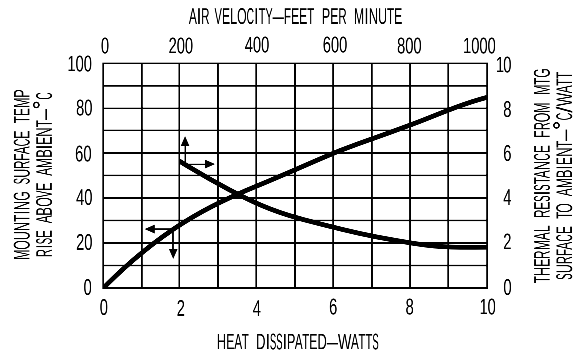

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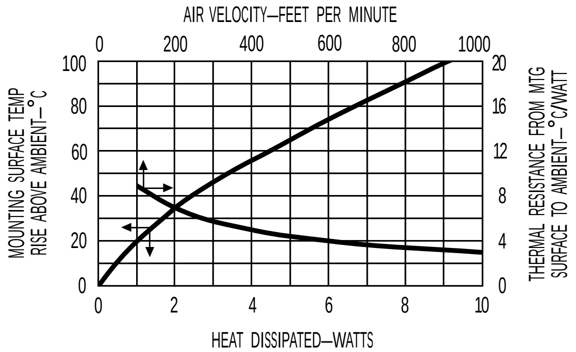
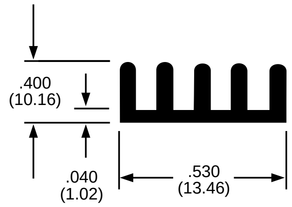


EXTRUSION INDEX

1

62000
0.2lb/ft
14.6°C/W/3in
4.8 in²/in



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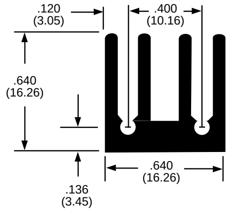
62470
0.3lb/ft
12.0°C/W/3in
5.6 in²/in



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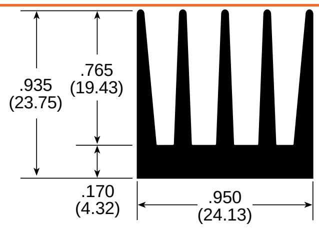
64675
0.5lb/ft
7.1°C/W/3in
9.9 in²/in



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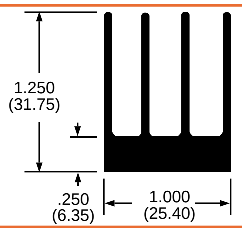
62560
0.6lb/ft
6.7°C/W/3in
10.5 in²/in



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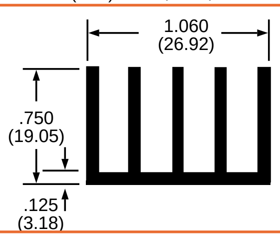
63400
0.4lb/ft
8.1°C/W/3in
8.6 in²/in



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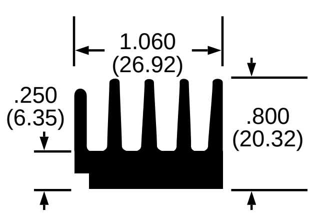
62930
0.6lb/ft
8.8°C/W/3in
7.9 in²/in



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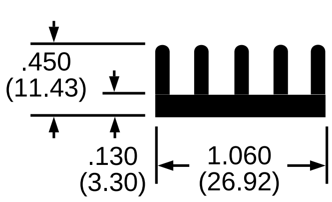
62925
0.3lb/ft
12.5°C/W/3in
5.6 in²/in



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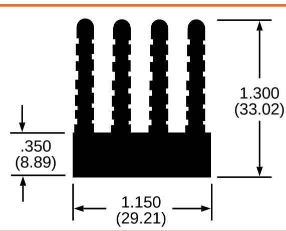
62230
0.8lb/ft
5.1°C/W3/in
13.7 in²/in



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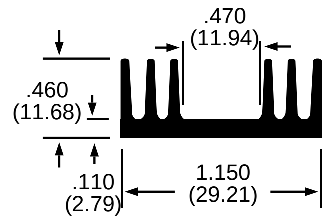
62365
0.3lb/ft
10.5°C/W/3in
6.8 in²/in



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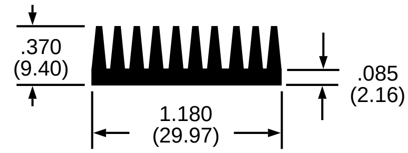
63045
0.4lb/ft
8.6°C/W3/in
8.2 in²/in



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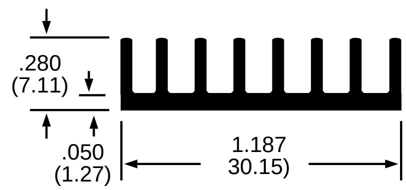
63455
0.2lb/ft
11.4°C/W3/in
6.2 in²/in



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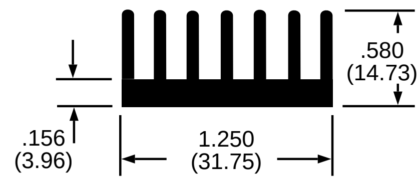
0.5lb/ft
8.0°C/W3/in
8.8 in²/in



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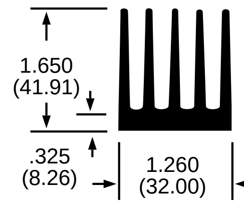
65245
1.3lb/ft
4.4°C/W3/in
15.9 in²/in



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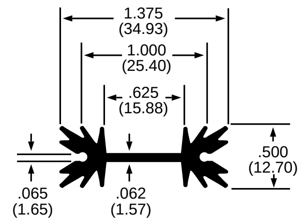
60130
0.4lb/ft
9.2°C/W3/in
7.6 in²/in



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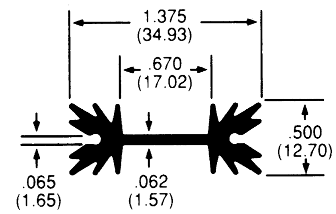
63620
0.4lb/ft
9.2°C/W3/in
7.6 in²/in



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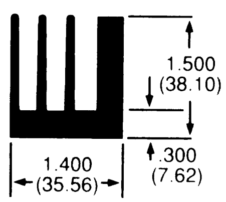
61605
1.3lb/ft
5.4°C/W3/in
13.0 in²/in



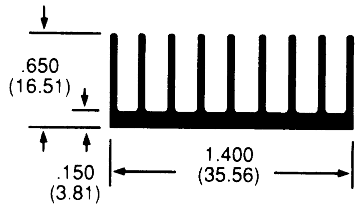
Performance vs. Length

The thermal resistance of a heat sink changes significantly with length. For example, to convert the published natural convection thermal resistance at a 3" length to a desired length, see page 35 for a length conversion table.

Note: The profiles are not to scale in relation to each other. Standard commercial extrusion tolerances apply (see our full line catalog, page 96). Dimension in parenthesis are millimeters.

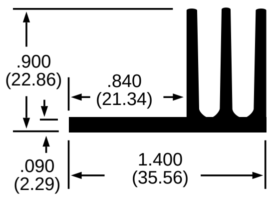
1

66450
0.5lb/ft
6.3°C/W/3in
11.2 in^2/in



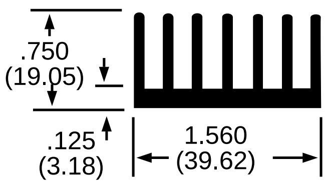
2

63380
3.5lb/ft
9.5°C/W/3in
7.8 in^2/in



3

61080
0.5lb/ft
5.7°C/W/3in
12.1 in^2/in



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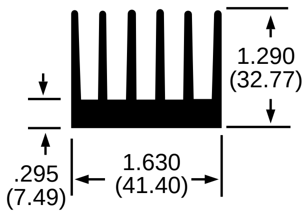
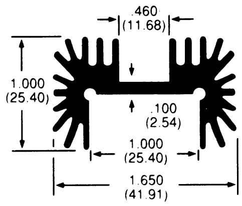
61215
1.3lb/ft
4.4°C/W/3in
15.9 in^2/in



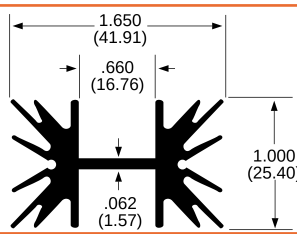
5

63485
0.8lb/ft
4.5°C/W/3in
15.4 in^2/in



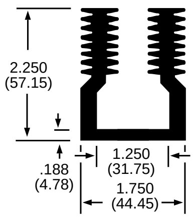
6

63130
0.6lb/ft
5.2°C/W/3in
13.4 in^2/in



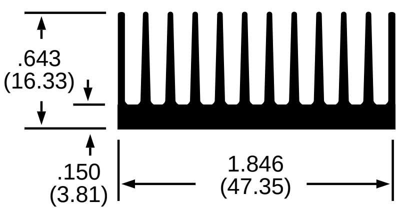
7

60180
2.1lb/ft
2.3°C/W/3in
27.5 in^2/in



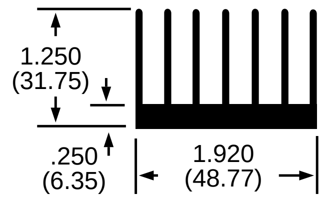
8

64635
0.7lb/ft
4.4°C/W/3in
15.8 in^2/in



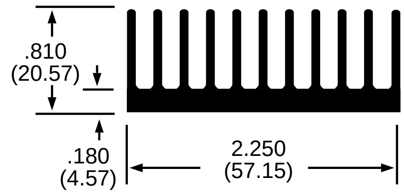
9

62745
1.1lb/ft
3.8°C/W/3in
18.3 in^2/in



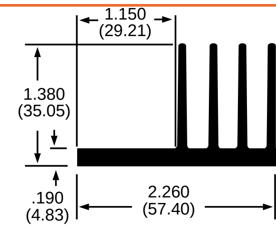
10

64690
1.2lb/ft
3.7°C/W/3in
18.7 in^2/in



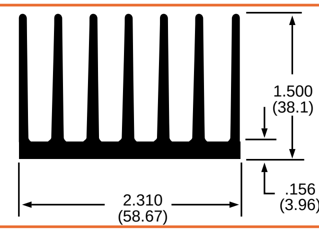
11

61325
1.0lb/ft
4.8°C/W/3in
14.5 in^2/in



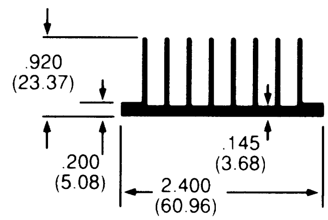
12

62500
1.4lb/ft
3.0°C/W/3in
23.7 in^2/in



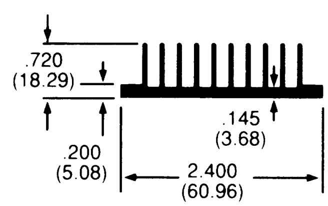
13

65550
0.9lb/ft
4.1°C/W/3in
17.2 in^2/in



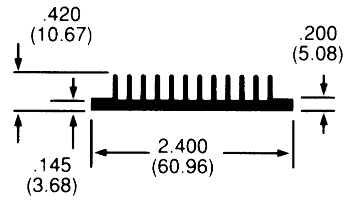
14

65795
0.9lb/ft
4.3°C/W/3in
16.2 in^2/in



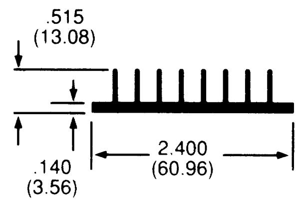
15

66000
0.7lb/ft
6.3°C/W/3in
11.1 in^2/in



16

66385
0.6lb/ft
6.4°C/W/3in
10.9 in^2/in

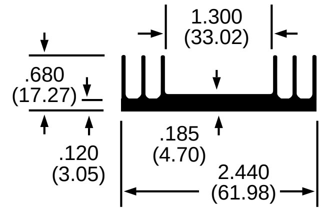


Temperature Rise Factor
The published thermal resistance assumes a 75°C temperature rise of the heat sink above the ambient temperature.

Note: The profiles are not to scale in relation to each other. Standard commercial extrusion tolerances apply (see our full line catalog, page 96). Dimension in parenthesis are millimeters.

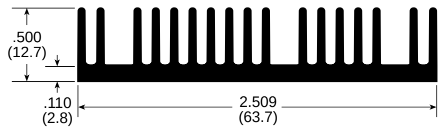
1

60985
0.8lb/ft
6.1°C/W/3in
11.5 in²/in



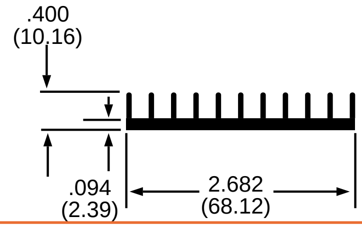
2

71275
.71lb/ft
4.0°C/W/3in
17.6 in²/in



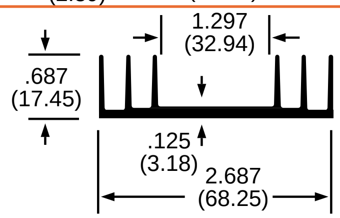
3

60955
0.6lb/ft
5.7°C/W/3in
12.3 in²/in



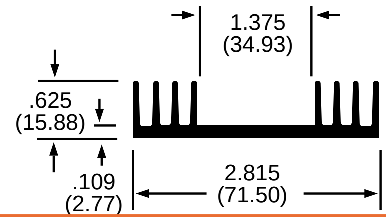
4

60865
0.5lb/ft
5.1°C/W/3in
13.6 in²/in



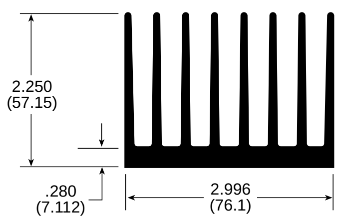
5

60235
0.8lb/ft
4.8°C/W/3in
14.4 in²/in



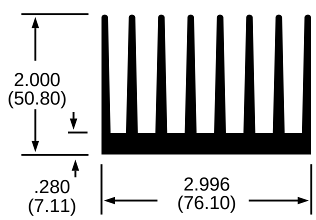
6

63730
2.8lb/ft
1.8°C/W/3in
38.1 in²/in



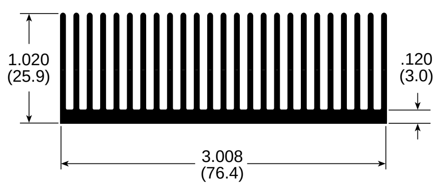
7

63020
2.3lb/ft
1.9°C/W/3in
34.1 in²/in



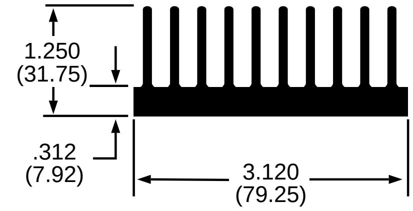
8

72070
1.3lb/ft
1.4°C/W/3in
50.5 in²/in



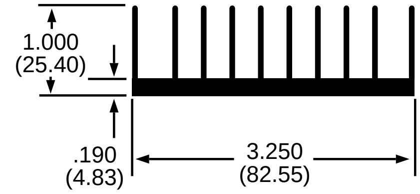
9

61315
2.3lb/ft
2.7°C/W/3in
25.6 in²/in



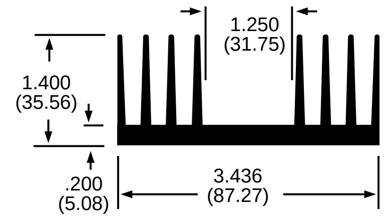
10

60760
1.6lb/ft
3.1°C/W/3in
22.7 in²/in



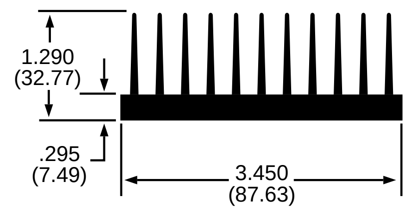
11

61055
1.9lb/ft
2.5°C/W/3in
26.5 in²/in



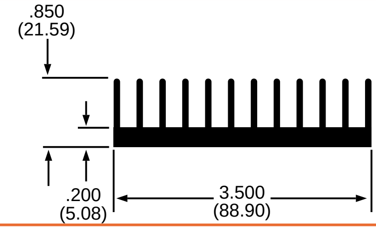
12

60250
2.1lb/ft
2.4°C/W/3in
28.5 in²/in



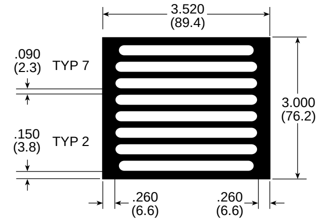
13

62200
1.5lb/ft
3.0°C/W/3in
23.0 in²/in



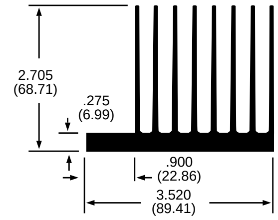
14

70560
5.3lb/ft
1.1°C/W/3in
63.0 in²/in



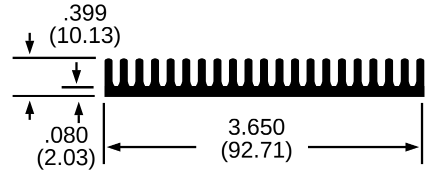
15

62580
3.1lb/ft
1.5°C/W/3in
46.5 in²/in



16

62650
0.9lb/ft
3.4°C/W/3in
20.9 in²/in

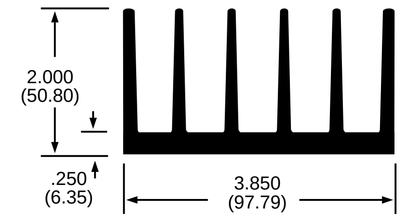


Optimization

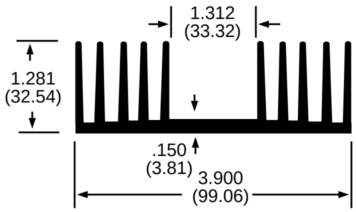
Optimization in either forced or natural convection can result in cost and size reduction of the heat sink. In forced convection, optimization can reduce the size of the fan or blower.

Note: The profiles are not to scale in relation to each other. Standard commercial extrusion tolerances apply (see our full line catalog, page 96). Dimension in parenthesis are millimeters.

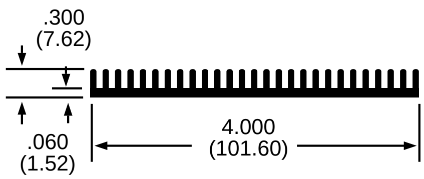
1
60825
2.9lb/ft
2.3°C/W/3in
30.0 in²/in



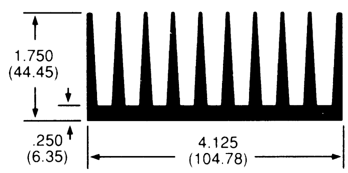
2
60630
1.8lb/ft
2.3°C/W/3in
30.0 in²/in



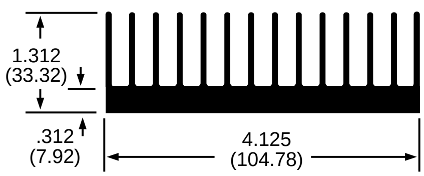
3
61585
0.7lb/ft
3.3°C/W/3in
21.1 in²/in



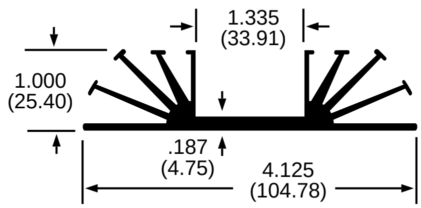
4
60095
3.5lb/ft
1.8°C/W/3in
38.8 in²/in



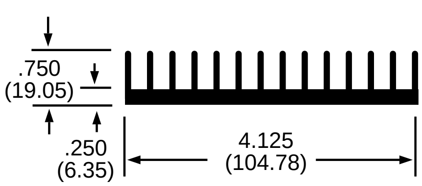
5
61090
3.0lb/ft
2.0°C/W/3in
36.9 in²/in



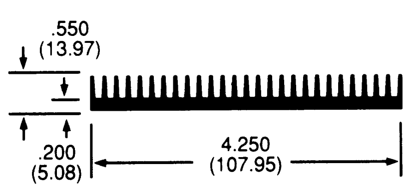
6
60080
1.2lb/ft
2.9°C/W/3in
23.6 in²/in



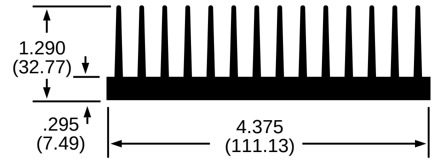
7
63985
1.7lb/ft
3.1°C/W/3in
22.3 in²/in



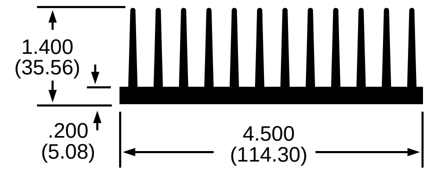
8
66505
1.6lb/ft
2.7°C/W/3in
25.9 in²/in



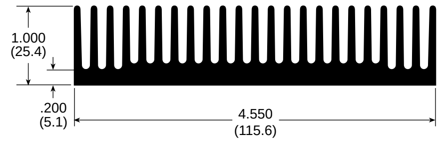
9
60560
2.7lb/ft
1.8°C/W/3in
36.5 in²/in



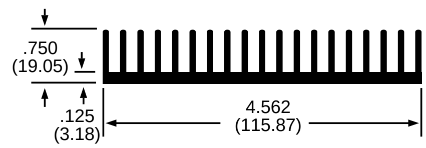
10
61075
2.4lb/ft
1.7°C/W/3in
38.2 in²/in



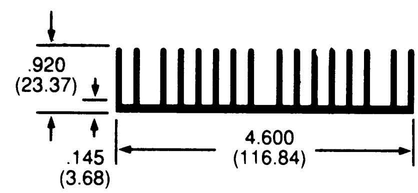
11
72205
2.5lb/ft
1.7°C/W/3in
42.3 in²/in



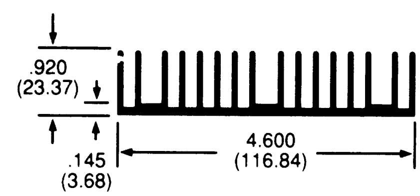
12
60585
1.7lb/ft
2.2°C/W/3in
32.0 in²/in



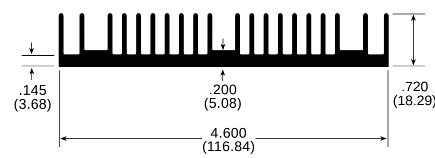
13
65185
1.7lb/ft
2.0°C/W/3in
34.3 in²/in



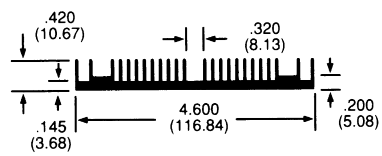
14
65555
1.7lb/ft
2.1°C/W/3in
33.5 in²/in



15
65990
1.6lb/ft
2.2°C/W/3in
31.2 in²/in



16
65995
1.3lb/ft
3.3°C/W/3in
21.3 in²/in



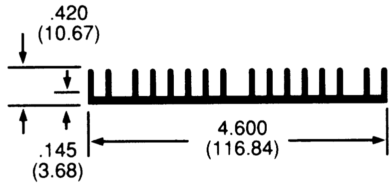
Technical Capabilities

Aavid Thermalloy Application Engineering Department has the capability to perform a full thermal analysis, including optimization, in order to find the right Aavid heat sink for your application.

Note: The profiles are not to scale in relation to each other. Standard commercial extrusion tolerances apply (see our full line catalog, page 96). Dimension in parenthesis are millimeters.

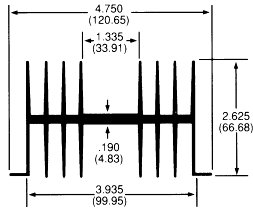
1

65175
1.1lb/ft
3.9°C/W/3in
18.1 in²/in



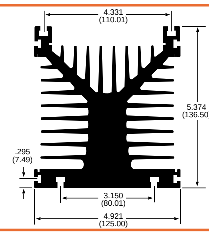
2

60055
2.5lb/ft
1.5°C/W/3in
48.1 in²/in



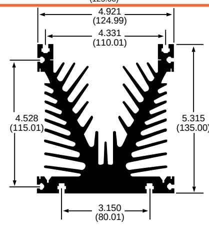
3

62375
12.8lb/ft
0.8°C/W/3in
91.3 in²/in



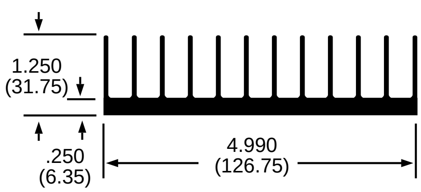
4

62905
11.1lb/ft
0.8°C/W/3in
91.2 in²/in



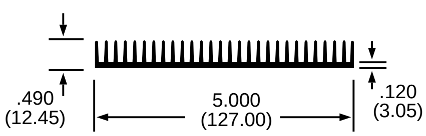
5

61745
2.4lb/ft
2.0°C/W/3in
34.5 in²/in



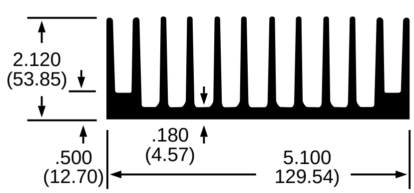
6

67895
1.4lb/ft
2.4°C/W/3in
29.3 in²/in



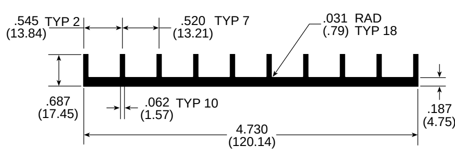
7

63815
3.9lb/ft
1.7°C/W/3in
41.7 in²/in



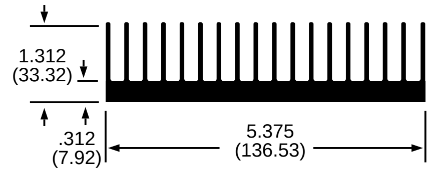
8

61095
1.7lb/ft
3.5°C/W/3in
19.8 in²/in



9

61085
3.6lb/ft
1.5°C/W/3in
46.1 in²/in

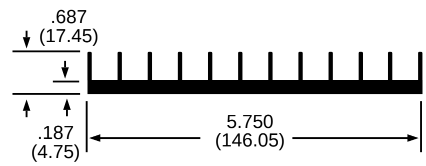


10

60215
4.2lb/ft
1.6°C/W/3in
43.6 in²/in

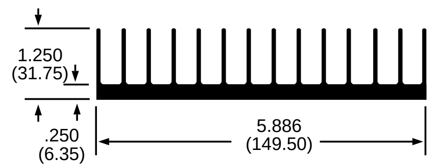
11

61790
1.7lb/ft
2.9°C/W/3in
23.9 in²/in



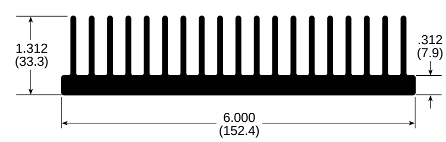
12

60230
2.9lb/ft
1.8°C/W/3in
40.0 in²/in



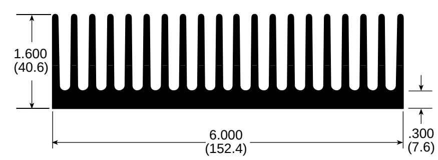
13

68995
3.6lb/ft
1.4°C/W/3in
49.7 in²/in



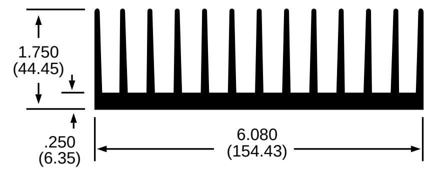
14

72385
4.8lb/ft
1.1°C/W/3in
61.8 in²/in



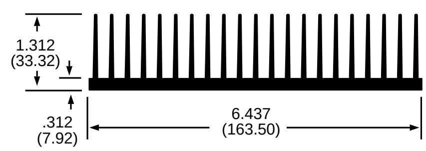
15

60140
4.1lb/ft
1.4°C/W/3in
50.3 in²/in



16

60340
3.2lb/ft
1.2°C/W/3in
55.5 in²/in

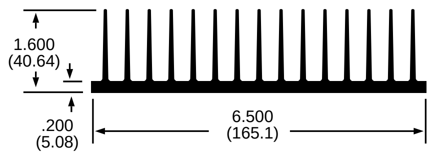


Fabrication Capabilities Aavid has extensive manufacturing capabilities for the complete fabrication of heat sinks for extrusions. The Aavid plant is equipped with high speed saws, a battery of CNC machining centers, and an automated anodizing line incorporating the latest technology available in the world.

Note: The profiles are not to scale in relation to each other. Standard commercial extrusion tolerances apply (see our full line catalog, page 96). Dimension in parenthesis are millimeters.

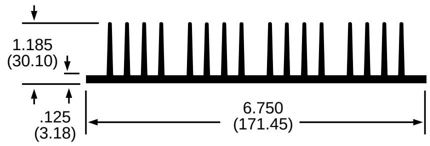
1

61070
3.4lb/ft
1.3°C/W/3in
56.0 in²/in



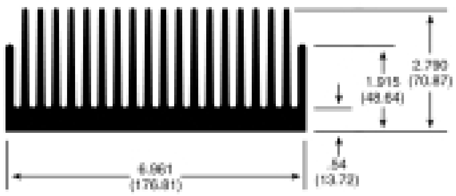
2

60995
2.5lb/ft
1.4°C/W/3in
50.1 in²/in



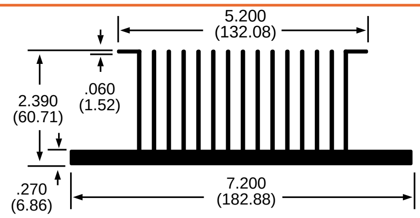
3

65605
9.3lb/ft
0.7°C/W/3in
97.9 in²/in



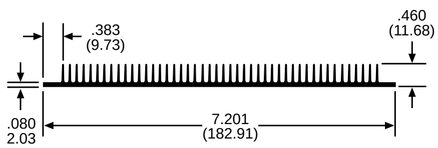
4

62625
4.7lb/ft
0.9°C/W/3in
78.2 in²/in



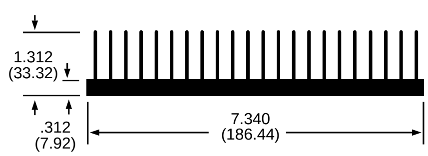
5

68855
1.7lb/ft
1.5°C/W/3in
46.3 in²/in



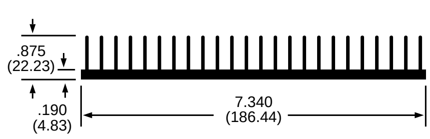
6

65445
4.8lb/ft
1.1°C/W/3in
62.6 in²/in



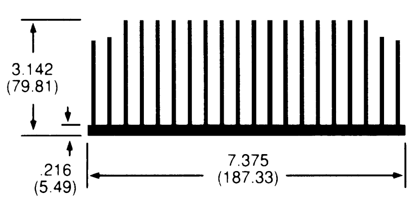
7

61915
2.9lb/ft
1.5°C/W/3in
47.9 in²/in



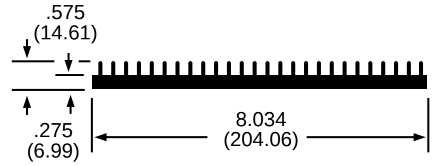
8

67690
6.6lb/ft
0.5°C/W/3in
129.6 in²/in



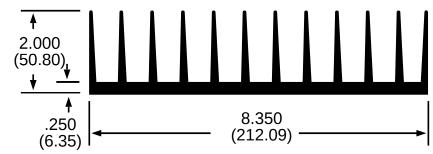
9

62805
3.1lb/ft
2.2°C/W/3in
32.2 in²/in



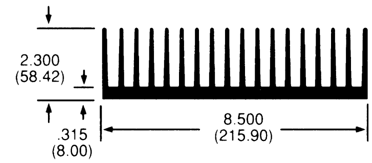
10

60815
6.0lb/ft
1.2°C/W/3in
56.8 in²/in



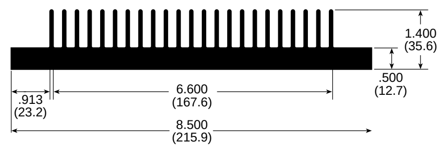
11

65345
9.0lb/ft
0.8°C/W/3in
86.3 in²/in



12

71390
6.78lb/ft
1.2°C/W/3in
58.1 in²/in

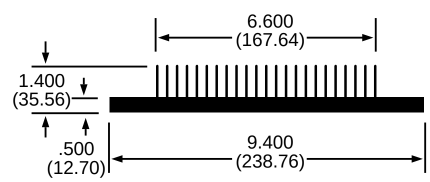


13

65615
9.0lb/ft
0.7°C/W/3in
104.5 in²/in

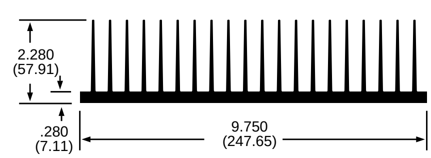
14

65335
7.3lb/ft
1.2°C/W/3in
59.7 in²/in



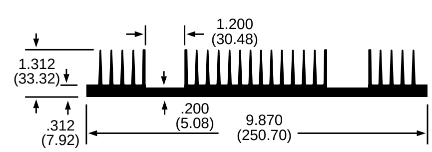
15

62725
7.1lb/ft
0.7°C/W/3in
100.1 in²/in



16

62030
5.6lb/ft
1.0°C/W/3in
66.9 in²/in



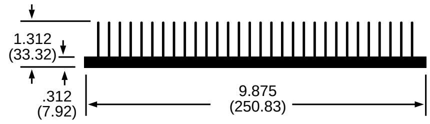
Electronic Enclosures

Multi-function extruded electronic enclosures improve product appearance, reduce packaging costs, and extend electronic system life. For more information, contact Aavid to request the Technical Design Guide for Electronic Enclosures.

Note: The profiles are not to scale in relation to each other. Standard commercial extrusion tolerances apply (see our full line catalog, page 96). Dimension in parenthesis are millimeters.

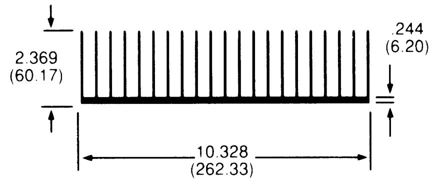
1

60520
6.7lb/ft
0.9°C/W/3in
80.4 in²/in



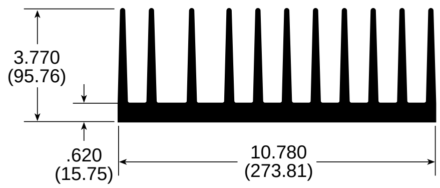
2

65525
8.1lb/ft
0.6°C/W/3in
108.9 in²/in



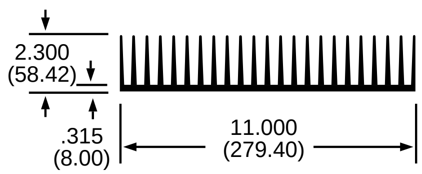
3

61785
16.4lb/ft
0.8°C/W/3in
92.1 in²/in



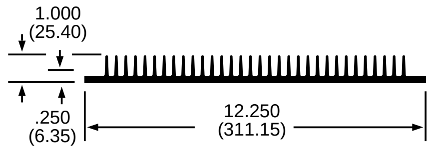
4

65340
11.8lb/ft
0.6°C/W/3in
110.4 in²/in



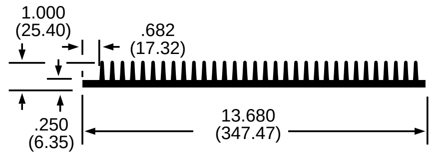
5

61155
7.0lb/ft
1.0°C/W/3in
73.0 in²/in



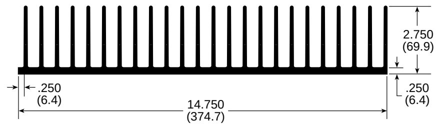
6

62645
8.7lb/ft
0.9°C/W/3in
75.9 in²/in



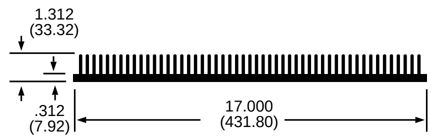
7

72545
11.9lb/ft
0.5°C/W/3in
144.8 in²/in



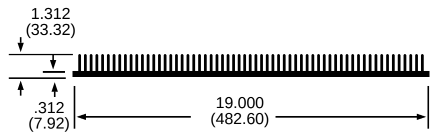
8

63340
10.4lb/ft
0.5°C/W/3in
136.6 in²/in



9

62335
11.6lb/ft
0.4°C/W/3in
160.6 in²/in



Performance vs. Length

The thermal resistance of a heat sink changes significantly with length. For example, to convert the published natural convection thermal resistance at a 3" length to a desired length, see page 35 for a length conversion table.

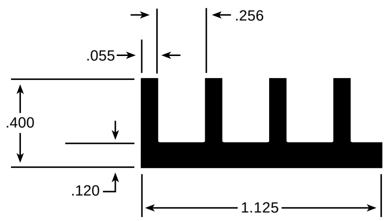
Note: The profiles are not to scale in relation to each other. Standard commercial extrusion tolerances apply (see our full line catalog, page 96). Dimension in parenthesis are millimeters.

HOW TO USE PUBLISHED DATA FOR EXTRUSION PROFILES

Each extrusion profile is described in a separate box along with its part number, dimensions, surface area (in^2/in), weight per foot of extrusion (lb/ft), and natural convection thermal resistance for a three inch length of extrusion (°C/W/3").

12

60270
4.7 in^2/in
0.2 lb/ft
14.9°C/W/3in



60270

The extrusion's five digit base part number is listed in the left hand corner.

In²/in

The perimeter of the cross-sectional profile of the extrusion is also the outside surface area per inch of length (in^2/in). The perimeter is used to predict the thermal resistance (θsa) in the forced convection applications. The performance factor table on page 35 provides thermal resistance of an extrusion using two variables; air velocity and extrusion length.

EXAMPLE: Extrusion #65810 has a perimeter of 26.2 in^2/in and will be cut to 4.0" long. The air flow is 600 LFM. Therefore, the performance factor is 18.70 (from the table using 600 LFM and 4.0") and its θsa is 0.71 ℃/W (18.70/26.2)

lb/ft

The weight of the extrusion in pounds per foot (lb/ft) is used as a relative indicator of extrusion cost when considering different extrusions for a particular application. This figure may also be used to calculate the cross-sectional surface area (in^2) of an extrusion.

Area (cross-section) = 1.18 x lb/ft

°C/W/3"

The theoretical thermal resistance (°C/W) for a three inch section of extrusion in natural convection is a calculated figure derived from surface area per inch of length (in^2/in), a sink-to-ambient temperature difference of 75°C, a black anodize finish, and a single point heat source mounted at the center of the three inch section (the length axis of the extrusion is vertical with respect to gravity).

TEMPERATURE CORRECTION CONSIDERATIONS

Since natural convection heat sink efficiency degrades with decreasing sink-to-ambient temperature differential, a correction factor must be applied to the published data if an application requires a sink-to-ambient temperature rise of less than 75°C. The corrected thermal resistance is obtained by multiplying published °C/W/3" data by the appropriate factor from the following table:

Temperature Rise (ΔTsa)	Correction Factor
75°C	1.000
70°C	1.017
60°C	1.057
50°C	1.106
40°C	1.170
30°C	1.257

For any extrusion profile in natural convection, the thermal resistance (°C/W) is more than 25% higher at ΔTsa = 30°C than at ΔTsa = 75°C.

LENGTH CORRECTION CONSIDERATIONS

The published extrusion data shows natural convection performance for a three inch section with a centrally located point source heat load. Because the heat load is assumed to be at a point rather than uniformly distributed, thermal resistance does not change linearly with length. (The ends of a very long extrusion would be cooler than the center and therefore the transfer of heat to the surrounding air is little, if any.) It is therefore necessary to apply a correction factor to published data for extrusion lengths shorter or longer than three inches. The corrected thermal resistance for different lengths
of extrusion is obtained by multiplying published °C/W/3" data by the appropriate factor from the following table: (see next page)

Length of Heat Sink	Correction Factor
1.0”	1.80
2.0”	1.25
3.0”	1.00
4.0”	0.87
5.0”	0.78
6.0”	0.73
7.0”	0.67
8.0”	0.64
9.0”	0.60
10.0”	0.58
11.0”	0.56
12.0”	0.54
13.0”	0.52
14.0”	0.51
15.0”	0.50

This table may also be used to determine the appropriate length of a preferred extrusion required to obtain a desired thermal resistance. Merely divide the desired thermal resistance by the published thermal resistance for a three inch section to obtain a correction factor.

EXAMPLE: Extrusion 62465 has a thermal resistance of 8.0 °C/W/3 inch. A five inch piece will have a thermal resistance of 6.24°C/W, using the appropriate length correction factor of 0.78 [i.e. 8.0°C/W x 0.78 = 6.24°C/W].

Since the thermal resistance of 6.24°C/W is at a temperature rise of 75°C, the resistance of the heat sink at a temperature rise of 50°C will be increased by the temperature correction factor of 1.106. There-fore the new natural convection thermal resistance is now 6.90°C/W [6.24°C/W x 1.106 = 6.90°C/W].

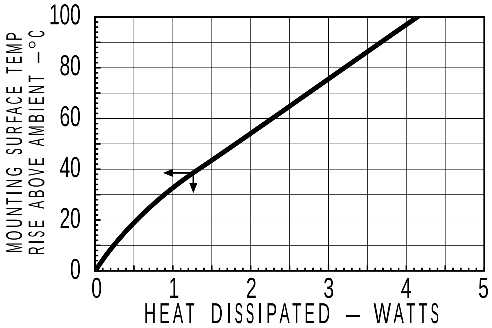
PERFORMANCE FACTOR TABLE

Extrusion Length (In.)	Natural Convection	Forced Convection, Air Velocity (Ft/Min) 100	200	300	400	500	600	700	800	900	1000	1100	1200
0.25	242.20	183.33	129.63	105.84	91.66	81.98	74.84	69.29	64.81	61.11	57.97	55.27	52.92
0.50	171.27	129.63	91.66	74.84	64.81	57.97	52.92	48.99	45.83	43.21	40.99	39.08	37.42
1.00	121.10	91.61	64.77	52.89	45.80	40.96	37.40	34.62	32.38	30.53	28.97	27.62	26.44
2.00	85.63	64.89	45.88	37.46	32.44	29.02	26.49	24.52	22.94	21.63	20.52	19.56	18.73
3.00	69.92	52.88	37.39	30.53	26.44	23.64	21.58	19.98	18.69	17.62	16.72	15.94	15.26
4.00	60.55	45.81	32.39	26.45	22.90	20.49	18.70	17.31	16.19	15.27	14.48	13.81	13.22
5.00	54.16	40.99	28.98	23.66	20.49	18.33	16.73	15.49	14.49	13.66	12.96	12.36	11.83
6.00	49.44	37.39	26.44	21.58	18.69	16.72	15.26	14.13	13.22	12.46	11.82	11.27	10.79
7.00	45.77	34.61	24.47	19.98	17.30	15.48	14.13	13.08	12.23	11.53	10.94	10.43	9.99
8.00	42.82	32.39	22.90	18.70	16.19	14.48	13.22	12.24	11.45	10.79	10.24	9.76	9.35
9.00	40.37	30.53	21.58	17.62	15.26	13.65	12.46	11.53	10.79	10.17	9.65	9.20	8.81
10.00	38.30	28.97	20.48	16.72	14.48	12.95	11.82	10.94	10.24	9.65	9.16	8.73	8.36
11.00	36.51	27.62	19.53	15.95	13.81	12.35	11.27	10.44	9.76	9.20	8.73	8.32	7.97
12.00	34.96	26.44	18.69	15.26	13.22	11.82	10.79	9.99	9.34	8.81	8.36	7.97	7.63
13.00	33.59	25.40	17.96	14.66	12.70	11.36	10.37	9.60	8.98	8.46	8.03	7.66	7.33
14.00	32.37	24.48	17.31	14.13	12.24	10.95	9.99	9.25	8.65	8.16	7.74	7.38	7.06

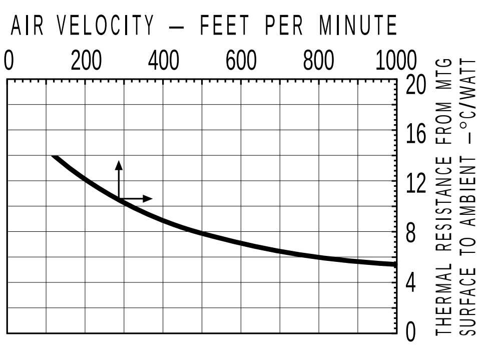
NOTE: For lengths and flow velocities not shown above, the equation $P.F. = \frac{916}{\sqrt{V \cdot L}}$ may be used.

READING A THERMAL PERFORMANCE GRAPH

The performance graphs in the catalog are actually a composite of two separate graphs which, as shown below, have been combined to save space on the page. The small arrows on each curve indicate to which axes the curve corresponds. Thermal graphs are published assuming the device to be cooled is properly mounted and the heat sink is in its normally used mounting position.



GRAPH A is used to show heat sink performance when used in a natural convection environment (i.e. without forced air). This graph starts in the lower left hand corner with the horizontal axis representing the heat dissipation (watts) and the vertical left hand axis representing the rise in heat sink mounting surface temperature above ambient (°C). By knowing the power to be dissipated, the temperature rise of the mounting surface can be predicted. Thermal resistance, in natural convection, is determined by dividing this temperature rise by the power input (°C/W).



GRAPH B is used to show heat sink performance when used in a forced convection environment (i.e. with forced air flow through the heat sink). This graph has its origin in the top right hand corner with the horizontal axis (top) representing air velocity over the heat sink (LFM) and the vertical right hand axis representing the thermal resistance of the heat sink (°C/W). Air velocity is calculated by dividing the output volumetric flow rate of the fan by the cross- sectional area of the outflow air passage.

$$\text{Velocity (LFM)} = \frac{\text{Volume (CFM)}}{\text{area (ft}^2\text{)}}$$

Although most fans are normally rated and compared at their free air delivery at zero back pressure, this is rarely the case in most applications. For accuracy, the volume of output must be derated by 60% to 80% for the anticipation of back pressure.

EXAMPLE: The output air volume of a fan is given as 80 CFM. The output area is 6 inches by 6 inches or 36 in^2 or .25 ft^2.

To find velocity:

$$\text{velocity} = \frac{80}{0.25} = 320$$

Velocity is 320 LFM, which at 80%, derates to 256 LFM.

EXAMPLE A: Aavid part number 579802 (see page 51) is to be used to dissipate 3 watts of power in natural convection. Because we are dealing with natural convection, we refer to the "A" part of the graph. Knowing that 3 watts are to be dissipated, follow the grid line to the curve and find that at 3 watts there is a temperature rise of 75°C. To get the thermal resistance, divide the temperature rise by the power dissipated, which yields 25°C/W.

EXAMPLE B: For the same application we add a fan which blows air over the sink at a velocity of 400 LFM.

The addition of a fan means that we are dealing with forced convection and therefore we refer to the "B" part of the graph. Knowing the air flow, the thermal resistance is taken from the graph. This resistance of 8.75°C/W is then multiplied by the power to be dissipated, 3 watts. This yields a temperature rise of 26.25°C.

The difference between the natural convection cooling and the forced air cooling at 400 feet/minute can be seen by comparing the thermal resistance of the heat sink in these environments, 25°C/W vs. 8.75°C/W respectively.

DESIGN ASSISTANCE

Aavid Thermal Technologies can assist in the design of heat sinks for both forced and natural convection applications. Aavid's technical staff can help in the selection of an existing "near" optimum extrusion from over 3,000 shapes that have been previously designed and tooled by Aavid Thermal Technologies or can design a new extrusion which best meets the requirements of the application.

Any thermal application needing an extruded heat sink should be thermally defined as explicitly as possible before an extrusion is selected or designed.

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