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# How to Use This Catalog

GENERAL INFORMATION



## TO-220 Heat Sinks

Icons indicate that a mounting kit, grease or epoxy can be used with the heat sink

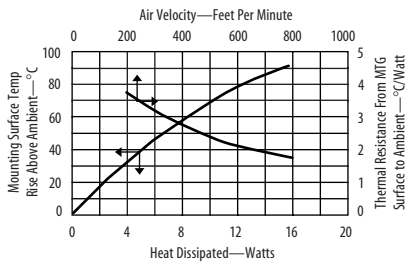


### 7022 Channel style heat sink with folded back fins

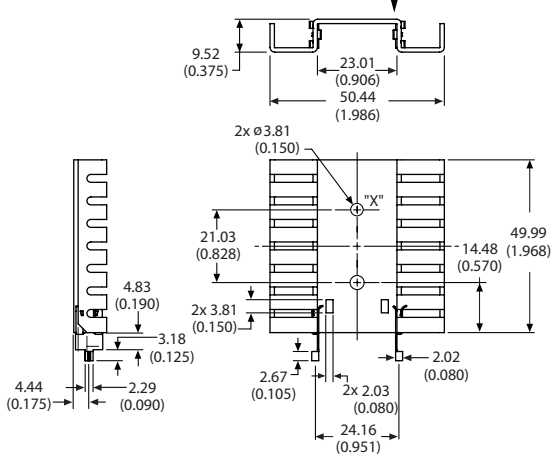
Semiconductor devices have been included in photos to assist in determining mounting position.



Thermal graphs show natural and forced convection based on black anodize finish. For information on how to use a thermal graph, please refer to page 11.



Mechanical Drawing Dimensions as shown are mm (inches)



Detailed description illustrates the heat sink's differentiating features.

Channel style heat sink with folded back fins for increased cooling surface area. Available with tin plated solderable tabs for easy attachment to the printed circuit card.

Ordering information will specify the base heat sink with available accessories.

Material and finish information is shown for each part

Material: 1.27 (0.050) Thick Aluminum  
Finish: See Table

#### ORDERING INFORMATION

Part Number	Description	Finish	Dia of PCB Plated Thru Hole for Tabs
7022B	Channel heat sink with folded back fins	Black anodize	
7022PB	Channel heat sink with folded back fins	Pre-black anodize*	
7022B-MT	With solderable tabs	Black anodize	2.90 ( 0.114)
7022PB-MT	With solderable tabs	Pre-black anodize*	2.90 ( 0.114)

\* Edges cut during the manufacturing process will be unfinished. See page XX for more information

#### POPULAR OPTIONS: 7022B-

Position	Code	Description	Location	Details
A	TC11-MT	Insulated device mounting clip for TO-220 and solderable tabs	Hole X	Page

For additional options see page xx

Aavid has a large selection of popular options to enhance your heat sink selection. This section will indicate the most popular options available.

Detailed indexes are available to select additional options.

## RoHS Compliance

Aavid is committed to meeting all aspects of the European Union directive for removal of Hazardous Substances (RoHS) on standard parts. As such, Aavid has denoted all RoHS compliant parts in red in the next INDEX section. Updates on converted RoHS parts will be circulated separately when available.













# Index by Device Cooled, Heat Sink Style, and Thermal Resistance

Part Number Thermal Resistance Board Mounting Page

## TO-220 CONTINUED

534002B02554	9.0	V	50
533202B02551	9.0	V	55
513202B02500	9.0	V	58
SW50-2	8.8	V	56
SW50-4	8.8	V	56
YB32-4	8.4	V	61
533302B02551	8.0	V	55
530002B02500	8.0	V	56
513302B02500	8.0	V	58
531302B02500	8.0	V	59
531302C02500	8.0	V	59
531202C02500	7.5	V	59
531202B02500	7.5	V	59
BW38-2	7.2	V	58
BW38-4	7.2	V	58
SW63-2	7.0	V	56
SW63-4	7.0	V	56
BW50-2	5.8	V	58
BW50-4	5.8	V	58
533702B02552	5.7	V	57
6396B	5.6	V	60
6396B-P2	5.6	V	60
532602B02500	5.5	V	50
529702B02500	5.5	V	56
533402B02552	5.0	V	57
532702B02500	4.8	V	50
BW63-2	4.7	V	58
BW63-4	4.7	V	58
529902B02500	4.5	V	56
533502B02552	4.5	V	57
6398B	4.4	V	60
6398B-P2	4.4	V	60
532802B02500	4.2	V	50
533602B02552	3.8	V	57
529802B02500	3.7	V	56
6399B	3.3	V	60
6399B-P2	3.3	V	60
6400B	2.7	V	60
6400B-P2	2.7	V	60
<b>Hat Section Heat Sinks</b>			
6237B	25.0	H	43
6237PB	25.0	H	43
TV96	24.0	H	53
7137D	20.8	V	42
7140D	20.8	H	42
506902B00000	20.0	V	42
TV97	20.0	H-V	53
507002B00000	15.6	H-V	42
507102B00000	15.6	H-V	42
507222B00000	9.6	H	42
<b>High Rise Style Heat Sinks</b>			
530102B00100	6.3	V	54
530102B00150	6.3	V	54
530802B05100	6.3	V	54
530802B05150	6.3	V	54
530402B00100	6.3	V	55
530402B00150	6.3	V	55
<b>Plug In Style Heat Sinks</b>			
576802B00000	27.3	V	52
576802C00000	27.3	V	52
576802U00000	27.3	V	52
576802B03100	27.3	H	52
576802C03100	27.3	H	52
576802U03100	27.3	H	52
576802B04000	27.3	V	52
576802C04000	27.3	V	52
576802U04000	27.3	V	52
591202B00000	26.8	H-V	51
591202B03100	26.8	H	51
591202B04000	26.8	V	51

Part Number Thermal Resistance Board Mounting Page

591302B00000	26.8	H-V	51
591302B02800	26.8	V	51
591302B04000	26.8	H	51
PF432	20.3	V	52
PF433	20.3	V	52
PF434	20.3	H	52
PF435	20.3	V	52
PF436	20.3	H	52
566902B00000	18.8	H-V	53
566902B03100	18.8	H	53
566902B04000	18.8	V	53
<b>Slide On Heat Sinks</b>			
574402B00000	23.2	H-V	45
574402B03200	23.2	H	45
574102B00000	23.2	H-V	45
574102B03300	23.2	V	45
574602B00000	21.6	H-V	45
574602B03300	21.6	V	45
574502B00000	21.2	H-V	45
574502B03300	21.2	V	45
574902B00000	16.0	H-V	45
574902B03300	16.0	V	45
<b>Snap Down Style Heat Sinks</b>			
575102B00000	16.8	H-V	46
579302B00000	16.8	V	46
579402B00000	16.8	V	46
<b>Space Saving Heat Sinks</b>			
542502B00000	24.0	H	49
542502D00000	24.0	H	49
592502B03400	22.0	V	49
592502U03400	22.0	V	49
6025D	17.9	V	48
6025B-TT	17.9	V	48
6022PB	16.7	V	47
6022B	16.7	V	47
6225B-MT	15.0	V	47
593202B03500	10.4	V	48
6232B-MT	10.0	V	48
6232PB-MT	10.0	V	48
6032B-TT	8.3	V	47
6032D	8.3	V	47
<b>Square Basket Heat Sink</b>			
569022B00000	5.5	H	43
<b>TO-247</b>			
<b>Dual Extruded Heat Sinks</b>			
533721B02552	5.7	V	57
533421B02552	5.0	V	57
533521B02552	4.5	V	57
533621B02552	3.8	V	57
<b>Dual High Rise Style Heat Sinks</b>			
530161B00162	4.4	V	54
530861B05162	4.4	V	54
<b>Extruded Heat Sinks</b>			
513001B02500	13.4	V	58
533001B02551	13.0	V	55
SW25-2	11.4	V	56
SW25-4	11.4	V	56
533101B02551	11.0	V	55
513101B02500	11.0	V	58
SW38-2	10.2	V	56
SW38-4	10.2	V	56
533201B02551	9.0	V	55
513201B02500	9.0	V	58
SW50-2	8.8	V	56
SW50-4	8.8	V	56
YB32-4	8.4	V	61
533301B02551	8.0	V	55

Part Number Thermal Resistance Board Mounting Page

530001B02500	8.0	V	56
513301B02500	8.0	V	58
BW38-2	7.2	V	58
BW38-4	7.2	V	58
SW63-2	7.0	V	56
SW63-4	7.0	V	56
6380B	6.8	V	60
BW50-2	5.8	V	58
BW50-4	5.8	V	58
6381B	5.8	V	60
533701B02552	5.7	V	57
6396B	5.6	V	60
6396B-P2	5.6	V	60
529701B02500	5.5	V	56
533401B02552	5.0	V	57
6374B	5.0	V	61
BW63-2	4.7	V	58
BW63-4	4.7	V	58
529901B02500	4.5	V	56
533501B02552	4.5	V	57
6398B	4.4	V	60
6398B-P2	4.4	V	60
6382B	4.2	V	60
533601B02552	3.8	V	57
529801B02500	3.7	V	56
6399B	3.3	V	60
6399B-P2	3.3	V	60
6400B	2.7	V	60
6400B-P2	2.7	V	60
<b>Hat Section Heat Sinks</b>			
TV96	24.0	H	53
TV97	20.0	H-V	53
<b>High Rise Style Heat Sinks</b>			
530101B00100	6.3	V	54
530101B00150	6.3	V	54
530801B05100	6.3	V	54
530801B05150	6.3	V	54
530401B00100	6.3	V	55
530401B00150	6.3	V	55

## TO-262

<b>Plug In Style Heat Sinks</b>			
576802B00000	27.3	H-V	52
576802C00000	27.3	H-V	52
576802U00000	27.3	H-V	52
576802B03100	27.3	H	52
576802C03100	27.3	H	52
576802U03100	27.3	H	52
576802B04000	27.3	V	52
576802C04000	27.3	V	52
576802U04000	27.3	V	52
591202B00000	26.8	H-V	51
591202B03100	26.8	H	51
591202B04000	26.8	V	51
591302B00000	26.8	H-V	51
591302B02800	26.8	V	51
591302B04000	26.8	H	51
566902B00000	18.8	H-V	53
566902B03100	18.8	H	53
566902B04000	18.8	V	53
PF432	20.3	V	52
PF433	20.3	V	52
PF434	20.3	H	52
PF435	20.3	V	52
PF436	20.3	H	52



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, T<sub>j</sub>, 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, T<sub>a</sub>, 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 (LFM), must be known.

### BASIC FORMULAS:

Heat is a form of energy that flows from a higher temperature location (i.e. the semiconductor junction at T<sub>j</sub>) to a lower temperature location (i.e. the surrounding ambient air at T<sub>a</sub>). In semiconductor devices, heat will flow from the device to 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:

$$\theta_{ja} = \frac{T_j - T_a}{Q}$$

where θ is the thermal resistance in degrees C per watt, and where j<sub>a</sub> 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, θ<sub>ja</sub>, 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, θ<sub>jc</sub>, to account for the thermal path across the internal structure of the device,
- 2) the case-to-sink resistance, θ<sub>cs</sub>, which is also called the interface resistance, to account for the path across the interface between the device and the heat sink,
- 3) the sink-to-ambient resistance, θ<sub>sa</sub>, 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, θ<sub>cs</sub> and θ<sub>sa</sub>. Therefore, for a device with a known θ<sub>jc</sub> obtained from the device manufacturer's data book, θ<sub>cs</sub> and θ<sub>sa</sub> 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 between the case and the heat sink is dependent on four variables: the thermal resistivity of the interface material (ρ °C,W-inch), the average material thickness (t, inches), the area of the thermal contact footprint (A, inch<sup>2</sup>), and the ability to replace voids due to finish or flatness (sink or chip) with a better conductor than air. 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:

$$\rho = \frac{273.2}{k} \quad \text{when } k \text{ is in units of } \frac{\text{Btu} \cdot \text{inch}}{\text{hr} \cdot \text{ft}^2 \cdot ^\circ\text{F}}$$

### 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

Note: These values do not take into account the contact resistance that will depend on the filling of voids with the interface material. i.e. copper is much more conductive than grease, but grease is used since copper will not flow to fill in the voids that may be present.

Once the θ<sub>cs</sub> is calculated, the required thermal resistance from the sink to ambient (θ<sub>sa</sub>) is easily calculated by the following equation:

$$\theta_{sa} = \frac{T_j - T_a}{Q} (\theta_{jc} + \theta_{cs})$$

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.

# How To Select a Heat Sink

## Example A

Given: TO-220 case style to dissipate 5 watts:

$$R_{\theta JC} = 3.0^{\circ}\text{C/watt}$$

$$T_j \text{ max} = 150^{\circ}\text{C}$$

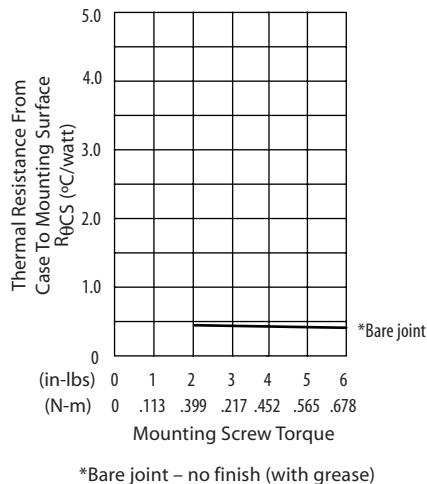
$$T_a \text{ max} = 50^{\circ}\text{C}$$

Find: The proper heat sink to keep the semiconductor junction from exceeding 150°C in natural convection.

### Equation:

$$P_D = \frac{T_j - T_a}{R_{\theta JC} + R_{\theta CS} + R_{\theta SA}}$$

Assume the device is mounted with Thermalcote™<sup>1</sup> without an insulator. The thermal resistance from case to mounting surface can be obtained from this figure below:



$R_{\theta CS} = 0.5 \text{ C/Watt}$  at 0.678 Nm (Newton meter) or 6in. – lbs mounting screw torque, therefore:

$$R_{\theta SA} = \frac{150^{\circ}\text{C} - 50^{\circ}\text{C}}{5 \text{ Watts}} = 3.5 \quad R_{\theta SA} = 16.5^{\circ}\text{C/Watt}$$

Part number 6022 on page 47 at 5 watts power dissipation has a mounting surface temperature of 80° C above ambient, therefore:

$$R_{\theta SA} = \frac{80^{\circ}\text{C}}{5 \text{ watts}} = 16^{\circ}\text{C/Watt}$$

which meets this requirement of natural convection.

## Example B

T0-220 to dissipate 13 watts:

$$T_j \text{ Max} = 150^{\circ}\text{C}$$

$$T_a \text{ max} = 50^{\circ}\text{C}$$

$$\theta_{jc} = 3.0^{\circ}\text{C/W}$$

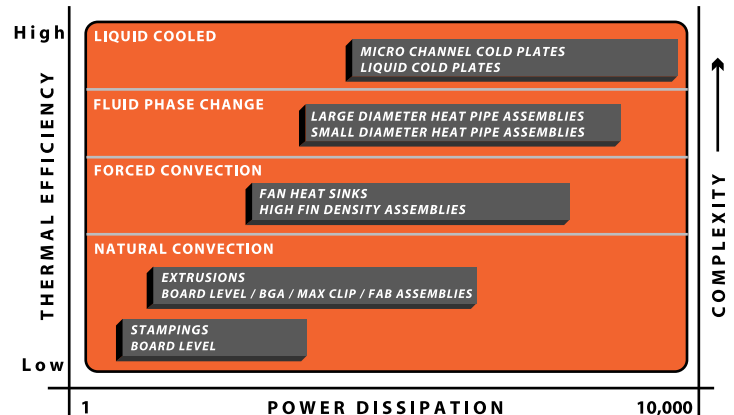
$$\text{Air Velocity} = 400\text{ft/min}$$

Find a suitable heat sink

Assume the use of a Kon-Dux™<sup>2</sup> pad with a torque of 2 in-lb. From Aavid's data for this type of semiconductor, we know that  $\theta_{cs} = 0.5^{\circ}\text{C/W}$ .

Using the formula above, you will find that Aavid 504222 (see page 39) has a thermal resistance of 4.0° C/Watt at an air velocity of 400 ft/min and therefore will comply with the requirements.

## Technical Capabilities



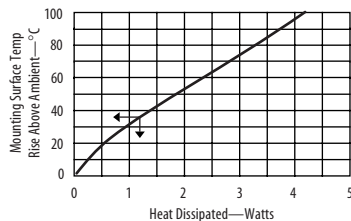
There are 4 primary cooling mechanisms that Aavid Thermalloy takes pride in having expertise and technical capabilities in. The cooling mechanisms include: Natural Convection, Forced Convection, Fluid Phase Change, and Liquid Cooled. This Standard Product Catalog focuses on displaying products that dissipate heat at the board level and various options that can assist in overall performance. The above graph illustrates where the board level products fall in terms of power dissipation and can assist as a starting point to gauge what type of products can be used for your system configuration. For further information related to our other cooling mechanisms, please contact Aavid Thermalloy at [www.aavidthermalloy.com](http://www.aavidthermalloy.com).

1. See page 113 for information on Thermalcote™

2. See page 86 for information on Kon-Dux™ Pads

The performance graphs you will see in this catalog (See graph 579802) are actually a composite of two separate graphs which have been combined to save space. The small arrows on each curve indicate to which axis the curve corresponds. Thermal graphs are published assuming the device to be cooled is properly mounted and the heat sink is in its recommended mounting position.

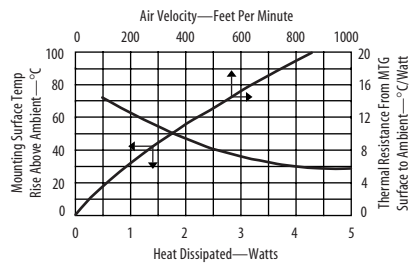
GRAPH A



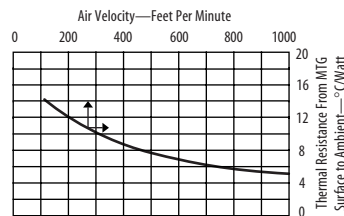
**GRAPH A** is used to show heat sink performance when used in a natural convection environment (i.e. without forced air). This graph starts in the lower left hand corner with the horizontal axis representing the heat dissipation (watts) and the vertical left hand axis representing the rise in heat sink 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).

**EXAMPLE A:** Aavid Thermalloy part number 579802 is to be used to dissipate 3 watts of power in natural convection. Because we are dealing with natural convection, we refer to graph "A". 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.

579802



GRAPH B



**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 representing air velocity over the heat sink LFM<sup>1</sup> and the vertical 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.

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

**EXAMPLE B:** For the same application we add a fan which blows air over the heat sink at a velocity of 400 LFM. The addition of a fan indicates the use of forced convection and therefore we refer to graph "B". This resistance of 9.50°C/W is then multiplied by the power to be dissipated, 3 watts. This yields a temperature rise of 28.5°C.

## CONVERTING VOLUME TO VELOCITY

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

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 60% - 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<sup>2</sup> or 25 ft<sup>2</sup>. To find velocity:

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

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

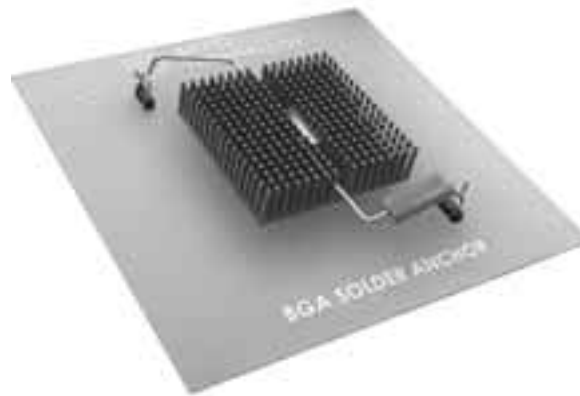
## DESIGN ASSISTANCE

Aavid Thermalloy can assist in the design of heat sinks for both forced and natural convection applications. Contact us for help with your next thermal challenge. For more information, visit our web site at: [www.aavidthermalloy.com](http://www.aavidthermalloy.com)

1. Linear feet per minute  
2. Cubic feet per minute

## Solder anchor attachment

Aavid's unique Solder Anchor attachment method uses two or four small Solder Anchors attached to the circuit card and a wire spring clip to securely fasten the heat sink to the device. This method is rugged, compact and allows for easy removal in case of rework. All products include a phase change pad to optimize thermal performance. Suitable for most IC package styles. Models are available with a single or dual spring clips for additional thermal interface pressure. Solder Anchors are ordered separately.



### ORDERING INFORMATION

IC Pkg Size (mm)	IC Pkg Style	Part Number	"W" (mm)	"L" (mm)	"H" (mm)	"A" (mm)	Øn <sup>1</sup>	Øf <sup>2</sup>	Finish	Fig. <sup>4</sup>	PCB Fig. <sup>4</sup> #Anchors <sup>3</sup>
23 x 23	All	374024B60023	23.00	23.00	10.00	49.70	40.00	11.69	Black anodize	1	A 2
23 x 23	All	374124B60023	23.00	23.00	18.00	49.70	23.40	7.39	Black anodize	1	A 2
23 x 23	All	374224B60023	23.00	23.00	25.00	49.70	19.70	6.37	Black anodize	1	A 2
27 x 27	All	374324B60023	27.00	27.00	10.00	49.70	30.60	9.35	Black anodize	1	A 2
27 x 27	All	374424B60023	27.00	27.00	18.00	49.70	20.30	6.46	Black anodize	1	A 2
27 x 27	All	374524B60023	27.00	27.00	25.00	49.70	16.50	5.47	Black anodize	1	A 2
35 x 35	Flip Chip	10-5634-01	31.00	34.90	23.00		11.50	4.20	Black anodize	2	C 2
35 x 35	Flip Chip	10-THMA-01	31.00	34.90	35.00		10.70	3.95	Black anodize	2	C 2
35 x 35	All	374624B60024	35.00	35.00	10.00	62.30	23.40	7.55	Black anodize	1	B 2
35 x 35	All	374724B60024	35.00	35.00	18.00	62.30	15.30	5.15	Black anodize	1	B 2
35 x 35	All	374824B60024	35.00	35.00	25.00	62.30	12.00	4.27	Black anodize	1	B 2
37.5 x 37.5	Flip Chip	10-BRD2-01	35.70	37.30	23.00		11.50	4.20	Clear anodize	2	B 2
37.5 x 37.5	Flip Chip	10-BRD1-01	37.50	37.50	23.00		10.10	3.83	Black anodize	2	B 2
37.5 x 37.5	Flip Chip	10-BRD1-03	37.50	37.50	23.00		10.10	3.83	Black anodize	3	D 4
37.5 x 37.5	Flip Chip	10-BRD1-04	37.50	37.50	23.00		10.10	3.83	Black anodize	2	B 2
37.5 x 37.5	Flip Chip	10-BRD1-05	37.50	37.50	23.00		10.10	3.83	Clear anodize	3	D 4
37.5 x 37.5	Flip Chip	10-BRD1-07	37.50	37.50	23.00		10.10	3.83	Clear anodize	2	B 2
40 x 40	All	374924B60024	40.00	40.00	10.00	62.30	20.30	6.46	Black anodize	1	B 2
40 x 40	All	375024B60024	40.00	40.00	18.00	62.30	12.20	4.34	Black anodize	1	B 2
42 x 40	All	375124B60024	40.00	40.00	25.00	62.30	10.30	3.83	Black anodize	1	B 2
42.5 x 42.5	Flip Chip	10-CLS1-01	42.30	42.30	23.00		8.80	3.51	Black anodize	2	E 2
42.5 x 42.5	Flip Chip	10-CLS2-01	42.30	42.30	35.00		8.30	3.44	Black anodize	2	E 2

1. Natural convection thermal resistance based on a 75° C heat sink temperature rise.
2. Force convection thermal resistance based on an entering 1.0 m/s (200LFM) airflow.
3. Solder Anchors are sold separately refer to Figure 4 on page 13
4. Solder Anchor mechanical drawings and board mounting drawings see page 13

## Solder Anchor heat sinks mechanical drawings

FIGURE 1

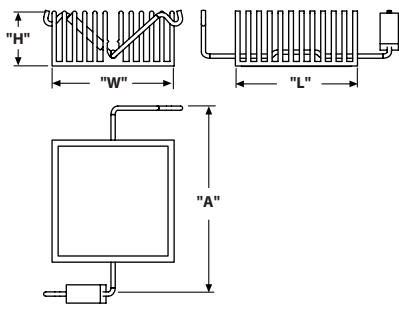


FIGURE 2

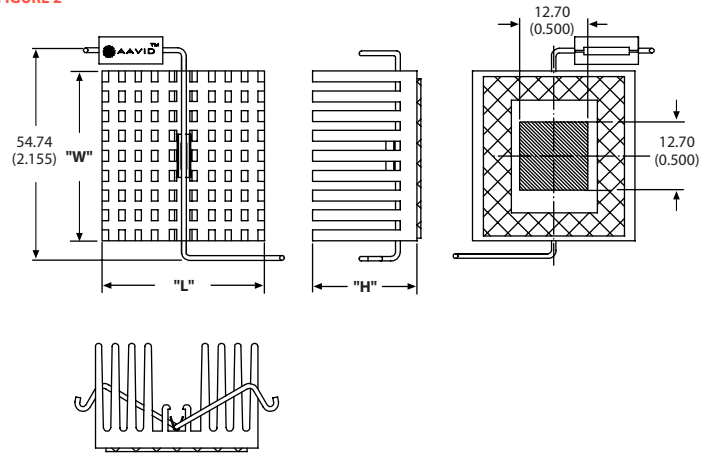


FIGURE 3

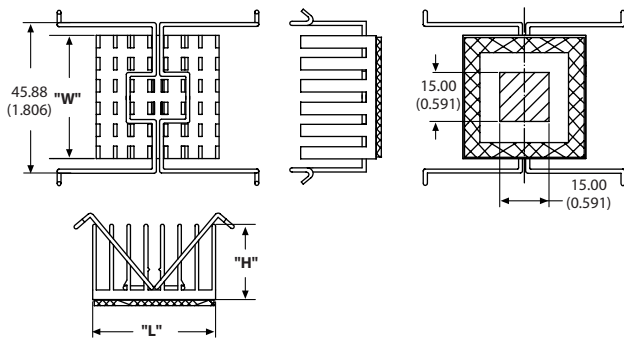
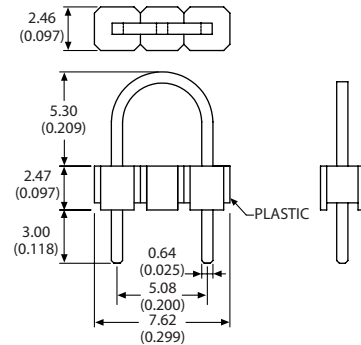


FIGURE 4

Solder anchor  
part number DO57



## Board mounting pattern information for solder anchor heat sinks

FIGURE A

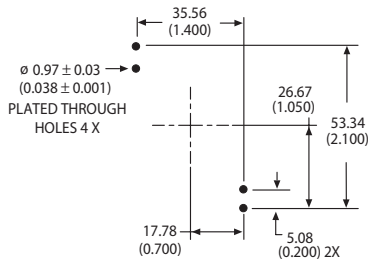


FIGURE B

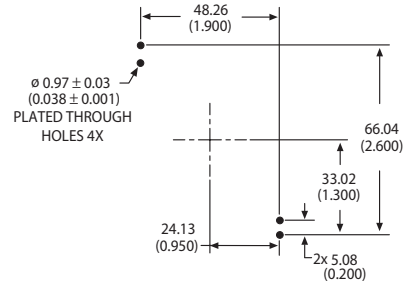


FIGURE C

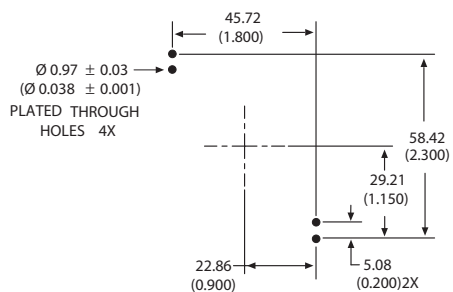


FIGURE D

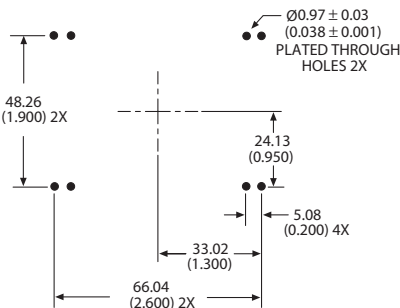
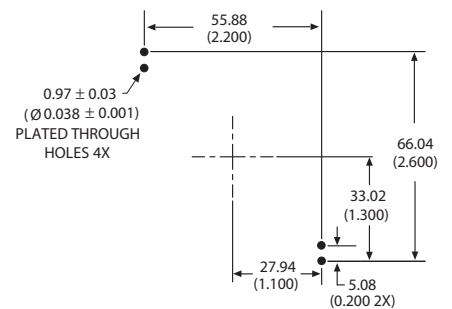


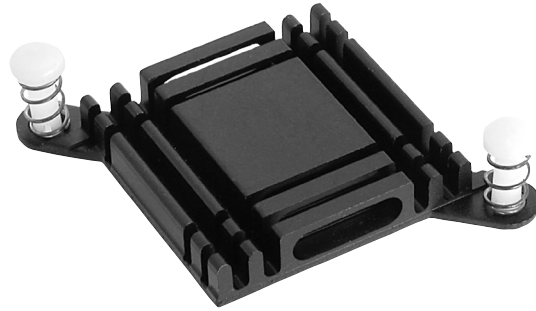
FIGURE E





## Push pin attachment

Push pin heat sinks require two 3.10mm holes in the circuit card to quickly attach the heat sink over the device. The one piece design makes assembly a snap. Pressure is maintained by the tension of the push pin coil springs to ensure even pressure across the device. Push pins provide a greater margin of reliability in applications where gravity or vibration may cause tapes or adhesives to fail. The addition of a phase change pad optimizes thermal performance.



### ORDERING INFORMATION

IC Pkg. Size (mm)	Part Number	"W" (mm)	"L" (mm)	"H" (mm)	"S" (mm)	"T" (mm)	$\theta_{n^2}$	$\theta_{f^3}$	Finish	Fig.	PCB Fig. <sup>1</sup>	Pin Style	Pad
28 x 28	10-6326-27	28.00	28.00	6.00	46.60	6.50	44.10	13.13	Black anodize	1	A	Plastic	Yes
28 x 28	10-6326-28	28.00	28.00	6.00	46.60	6.50	44.10	13.13	Black anodize	1	A	Brass	Yes
28 x 28	10-6327-01	28.50	28.50	10.00	46.60	7.00	30.60	9.26	Black anodize	2	A	Plastic	No
35 x 35	10-TNT2-01	36.10	48.00	11.60		6.50	18.80	6.13	Black anodize	3	D	Plastic	No
37.5 x 37.5	10-5597-02	37.40	37.40	6.00	59.00	6.50	33.30	9.91	Green anodize	5	B	Plastic	No
37.5 x 37.5	10-5597-22	37.40	37.40	6.00	59.00	6.50	33.30	9.91	Gold anodize	5	B	Plastic	Yes
37.5 x 37.5	10-5597-33	37.40	37.40	6.00	59.00	6.50	33.30	9.91	Gold anodize	5	B	Brass	Yes
37.5 x 37.5	10-5607-04	37.40	37.40	10.00	59.00	7.00	22.10	6.99	Black anodize	5	B	Plastic	Yes
37.5 x 37.5	10-5607-05	37.40	37.40	10.00	59.00	7.00	22.10	6.99	Black anodize	5	B	Brass	Yes
37.5 x 37.5	372924M02000	37.40	37.40	6.00	59.00	6.50	32.60	9.91	Green anodize	5	B	Plastic	No
45 x 45	10-L4LB-03	45.20	41.40	11.89	58.80	8.00	16.70	5.60	Black anodize	4	C	Plastic	Yes
45 x 45	10-L4LB-05	45.20	41.40	11.89	58.80	8.00	16.70	5.60	Black anodize	4	C	Brass	Yes
45 x 45	10-L4LB-11	45.20	41.40	11.70	58.80	8.00	14.20	4.91	Black anodize	4	C	Plastic	No

1. Push pin mechanical drawings and board mounting drawings see page 15
2. Natural convection thermal resistance based on a 75° C heat sink temperature rise.
3. Force convection thermal resistance based on an entering 1.0 m/s (200LFM) airflow.

## Mechanical drawings

FIGURE 1

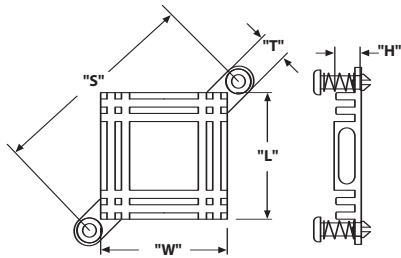


FIGURE 2

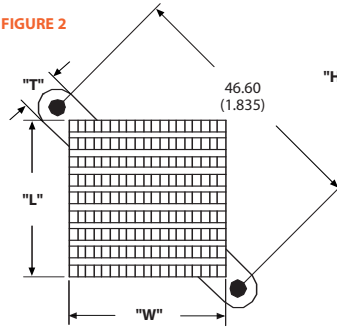


FIGURE 3

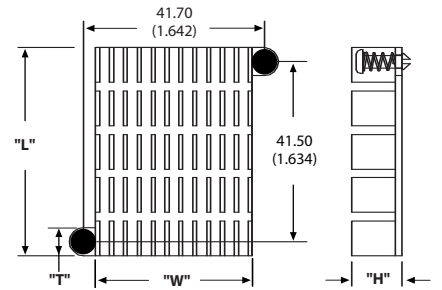


FIGURE 4

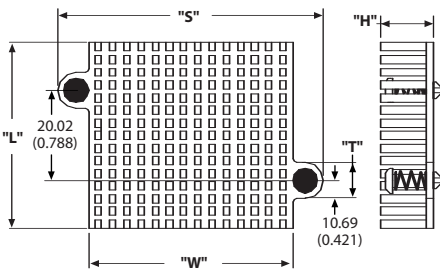
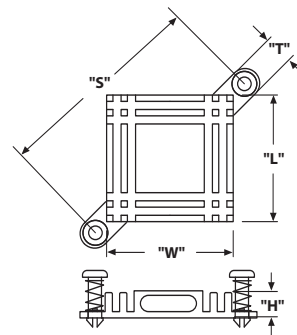


FIGURE 5



## Board mounting pattern information

FIGURE A

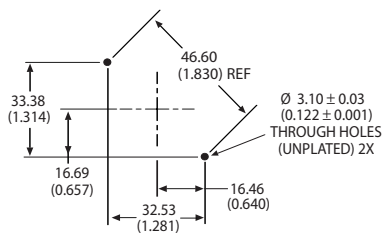


FIGURE B

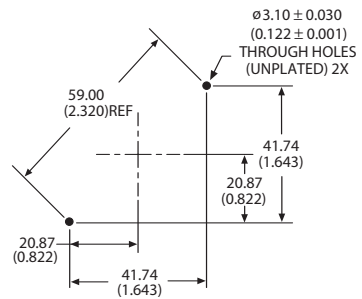


FIGURE C

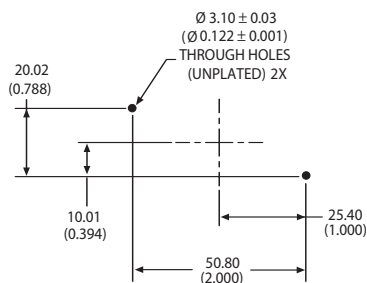
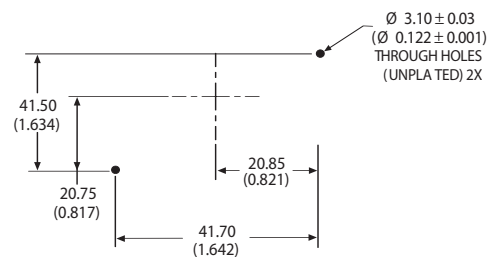
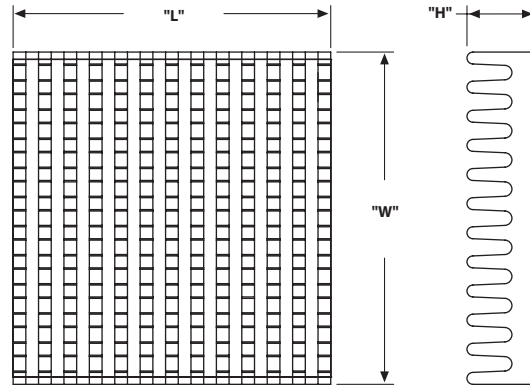
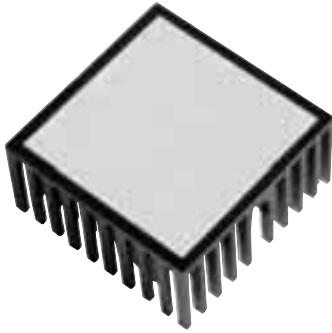


FIGURE D



## Tape attachment



Material: Aluminum

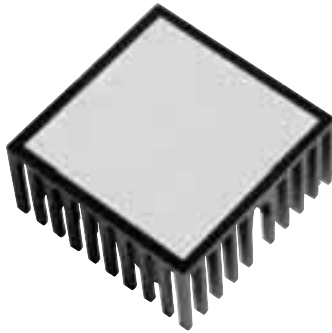
Pressure sensitive, thermally conductive adhesive tape easily and reliably bonds a heat sink to an integrated circuit package. Tapes provide high thermal conductivity and exceptional bonding properties. Adhesives are formulated for plastic and metal/ceramic packages.

### ORDERING INFORMATION

IC Pkg. Size (mm)	IC Pkg. Style	Part Number	"W" (mm)	"L" (mm)	"H" (mm)	$\theta_{n^2}$	$\theta_F$	Finish	Tape code <sup>1</sup>
10 x 10	Plastic	375324B00035	10.20	10.20	10.20	71.40	21.20	Black anodize	35
10 x 10	Metal / Ceramic	375224B00032	10.20	11.10	10.20	71.40	21.20	Black anodize	32
15 x 15	Plastic	375424B00034	15.20	15.20	6.40	62.50	17.60	Black anodize	34
23 x 23	Metal / Ceramic	374024B00032	23.00	23.00	10.00	40.00	11.69	Black anodize	32
23 x 23	Plastic	374024B00035	23.00	23.00	10.00	40.00	11.69	Black anodize	35
23 x 23	Metal / Ceramic	374124B00032	23.00	23.00	18.00	23.40	7.39	Black anodize	32
23 x 23	Plastic	374124B00035	23.00	23.00	18.00	23.40	7.39	Black anodize	35
23 x 23	Metal / Ceramic	374224B00032	23.00	23.00	25.00	19.70	6.370	Black anodize	32
23 x 23	Plastic	374224B00035	23.00	23.00	25.00	19.70	6.370	Black anodize	35
25 x 25	Metal / Ceramic	335224B00032	25.00	25.00	9.90	34.00	10.39	Black anodize	32
25 x 25	Plastic	335224B00034	25.00	25.00	9.90	34.00	10.39	Black anodize	34
27 x 27	Metal / Ceramic	335324B00032	26.90	26.90	11.40	27.70	8.71	Black anodize	32
27 x 27	Metal / Ceramic	374324B00032	27.00	27.00	10.00	30.60	9.35	Black anodize	32
27 x 27	Plastic	374324B00035	27.00	27.00	10.00	30.60	9.35	Black anodize	35
27 x 27	Metal / Ceramic	374424B00032	27.00	27.00	18.00	20.30	6.46	Black anodize	32
27 x 27	Plastic	374424B00035	27.00	27.00	18.00	20.30	6.46	Black anodize	35
27 x 27	Metal / Ceramic	374524B00032	27.00	27.00	25.00	16.50	5.47	Black anodize	32
27 x 27	Plastic	374524B00035	27.00	27.00	25.00	16.50	5.47	Black anodize	35
28 x 28	Metal / Ceramic	373024B00032	27.90	27.90	8.89	33.30	10.00	Black anodize	32
28 x 28	Plastic	373024B00034	27.90	27.90	8.90	33.30	10.00	Black anodize	34
28 x 28	Metal / Ceramic	373224M00032	28.00	28.00	6.00	44.10	13.13	Green anodize	32
28 x 28	Plastic	2327B-CP50	27.90	28.10	15.20	23.40	7.43	Black anodize	34
28 x 28	Metal / Ceramic	2327B-TACH	27.90	28.10	15.20	23.40	7.43	Black anodize	32
31 x 31	Metal / Ceramic	335724B00032	30.10	30.10	6.60	35.70	10.84	Black anodize	32
31 x 31	Metal / Ceramic	335824B00032	30.00	30.00	9.40	29.40	9.11	Black anodize	32
31 x 31	Plastic	335824B00034	30.00	30.00	9.40	29.40	9.11	Black anodize	34

1. For tape specifications see page 88
2. Natural convection thermal resistance based on a 75° C heat sink temperature rise.
3. Force convection thermal resistance based on an entering 1.0 m/s (200LFM) airflow.

## Tape attachment



### ORDERING INFORMATION

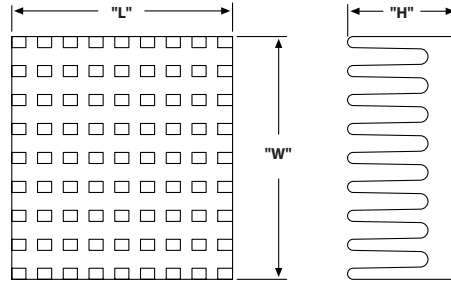
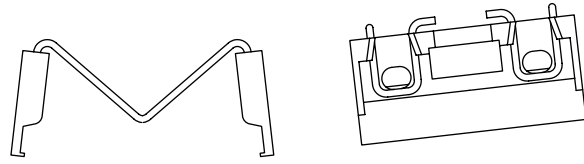
IC Pkg. Size (mm)	IC Pkg. Style	Part Number	"W" (mm)	"L" (mm)	"H" (mm)	Øn <sup>2</sup>	Ø <sup>2</sup>	Finish	Tape Code <sup>1</sup>
32.5 x 32.5	Metal / Ceramic	2338B-TACH	33.00	31.40	12.50	23.10	7.23	Black anodize	32
35 x 35	Metal / Ceramic	371824B00032	35.00	35.00	7.00	31.90	9.67	Black anodize	32
35 x 35	Plastic	371824B00034	35.00	35.00	7.00	31.90	9.67	Black anodize	34
35 x 35	Metal / Ceramic	374624B00032	35.00	35.00	10.00	23.40	7.55	Black anodize	32
35 x 35	Plastic	374624B00035	35.00	35.00	10.00	23.40	7.55	Black anodize	35
35 x 35	Metal / Ceramic	374724B00032	35.00	35.00	18.00	15.30	5.15	Black anodize	32
35 x 35	Plastic	374724B00035	35.00	35.00	18.00	15.30	5.15	Black anodize	35
35 x 35	Metal / Ceramic	374824B00032	35.00	35.00	25.00	12.00	4.27	Black anodize	32
35 x 35	Plastic	374824B00035	35.00	35.00	25.00	12.00	4.27	Black anodize	35
35 x 35	Metal / Ceramic	372024B00032	35.00	35.00	27.90	11.90	4.28	Black anodize	32
35 x 35	Plastic	372024B00034	35.00	35.00	27.90	11.90	4.28	Black anodize	34
37.5 x 37.5	Metal / Ceramic	373324M00032	37.40	37.40	6.00	32.60	9.91	Green anodize	32
37.5 x 37.5	Metal / Ceramic	2319B-TACH405	38.10	38.10	10.16	12.50	3.50	Black anodize	32
37.5 x 37.5	Metal / Ceramic	336624B00032	38.10	38.10	16.00	15.30	5.15	Black anodize	32
40 x 40	Metal / Ceramic	374924B00032	40.00	40.00	10.00	20.30	6.46	Black anodize	32
40 x 40	Plastic	374924B00035	40.00	40.00	10.00	20.30	6.46	Black anodize	35
40 x 40	Metal / Ceramic	364424B00032	40.10	40.00	11.40	18.40	6.02	Black anodize	32
40 x 40	Plastic	364424B00034	40.10	40.00	11.40	18.40	6.02	Black anodize	34
40 x 40	Metal / Ceramic	375024B00032	40.00	40.00	18.00	12.20	4.34	Black anodize	32
40 x 40	Plastic	375024B00035	40.00	40.00	18.00	12.20	4.34	Black anodize	35
40 x 40	Metal / Ceramic	375124B00032	40.00	40.00	25.00	10.30	3.83	Black anodize	32
40 x 40	Plastic	375124B00035	40.00	40.00	25.00	10.30	3.83	Black anodize	35
42.5 x 42.5	Metal / Ceramic	2321B-TACH	43.20	41.30	8.90	22.10	6.93	Black anodize	32
42.5 x 42.5	Metal / Ceramic	2332B-TACH	43.20	41.30	16.50	12.90	4.53	Black anodize	32
45 x 45	Metal / Ceramic	2342B-TACH	45.70	44.60	7.00	23.10	7.26	Black anodize	32

1. For tape specifications see page 88

2. Natural convection thermal resistance based on a 75° C heat sink temperature rise.

3. Force convection thermal resistance based on an entering 1.0 m/s (200LFM) airflow.

## Clip attachment



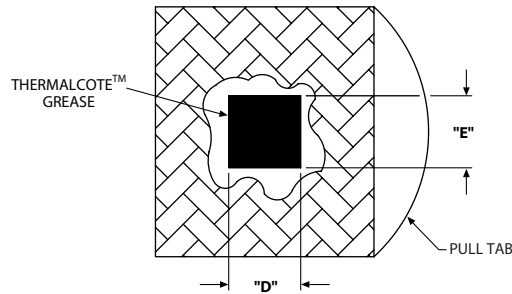
Material: Aluminum  
Finish: Black Anodize

Aavid's BGS Clip heat sinks provide a mechanical attachment alternative to tape applications where it is desirable to attach the heat sink directly to the device. The unique clip uses spring pressure to ensure even contact across the device while the end plates firmly engage the edge of the package, locking the heat sink in place. Each heat sink uses pre-applied thermal grease for optimum thermal performance.

### ORDERING INFORMATION

IC Pkg. Size (mm)	Part Number	"W" (mm)	"L" (mm)	"H" (mm)	IC Pkg. Style	$\theta_n^1$	$\theta_f^2$	Interface	Clip <sup>3</sup>
27 x 27	2317B-EP11-BGS1	26.14	20.47	15.24	All	32.60	9.94	EP11	BGS1
35 x 35	2518B-EP11-BGS2	30.50	28.10	15.60	All	22.70	7.05	EP11	BGS2
42.5 X 42.5	2519B-EP11-BGS5	34.50	31.40	15.60	All	19.70	6.30	EP11	BGS5
42.5 X 42.5	2520B-EP04-BGS5	38.10	38.00	15.60	All	15.60	5.17	EP04	BGS5
42.5 X 42.5	2522B-EP04-BGS5	38.10	38.00	10.16	All	22.10	6.94	EP04	BGS5

1. Natural convection thermal resistance based on a 75° C heat sink temperature rise.
2. Force convection thermal resistance based on an entering 1.0 m/s (200LFM) airflow.
3. For BGS features, see page 20.



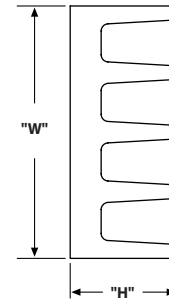
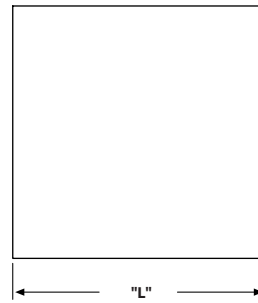
### TAPE TYPE AND INTERFACE MATERIAL INFORMATION

Material	Description	Adhesive	Thermal Resistance	Color	Carrier	"D" Dim	"E" Dim
EP11	Thermalcote™ grease with release liner	None	0.18	White	None	13.34 (0.525)	13.34 (0.525)
EP04	Thermalcote™ grease with release liner	None	0.03	White	None	31.75 (1.250)	31.75 (1.250)

NOTE: For BGS features, see page 20.  
For more information on Thermalcote™ see page 113.



Bi Directional



Material: Aluminum

Designed for application with airflow traveling in a single direction, these heat sinks are suitable for a variety of standard square IC packages. Models are available with pre applied thermal tape for easy attachment to the IC. Epoxy attach models are also available.

ORDERING INFORMATION

IC Pkg Size	IC Pkg Style	Part Number	"W" (mm)	"L" (mm)	"H" (mm)	θn <sup>3</sup>	Finish	Attachment	Tape Code <sup>2</sup>
10 X 10	ALL	615653B00250	6.00	6.00	5.00	142.58	Black anodize	Epoxy <sup>1</sup>	N/A
10 X 10	ALL	709203B00400	10.00	10.00	10.00	55.98	Black anodize	Epoxy <sup>1</sup>	N/A
24 X 24	Metal	335114B00032	24.00	24.00	24.00	13.60	Black anodize	Tape	32
25 X 25	Metal	335214B00032	25.00	25.00	10.00	10.00	Black anodize	Tape	32
25 X 25	Metal	335211B00032	25.00	25.00	10.00	10.00	Black anodize	Tape	32
25 X 25	ALL	335214B00000	25.00	25.00	10.00	10.00	Black anodize	Epoxy <sup>1</sup>	N/A
25 X 25	ALL	335211B00000	25.00	25.00	10.00	10.00	Black anodize	Epoxy <sup>1</sup>	N/A
25 X 25	Plastic	335214B00034	25.00	25.00	10.00	10.00	Black anodize	Tape	34
27 X 27	Plastic	335314B00035	27.00	27.00	11.00	10.00	Black anodize	Tape	35
27 X 27	Metal	335314B00032	27.00	27.00	11.00	10.00	Black anodize	Tape	32
27 X 27	ALL	335314B00000	27.00	27.00	11.00	10.00	Black anodize	Epoxy <sup>1</sup>	N/A
28 X 28	ALL	700353U01100	28.00	28.00	9.00	18.49	Unfinished	Epoxy <sup>1</sup>	N/A
30 X 30	ALL	335814B00000	30.00	30.00	9.00	10.50	Black anodize	Epoxy <sup>1</sup>	N/A
30 X 30	ALL	335714B00000	30.00	30.00	7.00	15.20	Black anodize	Epoxy <sup>1</sup>	N/A
30 X 30	Metal	335814B00032	30.00	30.00	9.00	9.20	Black anodize	Tape	32
30 X 30	Metal	335714B00032	30.00	30.00	7.00	15.20	Black anodize	Tape	32
37.5 X 37.5	ALL	799403B01500	38.00	38.00	10.00	12.21	Black anodize	Epoxy <sup>1</sup>	N/A
37.5 X 37.5	ALL	336314B00000	36.00	36.00	17.00	11.00	Black anodize	Epoxy <sup>1</sup>	N/A

1. Epoxy ordered separately for information on Epoxy see page 114,115.
2. For tape specifications see page 88.
3. Natural convection thermal resistance based on a 75° C heat sink temperature rise.

# BGA-Fluted Fins™

## Fluted Fins™

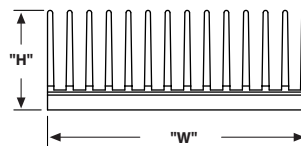
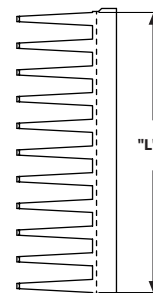
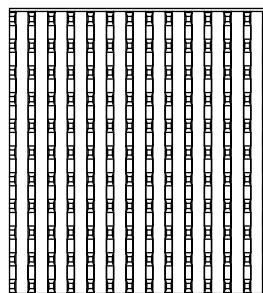
Fluted Fin™ technology was developed to produce a low cost BGA cooling solution with enhanced thermal performance versus conventional cross cut methods. Instead of straight edged rectangular pin fins, Fluted Fin™ are rippled and slightly staggered. Under many circumstances, this design may contribute to increase turbulent airflow conditions within the pin fin field array, resulting in improved performance.



### ORDERING INFORMATION

IC Pkg. Size (mm)	Part Number	"W" (mm)	"L" (mm)	"H" (mm)	θn'	θF
27 X 27	3319B	25.90	23.90	10.00	20.90	11.50
35 X 35	3613B	30.80	30.60	10.00	16.00	8.80
40 X 40	3624B	40.60	30.60	10.00	13.60	7.50
40 X 40	3625B	40.60	37.30	10.00	11.30	6.20
42.5 X 42.5	3330B	40.60	37.30	16.50	8.70	4.80
42.5 X 42.5	3332B	45.50	44.00	16.50	6.90	3.80
45 X 45	3320B	40.60	44.00	10.00	10.40	5.70
45 X 45	3321B	45.50	44.00	10.00	9.80	5.40
45 X 45	3331B	40.60	44.00	16.50	7.60	4.20
50 MM or larger	3634B	50.40	44.00	10.00	9.30	5.10
50 MM or larger	3325B	50.40	50.70	10.00	8.60	4.70
50 MM or larger	3334B	50.40	50.70	16.50	6.00	3.30
50 MM or larger	3354B	50.40	50.70	25.00	4.80	2.60
50 MM or larger	3356B	50.40	64.10	25.00	4.10	2.30
50 MM or larger	3357B	50.40	70.80	25.00	3.80	2.10

1. Natural convection thermal resistance based on a 75° C heat sink temperature rise.
2. Force convection thermal resistance based on an entering 1.0 m/s (200LFM) airflow.



Material: Aluminum  
Finish: Black Anodize

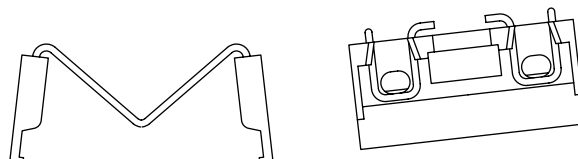
## BGS Clip for Fluted Fins™

Aavid BGS Clip provides a mechanical attachment alternative to tape in applications where it is desirable to attach the heat sink directly to the device. This unique clip uses spring pressure to ensure even contact across the device while the end plates firmly engage the edge of the package locking the heat sink in place.



**POPULAR OPTIONS:** 3-\_\_-B-\_\_  
Base part no. (from table above) A

Position	Code	Max. BGA Size (mm)
A	BGS1	27.00
A	BGS2	35.00
A	BGS3	40.00
A	BGS4	45.00
A	BGS5	42.50

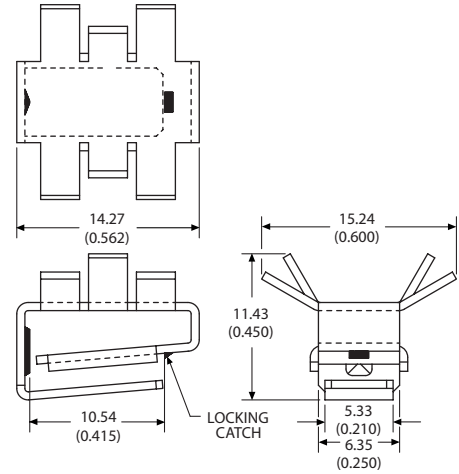
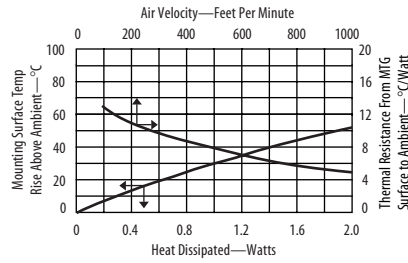




**5801 Slide on heat sink with staggered fins**



**Slide on heat sink with staggered fins** attaches to 8 pin DIP packages quickly and easily. The heat sink features double spring action and locking catch to firmly attach the device creating a thermal conduction path on both the top and bottom surfaces. Available in two finishes.



Material: 0.63 (0.025) Thick Aluminum  
Finish: See Table

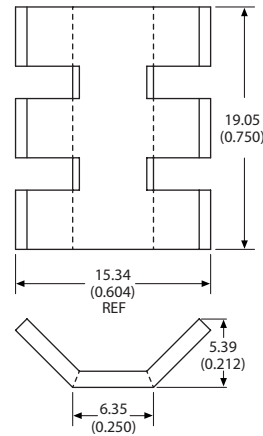
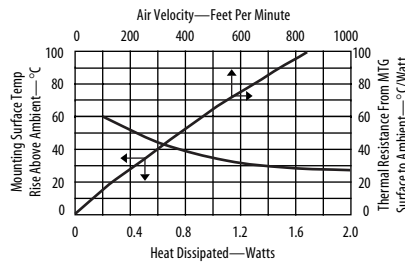
**ORDERING INFORMATION**

Part Number	Finish
580100B00000	Black anodize
580100W00000	Black anodize with black paint on bottom side

**5010 Angle fin heat sink**



**Angle fin heat sink** is a simple low cost solution for cooling DIP devices. Suitable for 14 and 16 pin packages and available in two finish options. Easily attaches using thermal epoxy.



Material: 1.27 (0.050) Thick Aluminum  
Finish: See Table

**ORDERING INFORMATION**

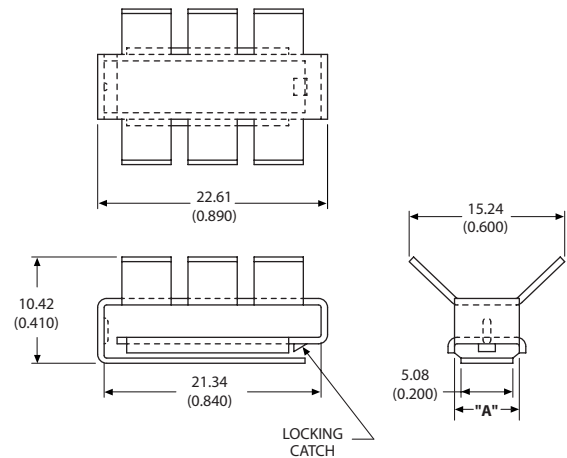
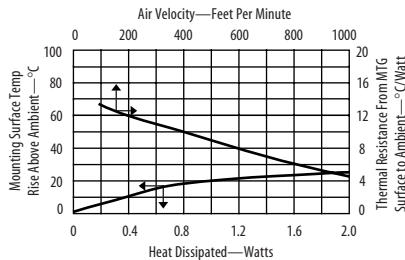
Part Number	Finish
501000J00000	Pre black anodize*
501000B00000	Black anodize

\* Edges cut during the manufacturing process will be unfinished. See page 110 for more information.

**5602, 5802 Slide on heat sink with angled fins**



**Slide on heat sink with angled fins** attaches to 14 and 16 pin DIP packages quickly and easily. The heat sink features double spring action and locking catch to firmly attach the device creating a thermal conduction path on both the top and bottom surfaces. Available in two finishes.



Material: 0.63 (0.025) Thick Aluminum  
Finish: See Table

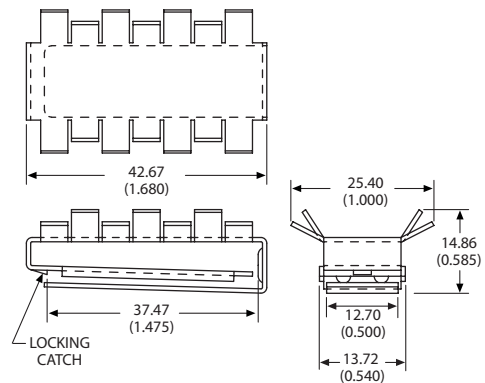
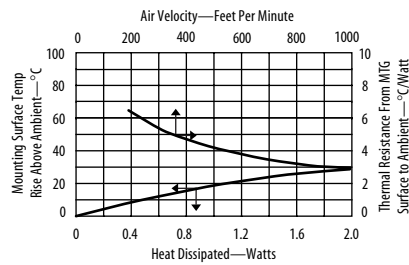
**ORDERING INFORMATION**

Part Number	Device Pkg Style	Finish	"A" Dim
560200B00000	Ceramic	Black anodize	7.87 (0.310)
560200W00000	Ceramic	Black anodize with black paint on bottom side	7.87 (0.310)
580200B00000	Plastic	Black anodize	6.35 (0.250)
580200W00000	Plastic	Black anodize with black paint on bottom side	6.35 (0.250)

**5806 Slide on Heat Sink with Staggered Fins**



**Slide on heat sink with staggered fins** attaches to 28 pin DIP packages quickly and easily. The heat sink features double spring action and locking catch to firmly attach the device creating a thermal conduction path on both the top and bottom surfaces.

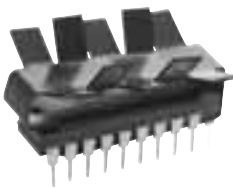


Material: 0.81 (0.032) Thick Aluminum  
Finish: Black Anodize

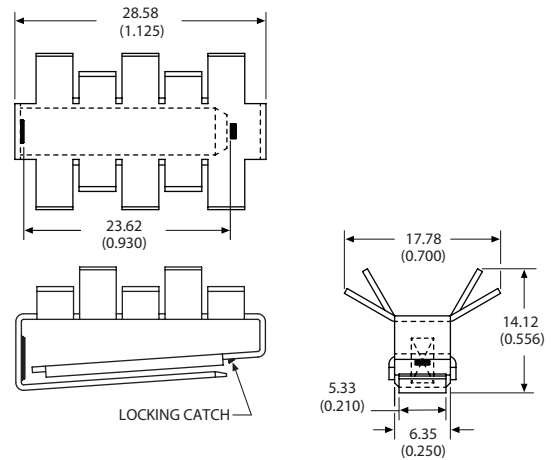
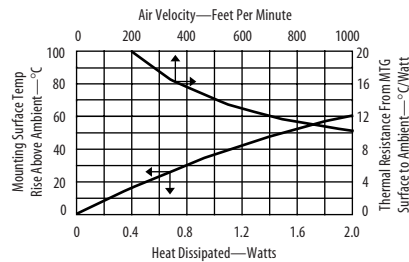
**ORDERING INFORMATION**

Part Number	Description
580600B00000	Slide on heat sink with staggered fins

**5803 Slide on Heat Sink with Staggered Fins**



**Slide on heat sink with staggered fins** attaches to 18 pin DIP packages quickly and easily. The heat sink features double spring action and locking catch to firmly attach the device creating a thermal conduction path on both the top and bottom surfaces.



Material: 0.63 (0.025) Thick Aluminum  
Finish: Black Anodize

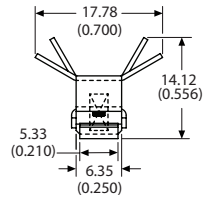
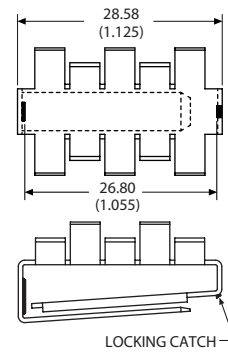
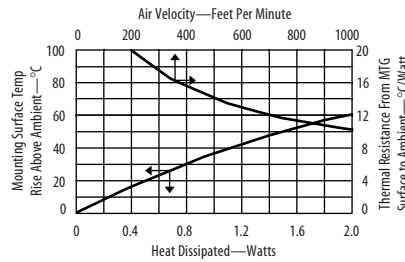
**ORDERING INFORMATION**

Part Number	Description
580300B00000	Slide on heat sink with staggered fins

**5804 Slide on heat sink with staggered fins**



**Slide on heat sink with staggered fins** attaches to 20 pin DIP packages quickly and easily. The heat sink features double spring action and locking catch to firmly attach the device creating a thermal conduction path on both the top and bottom surfaces.



Material: 0.63 (0.025) Thick Aluminum  
Finish: Black Anodize

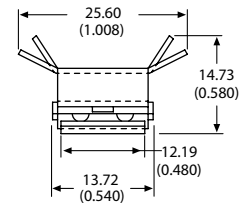
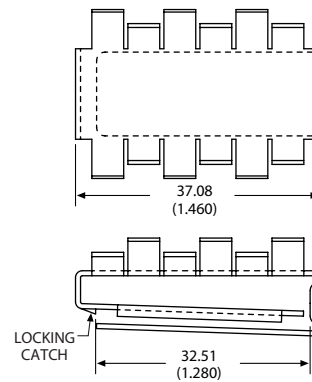
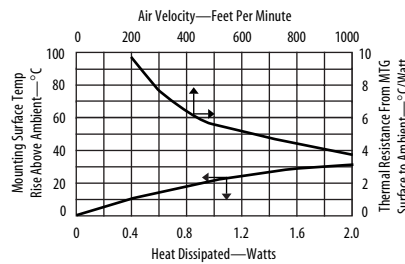
**ORDERING INFORMATION**

Part Number	Description
580400B00000	Slide on heat sink with staggered fins

**5805 Slide on heat sink with staggered fins**



**Slide on heat sink with staggered fins** attaches to 24 pin DIP packages quickly and easily. The heat sink features double spring action and locking catch to firmly attach the device creating a thermal conduction path on both the top and bottom surfaces.



Material: 0.81 (0.032) Thick Aluminum  
Finish: Black Anodize

**ORDERING INFORMATION**

Part Number	Description
580500B00000	Slide on heat sink with staggered fins

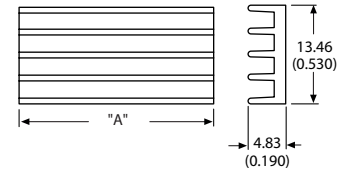
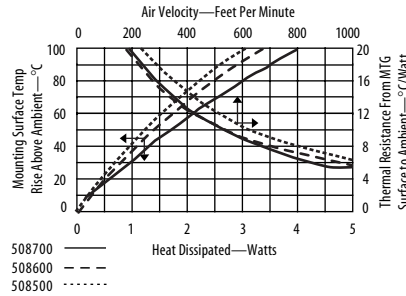


**5085, 5086, 5087**

**Extruded epoxy attach on heat sink with straight fins**



**Extruded epoxy attach on heat sink** with straight fins attaches to 24, 28, and 40 pin DIP packages quickly and easily. May be added before or after final board assembly, no additional board space is required.



Material: Aluminum  
Finish: Black anodize

**ORDERING INFORMATION**

Part Number	Pins	"A" Dim
508500B00000	24	31.75 (1.250)
508600B00000	28	36.83 (1.450)
508700B00000	40	50.80 (2.000)

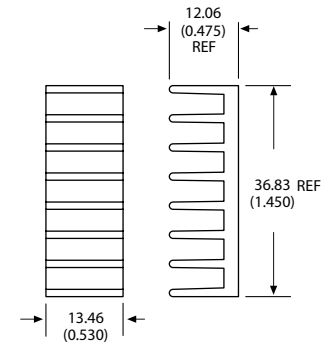
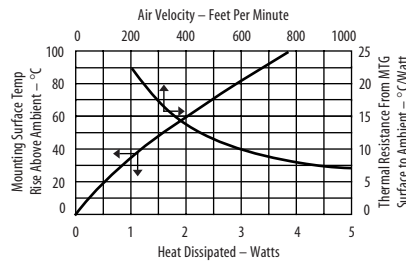
For epoxy information see pages 114-115.

**6284**

**Extruded epoxy attach heat sink**



**Extruded epoxy attach heat sink** which requires no additional board space is suitable for narrow DIP packages. May be added before or after final board assembly, no additional board space is required. Attaches to 28 pin DIP.



Material: Aluminum  
Finish: Black anodize

**ORDERING INFORMATION**

Part Number	Description
6284B	Extruded epoxy attach heat sink for 28 Pin DIP

For epoxy information see pages 114-115.

**5011, 5012**

**Extruded epoxy attach heat sink with straight fins**



**Extruded epoxy attach heat sink with straight fins** attaches to 14 and 16 pin DIP packages quickly and easily. May be added before or after final board assembly, no additional board space is required. Available in two fin directions.

FIGURE A

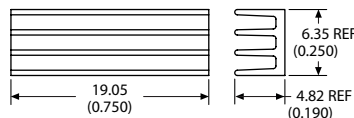
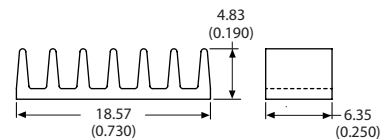


FIGURE B

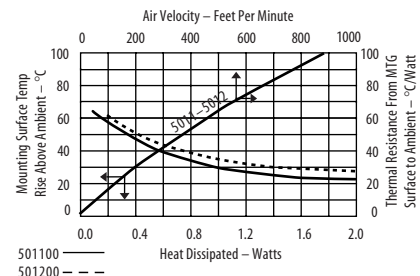


Material: Aluminum  
Finish: Black Anodize

**ORDERING INFORMATION**

Part Number	Description	Figure
501100B00000	Extruded epoxy attach heat sink with straight fins	A
501200B00000	Extruded epoxy attach heat sink with straight fins	B

For epoxy information see pages 114-115.





### 5731 Surface mount heat sink for D-PAK (TO-252) package semiconductors

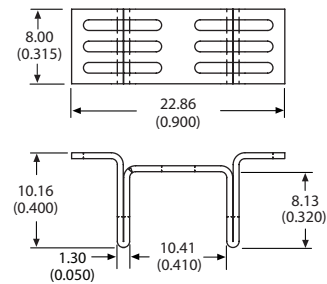
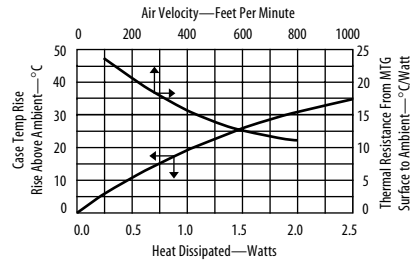


**Surface mount heat sink for D-PAK (TO-252) package semiconductors** remove the heat indirectly without contacting the device like traditional through hole heat sinks. The device and the heat sink are soldered directly to a modified drain pad creating a thermal transfer path from package tab to the heat sink.

#### ORDERING INFORMATION

Part Number	Packaging
573100D00010	13" Reel, 250 per reel
573100D00000	Bulk, 500 per bag

See page 26 for tape and reel information



Material: 0.63 (0.025) Thick Copper  
Finish: Tin Plated

Refer to Figure A and B on page 27 for board footprint information

### 5733 Surface mount heat sink for D<sup>2</sup>PAK (TO-263) package semiconductors

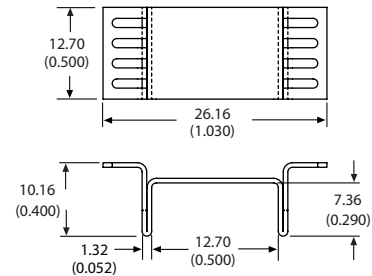
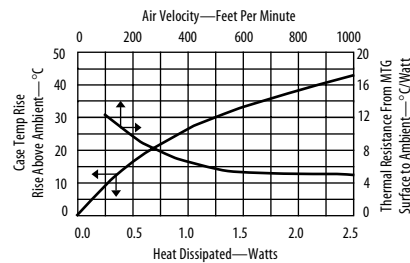


**Surface mount heat sink for D<sup>2</sup>PAK (TO-263) package semiconductors** remove the heat indirectly without contacting the device like traditional through hole heat sinks. The device and the heat sink are soldered directly to a modified drain pad creating a thermal transfer path from package tab to the heat sink.

#### ORDERING INFORMATION

Part Number	Packaging
573300D00010	13" Reel, 250 per reel
573300D00000	Bulk, 500 per bag

See page 26 for tape and reel information



Material: 0.63 (0.025) Thick Copper  
Finish: Tin Plated

Refer to Figure A and B on page 27 for board footprint information

### 7106 Surface mount heat sink for D<sup>2</sup>PAK (TO-263), power SO-10 (MO-184) and SO-10 package semiconductors

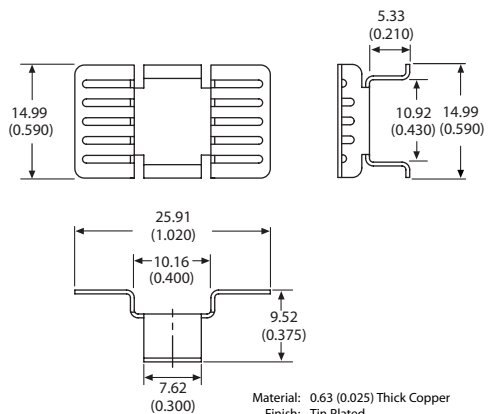
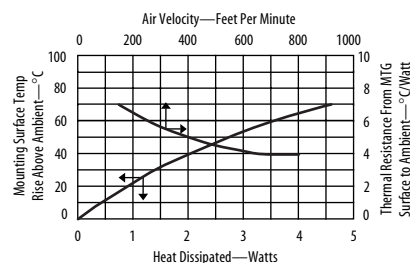


**Surface mount heat sink for D<sup>2</sup>PAK (TO-263), power SO-10 (MO-184) and SO-10 package semiconductors** remove the heat indirectly without contacting the device like traditional through hole heat sinks. The device and the heat sink are soldered directly to a modified drain pad creating a thermal transfer path from package tab to the heat sink.

#### ORDERING INFORMATION

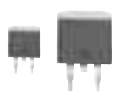
Part Number	Packaging
7106D/TR	13" Reel, 200 per reel
7106D	Bulk, 500 per bag

See page 26 for tape and reel information



Material: 0.63 (0.025) Thick Copper  
Finish: Tin Plated

Refer to Figure C on page 27 for board footprint information



**7109 Surface mount heat sink for D<sup>2</sup>PAK (TO-263) package semiconductors**

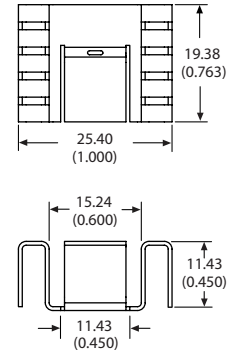
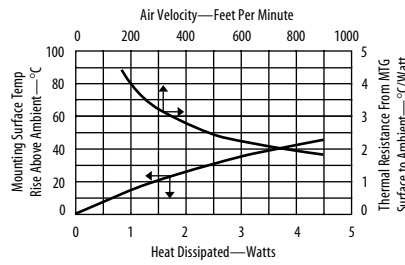


**Surface mount heat sink for D<sup>2</sup>PAK (TO-263) package semiconductors** remove the heat indirectly without contacting the device like traditional through hole heat sinks. The device and the heat sink are soldered directly to a modified drain pad creating a thermal transfer path from package tab to the heat sink.

**ORDERING INFORMATION**

Part Number	Packaging
7109D/TR	13" Reel, 125 per reel
7109D	Bulk, 500 per bag

See below for tape and reel information



Material: 0.63 (0.025) Thick Copper  
Finish: Tin Plated

Refer to Figure D on page 27 for board footprint information

**5734 Surface mount heat sink for D<sup>3</sup>PAK (TO-268) package semiconductors**

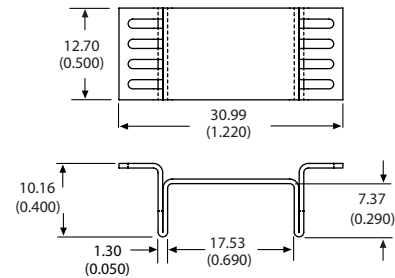
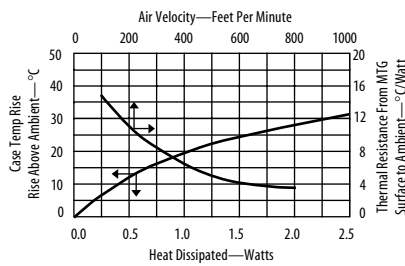


**Surface mount heat sink for D<sup>3</sup>PAK (TO-268) package semiconductors** remove the heat indirectly without contacting the device like traditional through hole heat sinks. The device and the heat sink are soldered directly to a modified drain pad creating a thermal transfer path from package tab to the heat sink.

**ORDERING INFORMATION**

Part Number	Packaging
573400D00010	13" Reel, 250 per reel
573400D00000	Bulk, 500 per bag

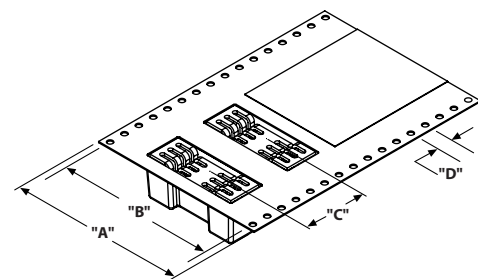
See below for tape and reel information



Material: 0.63 (0.025) Thick Copper  
Finish: Tin Plated

Refer to Figure A and B on page 27 for board footprint information

**Tape and Reel information**



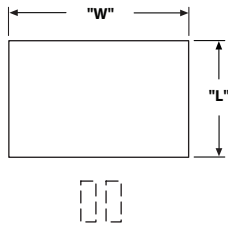
**ORDERING INFORMATION**

Part Number	"A" Dim	"B" Dim	"C" Dim	"D" Dim
7106D/TR	44.00 (1.730)	40.40 (1.590)	24.00 (0.940)	4.06 (0.160)
7109D/TR	44.00 (1.730)	40.40 (1.590)	36.00 (1.420)	4.06 (0.160)
573100D00010	44.00 (1.730)	40.40 (1.590)	16.00 (0.630)	4.06 (0.160)
573300D00010	44.00 (1.730)	40.40 (1.590)	24.00 (0.940)	4.06 (0.160)
573400D00010	44.00 (1.730)	40.40 (1.590)	24.00 (0.940)	4.06 (0.160)

**FIGURE A**

Recommended copper heat spreader drain pad footprint

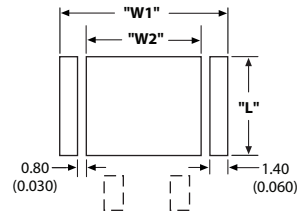
Note: The thickness of the drain pad is variable depending on the amount of heat generated by the SMT device, design, limitations and process



Part Number	"L"	"W"
573100	9.53 (0.375)	13.97 (0.550)
573300	14.22 (0.560)	16.26 (0.640)
573400	14.22 (0.560)	21.08 (0.830)

**FIGURE B**

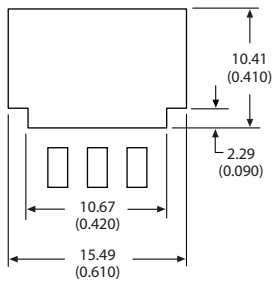
Recommended heat sink solder mask opening



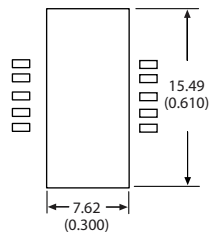
Part Number	"L"	"W1"	"W2"
573100	9.02 (0.355)	13.46 (0.530)	8.89 (0.350)
573300	13.72 (0.540)	15.75 (0.620)	11.18 (0.440)
573400	13.72 (0.540)	20.57 (0.810)	16.00 (0.630)

**FIGURE C**

Recommended copper pad size for heat sink and device mounting footprint



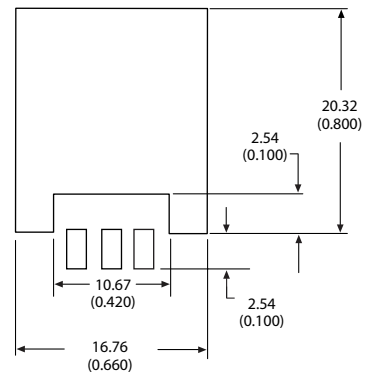
For D Pak (TO-263)



For MO-184 and SO-10

**FIGURE D**

Recommended copper pad size for heat sink and device mounting footprint

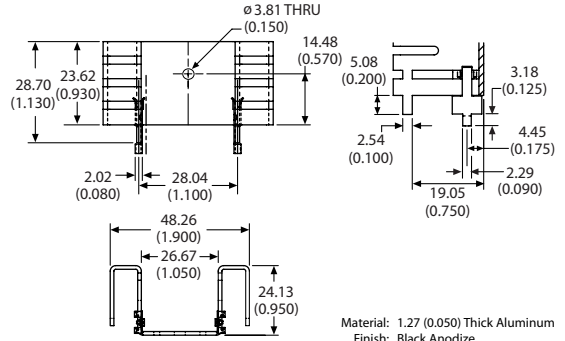
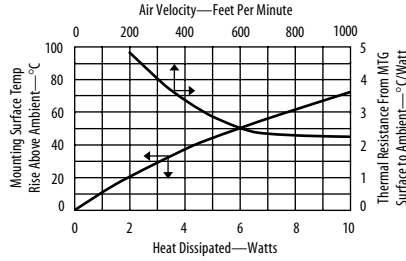




## 7025 Channel style heat sink with folded back fins



Channel style heat sink with folded back fins for increased cooling surface area. Available with tin plated solderable tabs for easy attachment to the printed circuit card.



Material: 1.27 (0.050) Thick Aluminum  
 Finish: Black Anodize

### ORDERING INFORMATION

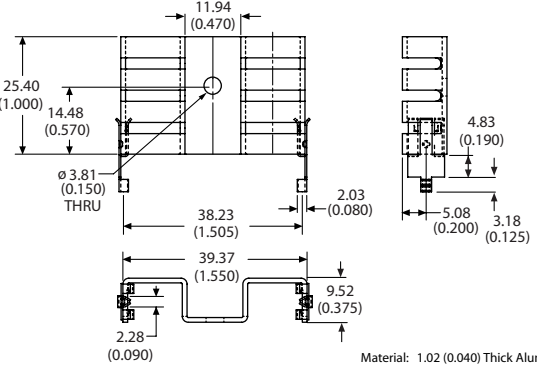
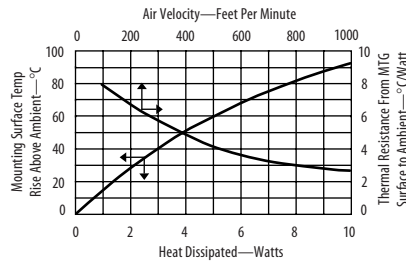
Part Number	Description	Dia of PCB Plated Thru Hole for Tabs
7025B	Channel heat sink with folded back fins	
7025B-MT	With solderable mounting tabs	2.90 ( 0.114)

For additional options see page 85

## 7019 Narrow channel style heat sink with folded back fins



Narrow channel style heat sink with folded back fins for increased cooling surface area. Available with tin plated solderable tabs for easy attachment to the printed circuit card.



Material: 1.02 (0.040) Thick Aluminum  
 Finish: See Table

### ORDERING INFORMATION

Part Number	Description	Finish	Dia of PCB Plated Thru Hole for Tabs
7019B	Channel heat sink with folded back fins	Black anodize	
7019PB	Channel heat sink with folded back fins	Pre black anodize*	
7019B-MT	With solderable tabs	Black anodize	2.90 ( 0.114)

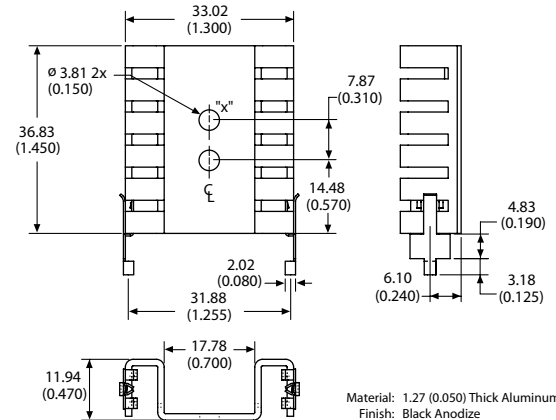
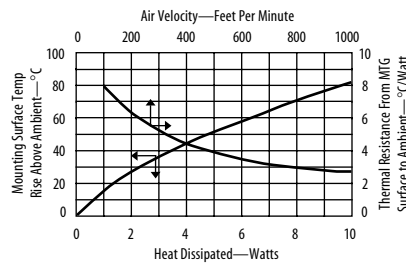
\*Edges cut during the manufacturing process will be unfinished.  
 See page 110 for more information

For additional options see page 85

## 7020 Narrow channel style heat sink with folded back fins



Narrow channel style heat sink with folded back fins for increased cooling surface area. Available with tin plated solderable tabs for easy attachment to the printed circuit card.



Material: 1.27 (0.050) Thick Aluminum  
 Finish: Black Anodize

### ORDERING INFORMATION

Part Number	Description	Dia of PCB Plated Thru Hole for Tabs
7020B	Narrow channel heat sink with folded back fins	
7020B-MT	With solderable tabs	2.90 (0.114)

### POPULAR OPTIONS:

Position	Code	Description	Location	Details
A	TC10-MT	Insulating device mounting clip and solderable tabs	Hole X	Page 93, 98

For additional options see page 85



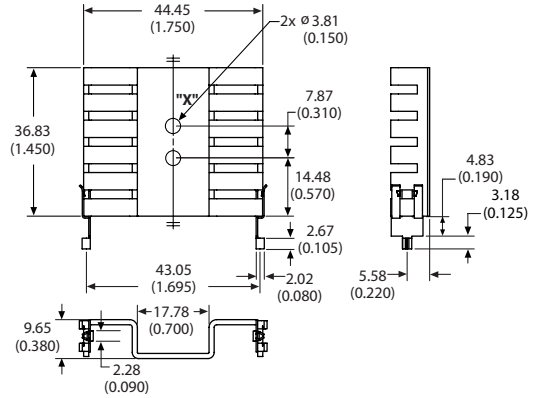
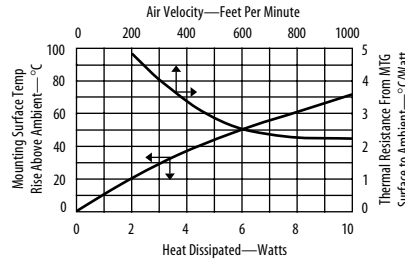
## 7021 Channel style heat sink with folded back fins

Grease & Epoxy  
page 112

Mounting Kits  
page 99



**Channel style heat sink with folded back fins** for increased cooling surface area. Available with tin plated solderable tabs for easy attachment to the printed circuit card.



Material: 1.27 (0.050) Thick Aluminum  
Finish: Black Anodize

### ORDERING INFORMATION

Part Number	Description	Dia of PCB Plated Thru Hole for Tabs
7021B	Channel heat sink with folded back fins	
7021B-MT	With solderable tabs	2.90 ( 0.114)

**POPULAR OPTIONS:** 7021B-  
Base part no. A

Position	Code	Description	Location	Details
A	TC10-MT	Locking device mounting clip and solderable tabs	Hole X	Page 93,98
A	MT5	Bifurcated tabs with 0.205 stand off		Page 93
A	MT6	Bifurcated tabs with 0.115 stand off		Page 93
A	TC10-MT5	Locking device mounting clip and bifurcated tabs	Hole X	Page 93,98

For additional options see page 85

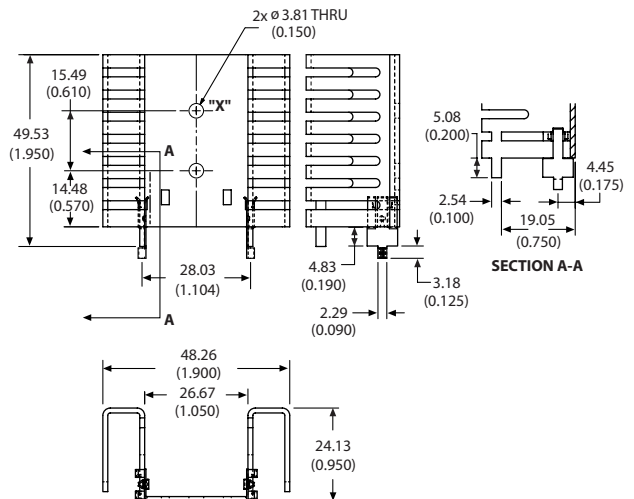
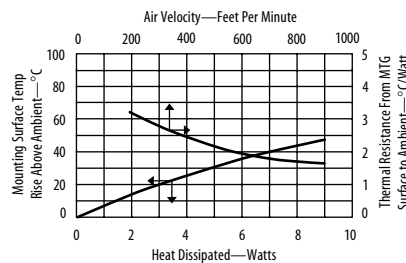
## 7023 Channel style heat sink with folded back fins

Grease & Epoxy  
page 112

Mounting Kits  
page 99



**Channel style heat sink with folded back fins** for increased cooling surface area. Available with tin plated solderable tabs for easy attachment to the printed circuit card.



Material: 1.27 (0.050) Thick Aluminum  
Finish: Black Anodize

### ORDERING INFORMATION

Part Number	Description	Dia of PCB Plated Thru Hole for Tabs
7023B	Channel heat sink with folded back fins	
7023B-MT	With solderable tabs	2.90 ( 0.114)

**POPULAR OPTIONS:** 7023B-  
Base part no. A

Position	Code	Description	Location	Details
A	TC6-MT	Locking device mounting clip and solderable tabs	Hole X	Page 93,98
A	TC7-MT	Insulating device mounting clip and solderable tabs	Hole X	Page 93,98

For additional options see page 85

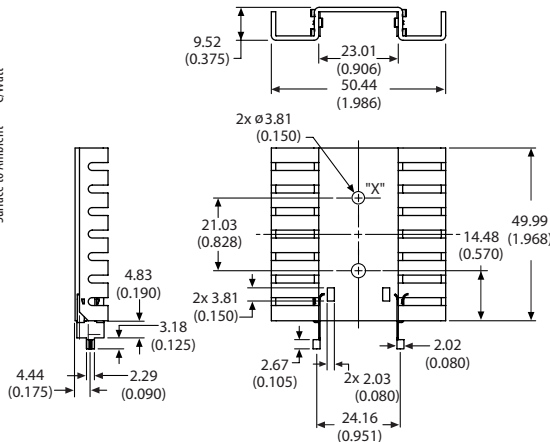
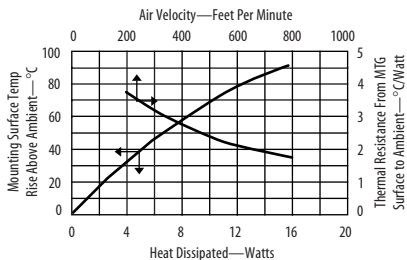


7022

## Channel style heat sink with folded back fins



Channel style heat sink with folded back fins for increased cooling surface area. Available with tin plated solderable tabs for easy attachment to the printed circuit card.



Material: 1.27 (0.050) Thick Aluminum  
Finish: See Table

### ORDERING INFORMATION

Part Number	Description	Finish	Dia of PCB Plated Thru Hole for Tabs
7022B	Channel heat sink with folded back fins	Black anodize	
7022PB	Channel heat sink with folded back fins	Pre black anodize*	
7022B-MT	With solderable tabs	Black anodize	2.90 ( 0.114)
7022PB-MT	With solderable tabs	Pre black anodize*	2.90 ( 0.114)

\* Edges cut during the manufacturing process will be unfinished. See page 110 for more information

POPULAR OPTIONS: 7022B-  
Base part no. A

Position	Code	Description	Location	Details
A	TC11-MT	Insulated device mounting clip for TO-220 and solderable tabs	Hole X	Page 93, 98

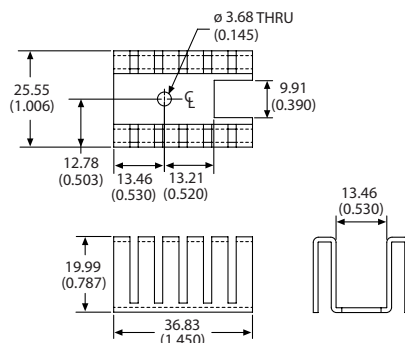
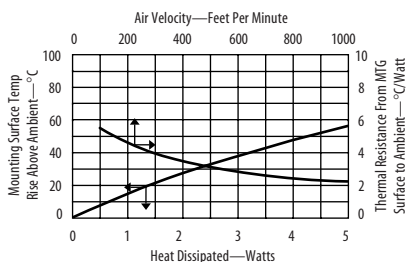
For additional options see page 85

5510

## High performance channel style heat sink



High performance channel style heat sink with folded back fins for greater cooling capacity in a minimum of space when mounted horizontally. Folded back fin design maximizes surface area without increasing the vertical space required by the heat sink.



Material: 1.27 (0.050) Thick Aluminum  
Finish: Black Anodize

### ORDERING INFORMATION

Part Number	Description
551002B00000	High performance channel style heat sink with folded back fins

POPULAR OPTIONS: 551002B0 00 00  
Base part no. A

Position	Code	Description	Details
A	01	6-32 Wave On threaded insert 0.100 stand off	Page 89

For additional options see page 82

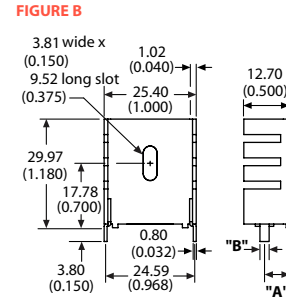
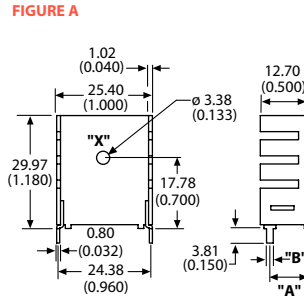




## 6021, 6221 Channel style heat sink with straight fins

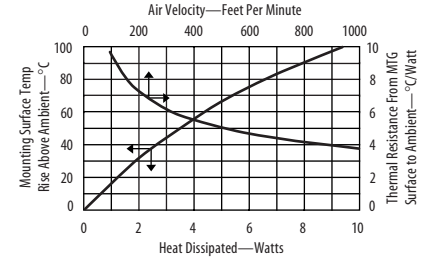
Grease & Epoxy page 112

Mounting Kits page 99



Material: 1.02 (0.040) Thick Aluminum  
Finish: See Table

**Channel style heat sink with straight fins** features integrated solderable tabs for easy mounting to the printed circuit card. Available with a single device mounting hole or slotted hole to accommodate varying device lead lengths.



### ORDERING INFORMATION

Part Number	Description	Finish	Figure	Dia of PCB Plated Thru Hole for Tabs	"A" Dim	"B" Dim
6021B	Channel heat sink with straight fins and integrated tabs	Black anodize	A	2.21 (0.087)	10.16 (0.400)	1.78 (0.070)
6021PB	Channel heat sink with straight fins and integrated tabs	Pre-black anodize*	A	2.21 (0.087)	10.16 (0.400)	1.78 (0.070)
6221PB	With slotted device mounting hole	Pre-black anodize*	B	3.18 (0.125)	6.99 (0.275)	2.54 (0.100)

\* Edges cut during the manufacturing process will be unfinished. See page 110 for more information

**POPULAR OPTIONS:** 6021-      -       
Available on the 6021 only Base part no. A B

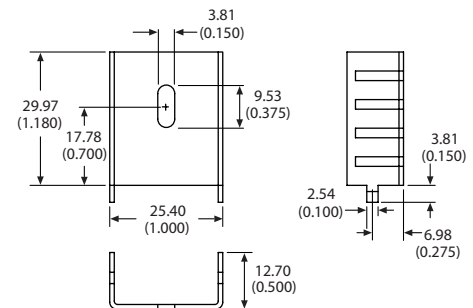
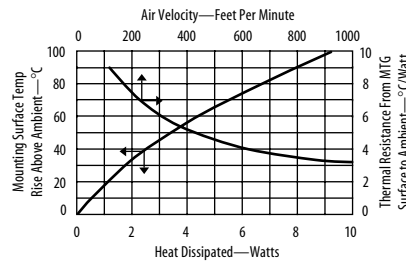
Position	Code	Description	Location	Details
A	B	Black anodize		
A	PB	Pre-black anodize*		
B	SF1	4-40 UNC-2A device mounting stud	Hole X	Page 96

For additional options for part 6021 see page 85

## 6230 Copper channel style heat sink with straight fins

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Mounting Kits page 99



Material: 0.63 (0.025) Thick Copper  
Finish: See Table

**Copper channel style heat sink with straight fins** features integrated tabs which can be twisted to attach the heat sink to the board prior to wave solder. Available in two finishes.

### ORDERING INFORMATION

Part Number	Finish	Dia of PCB Plated Thru Hole for Tabs
6230D	Tin plated	3.00 (0.118)
6230B-TT	Black paint and tinned tabs	3.00 (0.118)

THRU HOLE DISCRETE SEMICONDUCTOR PACKAGES

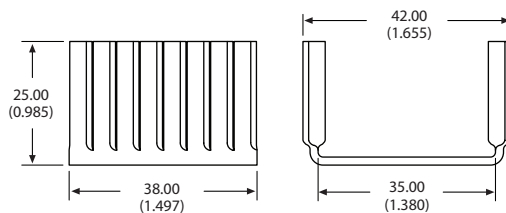
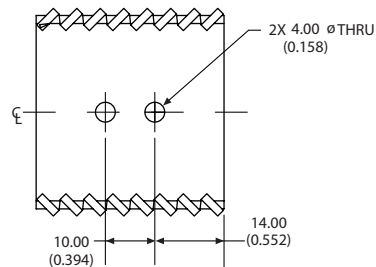
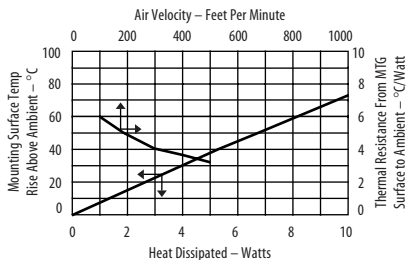


Grease & Epoxy page 112

Mounting Kits page 99

## TV35

### Narrow channel style heat sink features twisted fins



Material: 0.81 (0.032) Thick Aluminum  
Finish: Black Anodize

**Narrow channel style heat sink** features twisted fins for increased air turbulence and better cooling. Mounts horizontally to accommodate two TO-220 devices.

#### ORDERING INFORMATION

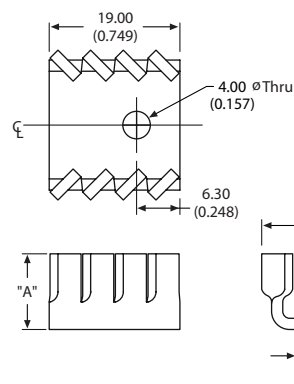
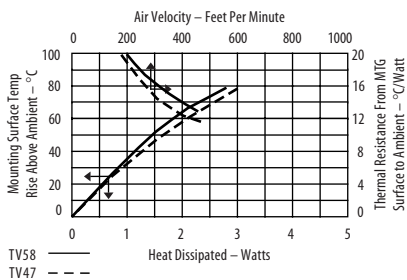
Part Number	Description
TV35	Channel style heat sink with twisted fins

## TV47, TV58

### Narrow channel style heat sink features twisted fins

Grease & Epoxy page 112

Mounting Kits page 99



Material: 0.81 (0.032) Thick Aluminum  
Finish: Black Anodize

**Narrow channel style heat sink** features twisted fins for increased air turbulence and better cooling. Can be mounted vertically or horizontally.

#### ORDERING INFORMATION

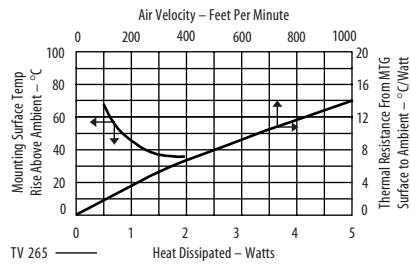
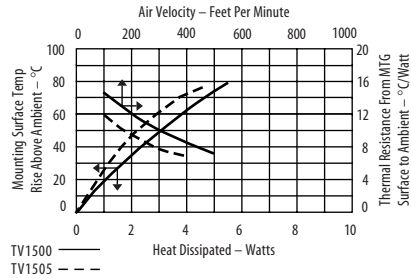
Part Number	"A" Dim
TV47	13.00 (0.512)
TV58	11.00 (0.433)



## TV265, TV1500, TV1505 Channel style heat sink features twisted fins

Grease & Epoxy page 112

Mounting Kits page 99



Channel style heat sink features **twisted fins** for increased air turbulence and better cooling. Can be mounted vertically or horizontally. Models are available with integrated twist tabs or mounting solderable tabs.

### ORDERING INFORMATION

Part Number	Description	Figure	Dia of PCB Plated Thru Hole for Tabs
TV265	Channel style heat sink with twisted fins and solderable tabs	A	2.39 (0.094)
TV1500	Channel style heat sink with twisted fins	B	
TV1505	With integrated twist tabs	B	3.30 (0.130)

FIGURE A

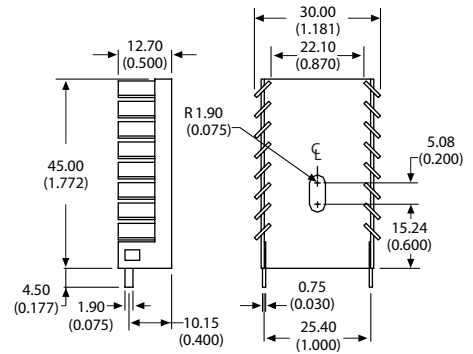
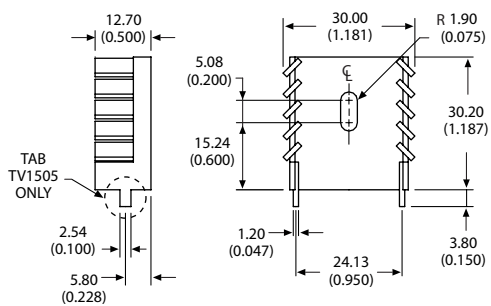


FIGURE B

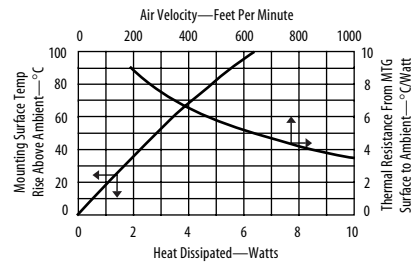


Material: 1.27 (0.050) Thick Aluminum  
Finish: Black Anodize

## 5900 Channel style heat sink features solderable tabs and twisted fins

Grease & Epoxy page 112

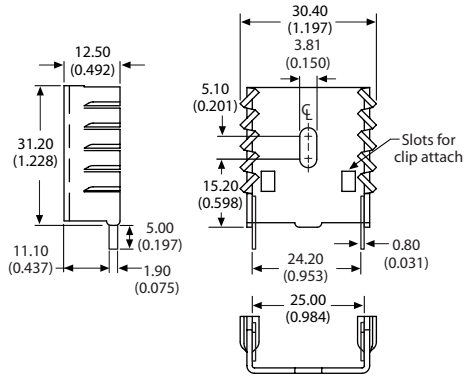
Mounting Kits page 99



Channel style heat sink features **solderable tabs and twisted fins** for increased air turbulence for better cooling. For ease of assembly use with clip 7701 (sold separately) to attach device. See page 97 for clip information.

### ORDERING INFORMATION

Part Number	Description	Dia of PCB Plated Thru Hole for Tabs
5900PB	Channel style heat sink with twisted fins and solderable tabs	2.40 (0.094)



Material: 1.19 (0.047) Thick Aluminum  
Finish: Pre Black Anodize\*

\* Edges cut during the manufacturing process will be unfinished. See page 110 for more information.



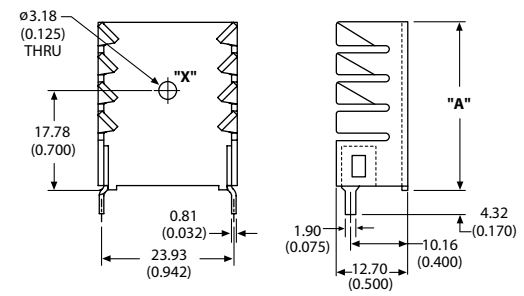
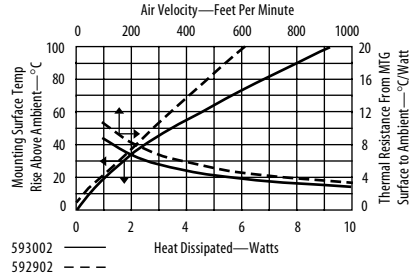
## 5929, 5930 Channel style heat sink featuring twisted fins

Grease & Epoxy page 112

Mounting Kits page 99



Channel style heat sink features twisted fins for increased air turbulence for better cooling. Two heights are available and include wave solderable tin plated tabs for easy attachment to the PC board.



Material: 1.27 (0.050) Thick Aluminum  
Finish: Black Anodize

### ORDERING INFORMATION

Part Number	"A" Dim	Dia of PCB Plated Thru Hole for Tabs
592902B03400	24.89 (0.980)	2.36 (0.093)
593002B03400	29.97 (1.180)	2.36 (0.093)

POPULAR OPTIONS: 59 02 B034 00  
Base part no.                      A

Position	Code	Description	Location	Details
A	05	4-40 male semiconductor mount	0.380 LG	Hole X Page 90

For additional options see page 82

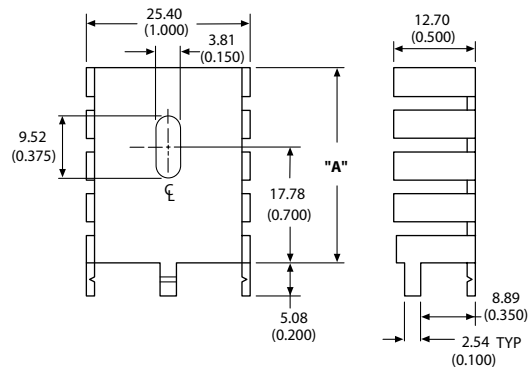
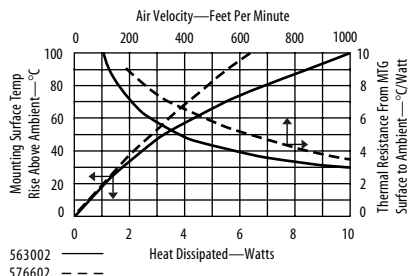
## 5630, 5766 Channel style heat sink featuring three integrated tabs

Grease & Epoxy page 112

Mounting Kits page 99



Channel style heat sink features three integrated tabs for greater stability and slotted mounting hole to accommodate a variety of device lead lengths. Available in two heights. Mounting tabs are designed for either soldering (tin finish) or twisted.



Material: 1.27 (0.050) Thick Aluminum  
Finish: See Table

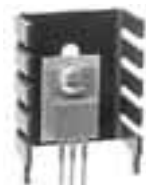
### ORDERING INFORMATION

Part Number	"A" Dim	Finish	Dia of PCB Plated Thru Hole for Tabs
563002B00000	29.97 (1.180)	Black anodize	3.10 (0.122)
563002D00000	29.97 (1.180)	Tin plated	3.10 (0.122)
563002T00000	29.97 (1.180)	Black paint and tinned tabs	3.10 (0.122)
576602B00000	24.13 (0.950)	Black anodize	3.10 (0.122)
576602D00000	24.13 (0.950)	Tin plated	3.10 (0.122)
576602T00000	24.13 (0.950)	Black paint and tinned tabs	3.10 (0.122)

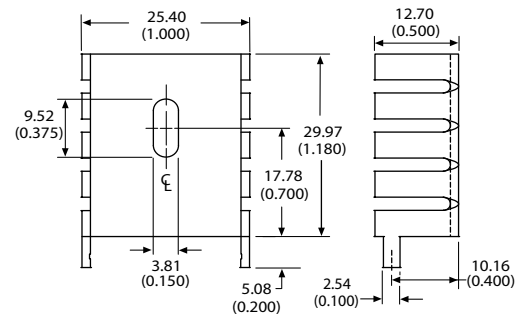
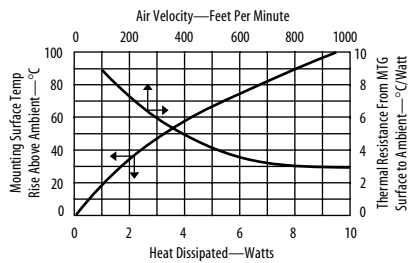
## 5750 Channel style heat sink with two integrated tabs

Grease & Epoxy page 112

Mounting Kits page 99



Channel style heat sink features two integrated tabs and slotted mounting hole to accommodate a variety of device lead lengths. Mounting tabs are designed for either soldering (tin finish) or twisted.



Material: 1.27 (0.050) Thick Aluminum  
Finish: See Table

### ORDERING INFORMATION

Part Number	Finish	Dia of PCB Plated Thru Hole for Tabs
575002B00000	Black anodize	3.10 (0.122)
575002D00000	Tin plated	3.10 (0.122)
575002T00000	Black paint and tinned tabs	3.10 (0.122)

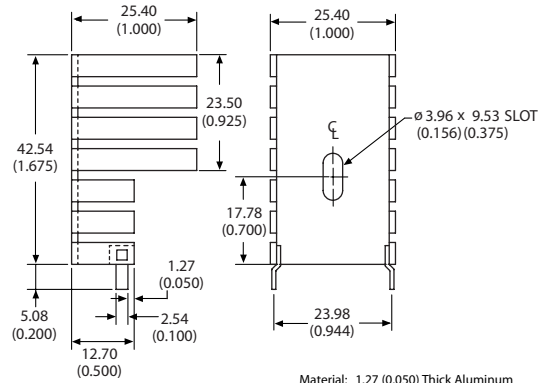
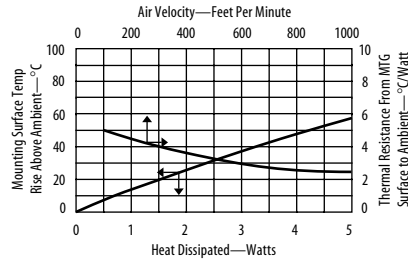


## 5901

### Channel style heat sink featuring recessed lower fins



**Channel style heat sink features recessed lower fins** to allow closer component spacing and longer upper fins for maximum cooling. Includes two solderable tabs for easy attachment to the PC card.



#### ORDERING INFORMATION

Part Number	Description	Dia of PCB Plated Thru Hole for Tabs
590102B03600	High performance heat sink with recessed lower fins	2.92 (0.115)

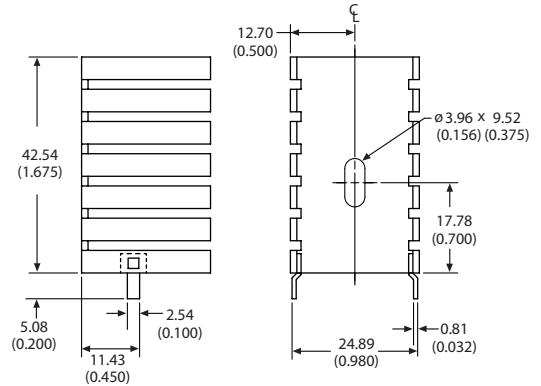
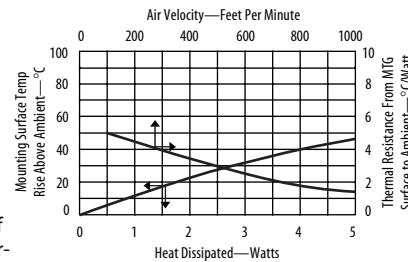
For additional options see page 82

## 5903

### Channel style heat sink featuring slotted mounting hole



**Channel style heat sink features slotted mounting hole** to accommodate a variety of devices and lead lengths. Includes two solderable tabs for easy attachment to the PC card.



#### ORDERING INFORMATION

Part Number	Description	Dia of PCB Plated Thru Hole for Tabs
590302B03600	High performance heat sink with solderable tabs	2.92 (0.115)

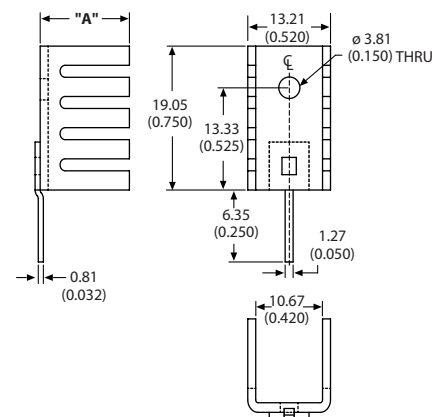
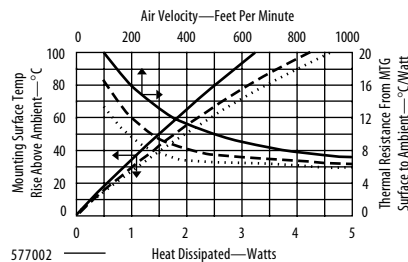
For additional options see page 82

## 5770, 5771, 5772

### Slim low cost channel style heat sink



**Slim low cost channel style heat sink** is ideal where space and cost are limited. Available in 3 fin heights with or without solderable mounting tab.



#### ORDERING INFORMATION

Part Number	Description	"A" Dim	Dia of PCB Plated Thru Hole for Tabs
577002B00000	Slim, low cost channel style heat sink	6.35 (0.250)	
577002B04000	With solderable tab	6.35 (0.250)	1.73 (0.068)
577102B00000	Slim, low cost channel style heat sink	9.52 (0.375)	
577102B04000	With solderable tab	9.52 (0.375)	1.73 (0.068)
577202B00000	Slim, low cost channel style heat sink	12.70 (0.500)	
577202B04000	With solderable tab	12.70 (0.500)	1.73 (0.068)

#### POPULAR OPTIONS: 57-02B Q 4000

Base part no. A

Position	Code	Description	Details
A	3	In-Sil-8™ pad	Page 86

For additional options see page 82



## 6109, 6110 Low cost channel style heat sink featuring integrated alignment tabs

Grease & Epoxy page 112

Mounting Kits page 99



Low cost channel style heat sink features integrated alignment tabs to prevent the device from rotating while applying torque to the mounting hardware. Available in two lengths with a pre-black anodized finish.

FIGURE A

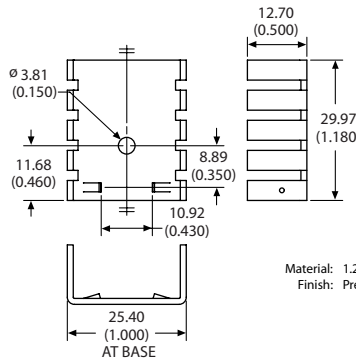
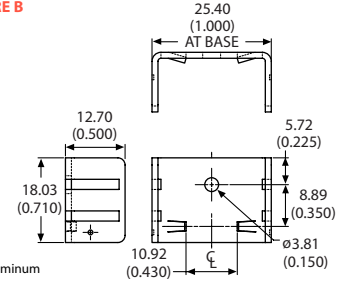


FIGURE B



Material: 1.27 (0.050) Thick Aluminum  
Finish: Pre-Black Anodize\*

### ORDERING INFORMATION

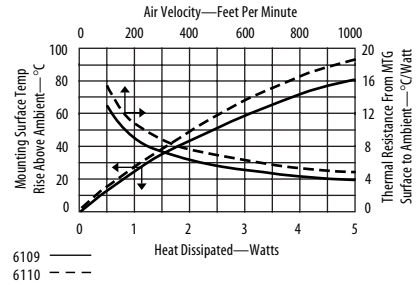
Part Number	Description	Figure
6109PB	Low cost channel heat sink with device locating tabs	A
6110PB	Low cost channel heat sink with device locating tabs	B

\* Edges cut during the manufacturing process will be unfinished. See page 110 for more information

POPULAR OPTIONS: 61    PB    -     
Base part no.      A

Position	Code	Description	Details
A	MT	Solderable mounting tabs	Page 93

For additional options see page 85



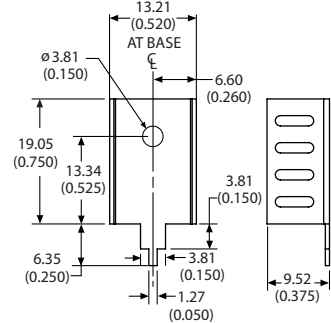
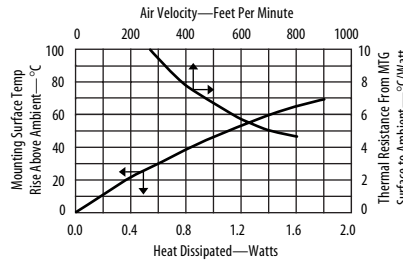
## 7178 Copper narrow channel style heat sink with a single integrated tab

Grease & Epoxy page 112

Mounting Kits page 99



Copper narrow channel style heat sink includes a single integrated tab to allow easy attachment to the PC board. Tin plated finish ensures easy solderability.



Material: 0.63 (0.025) Thick Copper  
Finish: Tin Plated

### ORDERING INFORMATION

Part Number	Description	Dia of PCB Plated Thru Hole for Tabs
7178D	Narrow channel copper heat sink	2.54 (0.100)

## 7136, 7139 Copper channel style slide on heat sink featuring integrated mounting clip

FIGURE A

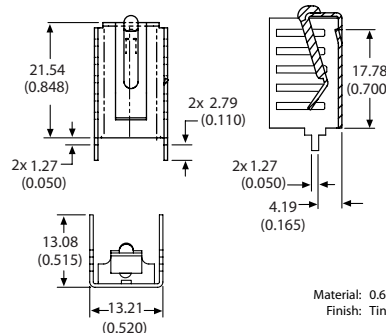
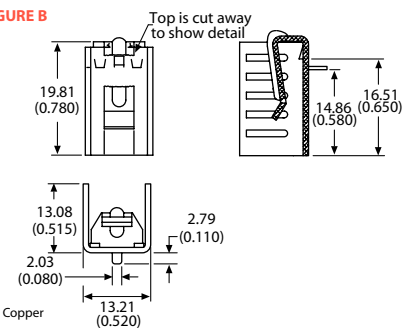


FIGURE B

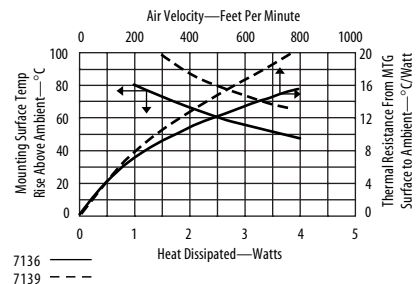


Material: 0.63 (0.025) Thick Copper  
Finish: Tin Plated

Copper channel style slide on heat sink features integrated mounting clip for easy no hardware attachment to the device. Also includes solderable mounting tabs for easy attachment to the PC board.

### ORDERING INFORMATION

Part Number	Description	Figure	Dia of PCB Plated Thru Hole for Tabs
7136D	Vertical mount	A	2.54 (0.100)
7139D	Horizontal mount	B	2.54 (0.100)



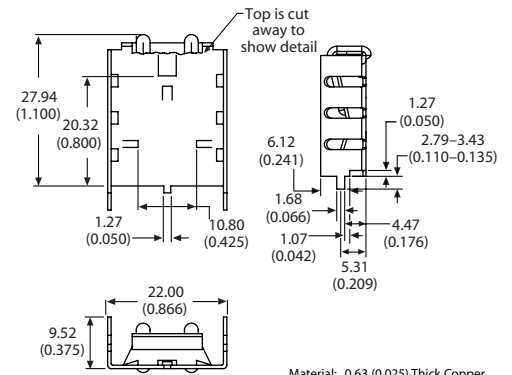
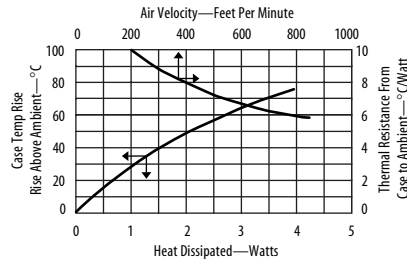




**7128 Copper channel style heat sink with integrated clip**



**Copper channel style heat sink with integrated clip and locking clip** for secure attachment to the device. Narrow profile uses less board space. Includes tin plated solderable tabs for easy attachment to the printed circuit card.



Material: 0.63 (0.025) Thick Copper  
Finish: Tin Plated

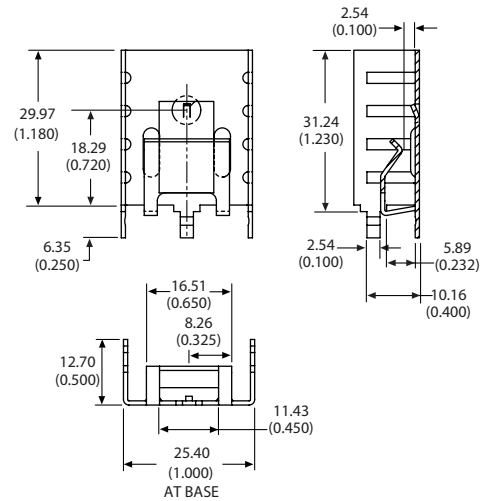
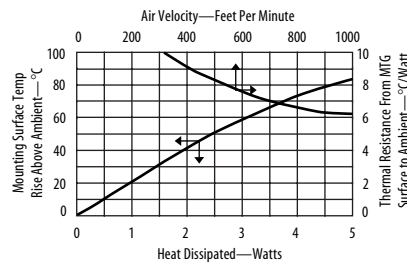
**ORDERING INFORMATION**

Part Number	Description	Dia of PCB Plated Thru Hole for Tabs
7128D	Slide on channel heat sink with integrated tabs	2.92 (0.115)

**6038 Channel style heat sink with integrated clip**



**Channel style heat sink with integrated clip and locking tab** for secure attachment to the device. Tabs can be bent for mounting or tinned tab version can be soldered directly to the board.



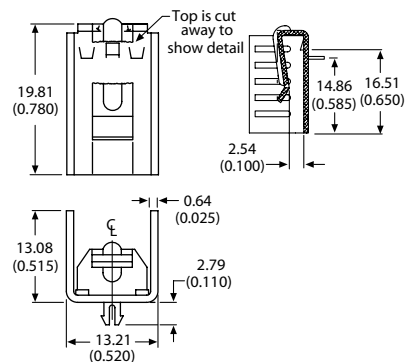
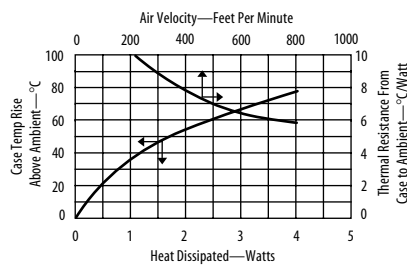
**ORDERING INFORMATION**

Part Number	Finish	Dia of PCB Plated Thru Hole for Tabs	Material
6038B	Black anodize	3.81 (0.150)	0.81(0.032) Thick Aluminum
6038B-TT	Black paint and tinned tabs	3.81 (0.150)	0.81(0.032) Thick Copper

**7142 Narrow channel style heat sink with integrated clip**



**Narrow channel style heat sink with integrated clip and locking tab** for secure attachment to the device. Device can be mounted horizontally using a single center tab that can be soldered directly to the PC board.



Material: 0.63 (0.025) Thick Copper  
Finish: Tin Plated

**ORDERING INFORMATION**

Part Number	Description	Dia of PCB Plated Thru Hole for Tabs
7142D	Slide on narrow channel heat sink with integrated clip	3.18 (0.125)

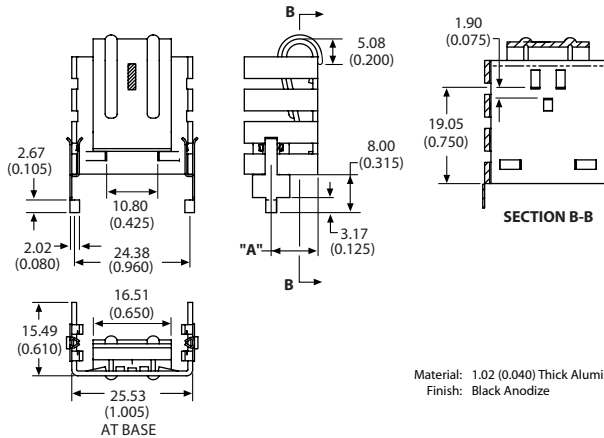




## 6238, 6239 Channel style heat sink with integrated clip



Channel style heat sink with integrated clip features strong spring tension and device locking tab to attach device securely to the heat sink. Available with solderable tabs for vertical mount or without tabs for mounting horizontally.

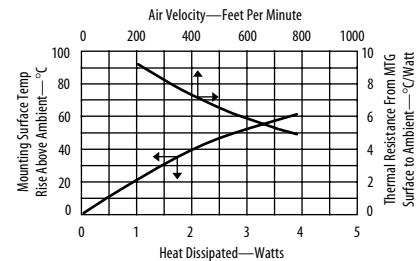


Material: 1.02 (0.040) Thick Aluminum  
Finish: Black Anodize

### ORDERING INFORMATION

Part Number	Description	"A" Dim	Dia of PCB Plated Thru Hole for Tabs
6238B	Slip on channel heat sink with integral clip		
6238B-MT	With solderable mounting tabs	10.16 (0.400)	2.90 (0.114)
6239B-MT	With solderable mounting tabs	6.99 (0.275)	2.90 (0.114)

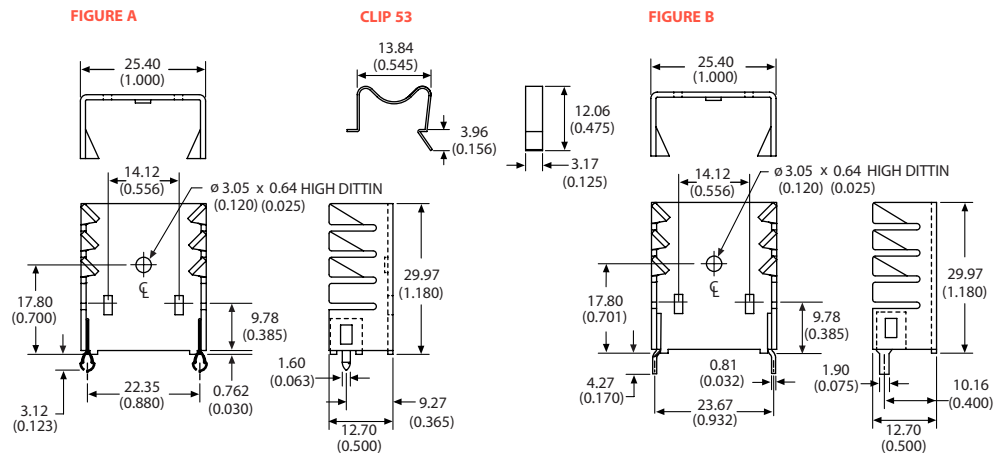
For additional options see page 85



## 5342 Channel style heat sink with convenient clip



Channel style heat sink features a dittin to locate the device and a convenient clip to eliminate the need for mounting hardware. The twisted fins increase cooling efficiency. Available in two solderable mounting tab styles.

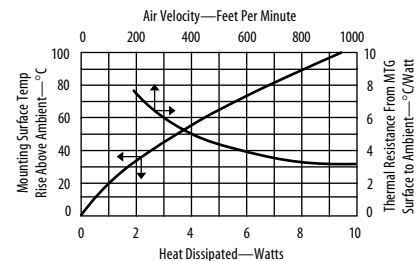


Material: 1.27 (0.050) Thick Aluminum  
Finish: Black Anodize

### ORDERING INFORMATION

Part Number	Description	Figure	Dia of PCB Plated Thru Hole for Tabs
534202B02853	With Shur-Lock™ tabs and clip	A	2.39 (0.094)
534202B03453	With solderable mounting tabs and clip	B	2.39 (0.094)

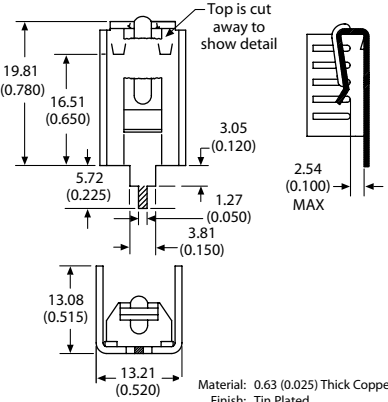
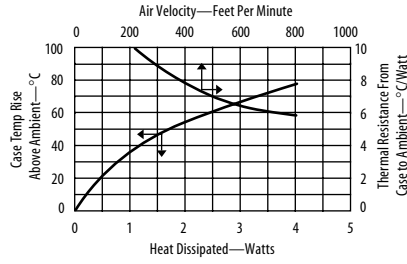
For additional options see page 82



7141 Copper narrow channel style heat sink with integrated clip



Copper narrow channel style heat sink with integrated clip and locking tab for secure attachment to the device. Single center tab can be soldered directly to the PC board.



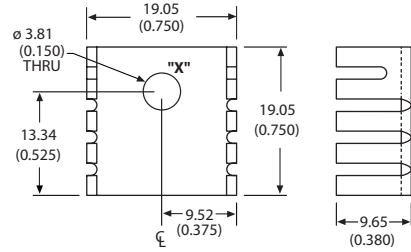
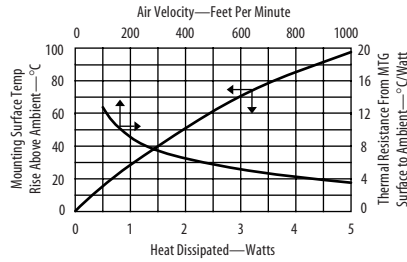
ORDERING INFORMATION

Part Number	Description	Dia of PCB Plated Thru Hole for Tabs
7141D	Slide on narrow channel heat sink with integrated clip	2.77 (0.109)

5073 Economy, narrow base, low profile channel style heat sink



Economy, narrow base, low profile channel style heat sink is perfect for use on printed circuit boards with 0.500 inch centering. When mounted horizontally, the total height of the heat sink is just 0.375.



ORDERING INFORMATION

Part Number	Finish
507302B00000	Black anodize
507302J00000	Pre-black anodize*

\* Edges cut during the manufacturing process will be unfinished. See page 110 for more information

POPULAR OPTIONS: 507302\_000\_00  
Base part no. A

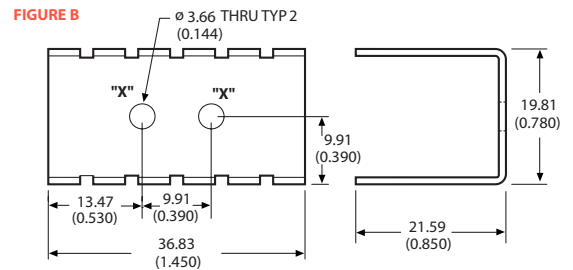
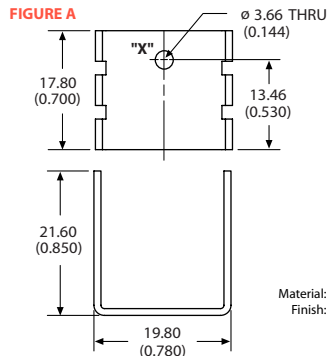
Position	Code	Description	Location	Details
A	09	Stud 4-40 x 0.350 LG	Hole X	Page 96

For additional options see page 82

5041, 5042 Economy, narrow base, low profile channel style heat sink



Economy, narrow base, low profile channel style heat sink is perfect for use on printed circuit boards with tight component spacing. Models are available for single and dual device mounting.



Material: 1.02 (0.040) Thick Aluminum Finish: Black Anodize

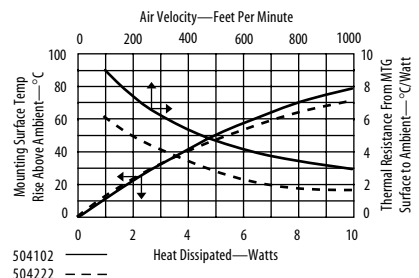
ORDERING INFORMATION

Part Number	Description	Figure
504102B00000	Economy, narrow base channel style heat sink	A
504222B00000	For dual devices	B

POPULAR OPTIONS: 504\_2B00000  
Base part no. A

Position	Code	Description	Location	Details
A	01	6-32 Wave On threaded insert 0.100 stand off	Hole X	Page 89

For additional options see page 82



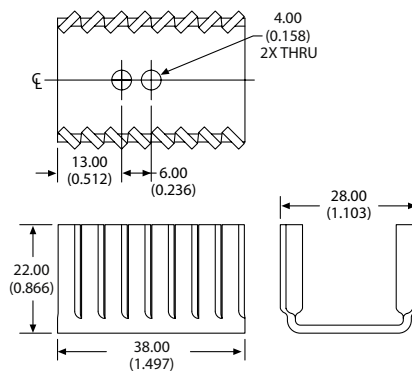
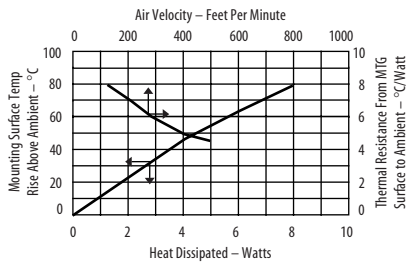


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Mounting Kits page 99

## TV40

### Narrow channel style heat sink features twisted fins



Material: 0.81 (0.032) Thick Aluminum  
Finish: Black Anodize

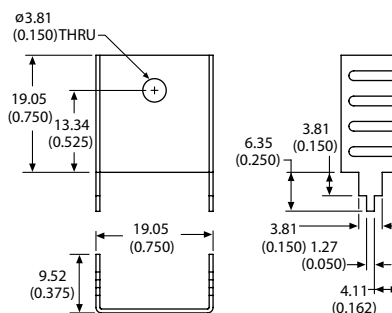
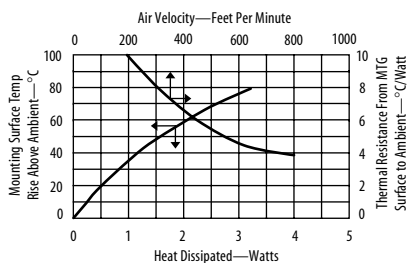
**Narrow channel style heat sink features twisted fins** for increased air turbulence and better cooling. Mounts horizontally to accommodate two TO-220 devices.

#### ORDERING INFORMATION

Part Number	Description
TV40	Narrow channel style heat sink with twisted fins

## 7173

### Copper channel style heat sink featuring two integrated tabs



Material: 0.63 (0.025) Thick Copper  
Finish: Tin Plated

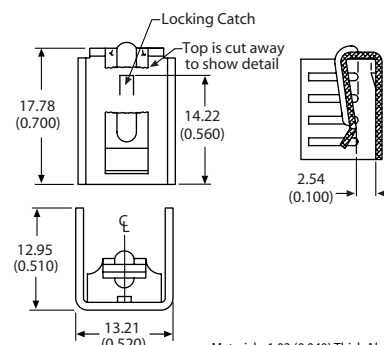
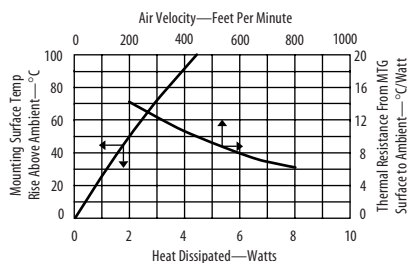
**Copper channel style heat sink features two integrated tabs.** The heat sink is tin plated and can be soldered to the PC board.

#### ORDERING INFORMATION

Part Number	Description	Dia of PCB Plated Thru Hole for Tabs
7173D	Copper channel style heat sink	2.54 (0.100)

## 6236

### Channel style heat sink featuring an integrated device retaining clip



Material: 1.02 (0.040) Thick Aluminum  
Finish: See table

**Channel style heat sink features an integrated device retaining clip** that eliminates the need for attachment hardware. Available in two finish options.

#### ORDERING INFORMATION

Part Number	Finish
6236B	Black anodize
6236PB	Pre-black anodize*

\* Edges cut during the manufacturing process will be unfinished. See page 110 for more information.



5306, 5307, 5760

## Channel style heat sink with wide mounting surface

Grease & Epoxy  
page 112

Mounting Kits  
page 99



**Lightweight, low cost channel style heat sink** with wide mounting surface and selection of lengths to accept a variety of packages. Models accommodate one or two devices.

### ORDERING INFORMATION

Part Number	Figure	"A" Dim	"B" Dim	"C" Dim
530613B00000	B	12.19 (0.480)	10.16 (0.400)	
530614B00000	A	29.97 (1.180)	11.68 (0.460)	12.70 (0.500)
530714B00000	A	18.03 (0.710)	12.32 (0.485)	12.70 (0.500)
576012B00000	A	22.86 (0.900)	11.43 (0.450)	9.65 (0.380)
576014B00000	A	22.86 (0.900)	8.13 (0.320)	9.65 (0.380)

For additional options see page 82

FIGURE A

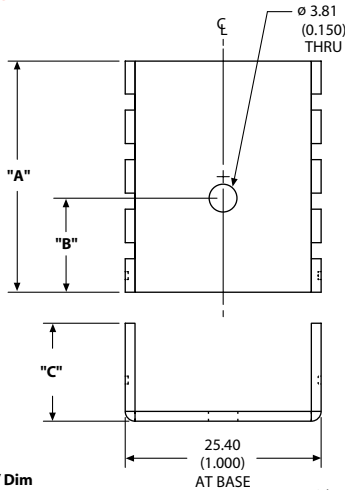
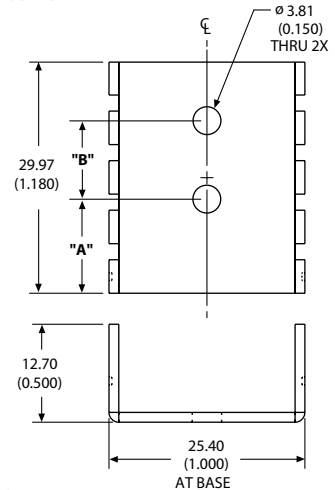
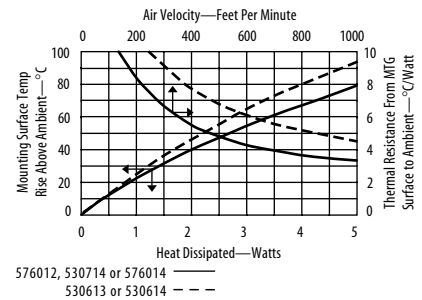


FIGURE B



Material: 1.27 (0.050) Thick Aluminum  
Finish: Black Anodize



5779, 5786

## Twin channel style heat sink

Grease & Epoxy  
page 112

Mounting Kits  
page 99



**Twin channel style heat sink** vertically mounts two TO-220 devices to a single heat sink. Center fins increase cooling capacity. Available with integrated twist tabs or staked on solder tabs for easy attachment to the PC board.

### ORDERING INFORMATION

Part Number	Description	Figure	Dia of PCB Plated Thru Hole for Tabs
577922B00000	Twin channel style heat sink with integrated tabs	A	3.10 (0.122)
578622B03200	With staked on solderable tabs	B	1.91 (0.075)

For additional options see page 43

FIGURE A

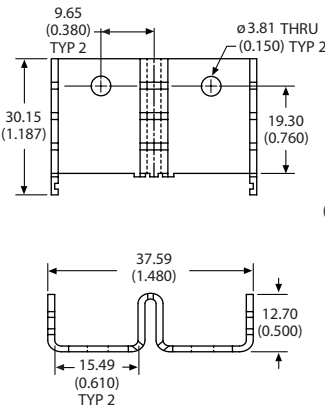
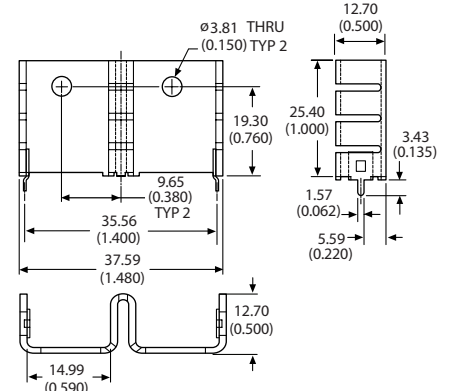
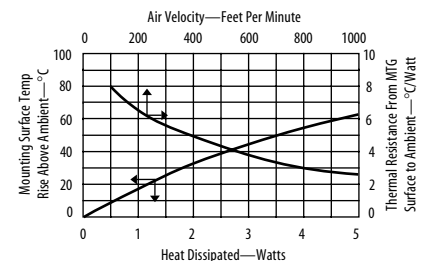


FIGURE B



Material: 1.27 (0.050) Thick Aluminum  
Finish: Black Anodize





## 5069, 5070, 5071, 5072 Hat section style heat sink



Hat section style heat sinks are low profile and perfect for use on printed circuit cards with 0.500 inch centering between boards. For higher power applications the 5071 hat can be added to the 5070 or 5072 for double sided cooling of a TO-220 device.

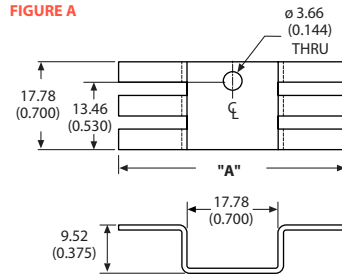
### ORDERING INFORMATION

Part Number	Description	Figure	"A" Dim
506902B00000	Hat section heat sink	A	31.75 (1.250)
507002B00000	Wide hat section heat sink	A	44.45 (1.750)
507102B00000	Hat section heat sink with cut out	C	
507222B00000	Dual device hat section heat sink	B	

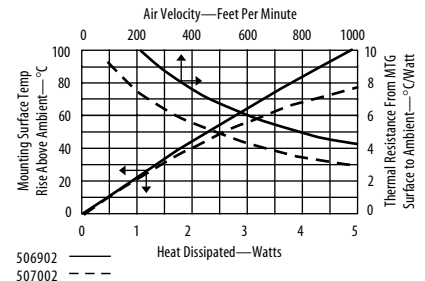
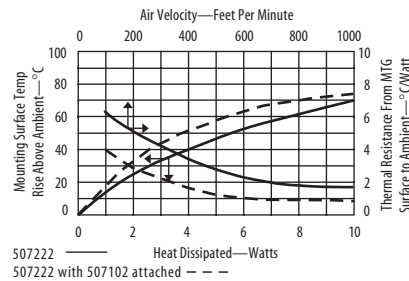
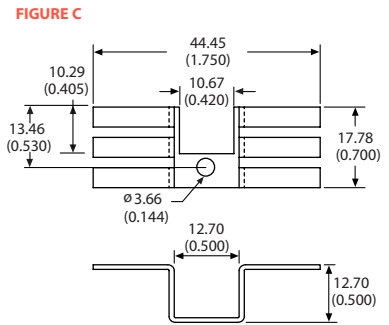
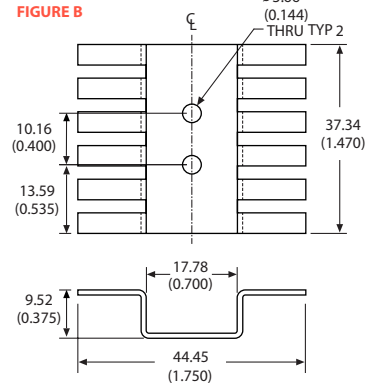
**POPULAR OPTIONS:** 50\_\_ \_2B 0 0000  
 Base part no. A

Position	Code	Description	Details
A	1	Kon Dux™ pad	Page 86

For additional options see page 82

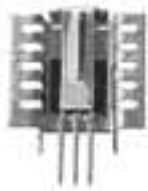


Material: 1.02 (0.040) Thick Aluminum  
 Finish: Black Anodize



## 7137, 7140

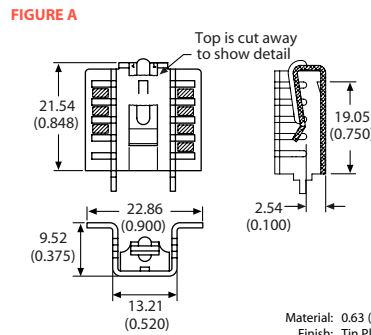
## Copper, hat section, slide on heat sink



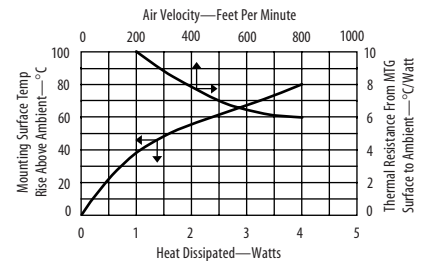
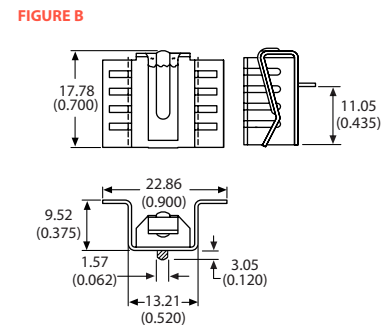
Copper, hat section, slide on heat sink features integrated mounting clip for easy no hardware attachment to the device. Also included are solderable mounting tabs for easy attachment to the PC card.

### ORDERING INFORMATION

Part Number	Description	Figure	Dia of PCB Plated Thru Hole for Tabs
7137D	Vertical mount	A	2.54 (0.100)
7140D	Horizontal mount	B	2.54 (0.100)



Material: 0.63 (0.025) Thick Copper  
 Finish: Tin Plated

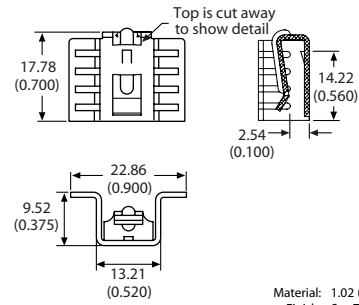
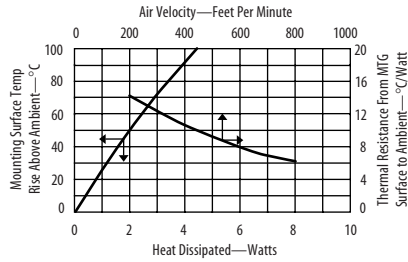




**6237 Hat section style heat sink featuring an integrated clip**



**Hat section style heat sink features an integrated clip** for secure attachment to the device without added hardware. Available in two finishes.



Material: 1.02 (0.040) Thick Aluminum  
Finish: See Table

**ORDERING INFORMATION**

Part Number	Finish
6237B	Black anodize
6237PB	Pre-black anodize*

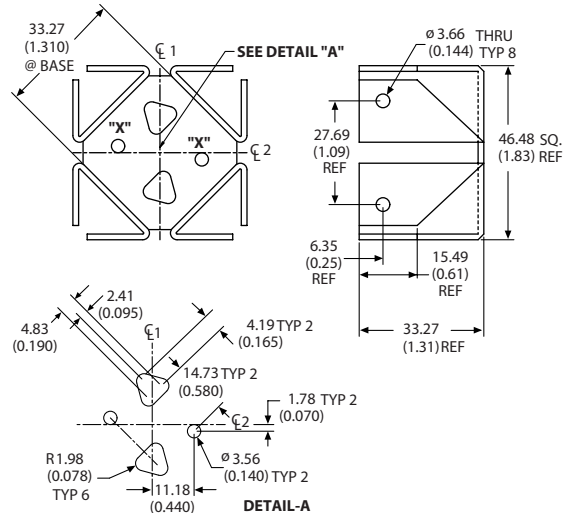
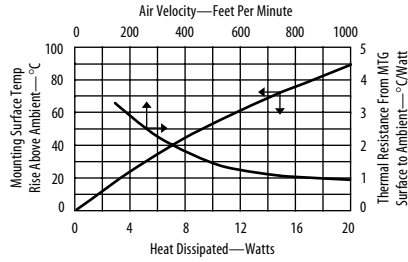
\* Edges cut during the manufacturing process will be unfinished. See page 110 for more information

**5690 High power, square basket heat sink with folded back fins**

Grease & Epoxy *page 112* | Mounting Kits *page 99*



**High power, square basket heat sink** accommodates two TO-220 devices. Features folded back fins for increased surface area for maximum cooling.



Material: 1.60 (0.063) Thick Aluminum  
Finish: Black Anodize

**ORDERING INFORMATION**

Part Number	Description
569022B00000	High power, square basket, folded back fin heat sink

**POPULAR OPTIONS:** 569022B0 00 00  
Base part no. A

Position	Code	Description	Location	Details
A	01	6-32 Wave On threaded insert, 0.100 stand off 0.062 Bd	Hole X	Page 89

For additional options see page 82



5748, 5798, 5799

Clip on style heat sink featuring an integrated clip



Clip on style heat sink features an integrated clip to retain the device meaning no mounting hardware is required. Models have fins on the both sides, left or right side and are available with solderable tabs for easy attachment to the PC board.

FIGURE A

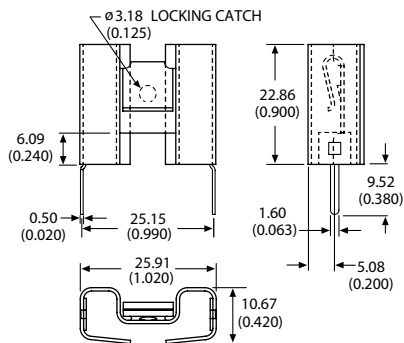
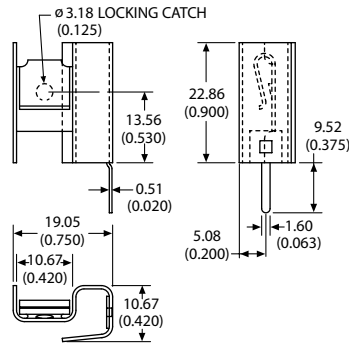


FIGURE B



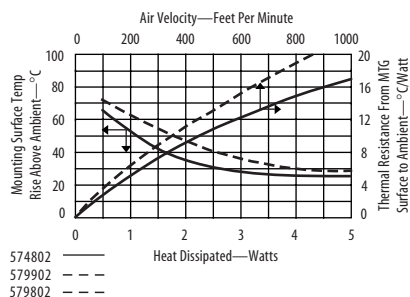
Material: 0.63 (0.025) Thick Aluminum  
Finish: Black Anodize

Note: Fins on left or right. Right hand side model shown

### ORDERING INFORMATION

Part Number	Description	Figure	Dia of PCB Plated Thru Hole for Tabs
574802B00000	Clip on heat sink, left & right side fins	A	
574802B03300	Left & right side fins with solderable tabs	A	1.91 (0.075)
579802B00000	Left side fin	B	
579802B03300	Left side fin with solderable tab	B	1.91 (0.075)
579902B00000	Right side fin	B	
579902B03300	Right side fin with solderable tab	B	1.91 (0.075)

For additional options see page 82

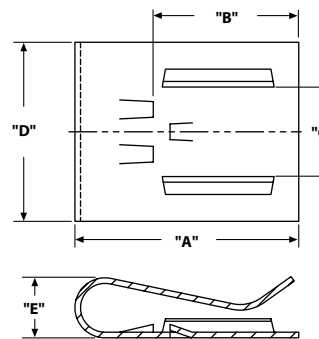
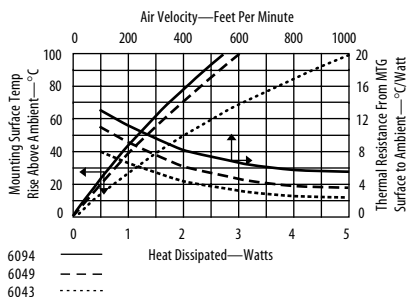


6043, 6049, 6094

Low cost, clip on style heat sink featuring a locking tab



Low cost, clip on style heat sink features a locking tab to prevent the device from dislodging from the heat sink. Also includes slide runners to ensure proper device alignment. Available in a pre-black anodize finish.



Material: 0.63 (0.025) Thick Aluminum  
Finish: Pre-Black Anodize\*

### ORDERING INFORMATION

Part Number	"A" Dim	"B" Dim	"C" Dim	"D" Dim	"E" Dim
6043PB	25.40 (1.000)	16.51 (0.650)	10.16 (0.400)	20.32 (0.800)	6.81 (0.268)
6049PB	25.40 (1.000)	16.51 (0.650)	10.16 (0.400)	13.97 (0.550)	6.81 (0.268)
6094PB	20.32 (0.800)	14.73 (0.580)	10.92 (0.430)	20.32 (0.800)	6.45 (0.254)

\*Edges cut during the manufacturing process will be unfinished.  
See page 110 for more information





5744, 5745, 5746, 5749 Low cost, labor saving, slide on heat sink featuring spring action



Low cost, labor saving, slide on heat sink features spring action to firmly hold the device tab to the heat sink providing maximum metal to metal contact and good thermal conduction. Available with solderable tabs for horizontal or vertical mounting to the PC board.

FIGURE A

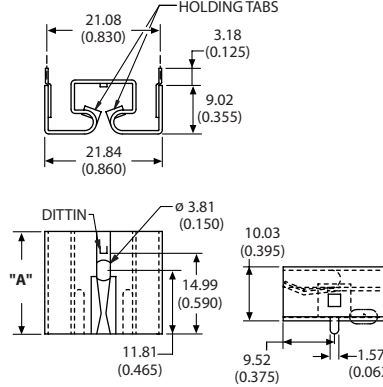
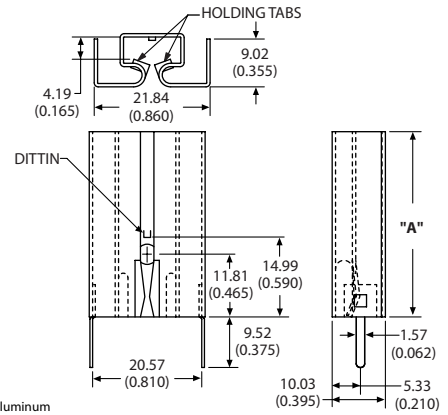


FIGURE B

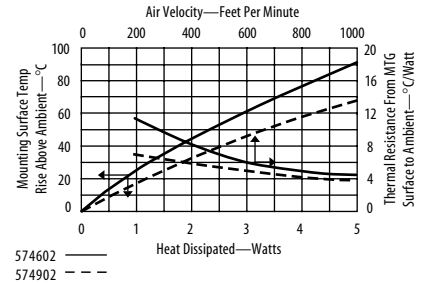
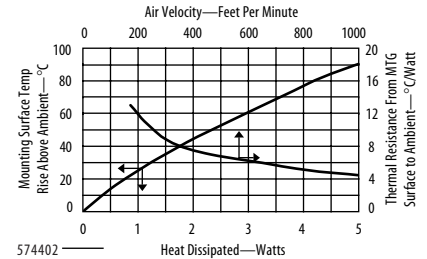


Material: 0.63 (0.025) Thick Aluminum  
Finish: Black Anodize

ORDERING INFORMATION

Part Number	Description	Figure	"A" Dim	Dia of PCB Plated Thru Hole for Tabs
574402B00000	Low cost slide on heat sink	A	19.05 (0.750)	
574402B03200	With solderable tabs for horizontal mounting	A	19.05 (0.750)	1.91 (0.075)
574502B00000	Low cost slide on heat sink	B	19.05 (0.750)	
574502B03300	With solderable tabs for vertical mounting	B	19.05 (0.750)	1.91 (0.075)
574602B00000	Low cost slide on heat sink	B	17.53 (0.690)	
574602B03300	With solderable tabs for vertical mounting	B	17.53 (0.690)	1.91 (0.075)
574902B00000	Low cost slide on heat sink	B	34.92 (1.375)	
574902B03300	With solderable tabs for vertical mounting	B	34.92 (1.375)	1.91 (0.075)

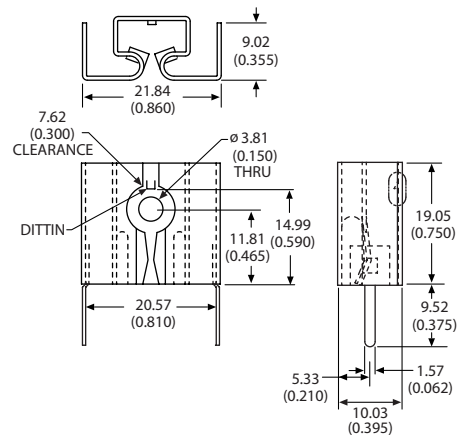
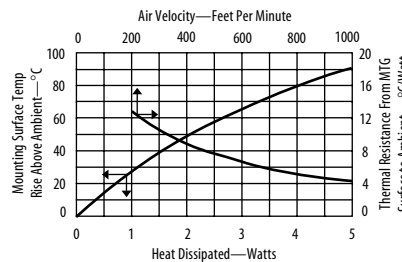
For additional options see page 82



5741 Low cost, labor saving, slide on heat sink featuring spring action



Low cost, labor saving, slide on heat sink features spring action to firmly hold the device tab to the heat sink providing maximum metal to metal contact and good thermal conduction. Includes a clearance hole in the top side to allow the use of optional hardware to attach device and heat sink to circuit board or other surface. Also available with solderable tabs for vertical mounting to the PC board.



Material: 0.63 (0.025) Thick Aluminum  
Finish: Black Anodize

ORDERING INFORMATION

Part Number	Description	Dia of PCB Plated Thru Hole for Tabs
574102B00000	Low cost slide on heat sink	
574102B03300	With solderable tabs	1.91 (0.075)

POPULAR OPTIONS: 574102B0 00 00

Base part no. A

Position	Code	Description	Details
A	37	Solderable tab with step to limit insertion depth	Page 92

For additional options see page 82



5751, 5793, 5794

Snap down style heat sink featuring two side fins



Snap down style heat sink feature two side fins that act as springs to hold the semiconductor firmly to the heat sink. Models include an integrated clip and device locking catch for more robust applications. Available for both standard and bevel edged TO-220 packages.

FIGURE A

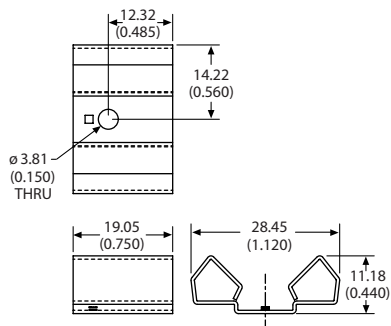
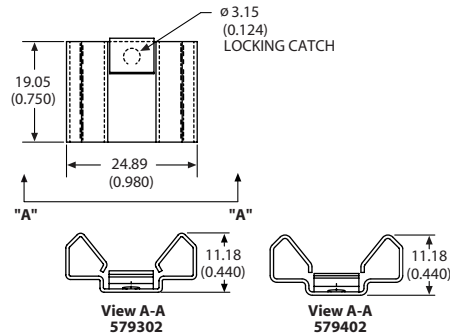


FIGURE B

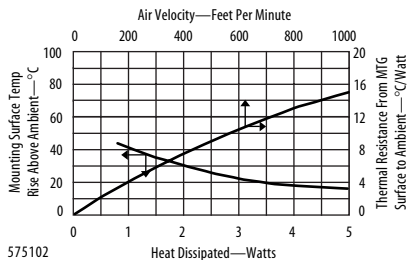
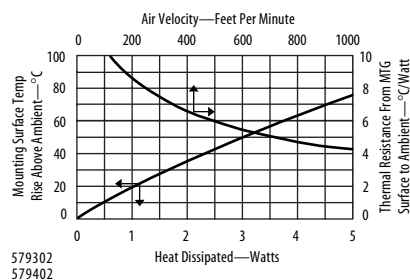


Material: 0.63 (0.025) Thick Aluminum  
Finish: Black Anodize

### ORDERING INFORMATION

Part Number	Description	Figure
575102B00000	Snap down heat sink	A
579302B00000	With integrated clip and locking catch	B
579402B00000	With integrated clip and locking catch for TO-220 with beveled edge	B

For additional options see page 82





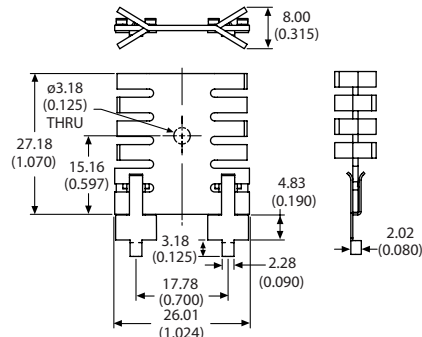
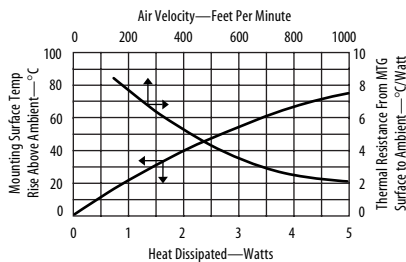
## 6225 Space saving staggered fin heat sink

Grease & Epoxy page 112

Mounting Kits page 99



**Space saving staggered fin heat sink for vertical mounting TO-220 devices.** Features solderable mounting tabs for easy attachment to the PC board.



Material: 1.02 (0.040) Thick Aluminum  
Finish: Black Anodize

### ORDERING INFORMATION

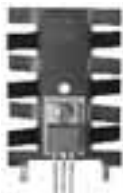
Part Number	Description	Dia of PCB Plated Thru Hole for Tabs
6225B-MT	Space saving staggered fin heat sink	2.90 (0.114)

For additional options see page 85

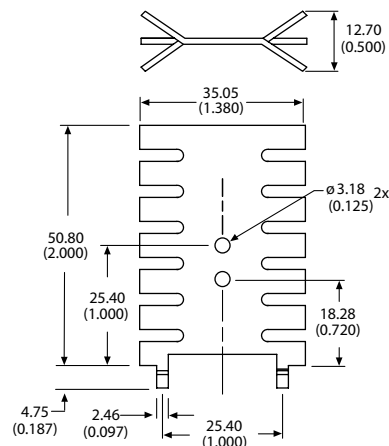
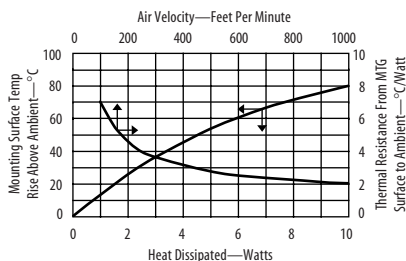
## 6032 Copper, space saving staggered fin heat sink

Grease & Epoxy page 112

Mounting Kits page 99



**Copper, space saving staggered fin heat sink for vertical mounting TO-220 devices.** Features solderable mounting tabs for easy attachment to the PC board.



Material: 1.27 (0.050) Thick Copper  
Finish: See Table

### ORDERING INFORMATION

Part Number	Finish	Dia of PCB Plated Thru Hole for Tabs
6032B-TT	Black paint with tinned tabs	3.10 (0.122)
6032D	Tin plated	3.10 (0.122)

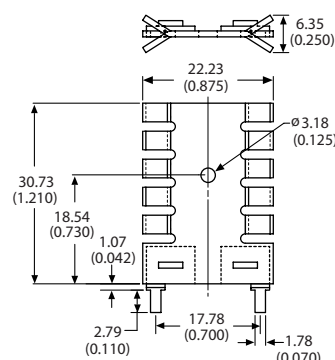
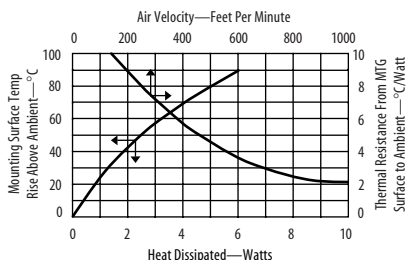
## 6022 Space saving staggered fin heat sink

Grease & Epoxy page 112

Mounting Kits page 99



**Space saving staggered fin heat sink for vertical mounting TO-220 devices.** Features staked on solderable mounting tabs for easy attachment to the PC board.



Material: 1.02 (0.040) Thick Aluminum  
Finish: See Table

### ORDERING INFORMATION

Part Number	Finish	Dia of PCB Plated Thru Hole for Tabs
6022PB	Pre-black anodize*	2.36 (0.093)
6022B	Black anodize	2.36 (0.093)

\*Edges cut during the manufacturing process will be unfinished.

See page 110 for more information

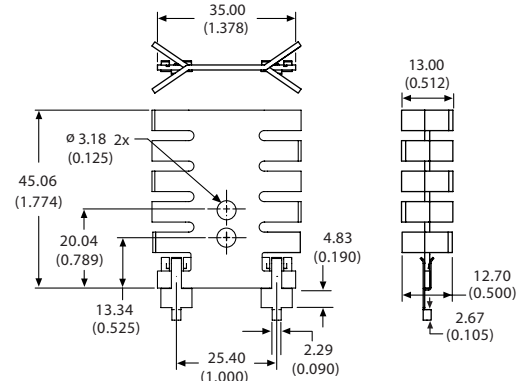
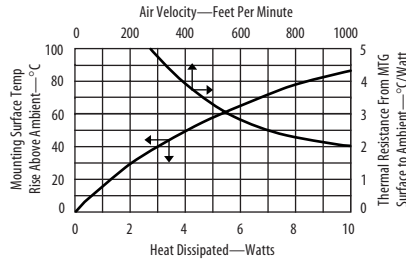
For additional options see page 85



## 6232 Space saving staggered fin heat sink



**Space saving staggered fin heat sink** for vertical mounting TO-220 devices. Features staked on triangular base and solderable mounting tabs for easy attachment to the PC board.



Material: 1.27 (0.050) Thick Aluminum  
 Finish: See Table

### ORDERING INFORMATION

Part Number	Finish	Dia of PCB Plated Thru Hole for Tabs
6232B-MT	Black anodize	3.10 (0.122)
6232PB-MT	Pre-black anodize*	3.10 (0.122)

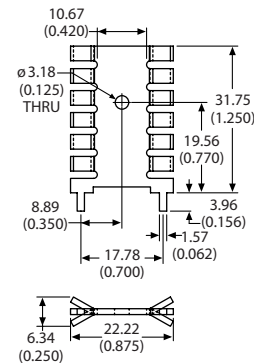
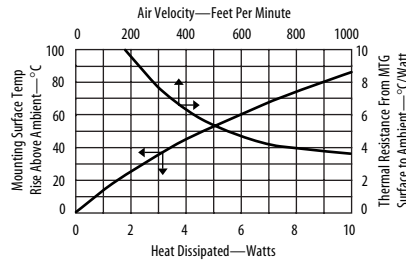
\*Edges cut during the manufacturing process will be unfinished. See page 110 for more information

For additional options see page 85

## 6025 Copper, space saving staggered fin heat sink



**Copper, space saving staggered fin heat sink** for vertical mounting TO-220 devices. Features integrated solderable mounting tabs for easy attachment to the PC board.



Material: 1.27 (0.050) Thick Copper  
 Finish: See Table

### ORDERING INFORMATION

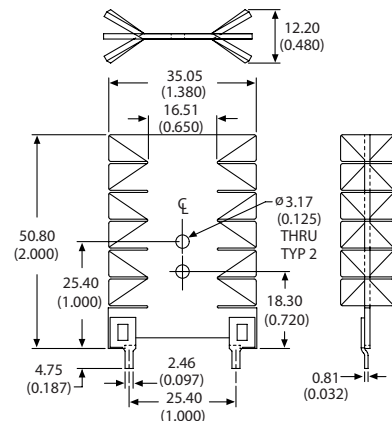
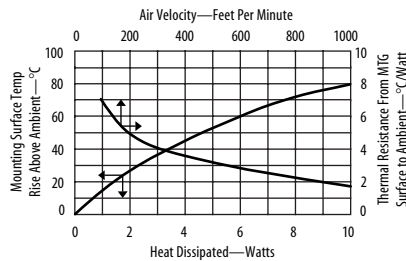
Part Number	Finish	Dia of PCB Plated Thru Hole for Tabs
6025D	Tin plated	2.54 (0.100)
6025B-TT	Black paint and tinned tabs	2.54 (0.100)

For additional options see page 85

## 5932 Space saving twisted fin heat sink



**Space saving twisted fin heat sink** for vertical mounting TO-220 devices. Features solderable mounting tabs for easy attachment to the PC board.



Material: 1.27 (0.050) Thick Aluminum  
 Finish: Black Anodize

### ORDERING INFORMATION

Part Number	Description	Dia of PCB Plated Thru Hole for Tabs
593202B03500	Space saving twisted fin heat sink with solderable tabs	2.84 (0.112)

### POPULAR OPTIONS: 593202B0 00 00

Base part no. A

Position	Code	Description	Details
A	34	Solderable tab for 0.094 plated thru hole	Page 92

For additional options see page 82



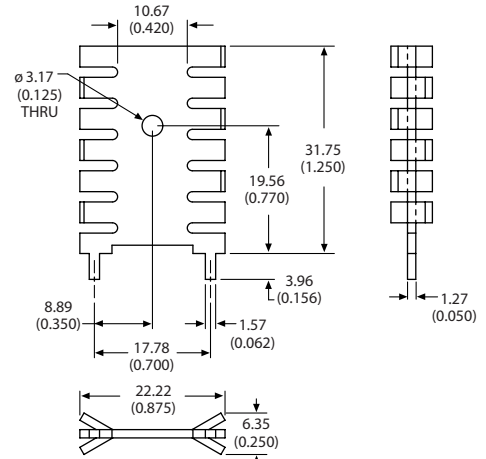
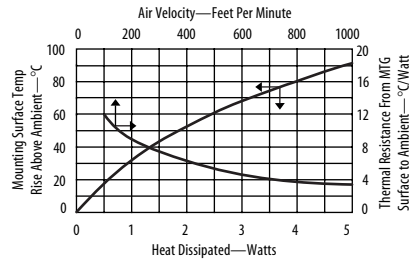
## 5425 Space saving staggered fin heat sink

Grease & Epoxy page 112

Mounting Kits page 99



**Space saving staggered fin heat sink for vertical mounting** TO-220 devices. Features integrated solderable mounting tabs that can be twisted for attachment to the PC board. Heat sink is also available with tin plating for soldering directly to the PC board.



Material: 1.27 (0.050) Thick Aluminum  
Finish: See Table

### ORDERING INFORMATION

**Dia of PCB Plated Thru Hole for Tabs**

Part Number	Finish	Dia of PCB Plated Thru Hole for Tabs
542502B00000	Black anodize	2.39 (0.094)
542502D00000	Tin plated	2.39 (0.094)

For additional options see page 82

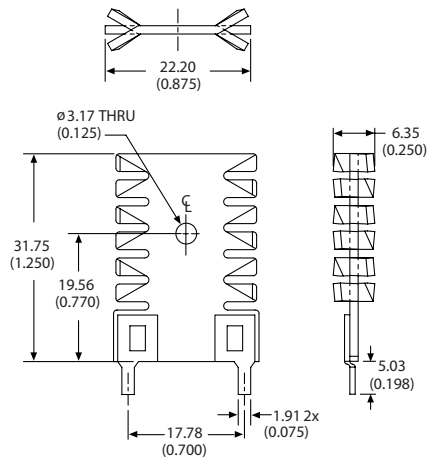
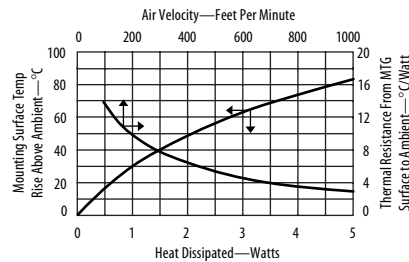
## 5925 Space saving twisted fin heat sink

Grease & Epoxy page 112

Mounting Kits page 99



**Space savings twisted fin heat sink for vertical mounting** TO-220 devices. Features staked on solderable mounting tabs for easy attachment to the PC board.



Material: 1.27 (0.050) Thick Aluminum  
Finish: See Table

### ORDERING INFORMATION

**Dia of PCB Plated Thru Hole for Tabs**

Part Number	Finish	Dia of PCB Plated Thru Hole for Tabs
592502B03400	Black anodize	2.39 (0.094)
592502U03400	Unfinished	2.39 (0.094)

For additional options see page 82

# TO-220 Heat Sinks

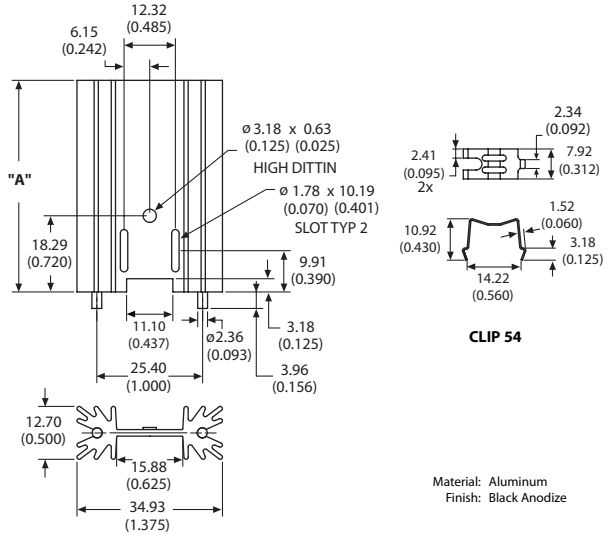
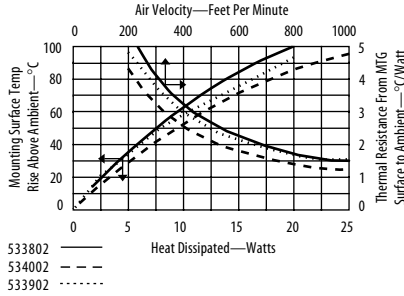


5338, 5339, 5340

## Extruded heat sink with radial fins



**Extruded heat sink with radial fins and channel clip attach feature** make device attachment easy. Includes clip and two solderable mounting pins which permit vertical mounting and eliminate stress on device leads. Available in three heights for TO-220 devices.



Material: Aluminum  
Finish: Black Anodize

### ORDERING INFORMATION

**Dia of PCB Plated Thru Hole for Pins**

Part Number	"A" Dim	Dia of PCB Plated Thru Hole for Pins
533802B02554	25.40 (1.000)	2.67 (0.105)
533902B02554	38.10 (1.500)	2.67 (0.105)
534002B02554	50.80 (2.000)	2.67 (0.105)

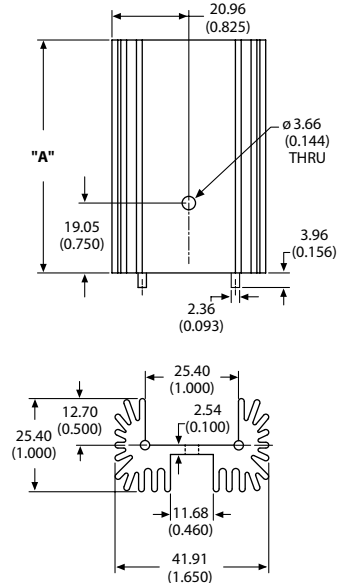
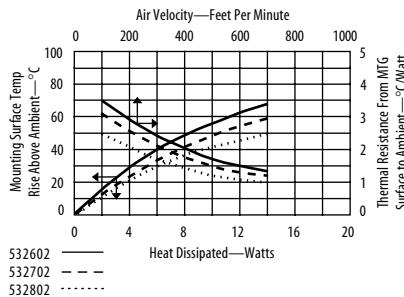
For additional options see page 83

5326, 5327, 5328

## High power extruded heat sink with large radial fins



**High power extruded heat sink with large radial fins** and increased fin count for additional cooling capacity. Solderable pins allow vertical mounting without stress on the device leads. Available in three heights for TO-220 devices.



Material: Aluminum  
Finish: Black Anodize

### ORDERING INFORMATION

**Dia of PCB Plated Thru Hole for Pins**

Part Number	"A" Dim	Dia of PCB Plated Thru Hole for Pins
532602B02500	38.10 (1.500)	2.67 (0.105)
532702B02500	50.80 (2.000)	2.67 (0.105)
532802B02500	63.50 (2.500)	2.67 (0.105)

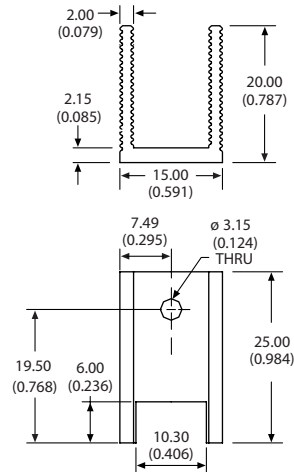
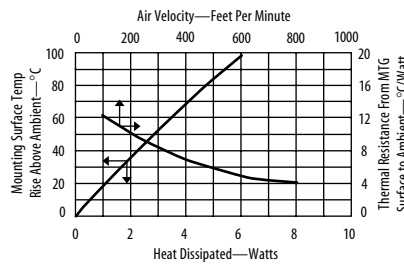
For additional options see page 83

ML26AA

## Extruded channel style heat sink featuring serrated fins



**Extruded channel style heat sink features serrated fins** for increased cooling capacity. The base of the heat sink is notched to clear the device leads when mounted horizontally on the printed circuit card. Narrow channel accommodates a TO-220 device.



Material: Aluminum  
Finish: Black Anodize

### ORDERING INFORMATION

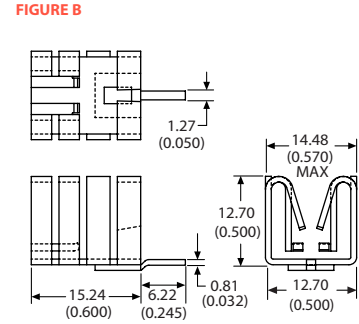
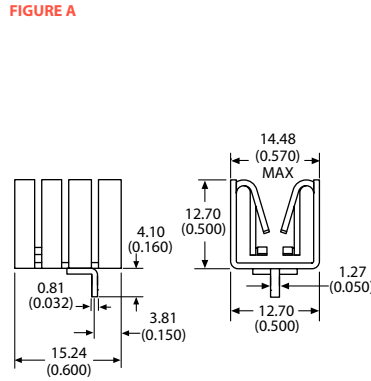
Part Number	Description
ML26AA	Extruded channel style heat sink



5912 Plug in style heat sink featuring four spring action clips



Plug in style heat sink features four spring action clips to firmly hold the device to the heat sink ensuring maximum metal to metal thermal contact. Available with solderable mounting tabs for both horizontal and vertical mounting to the PC board.

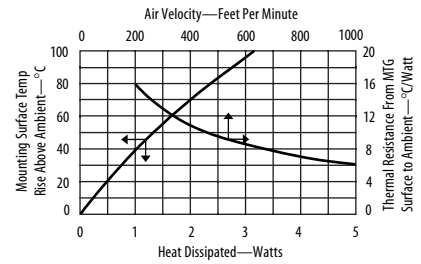


Material: 0.81 (0.032) Thick Aluminum  
Finish: Black Anodize

ORDERING INFORMATION

Part Number	Description	Figure	Dia of PCB Plated Thru Hole for Tabs
591202B00000	Plug in style heat sink	A	
591202B03100	With horizontal mounting tab	A	1.73 (0.068)
591202B04000	With vertical mounting tab	B	1.75 (0.069)

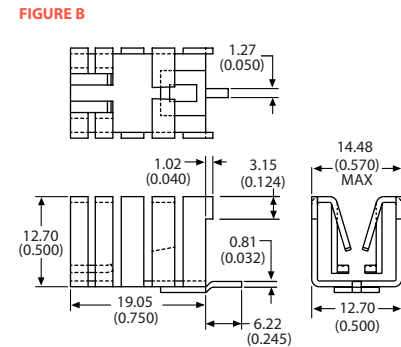
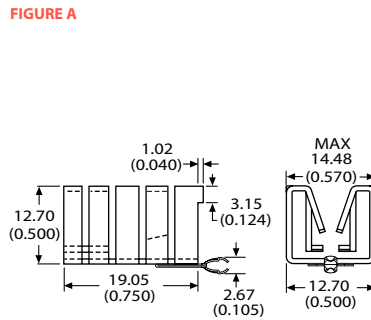
For additional options see page 84



5913 Plug in style heat sink featuring four spring action clips



Plug in style heat sink features four spring action clips to firmly hold the device to the heat sink ensuring maximum metal to metal thermal contact. Includes 2 integrated standoffs to steady the heat sink during wave soldering. Available with solderable mounting tabs for both horizontal and vertical mounting to the PC board.

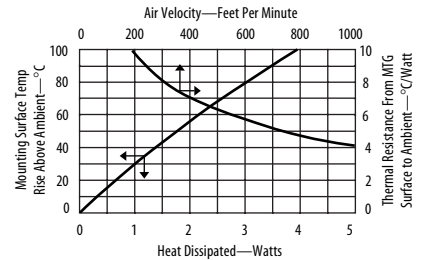


Material: 0.81 (0.032) Thick Aluminum  
Finish: Black Anodize

ORDERING INFORMATION

Part Number	Description	Figure	Dia of PCB Plated Thru Hole for Tabs
591302B00000	Plug in style heat sink with integrated standoffs	A	
591302B02800	With Shur-Lock™ tab for vertical mounting	A	1.73 (0.068)
591302B04000	With tab for vertical mounting	B	1.75 (0.069)

For additional options see page 84







5768

## Plug in style heat sink featuring four spring action clips



Plug in style heat sink features four spring action clips to firmly hold the device to the heat sink ensuring maximum metal to metal thermal contact. Available with solderable mounting tabs for both horizontal and vertical mounting to the PC board.

FIGURE A

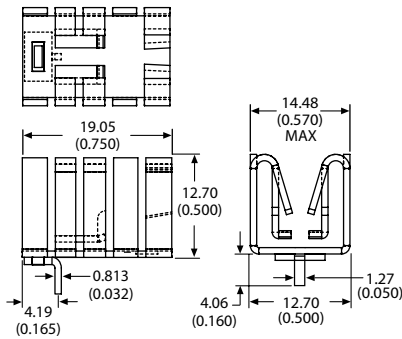
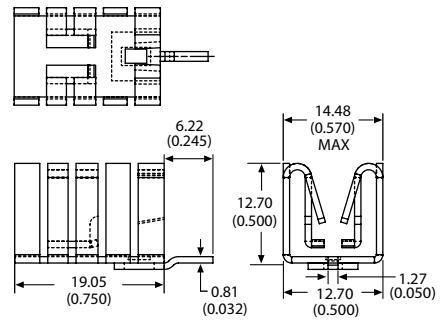


FIGURE B

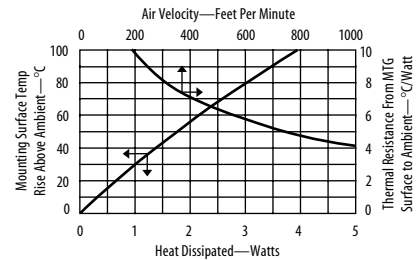


Material: 0.81 (0.032) Thick Aluminum  
Finish: See Table

### ORDERING INFORMATION

Part Number	Description	Figure	Finish	Dia of PCB Plated Thru Hole for Tabs
576802B00000	Slim plug in heat sink	A	Black anodize	
576802C00000	Slim plug in heat sink	A	Gold chromate	
576802U00000	Slim plug in heat sink	A	Unfinished	
576802B03100	With single tab for horizontal mounting	A	Black anodize	1.73 (0.068)
576802C03100	With single tab for horizontal mounting	A	Gold chromate	1.73 (0.068)
576802U03100	With single tab for horizontal mounting	A	Unfinished	1.73 (0.068)
576802B04000	With single tab for vertical mounting	B	Black anodize	1.75 (0.069)
576802C04000	With single tab for vertical mounting	B	Gold chromate	1.75 (0.069)
576802U04000	With single tab for vertical mounting	B	Unfinished	1.75 (0.069)

For additional options see page 84



## PF432, PF433, PF434, PF435, PF436 Plug in style heat sink features pre blackened finish



Plug in style heat sink features Pre-blackened finish and two spring action clips to firmly hold the device to the heat sink ensuring maximum metal to metal thermal contact. Available with solderable mounting tabs for both horizontal and vertical mounting to the PC board.

FIGURE A

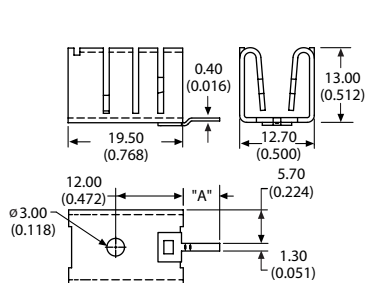


FIGURE B

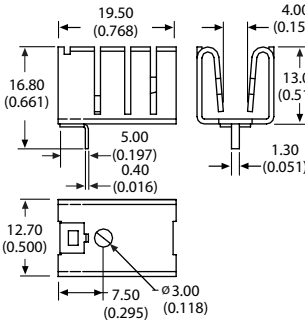
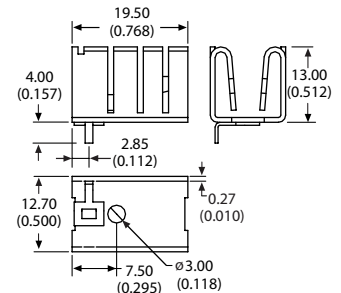


FIGURE C

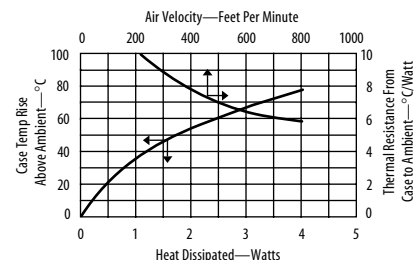


Material: 0.71 (0.028) Thick Aluminum  
Finish: Pre-Black Anodize\*

### ORDERING INFORMATION

Part Number	Description	Figure	Dim "A"	Dia of PCB Plated Thru Hole for Tabs
PF432	Plug in style heat sink with solderable tab, vertical mount	A	6.20 (0.244)	1.60 (0.063)
PF433	With vertical mount no tab	A		
PF434	With solderable tab, horizontal mount	B		1.60 (0.063)
PF435	With solderable tab, vertical mount	A	9.50 (0.374)	1.60 (0.063)
PF436	With solderable tab offset from center, horizontal mount	C		1.60 (0.063)

\*Edges cut during the manufacturing process will be unfinished.  
See page 110 for more information





5669 Plug in style heat sink with folded back fins



Plug in style heat sink with folded back fins for extra cooling capacity. Features four spring action clips to firmly hold the device to the heat sink ensuring maximum metal to metal thermal contact. Available with or without solderable mounting tabs for both horizontal and vertical mounting to the PC board.

FIGURE A

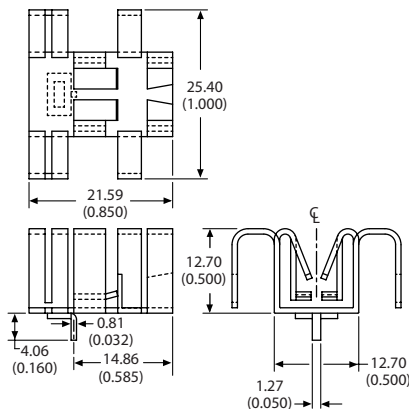
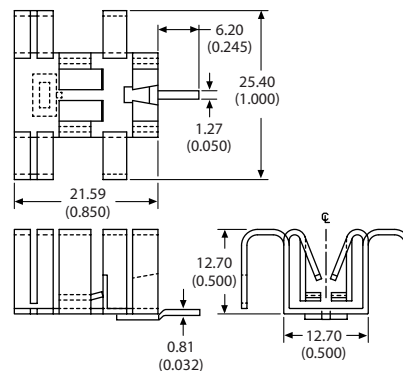


FIGURE B

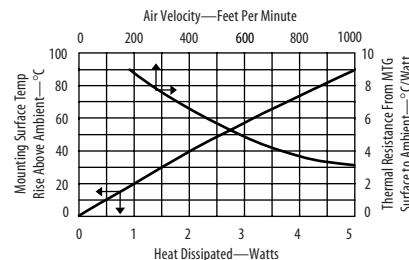


Material: 0.81 (0.032) Thick Aluminum  
Finish: Black Anodize

ORDERING INFORMATION

Part Number	Description	Figure	Dia of PCB Plated Thru Hole for Tabs
566902B00000	Plug in style heat sink with folded back fins	A	
566902B03100	With horizontal mounting tab	A	1.73 (0.068)
566902B04000	With vertical mounting tab	B	1.75 (0.069)

For additional options see page 82

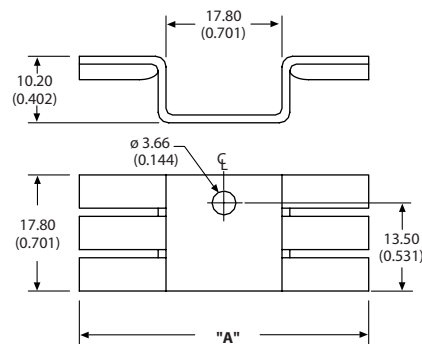
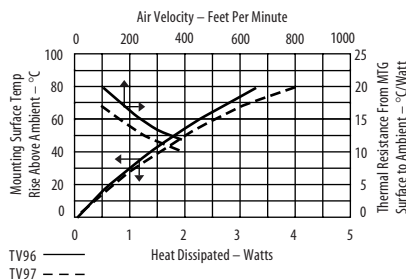


TO-220 & TO-218 & TO-247 Heat Sinks

TV96, TV97 Hat section heat sink with twisted fins



Hat section heat sink with twisted fins is low profile and perfect for use on circuit cards with 0.500 spacing. The twisted fins increase air turbulence for better thermal performance.

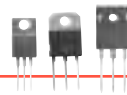


Material: 0.99 (0.039) Thick Aluminum  
Finish: Black Anodize

ORDERING INFORMATION

Part Number	"A" Dim
TV96	31.70 (1.248)
TV97	44.40 (1.748)

# TO-220 & TO-218 & TO-247 Heat Sinks



## 5301 High rise style heat sink features twisted fins and Wave-On™ solderable mounts



High rise style heat sink features twisted fins and Wave-On™ solderable mounts for easy attachment to the PC card. Models include thru holes on one side to attach devices using standard hardware and dittins with special slots on the other for easy device attachment using convenient spring clip. Dual models use two dittins and clips to locate and attach devices.

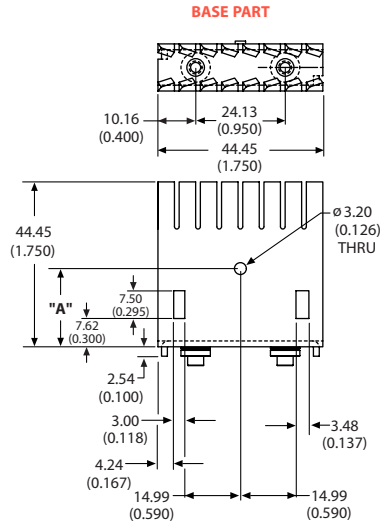


FIGURE A

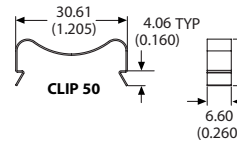
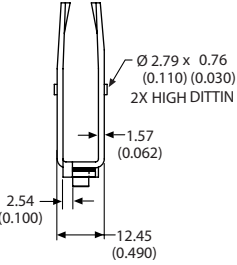
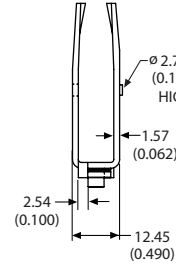
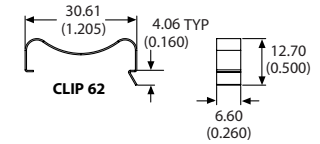
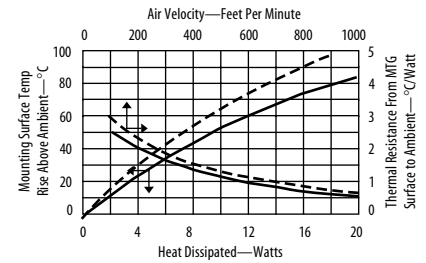


FIGURE B



Material: 1.60 (0.063) Thick Aluminum  
Finish: Black Anodize



530161 or 530162 ———  
530101 or 530102 - - -

### ORDERING INFORMATION

Part Number	Description	Device	Figure	"A" Dim	Dia of PCB Plated Thru Hole for Tabs
530101B00100	Heat sink twisted fin	TO-218, TO-247		21.08 (0.830)	4.75 (0.187)
530101B00150	With device clip #50	TO-218, TO-247	A	21.08 (0.830)	4.75 (0.187)
530102B00100	Heat sink twisted fin	TO-220		18.29 (0.720)	4.75 (0.187)
530102B00150	With device clip #50	TO-220	A	18.29 (0.720)	4.75 (0.187)
530161B00162	With two device clips #62	Dual TO-218, TO-247	B	21.08 (0.830)	4.75 (0.187)
530162B00162	With two device clips #62	Dual TO-220	B	18.29 (0.720)	4.75 (0.187)

For additional options see page 82

## 5308 High rise style heat sink features twisted fins and solderable tabs



High rise style heat sink features twisted fins and solderable tabs for easy attachment to the PC card. Models include thru holes on one side to attach devices using standard hardware and dittins with special slots on the other for easy device attachment using convenient spring clip. Dual models use two dittins and clips to locate and attach devices.

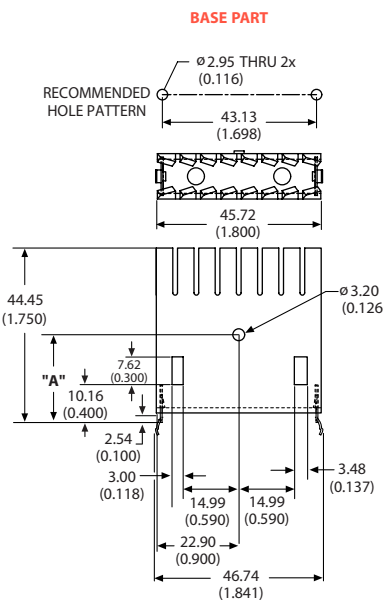


FIGURE A

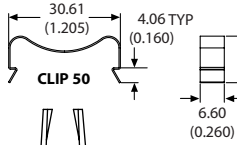
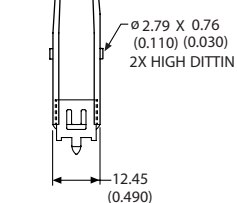
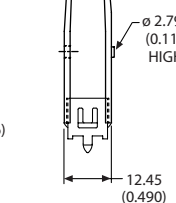
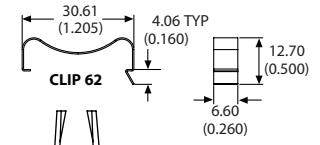
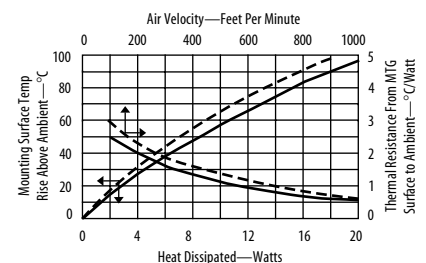


FIGURE B



Material: 1.60 (0.063) Thick Aluminum  
Finish: Black Anodize



530861 or 530862 ———  
530801 or 530802 - - -

### ORDERING INFORMATION

Part Number	Description	Device	Figure	"A" Dim	Dia of PCB Plated Thru Hole for Tabs
530801B05100	Heat sink twisted fin and solderable tabs	TO-218, TO-247		21.08 (0.830)	2.95 (0.116)
530801B05150	With device clip #50	TO-218, TO-247	A	21.08 (0.830)	2.95 (0.116)
530802B05100	Heat sink twisted fin and solderable tabs	TO-220		18.29 (0.720)	2.95 (0.116)
530802B05150	With device clip #50	TO-220	A	18.29 (0.720)	2.95 (0.116)
530861B05162	With two device clips #62	Dual TO-218, TO-247	B	21.08 (0.830)	2.95 (0.116)
530862B05162	With two device clips #62	Dual TO-220	B	18.29 (0.720)	2.95 (0.116)

For additional options see page 82

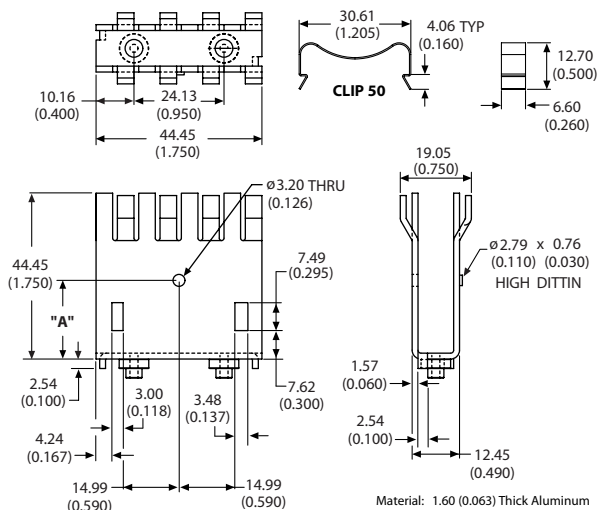
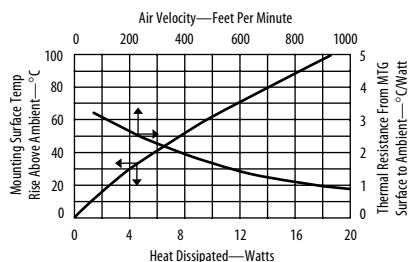
THRU HOLE DISCRETE SEMICONDUCTOR PACKAGES



5304 High rise style heat sink features staggered fins and Wave-On™ solderable mounts



High rise style heat sink features staggered fins and Wave-On™ solderable mounts for easy attachment to the PC card. Models include thru holes on one side to attach devices using standard hardware and dittins with special slots on the other for easy device attachment using a convenient spring clip.



Material: 1.60 (0.063) Thick Aluminum  
Finish: Black Anodize

ORDERING INFORMATION

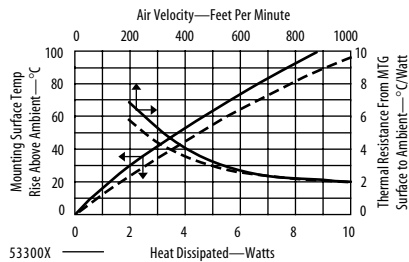
Part Number	Description	Device	"A" Dim	Dia of PCB Plated Thru Hole for Tabs
530401B00100	High rise style heat sink staggered fins	TO-218, TO-247	21.08 (0.830)	4.75 (0.187)
530401B00150	With device clip 50	TO-218, TO-247	21.08 (0.830)	4.75 (0.187)
530402B00100	High rise style heat sink staggered fins	TO-220	18.29 (0.720)	4.75 (0.187)
530402B00150	With device clip 50	TO-220	18.29 (0.720)	4.75 (0.187)

For additional options see page 82

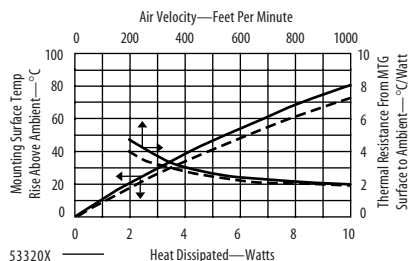
5330, 5331, 5332, 5333 Extruded heat sink with radial fins



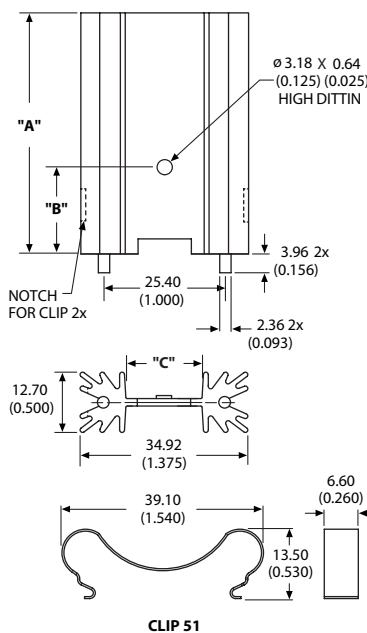
Extruded heat sink with radial fins and clip attach feature makes device attachment easy. Includes two solderable mounting pins which permit vertical mounting and eliminate stress on device leads. Available in four heights for TO-220, TO-218 and TO-247 devices.



53300X ———  
53310X - - - -



53320X ———  
53330X - - - -



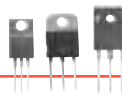
Material: Aluminum  
Finish: Black Anodize

ORDERING INFORMATION

Part Number	Device	"A" Dim	"B" Dim	"C" Dim	Dia of PCB Plated Thru Hole for Pins
533001B02551	TO-218, TO-247	25.40 (1.000)	21.59 (0.850)	17.02 (0.670)	2.67 (0.105)
533002B02551	TO-220	25.40 (1.000)	18.29 (0.720)	15.88 (0.625)	2.67 (0.105)
533101B02551	TO-218, TO-247	38.10 (1.500)	21.59 (0.850)	17.02 (0.670)	2.67 (0.105)
533102B02551	TO-220	38.10 (1.500)	18.29 (0.720)	15.88 (0.625)	2.67 (0.105)
533201B02551	TO-218, TO-247	50.80 (2.000)	21.59 (0.850)	17.02 (0.670)	2.67 (0.105)
533202B02551	TO-220	50.80 (2.000)	18.29 (0.720)	15.88 (0.625)	2.67 (0.105)
533301B02551	TO-218, TO-247	63.50 (2.500)	21.59 (0.850)	17.02 (0.670)	2.67 (0.105)
533302B02551	TO-220	63.50 (2.500)	18.29 (0.720)	15.88 (0.625)	2.67 (0.105)

For additional options see page 83

# TO-220 & TO-218 & TO-247 Heat Sinks



SW25, SW38, SW50, SW63

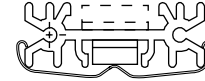
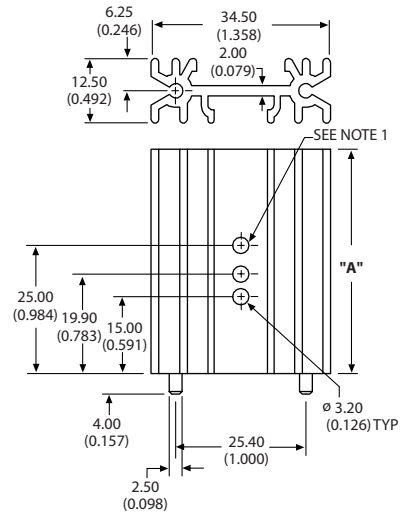
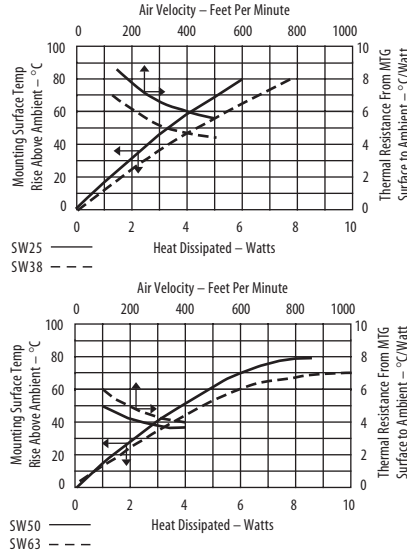
Extruded heat sink with unequal channel widths

Grease & Epoxy page 112

Mounting Kits page 99



**Extruded heat sink with unequal channel widths front and back** can accommodate a TO-220, TO-218, or TO-247 devices. Includes two solderable mounting pins which permit vertical mounting and eliminate stress on device leads. Available in three heights. Version without hole uses clip 5901 (sold separately) to attach device. See page 97 for clip information.



NOTE 1: This hole not present in SW25 model  
 Material: Aluminum  
 Finish: Black Anodize

## ORDERING INFORMATION

Part Number	Description	"A" Dim	Holes	Dia of PCB Plated Thru Hole for Pins
SW25-2	Extruded heat sink with unequal channel widths front and back	25.00 (0.984)	No	3.00 (0.118)
SW25-4	With device mounting holes	25.00 (0.984)	Yes	3.00 (0.118)
SW38-2	Extruded heat sink with unequal channel widths front and back	38.00 (1.496)	No	3.00 (0.118)
SW38-4	With device mounting holes	38.00 (1.496)	Yes	3.00 (0.118)
SW50-2	Extruded heat sink with unequal channel widths front and back	50.00 (1.968)	No	3.00 (0.118)
SW50-4	With device mounting holes	50.00 (1.968)	Yes	3.00 (0.118)
SW63-2	Extruded heat sink with unequal channel widths front and back	63.00 (2.480)	No	3.00 (0.118)
SW63-4	With device mounting holes	63.00 (2.480)	Yes	3.00 (0.118)

5297, 5298, 5299, 5300

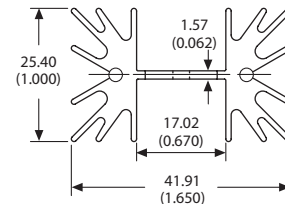
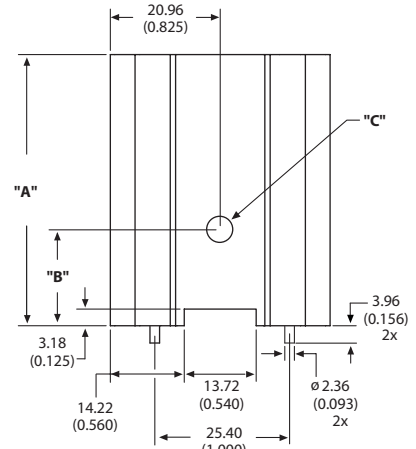
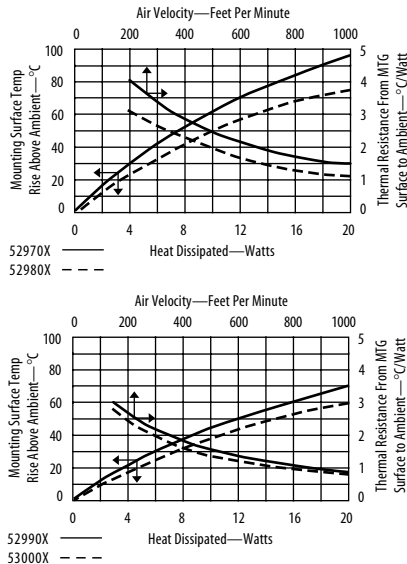
Extruded heat sink with large radial fins

Grease & Epoxy page 112

Mounting Kits page 99



**Extruded heat sink with large radial fins** features equal channel widths on both sides for single or dual device mounting. Includes two solderable mounting pins which permit vertical mounting and eliminate stress on device leads. Available in four heights for TO-220, TO-218, and TO-247 devices.

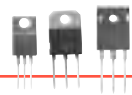


Material: Aluminum  
 Finish: Black Anodize

## ORDERING INFORMATION

Part Number	Device	"A" Dim	"B" Dim	"C" Dim	Dia of PCB Plated Thru Hole for Pins
529701B02500	TO-218, TO-247	25.40 (1.000)	21.59 (0.850)	3.66 (0.144)	2.67 (0.105)
529702B02500	TO-220	25.40 (1.000)	18.29 (0.720)	3.17 (0.125)	2.67 (0.105)
529801B02500	TO-218, TO-247	38.10 (1.500)	21.59 (0.850)	3.66 (0.144)	2.67 (0.105)
529802B02500	TO-220	38.10 (1.500)	18.29 (0.720)	3.17 (0.125)	2.67 (0.105)
529901B02500	TO-218, TO-247	50.80 (2.000)	21.59 (0.850)	3.66 (0.144)	2.67 (0.105)
529902B02500	TO-220	50.80 (2.000)	18.29 (0.720)	3.17 (0.125)	2.67 (0.105)
530001B02500	TO-218, TO-247	63.50 (2.500)	21.59 (0.850)	3.66 (0.144)	2.67 (0.105)
530002B02500	TO-220	63.50 (2.500)	18.29 (0.720)	3.17 (0.125)	2.67 (0.105)

For additional options see page 83

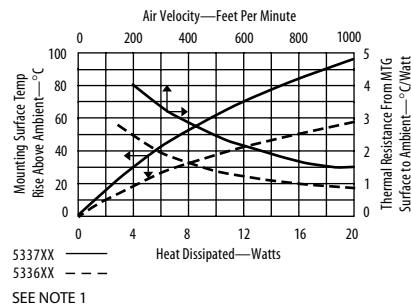
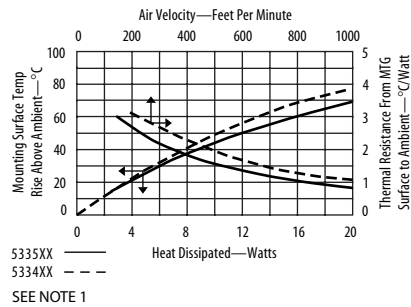


Grease & Epoxy page 112

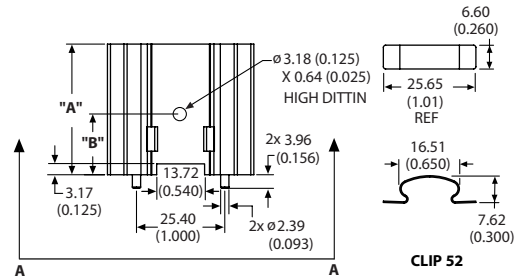
## 5334, 5335, 5336, 5337 Extruded heat sink with large radial fins



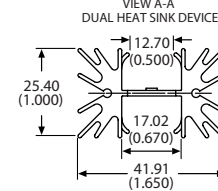
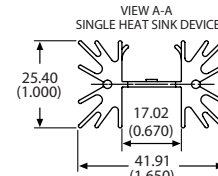
**Extruded heat sink with large radial fins and channel clip attach feature** makes device attachment easy. Includes clip and two solderable mounting pins which permit vertical mounting and eliminate stress on device leads. Available in four heights for TO-220, TO-218, and TO-247 devices.



NOTE 1: Graph depicts single device models. Dual device models exhibit a 15% performance increase.



Material: Aluminum  
Finish: Black Anodize



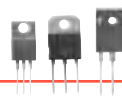
### ORDERING INFORMATION

Part Number	Device	Description	"A" Dim	"B" Dim	Dia of PCB Plated Thru Hole for Pins
533401B02552	TO-218, TO-247	Extruded heat sink with radial fins and device clip #52	38.10 (1.500)	21.59 (0.850)	2.67 (0.105)
533402B02552	TO-220	Extruded heat sink with radial fins and device clip #52	38.10 (1.500)	18.29 (0.720)	2.67 (0.105)
533421B02552	Dual TO-218, TO-247	With 2 device clips #52	38.10 (1.500)	21.59 (0.850)	2.67 (0.105)
533422B02552	Dual TO-220	With 2 device clips #52	38.10 (1.500)	18.29 (0.720)	2.67 (0.105)
533501B02552	TO-218, TO-247	Extruded heat sink with radial fins and device clip #52	50.80 (2.000)	21.59 (0.850)	2.67 (0.105)
533502B02552	TO-220	Extruded heat sink with radial fins and device clip #52	50.80 (2.000)	18.29 (0.720)	2.67 (0.105)
533521B02552	Dual TO-218, TO-247	With 2 device clips #52	50.80 (2.000)	21.59 (0.850)	2.67 (0.105)
533522B02552	Dual TO-220	With 2 device clips #52	50.80 (2.000)	18.29 (0.720)	2.67 (0.105)
533601B02552	TO-218, TO-247	Extruded heat sink with radial fins and device clip #52	63.50 (2.500)	21.59 (0.850)	2.67 (0.105)
533602B02552	TO-220	Extruded heat sink with radial fins and device clip #52	63.50 (2.500)	18.29 (0.720)	2.67 (0.105)
533621B02552	Dual TO-218, TO-247	With 2 device clips #52	63.50 (2.500)	21.59 (0.850)	2.67 (0.105)
533622B02552	Dual TO-220	With 2 device clips #52	63.50 (2.500)	18.29 (0.720)	2.67 (0.105)
533701B02552	TO-218, TO-247	Extruded heat sink with radial fins and device clip #52	25.40 (1.000)	21.59 (0.850)	2.67 (0.105)
533702B02552	TO-220	Extruded heat sink with radial fins and device clip #52	25.40 (1.000)	18.29 (0.720)	2.67 (0.105)
533721B02552	Dual TO-218, TO-247	With 2 device clips #52	25.40 (1.000)	21.59 (0.850)	2.67 (0.105)
533722B02552	Dual TO-220	With 2 device clips #52	25.40 (1.000))	18.29 (0.720)	2.67 (0.105)

For additional options see page 83



# TO-220 & TO-218 & TO-247 Heat Sinks

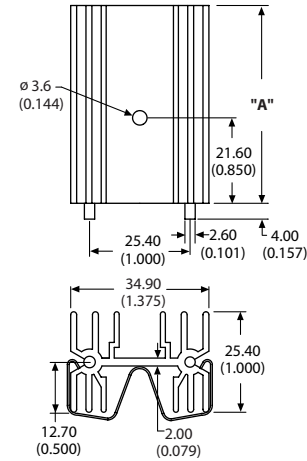
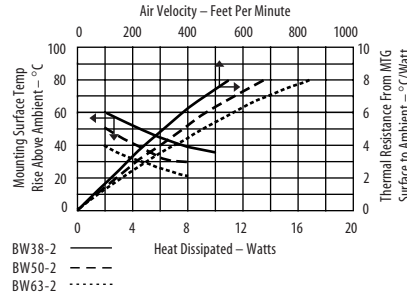


## BW38, BW50, BW63

## Wide extruded heat sink with unequal channel



**Wide extruded heat sink with unequal channel widths** on front and back can accommodate a TO-220, TO-218, or TO-247 device. Includes two solderable mounting pins which permit vertical mounting and eliminate stress on device leads. Available in three heights. Versions without hole use clip 6801 (sold separately) to attach device. See page 97 for clip information.



Material: Aluminum  
Finish: Black Anodize

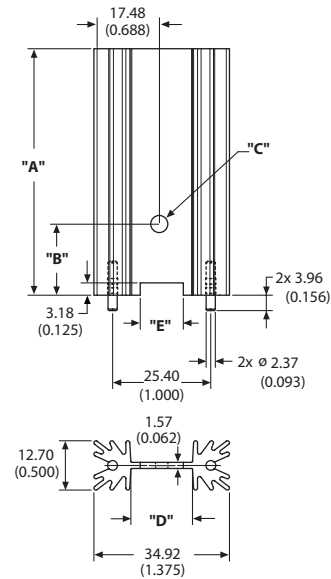
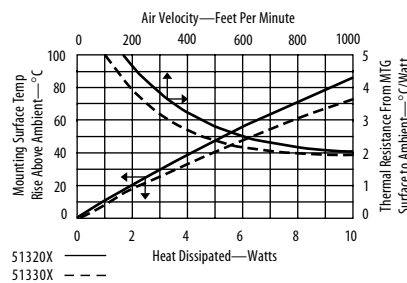
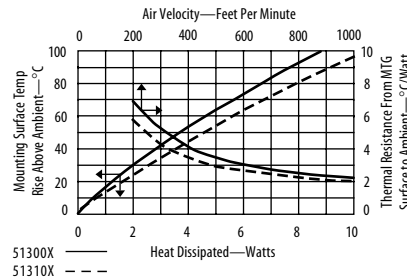
### ORDERING INFORMATION

Part Number	Description	"A" Dim	Holes	Dia of PCB Plated Thru Hole for Pins
BW38-2	Extruded heat sink with unequal channel widths front and back	38.00 (1.496)	No	3.00 (0.118)
BW38-4	With device mounting holes	38.00 (1.496)	Yes	3.00 (0.118)
BW50-2	Extruded heat sink with unequal channel widths front and back	50.00 (1.968)	No	3.00 (0.118)
BW50-4	With device mounting holes	50.00 (1.968)	Yes	3.00 (0.118)
BW63-2	Extruded heat sink with unequal channel widths front and back	63.00 (2.480)	No	3.00 (0.118)
BW63-4	With device mounting holes	63.00 (2.480)	Yes	3.00 (0.118)

## 5130, 5131, 5132, 5133 Extruded heat sink with radial fins



**Extruded heat sink with radial fins feature equal channel widths** on both sides for single or dual device mounting. Includes two solderable mounting pins which permit vertical mounting and eliminate stress on device leads. Available in four heights for TO-220, TO-218, and TO-247 devices.



Material: Aluminum  
Finish: Black Anodize

### ORDERING INFORMATION

Part Number	Device	"A" Dim	"B" Dim	"C" Dim	"D" Dim	"E" Dim	Dia of PCB Plated Thru Hole for Pins
513001B02500	TO-218, TO-247	25.40 (1.000)	21.59 (0.850)	3.66 (0.144)	17.02 (0.670)	13.72 (0.540)	2.67 (0.105)
513002B02500	TO-220	25.40 (1.000)	18.29 (0.720)	3.17 (0.125)	15.88 (0.625)	11.10 (0.437)	2.67 (0.105)
513101B02500	TO-218, TO-247	38.10 (1.500)	21.59 (0.850)	3.66 (0.144)	17.02 (0.670)	13.72 (0.540)	2.67 (0.105)
513102B02500	TO-220	38.10 (1.500)	18.29 (0.720)	3.17 (0.125)	15.88 (0.625)	11.10 (0.437)	2.67 (0.105)
513201B02500	TO-218, TO-247	50.80 (2.000)	21.59 (0.850)	3.66 (0.144)	17.02 (0.670)	13.72 (0.540)	2.67 (0.105)
513202B02500	TO-220	50.80 (2.000)	18.29 (0.720)	3.17 (0.125)	15.88 (0.625)	11.10 (0.437)	2.67 (0.105)
513301B02500	TO-218, TO-247	63.50 (2.500)	21.59 (0.850)	3.66 (0.144)	17.02 (0.670)	13.72 (0.540)	2.67 (0.105)
513302B02500	TO-220	63.50 (2.500)	18.29 (0.720)	3.17 (0.125)	15.88 (0.625)	11.10 (0.437)	2.67 (0.105)

For additional options see page 83





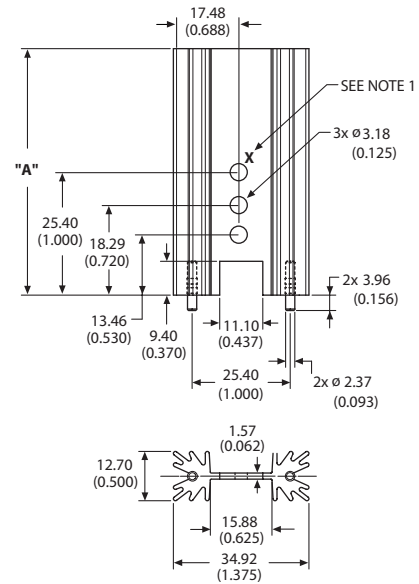
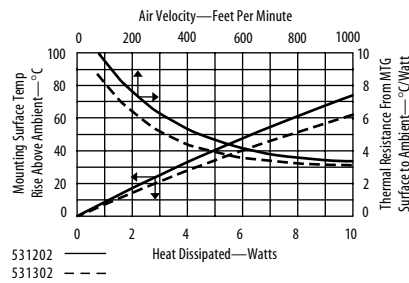
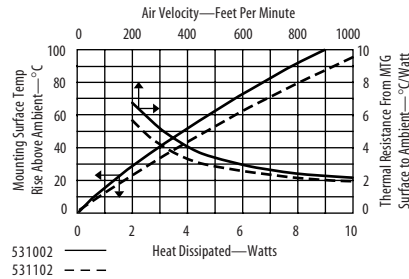
## 5310, 5311, 5312, 5313 Extruded heat sink with radial fins & notched base

Grease & Epoxy  
page 112

Mounting  
Kits  
page 99



**Extruded heat sink with radial fins and notched base** features equal channel widths on both sides and mounting holes to accommodate TO-220 and TO-202 devices. Includes two solderable mounting pins which permit vertical mounting and eliminate stress on device leads. Available in four heights.



NOTE 1: This hole not present in 5310 series

Material: Aluminum  
Finish: See Table

### ORDERING INFORMATION

Part Number	"A" Dim	Finish	Dia of PCB Plated Thru Hole for Pins
531002B02500	25.40 (1.000)	Black anodize	2.67 (0.105)
531002C02500	25.40 (1.000)	Gold chromate	2.67 (0.105)
531102B02500	38.10 (1.500)	Black anodize	2.67 (0.105)
531102C02500	38.10 (1.500)	Gold chromate	2.67 (0.105)
531202C02500	50.80 (2.000)	Gold chromate	2.67 (0.105)
531202B02500	50.80 (2.000)	Black anodize	2.67 (0.105)
531302B02500	63.50 (2.500)	Black anodize	2.67 (0.105)
531302C02500	63.50 (2.500)	Gold chromate	2.67 (0.105)

For additional options see page 83

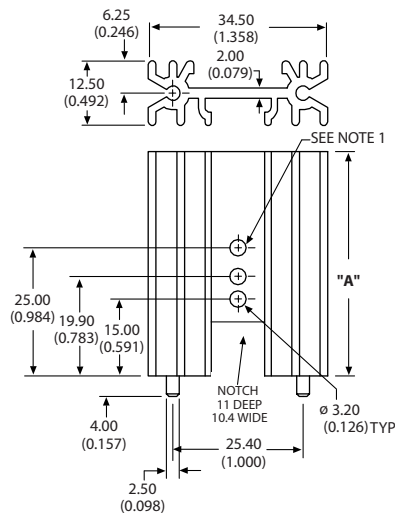
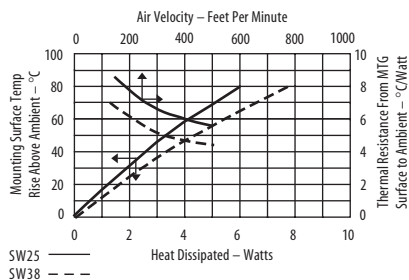
## SW25-6, SW38-6 Extruded heat sink with unequal channel widths

Grease & Epoxy  
page 112

Mounting  
Kits  
page 99



**Extruded heat sink with unequal channel widths front and back** can accommodate a TO-220 or TO-202 device. Includes two solderable mounting pins which permit vertical mounting and eliminate stress on device leads. Clip 5901 (sold separately) can be used to attach device. See page 97 for clip information.



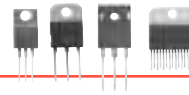
NOTE 1: This hole not present in SW25 series

Material: Aluminum  
Finish: Black Anodize

### ORDERING INFORMATION

Part Number	Description	"A" Dim	Dia of PCB Plated Thru Hole for Pins
SW25-6	Extruded heat sink with unequal channel widths front and back	25.00 (0.984)	3.00 (0.118)
SW38-6	Extruded heat sink with unequal channel widths front and back	38.00 (1.496)	3.00 (0.118)

# TO-220 & TO-218 & TO-247 & Multiwatt Heat Sinks



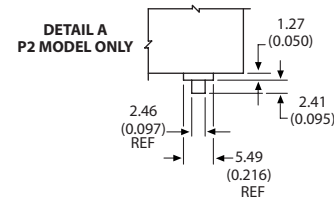
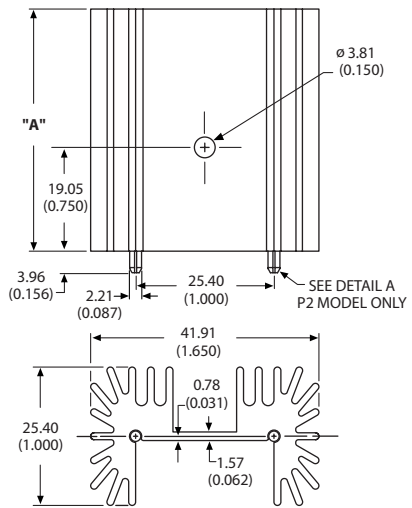
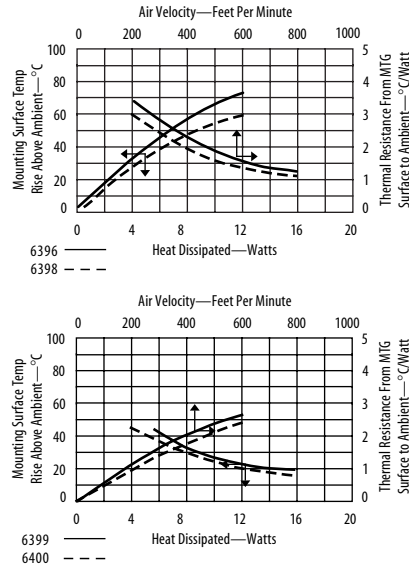
Grease & Epoxy  
page 112

Mounting Kits  
page 99

## 6396, 6398, 6399, 6400 High power extruded heat sink with large radial fins



**High power extruded heat sink with large radial fins and solderable shoulder pins** allows vertical mounting without stress on the device leads. Available with shoulder pins to provide fixed clearance between the bottom of the heat sink and the board. Available in four heights for TO-220, TO-218, TO-247 and multiwatt devices.



Material: Aluminum  
Finish: Black Anodize

### ORDERING INFORMATION

Part Number	Description	"A" Dim	Dia of PCB Plated Thru Hole for Pins
6396B	Extruded heat sink with large radial fins and straight pins	25.40 (1.000)	2.89 (0.114)
6396B-P2	With solderable shoulder pins	25.40 (1.000)	3.10 (0.122)
6398B	Extruded heat sink with large radial fins and straight pins	38.10 (1.500)	2.89 (0.114)
6398B-P2	With solderable shoulder pins	38.10 (1.500)	3.10 (0.122)
6399B	Extruded heat sink with large radial fins and straight pins	50.80 (2.000)	2.89 (0.114)
6399B-P2	With solderable shoulder pins	50.80 (2.000)	3.10 (0.122)
6400B	Extruded heat sink with large radial fins and straight pins	63.50 (2.500)	2.89 (0.114)
6400B-P2	With solderable shoulder pins	63.50 (2.500)	3.10 (0.122)

For additional options see page 85

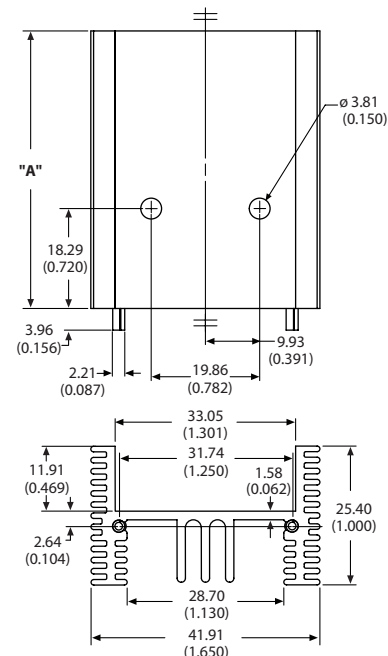
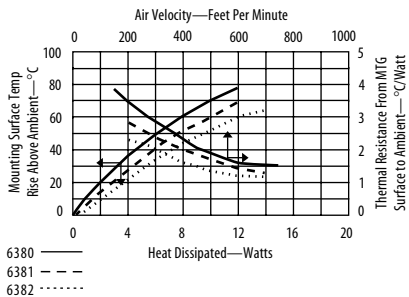
## 6380, 6381, 6382 High power extruded heat sink

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page 112

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page 99



**High power extruded heat sink for SIP packages.** Solderable pins allows vertical mounting without stress on the device leads. Available in three heights. Can also be used for dual TO-220, TO-218, TO-247 and multiwatt devices.



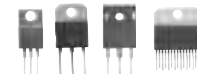
Material: Aluminum  
Finish: Black Anodize

### ORDERING INFORMATION

Part Number	Description	"A" Dim	Dia of PCB Plated Thru Hole for Pins
6380B	Extruded heat sink with solderable pins	25.40 (1.000)	2.89 (0.114)
6381B	Extruded heat sink with solderable pins	38.10 (1.500)	2.89 (0.114)
6382B	Extruded heat sink with solderable pins	50.80 (2.000)	2.89 (0.114)

For additional options see page 85

THRU HOLE DISCRETE SEMICONDUCTOR PACKAGES

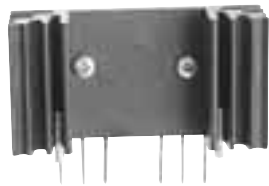


6374

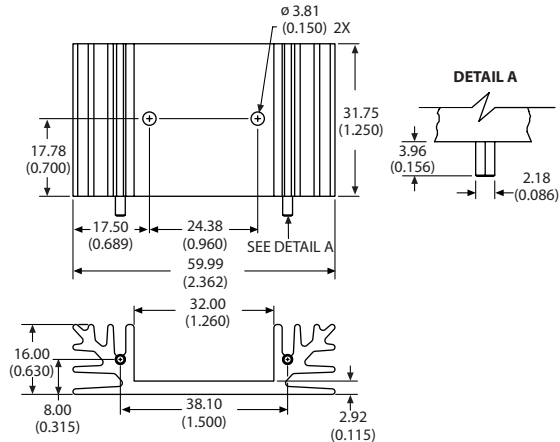
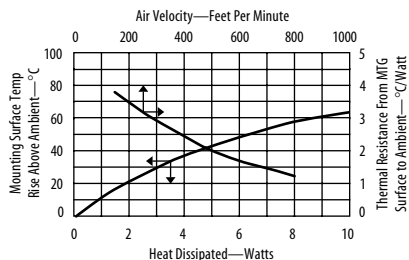
## Extruded heat sink for SIP packages

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**Extruded heat sink for SIP packages.** Solderable pins allows vertical mounting without stress on the device leads. Can also be used for dual TO-220, TO-218, TO-247, and multiwatt devices.



Material: Aluminum  
Finish: Black Anodize

### ORDERING INFORMATION

Part Number	Description	Dia of PCB Plated Thru Hole for Pins
6374B	Extruded heat sink with solderable pins	2.89 (0.114)

For additional options see page 85

YB32-4

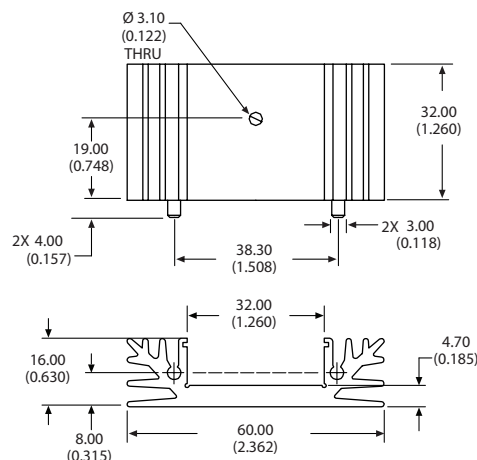
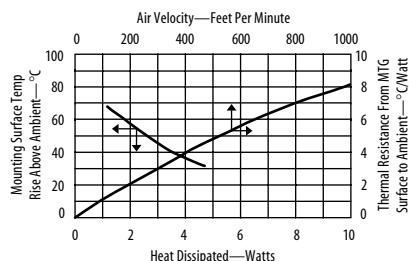
## High power flat back extruded channel style heat sink

Grease & Epoxy page 112

Mounting Kits page 99



**High power flat back extruded channel style heat sink** features a wide channel to accommodate several devices. Includes two solderable pins to allow vertical mounting without stress on the device leads. Can be used with TO-220, TO-218, TO-247, and multiwatt devices.



Material: Aluminum  
Finish: Black Anodize

### ORDERING INFORMATION

Part Number	Description	Dia of PCB Plated Thru Hole for Pins
YB32-4	High power flat back extruded heat sink	3.48 (0.137)

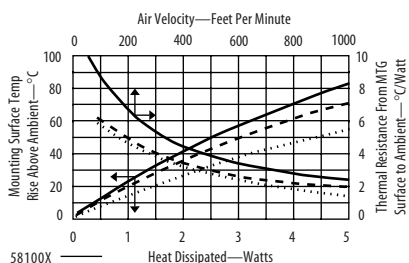
## 5810, 5811, 5812 Flat back extruded heat sink featuring solderable pins

Grease & Epoxy page 112

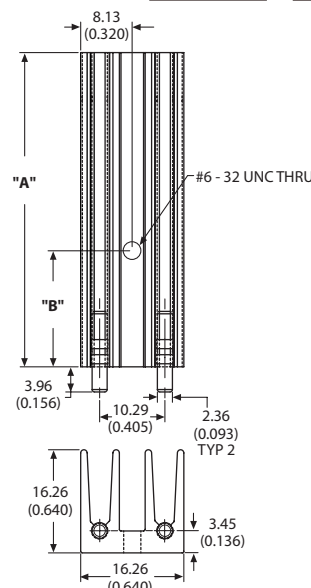
Mounting Kits page 99



**Flat back extruded heat sink features solderable pins** which allow vertical mounting without stress on the device leads. Available in three heights for TO-220 and TO-218 devices.



5810X ———  
5811X - - - -  
58120X ·····



Material: Aluminum  
Finish: Black Anodize

### ORDERING INFORMATION

Part Number	Device	"A" Dim	"B" Dim	Dia of PCB Plated Thru Hole for Pins
581001B02500	TO-218	25.40 (1.000)	21.59 (0.850)	2.67 (0.105)
581002B02500	TO-220	25.40 (1.000)	18.29 (0.720)	2.67 (0.105)
581101B02500	TO-218	38.10 (1.500)	21.59 (0.850)	2.67 (0.105)
581102B02500	TO-220	38.10 (1.500)	18.29 (0.720)	2.67 (0.105)
581201B02500	TO-218	50.80 (2.000)	21.59 (0.850)	2.67 (0.105)
581202B02500	TO-220	50.80 (2.000)	18.29 (0.720)	2.67 (0.105)

For additional options see page 83

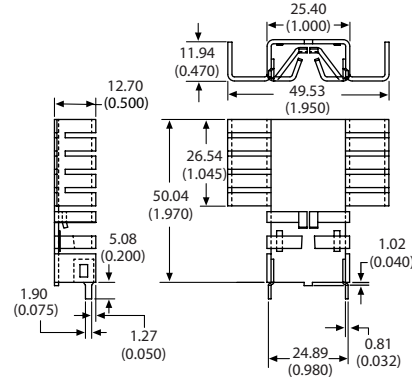
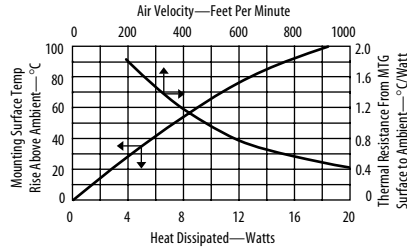


## 5922 Plug in style heat sink

Mounting Kits page 99



**Plug in style heat sink requires no hardware** to attach to the device. The four spring action clips apply even pressure eliminating gaps between the heat sink and device which rob thermal performance.



Material: 1.27 (0.050) Thick Aluminum  
Finish: Black Anodize

### ORDERING INFORMATION

Part Number	Description	Dia of PCB Plated Thru Hole for Tabs
592201B03400	High power plug in heat sink with folded back fins and solderable mounting tabs	2.39 (0.094)

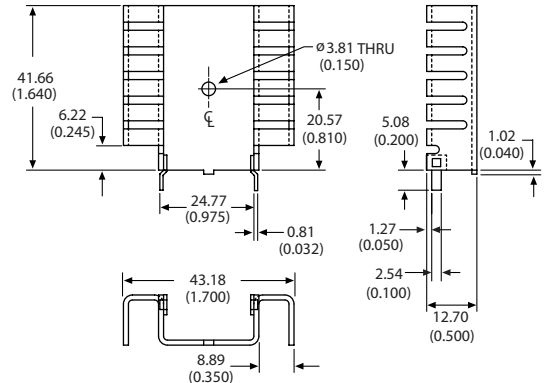
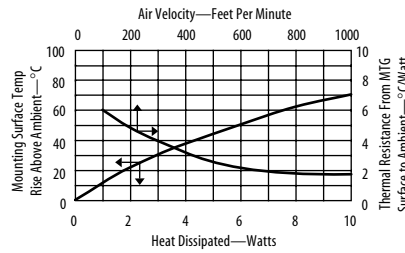
For additional options see page 82

## 5931 Channel style heat sink with folded back fins

Grease & Epoxy page 112 Mounting Kits page 99



**Channel style heat sink with folded back fins** for extra cooling capacity. The heat sink features solderable tabs for easy attachment to the PC board.



Material: 1.27 (0.050) Thick Aluminum  
Finish: Black Anodize

### ORDERING INFORMATION

Part Number	Description	Dia of PCB Plated Thru Hole for Tabs
593101B03600	Channel style heat sink with folded back fins and solderable tabs	2.92 (0.115)

**POPULAR OPTIONS:** 593101B 0 0000  
Base part no. A

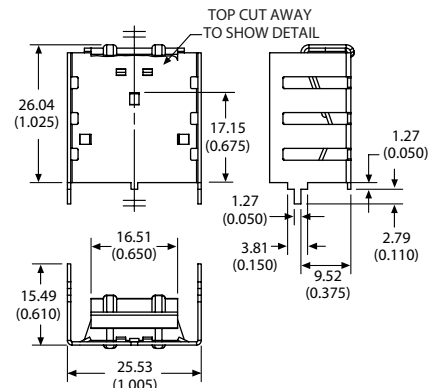
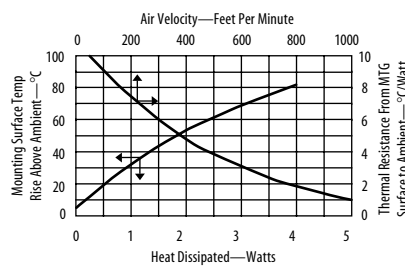
Position	Code	Description	Details
A	1	Kon-Dux™ pad	Page 86
A	3	In-Sil-8™ pad	Page 86

For additional options see page 82

## 7130 Copper slide on heat sink



**Copper slide on heat sink requires no hardware** to attach to the device. In addition, the copper heat sink is tin/lead plated to allow easy soldering to the PC board.



Material: 0.63 (0.025) Thick Copper  
Finish: Tin Plated

### ORDERING INFORMATION

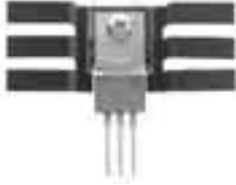
Part Number	Description	Dia of PCB Plated Thru Hole for Tabs
7130D	Slide on, channel style heat sink with integrated tabs	2.54 (0.100)



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Mounting Kits page 99

**5063 Low profile hat section heat sink**

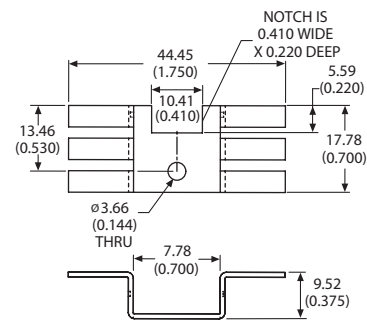
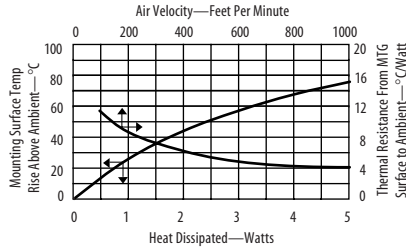


**Low profile hat section heat sink** has a total height of 0.375 making it perfect for mounting to printed circuit boards with 0.500 centering between boards.

**ORDERING INFORMATION**

Part Number	Description
506304B00000	Hat section heat sink

For additional options see page 84



Material: 1.02 (0.040) Thick Aluminum  
Finish: Black Anodize

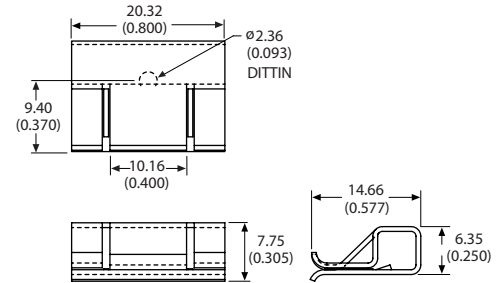
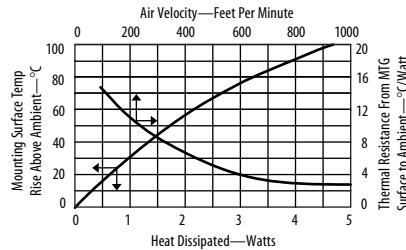
**5740 Low cost slide on heat sink**



**Low cost slide on heat sink** provides positive retention with an integral locking tab. The spring tensions ensures excellent thermal contact for maximum performance. Requires no hardware to mount.

**ORDERING INFORMATION**

Part Number	Finish
574004B00000	Black anodize
574004U00000	Unfinished



Material: 0.63 (0.025) Thick Aluminum  
Finish: See Table

**5742, 5796, 5797 Low cost slide on cooler heat sink**



**Low cost slide on cooler heat sink** is easy to assemble to the device and requires no mounting hardware. Models have fins on both sides, or the left or right. Available with or without staked on solderable tab for easy board mounting.

FIGURE A

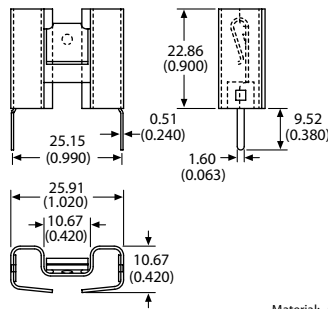
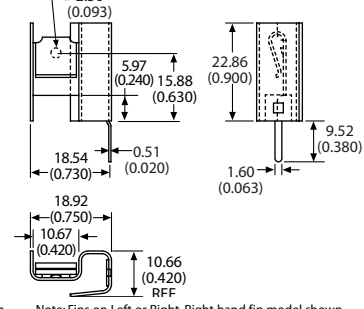


FIGURE B



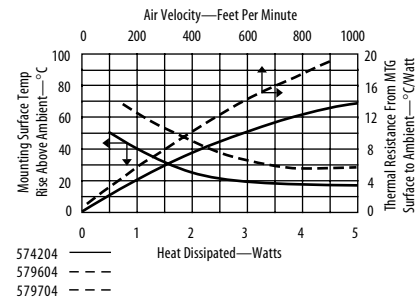
Material: 0.63 (0.025) Thick Aluminum  
Finish: Black Anodize

Note: Fins on Left or Right. Right hand fin model shown.

**ORDERING INFORMATION**

Part Number	Description	Figure	Dia of PCB Plated Thru Hole for Tabs
574204B00000	Low cost slide on cooler	A	
574204B03300	With solderable tabs	A	1.910 (0.075)
579604B00000	With left side fin only	B	
579604B03300	With left side fin only and solderable tabs	B	1.910 (0.075)
579704B00000	With right side fin only	B	
579704B03300	With right side fin only and solderable tabs	B	1.910 (0.075)

For additional options see page 84

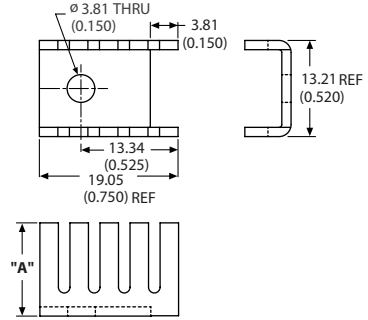
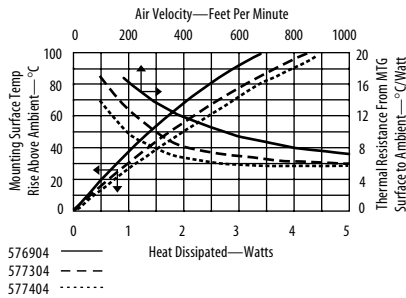




## 5769, 5773, 5774 Slim low profile channel style heat sink



**Slim low profile channel style heat sink** is notched to accommodate the TO-202 center tab packages. Available in 3 heights.



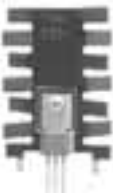
Material: 1.27 (0.050) Thick Aluminum  
Finish: Black Anodize

### ORDERING INFORMATION

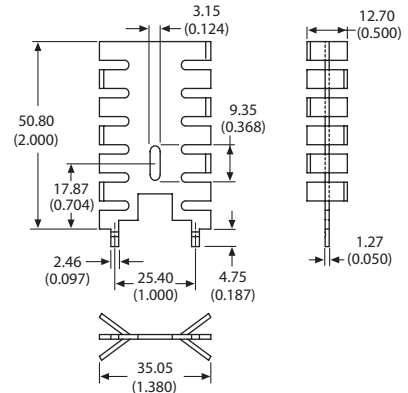
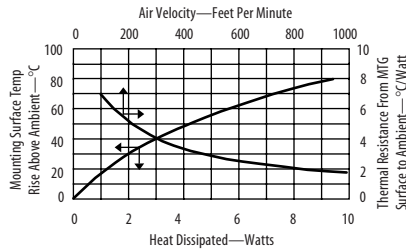
Part Number	"A" Dim
576904B00000	6.35 (0.250)
577304B00000	9.53 (0.375)
577404B00000	12.70 (0.500)

For additional options see page 84

## 6034 Space saving staggered fin heat sink



**Space saving heat sink** features staggered fins for increased cooling efficiency. This verticle mount heat sink features integrated tin plated tabs to solder directly to the PC board.



Material: 1.27 (0.050) Thick Copper  
Finish: Black Enamel Paint

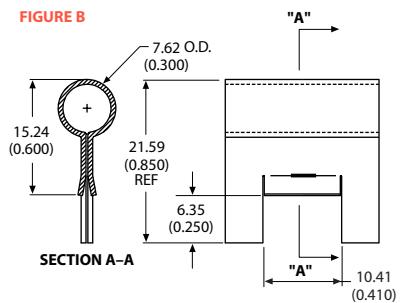
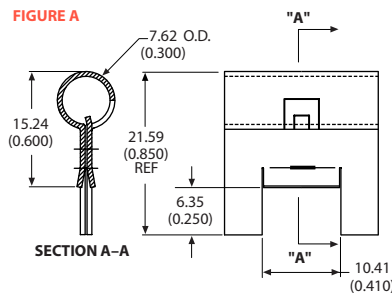
### ORDERING INFORMATION

Part Number	Description	Dia of PCB Plated Thru Hole for Tabs
6034B-TT	Space saving staggered fin heat sink with integrated tin plated tabs	3.10 (0.122)

## 6046, 6047 Compact slide on heat sink



**Compact slide on heat sink** makes assembly easy. The 6046 features a positive device catch to lock heat sink to the device.

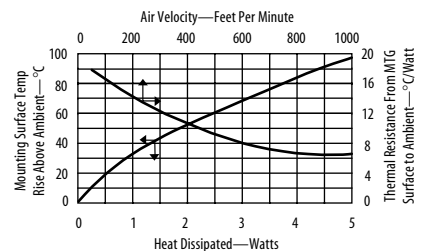


Material: 0.63 (0.025) Thick Aluminum  
Finish: Pre-Black Anodize\*

### ORDERING INFORMATION

Part Number	Description	Figure
6046PB*	With device catch	A
6047PB*	Compact slide on heat sink	B

\*Edges cut during the manufacturing process will be unfinished. See page 110 for more information.





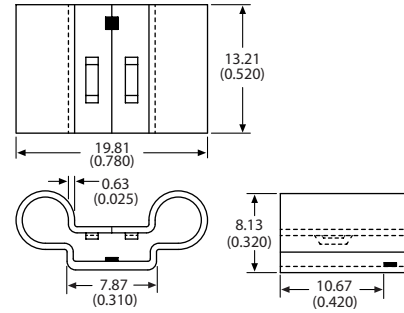
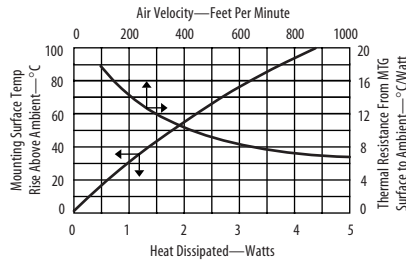


5775

Slip on heat sink



Slip on heat sink requires no hardware to attach to the device. Spring pressure ensures excellent retention. May be assembled before or after the device is attached to the board.



Material: 0.63 (0.025) Thick Aluminum  
Finish: See table

ORDERING INFORMATION

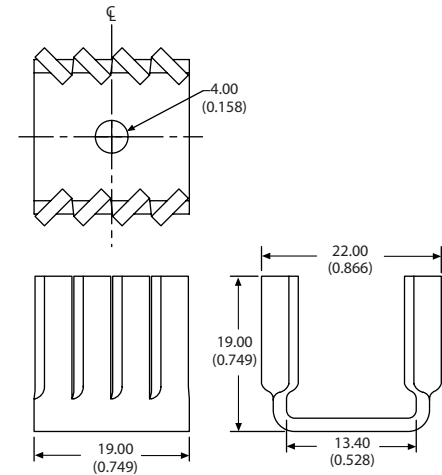
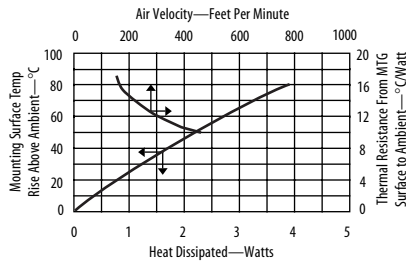
Part Number	Finish
577500B00000	Black anodize
577500U00000	Unfinished

TV4

Narrow channel style heat sink featuring twisted fins



Narrow channel style heat sink features twisted fins for increased air turbulence for better cooling. Can be mounted horizontally or vertically.



Material: 1.63 (0.064) Thick Aluminum  
Finish: Black Anodize

ORDERING INFORMATION

Part Number	Description
TV4	Narrow channel style heat sink with twisted fins



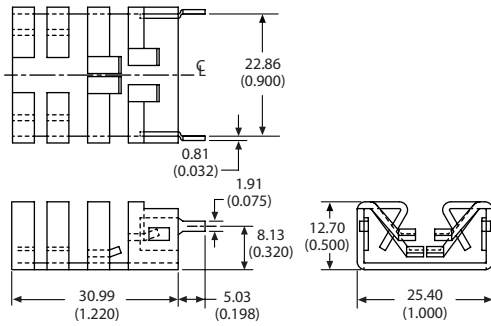


### 5660 Plug in style heat sink



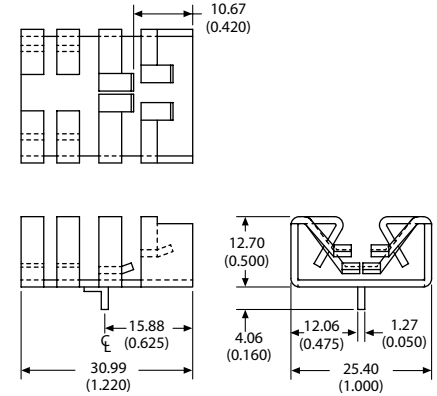
**Plug in style heat sink** features four spring action clips to firmly hold the device to the heat sink ensuring maximum metal to metal contact. Available with or without solderable tabs for horizontal or vertical mounting to the PC board.

FIGURE A



Material: 1.27 (0.050) Thick Aluminum  
Finish: Black Anodize

FIGURE B



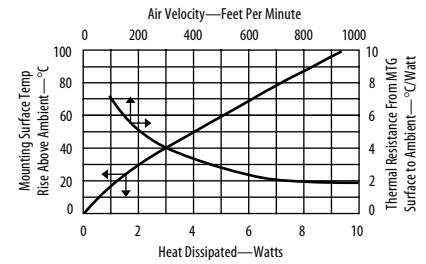
#### ORDERING INFORMATION

Part Number	Description	Figure	Dia of PCB Plated Thru Hole for Tabs
566010B00000	Plug in style heat sink	A	
566010B03100	With solderable tab for horizontal mounting	B	1.73 (0.068)
566010B03400	With solderable tabs for vertical mounting	A	2.39 (0.094)

**POPULAR OPTIONS:** 566010B0 00 00  
Base part no. A

Position	Code	Description	Details
A	28	Solderable Shur-Lock™ Tab for vertical mounting	Page 91

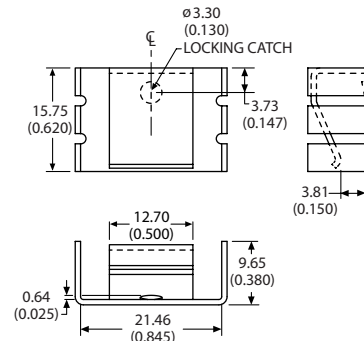
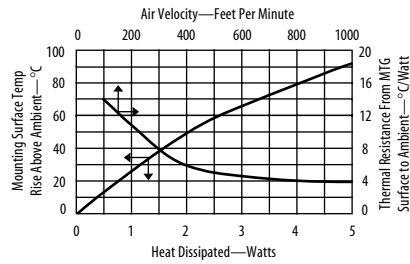
For additional options see page 84



### 5305 Channel style heat sink with integrated clip



**Channel style heat sink with integrated clip** features strong spring tension and device locking catch to attach device securely to the heat sink. Available in two finishes.



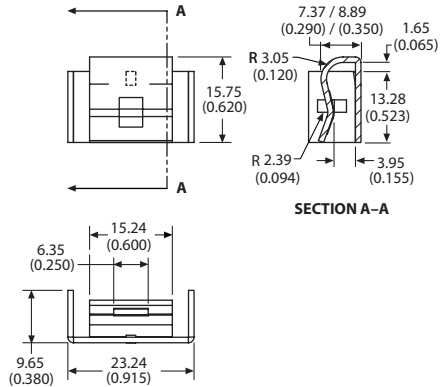
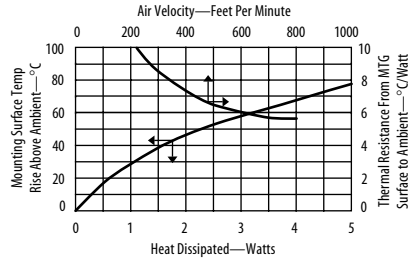
Material: 0.81 (0.032) Thick Aluminum  
Finish: See Table

#### ORDERING INFORMATION

Part Number	Finish
530510U00000	Unfinished
530510B00000	Black anodize



**7038 Channel style slide on heat sink featuring an integrated clip and device retaining tab**



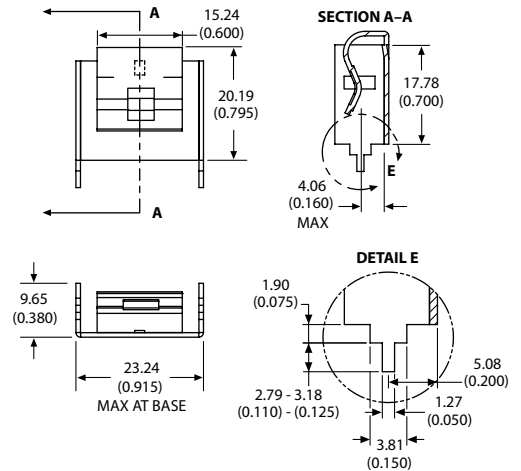
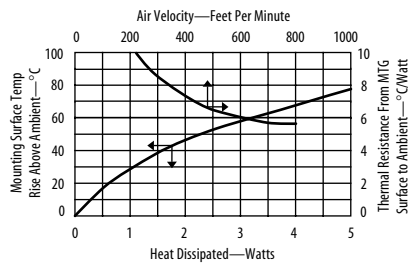
Material: 0.81 (0.032) Thick Aluminum  
Finish: Black Anodize

**Channel style slide on heat sink** features an integrated clip and device retaining tab to hold the heat sink to the device. Small footprint consumes less board space.

**ORDERING INFORMATION**

Part Number	Description
7038B	Channel style slide on heat sink

**7148 Copper channel style slide on heat sink featuring an integrated clip and solderable tabs**



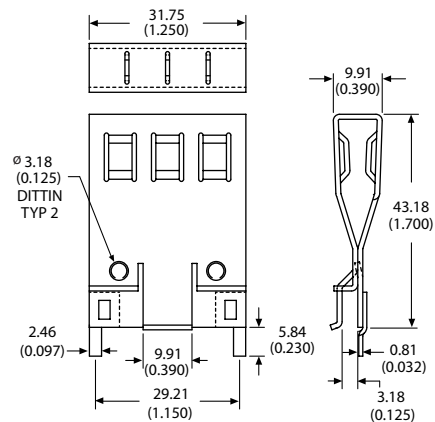
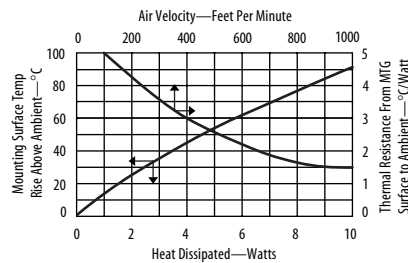
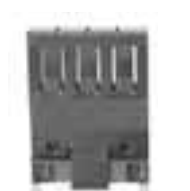
Material: 0.81 (0.032) Thick Copper  
Finish: Tin Plated

**Copper channel style slide on heat sink** features an integrated clip and solderable tabs. Includes a device retaining tab to securely hold the heat sink to the device. Small footprint consumes less board space.

**ORDERING INFORMATION**

Part Number	Description	Dia of PCB Plated Thru Hole for Tabs
7148D	Slide on heat sink with integrated clip	2.54 (0.100)

**5840 Clip on heat sink featuring louvers**



Material: 1.02 (0.040) Thick Aluminum  
Finish: Black Anodize

**Clip on heat sink** features louvers to provide excellent cooling in natural or forced air convection. Spring action provides strong clamping force to securely hold the heat sink to the device. Available with or without solderable tabs.

**ORDERING INFORMATION**

Part Number	Description	Dia of PCB Plated Thru Hole for Tabs
584000B00000	Clip on heat sink	
584000B03500	With solderable tabs for vertical mounting	2.84 (0.112)

For additional options see page 84



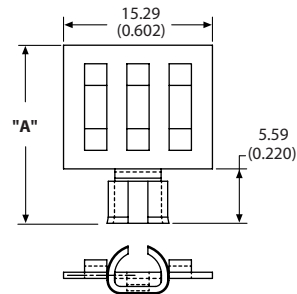
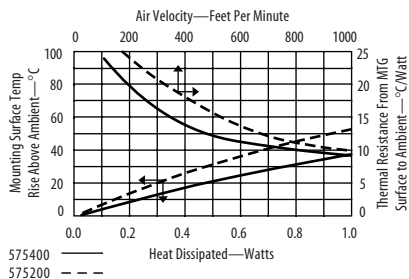
## 5752, 5753, 5754 Low cost slip on heat sink



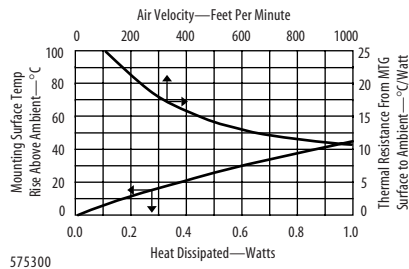
**Low cost slip on heat sink** features an expandable collar that tightly grips the device meaning no extra mounting hardware is required. Three heights to choose from.

### ORDERING INFORMATION

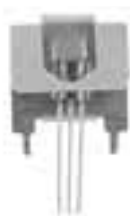
Part Number	"A" Dim
575200B00000	18.29 (0.720)
575300B00000	24.64 (0.970)
575400B00000	30.99 (1.220)



Material: 0.63 (0.025) Thick Aluminum  
Finish: Black Anodize



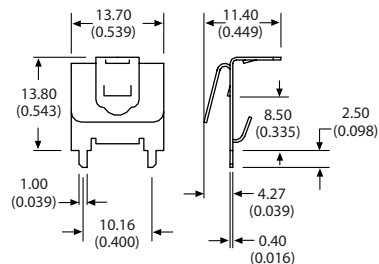
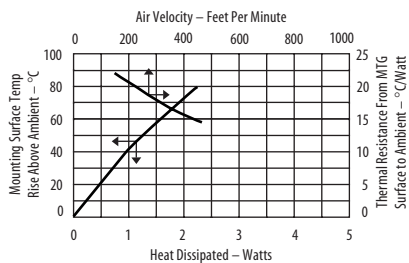
## 92F Low cost brass clip on heat sink



**Low cost brass clip on heat sink** requires no hardware to attach to the device. Includes integrated tabs that can be soldered or twisted to attach the heat sink to the board reducing stress on the device leads.

### ORDERING INFORMATION

Part Number	Description	Dia of PCB Plated Thru Hole for Tabs
92F	Brass clip on heat sink	1.73 (0.068)



Material: 0.38 (0.015) Thick Brass  
Finish: Unfinished



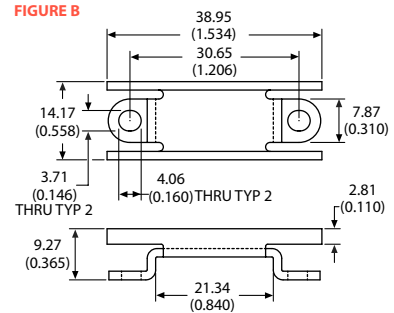
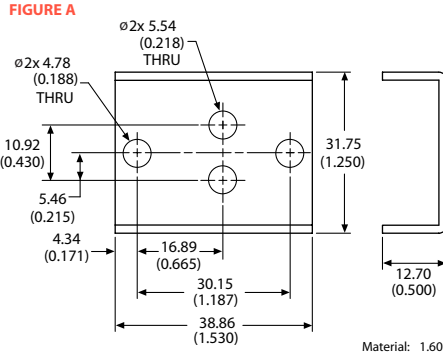
5203 Two piece heat sink

Grease & Epoxy page 112

Mounting Kits page 99



Two piece heat sink adds extra cooling in the same amount of board space as other solutions. Base and Top can be ordered separately.

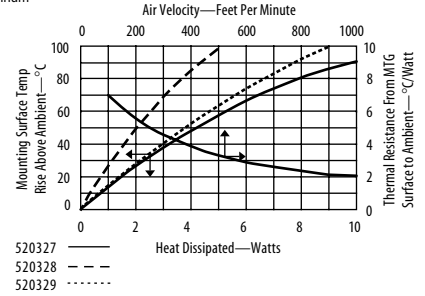


Material: 1.60 (0.063) Thick Aluminum  
Finish: Black Anodize

ORDERING INFORMATION

Part Number	Description	Figure
520327B00000	Two piece heat sink assembly, base and top	
520328B00000	Top only	B
520329B00000	Base only	A

For additional options see page 84

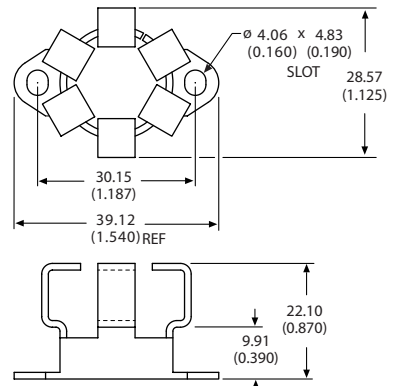
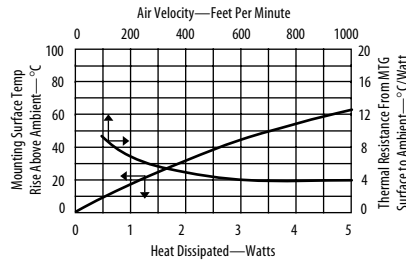


5791 Space saving expandable collar heat sink

Mounting Kits page 99



Space saving expandable collar heat sink has the same footprint as the device being cooled meaning no extra board space is required to fit the heat sink. The expandable collar tightly grips the device meaning no extra hardware is required. May also be used with any diamond or square basket heat sink to form a two piece heat sink for additional gold cooling. Available in conductive gold chromate or black anodize finish.



Material: 1.27 (0.050) Thick Aluminum  
Finish: See Table

ORDERING INFORMATION

Part Number	Finish
579103B00000	Black anodize
579103C00000	Gold chromate

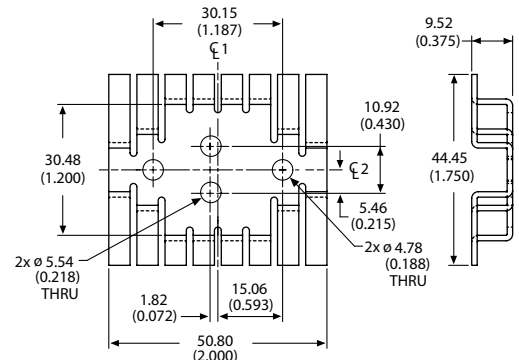
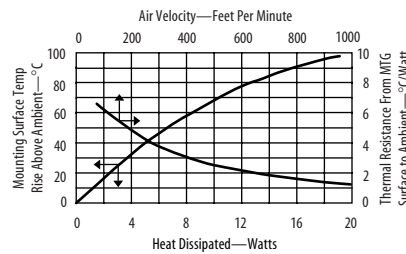
5060 Low profile hat section heat sink

Grease & Epoxy page 112

Mounting Kits page 99



Low profile hat section heat sink is ideal for applications where low component heights are required such as card cages with PCBs mounted on 0.500 centers.



Material: 1.27 (0.050) Thick Aluminum  
Finish: Black Anodize

ORDERING INFORMATION

Part Number	Description
506003B00000	Low profile hat section heat sink

For additional options see page 84

# TO-3 Heat Sinks



## 5756, 5757, 5758, 5759 Space saver diamond shaped basket heat sink

Grease & Epoxy page 112

Mounting Kits page 99



**Space saver diamond shaped basket heat sink** featuring a narrow base with slanted fins to increase air turbulence in natural and forced convection applications. Made from heavy gauge material. Four heights to choose from.

### ORDERING INFORMATION

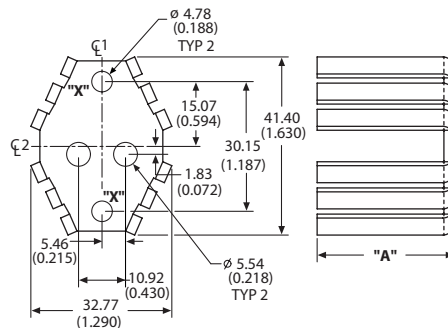
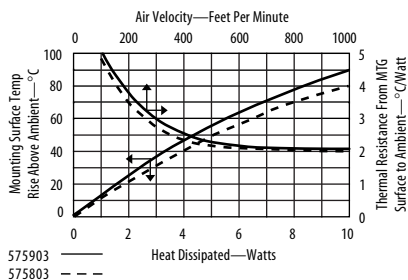
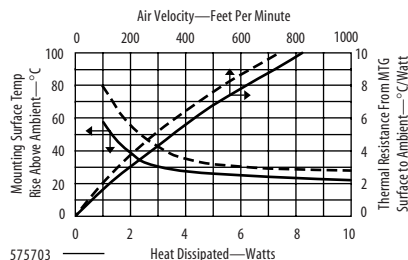
Part Number	"A" Dim
575603B00000	12.70 (0.500)
575703B00000	19.05 (0.750)
575803B00000	25.40 (1.000)
575903B00000	31.75 (1.250)

**POPULAR OPTIONS:** 575\_03B 0 00 00

Base part no. A B

Position	Code	Description	Location	Details
A	1	Kon-Dux™ pad		Page 86
A	3	In-Sil-8™ pad		Page 86
B	01	6-23 Wave-On™ threaded insert 0.100 stand off	Hole X	Page 89

For additional options see page 84



Material: 2.29 (0.090) Thick Aluminum  
Finish: Black Anodize

## 5013, 5014, 5015, 5016 Low cost diamond shaped basket heat sink

Grease & Epoxy page 112

Mounting Kits page 99



**Low cost diamond shaped basket heat sink** with straight fins. High fin count enhances efficiency. Four heights to choose from.

### ORDERING INFORMATION

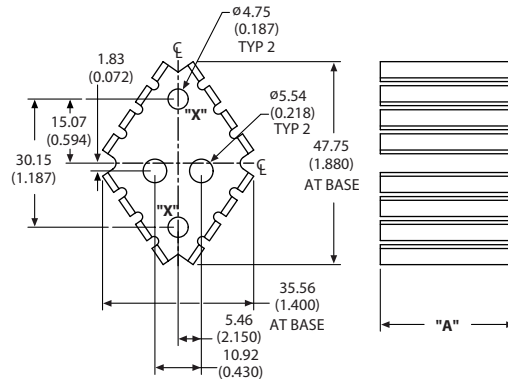
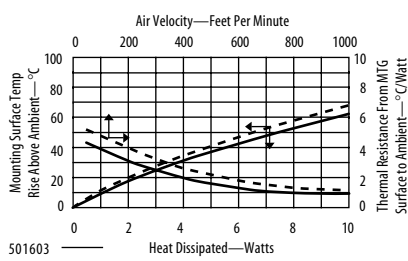
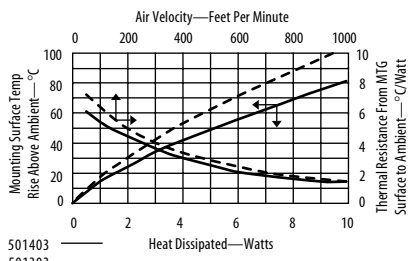
Part Number	"A" Dim
501303B00000	12.70 (0.500)
501403B00000	19.05 (0.750)
501503B00000	25.40 (1.000)
501603B00000	31.75 (1.250)

**POPULAR OPTIONS:** 501\_03B 0 00 00

Base part no. A B C

Position	Code	Description	Location	Details
A	1	Kon-Dux™ pad		Page 86
B	01	6-23 Wave-On™ threaded insert 0.100 stand off	Hole X	Page 89
C	08	6-32 x 0.350 Long wave on stud	Hole X	Page 96

For additional options see page 84



Material: 1.60 (0.063) Thick Aluminum  
Finish: Black Anodize



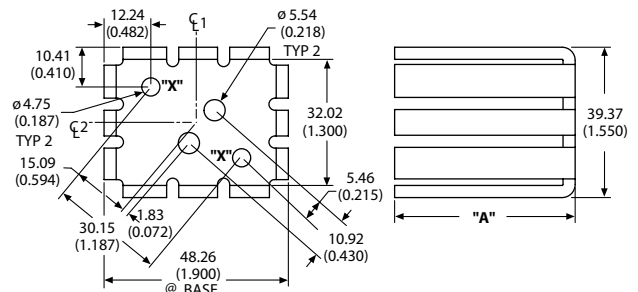
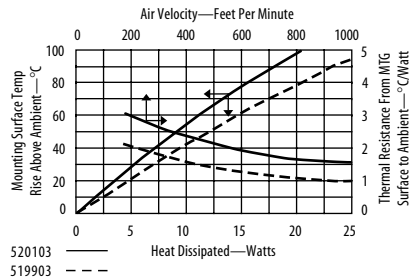
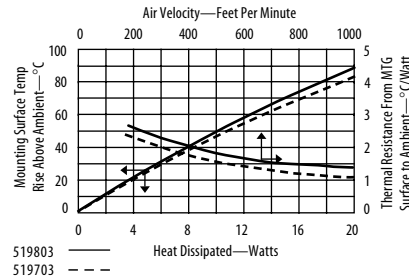
## 5197, 5198, 5199, 5201 Heavy gauge square basket heat sink

Grease & Epoxy  
page 112

Mounting Kits  
page 99



**Heavy gauge square basket heat sink** provides excellent performance by using 1/8 thick aluminum to maximize efficiency. Available in 4 heights.



Material: 3.17 (0.125) Thick Aluminum  
Finish: Black Anodize

### ORDERING INFORMATION

Part Number	"A" Dim
519703B00000	38.10 (1.500)
519803B00000	44.45 (1.750)
519903B00000	50.80 (2.000)
520103B00000	31.12 (1.225)

**POPULAR OPTIONS:** 5\_\_03B 0 00 00  
Base part no. A B

Position	Code	Description	Location	Details
A	1	Kon-Dux™ pad		Page 86
B	01	6-32 Wave-On™ threaded insert 0.100 stand off	Hole X	Page 89

For additional options see page 84

## 5690, 5790

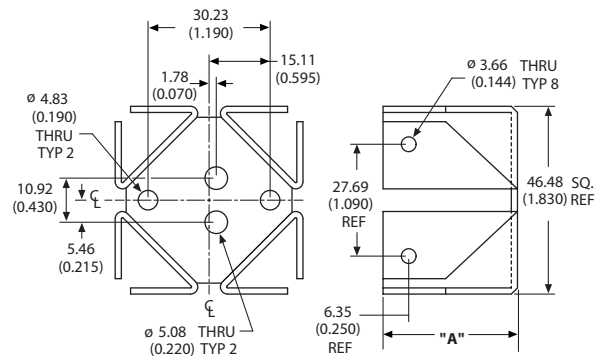
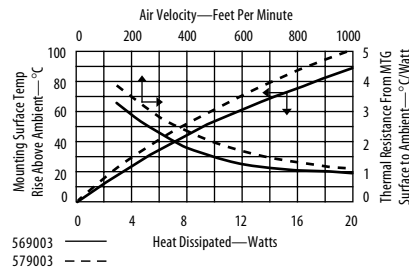
### Square basket heat sink features folded back fins

Grease & Epoxy  
page 112

Mounting Kits  
page 99



**Square basket heat sink** features folded back fins to increase surface area and power dissipation. Two heights are available.



Material: 1.60 (0.063) Thick Aluminum  
Finish: Black Anodize

### ORDERING INFORMATION

Part Number	"A" Dim
569003B00000	33.27 (1.310)
579003B00000	25.40 (1.000)

**POPULAR OPTIONS:** 5\_9003B 0 0000  
Base part no. A

Position	Code	Description	Details
A	1	Kon-Dux™ pad	Page 86
A	3	In-Sil-8™ pad	Page 86

For additional options see page 84



## 5001, 5002, 5003, 5004 Square basket heat sink featuring slanted fins

Grease & Epoxy page 112

Mounting Kits page 99



**Square basket heat sink featuring a slanted fin design for increased air turbulence and four integrated mounting holes. Four heights to choose from.**

### ORDERING INFORMATION

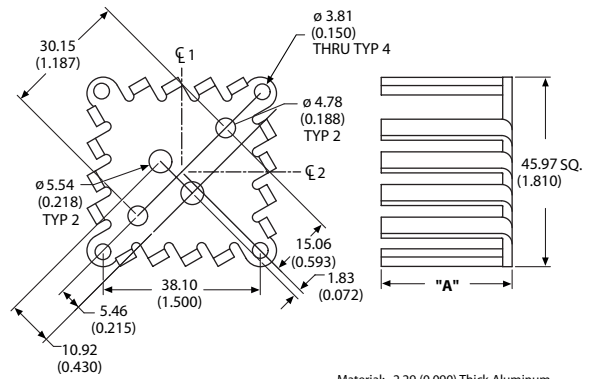
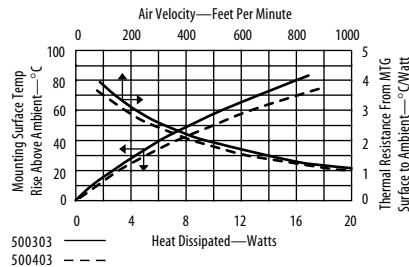
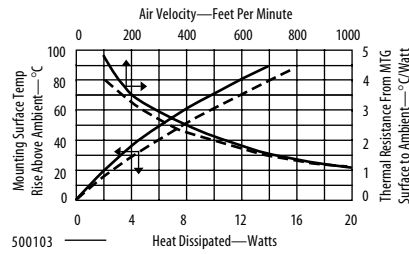
Part Number	"A" Dim
500103B00000	12.70 (0.500)
500203B00000	19.05 (0.750)
500303B00000	25.40 (1.000)
500403B00000	31.75 (1.250)

**POPULAR OPTIONS:** 500\_03B 0 0000

Base part no. T A

Position	Code	Description	Details
A	1	Kon-Dux™ pad	Page 86
A	3	In-Sil-8™ pad	Page 86

For additional options see page 84



Material: 2.29 (0.090) Thick Aluminum  
Finish: Black Anodize

## 5051, 5053, 5054 Square basket heat sink featuring straight fins

Grease & Epoxy page 112

Mounting Kits page 99



**Square basket heat sink features straight fins and 0.090 thick aluminum for increased cooling capacity. Three heights to choose from.**

### ORDERING INFORMATION

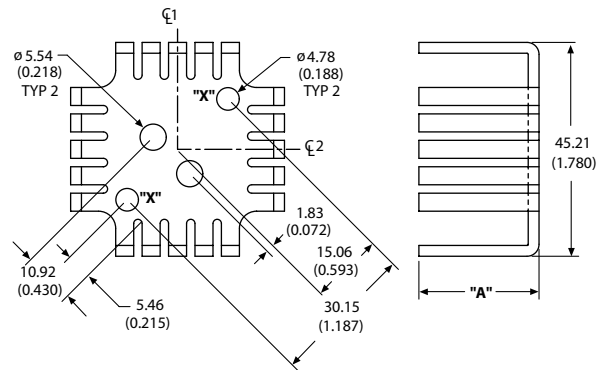
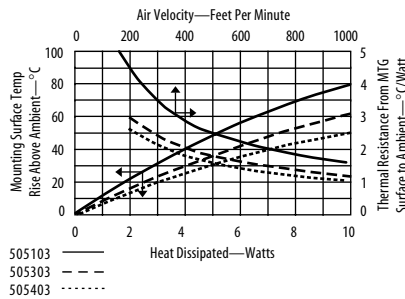
Part Number	"A" Dim
505103B00000	12.70 (0.500)
505303B00000	25.40 (1.000)
505403B00000	31.75 (1.250)

**POPULAR OPTIONS:** 505\_03B0 00 00

Base part no. T A

Position	Code	Description	Location	Details
A	01	6-23 Wave-On™ threaded insert 0.100 stand off	Hole X	Page 89

For additional options see page 84



Material: 2.29 (0.090) Thick Aluminum  
Finish: Black Anodize





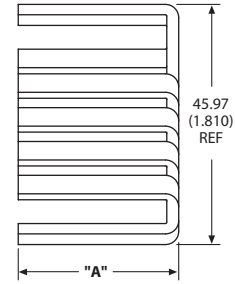
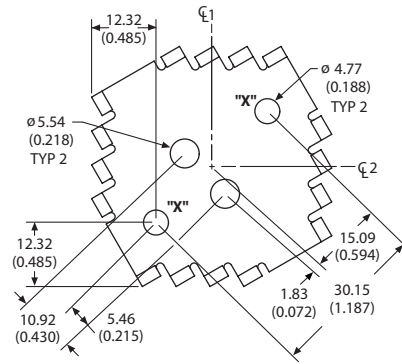
5761, 5762, 5763, 5764 Square basket heat sink featuring slanted vane fins

Grease & Epoxy page 112

Mounting Kits page 99



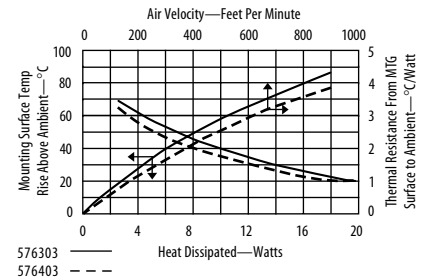
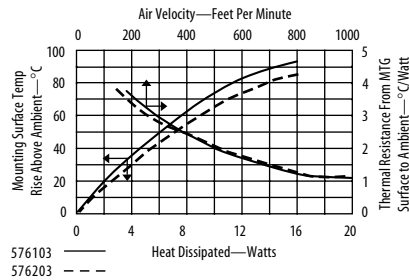
Square basket heat sink features slanted vane fins for efficient heat dissipation. Air movement from any direction is diverted into the center of the heat sink to create turbulence and improve heat transfer. Four heights to choose from.



Material: 2.29 (0.090) Thick Aluminum  
Finish: Black Anodize

ORDERING INFORMATION

Part Number	"A" Dim
576103B00000	12.70 (0.500)
576203B00000	19.05 (0.750)
576303B00000	25.40 (1.000)
576403B00000	31.75 (1.250)



POPULAR OPTIONS: 576\_03B 0 00 00

Base part no. A B

Position	Code	Description	Location	Details
A	1	Kon-Dux™ pad		Page 86
B	01	6-32 Wave-On™ threaded insert 0.100 stand off	Hole X	Page 89

For additional options see page 84



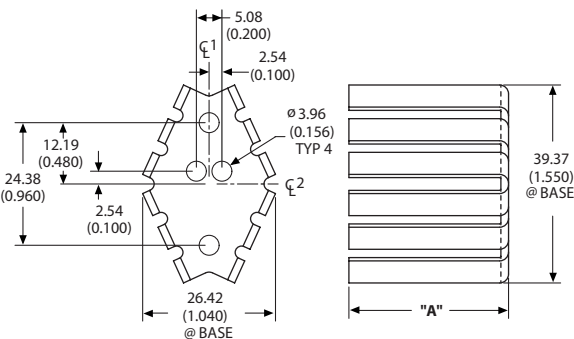
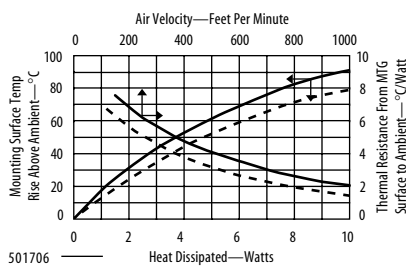
5017, 5018, 5019, 5020 Low cost diamond shaped basket heat sink

Grease & Epoxy page 112

Mounting Kits page 99



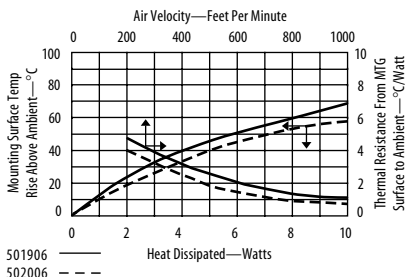
Low cost diamond shaped basket heat sink with straight fins. High fin count enhances efficiency. Four heights to choose from.



Material: 1.60 (0.063) Thick Aluminum  
Finish: Black Anodize

ORDERING INFORMATION

Part Number	"A" Dim
501706B00000	12.70 (0.500)
501806B00000	19.05 (0.750)
501906B00000	25.40 (1.000)
502006B00000	31.75 (1.250)



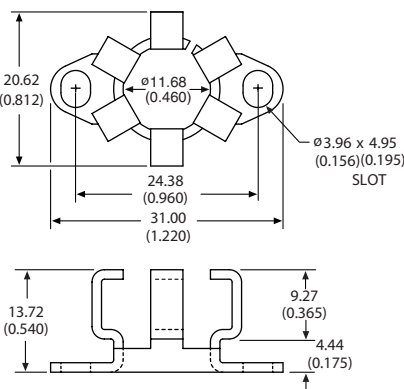
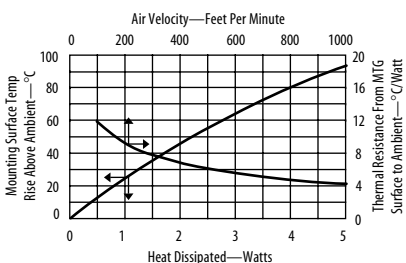
5792

Space saving expandable collar heat sink

Mounting Kits page 99



Space saving expandable collar heat sink has the same footprint as the device being cooled meaning no extra board space is required to fit the heat sink. The expandable collar tightly grips the device.



Material: 1.27 (0.050) Thick Aluminum  
Finish: See Table

ORDERING INFORMATION

Part Number	Finish
579206B00000	Black anodize
579206C00000	Gold chromate



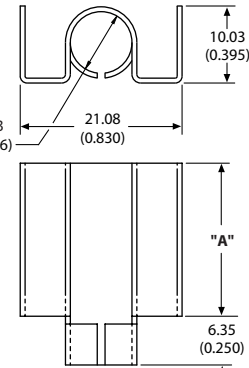
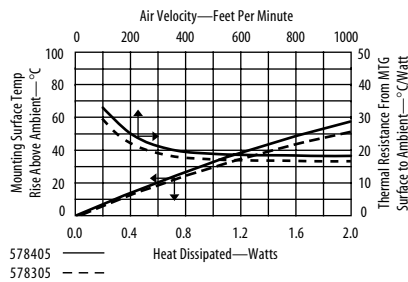
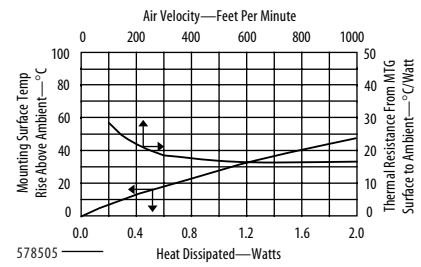
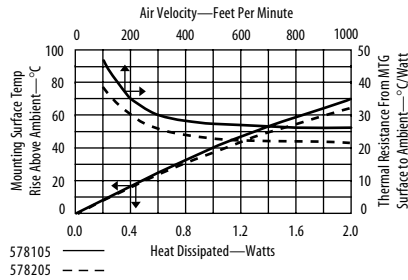
5781, 5782, 5783, 5784, 5785 Snap on cooler heat sink



Snap on cooler features easy no tools installation. Folded back fins provide maximum surface area while preserving valuable board space.

ORDERING INFORMATION

Part Number	"A" Dim
578105B00000	3.96 (0.156)
578205B00000	6.35 (0.250)
578305B00000	12.70 (0.500)
578405B00000	19.05 (0.750)
578505B00000	25.40 (1.000)



Material: 0.63 (0.025) Thick Aluminum  
Finish: Black Anodize

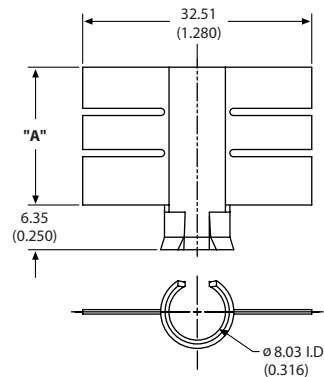
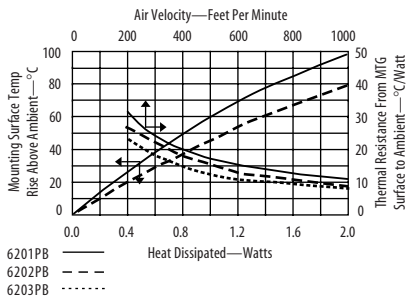
6201, 6202, 6203 Space saving expandable heat sink



Space saving expandable heat sink features a collar that tightly grips the device meaning no extra hardware is required. Heat sinks are constructed of pre-black anodize material to lower cost.

ORDERING INFORMATION

Part Number	"A" Dim	# Fins
6201PB	6.35 (0.250)	1
6202PB	12.70 (0.500)	2
6203PB	19.56 (0.770)	3



Material: 0.63 (0.025) Thick Aluminum  
Finish: Pre Black Anodize\*

\* Edges cut during the manufacturing process will be unfinished. See page 110 more information

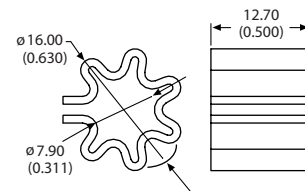
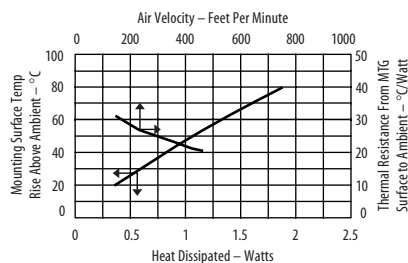
5F Low cost push on heat sink



Low cost push on heat sink uses spring pressure to firmly grip the device case creating a good thermal interface.

ORDERING INFORMATION

Part Number	Description
5F	Low cost push on heat sink



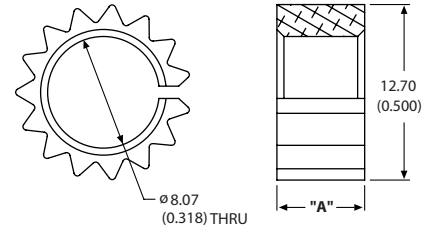
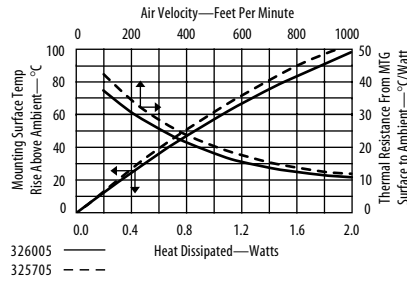
Material: Aluminum  
Finish: Black Anodize



## 3257, 3260 Extruded collar style heat sink with radial fins



**Extruded collar style heat sink with radial fins.** The split collar design provides a press fit between the transistor and the heat sink creating an excellent thermal conduction path. Available in two heights.



Material: Aluminum  
Finish: Black Anodize

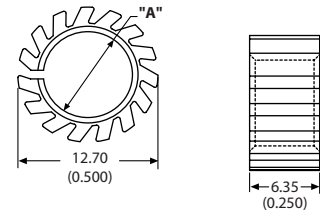
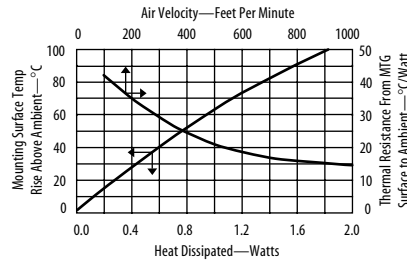
### ORDERING INFORMATION

Part Number	"A" Dim
325705B00000	6.35 (0.250)
326005B00000	9.53 (0.375)

## 3201, 3202 Extruded collar style heat sink with swept back fins



**Extruded collar style heat sink with swept back fins** for increased surface area in a small volume. The split collar design provides a press fit between the transistor and the heat sink creating an excellent thermal conduction path. Available in two inside diameters.



Material: Aluminum  
Finish: Black Anodize

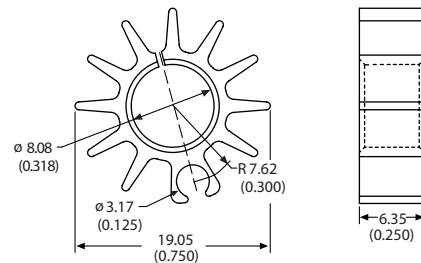
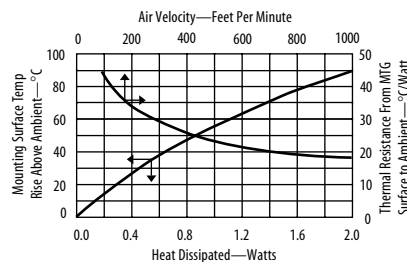
### ORDERING INFORMATION

Part Number	"A" Dim
320105B00000	8.07 (0.318)
320205B00000	7.75 (0.305)

## 3230 Extruded collar style heat sink with mounting hole



**Extruded collar style heat sink with mounting hole** for hardware attachment to the circuit card. The heat sink includes a mount boss that will accept a 4-40 screw for secure mounting in high vibration environments. The split collar design provides a press fit between the transistor and the heat sink creating an excellent thermal conduction path.



Material: Aluminum  
Finish: Black Anodize

### ORDERING INFORMATION

Part Number	Description
323005B00000	Extruded collar style heat sink with mounting boss



6000

Copper heat sink for axial lead devices



Copper heat sink for axial lead device requires no extra board space to mount. One lead of the heat sink is soldered to the device while the other solders to the PC board. Available in two finishes.

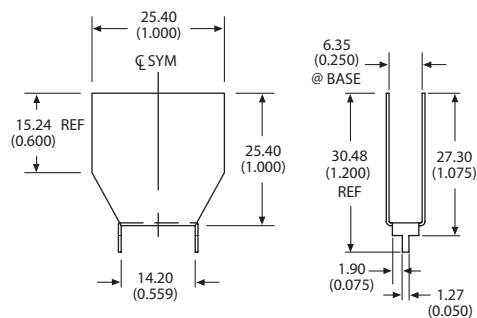
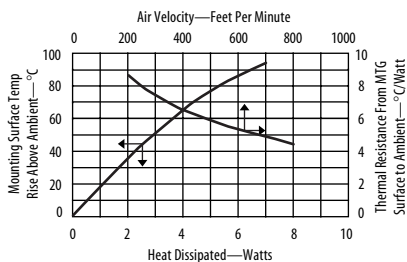
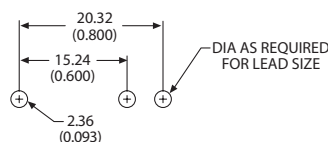


FIGURE A



Material: 0.53 (0.021) Thick Copper  
Finish: See Table

ORDERING INFORMATION

Part Number	Description	Finish	Dia of PCB Plated Thru Hole for Tabs
6000U	Heat sink for axial lead device	Unfinished	See figure A
6000PD	Heat sink for axial lead device	Pre-Tin plated*	See figure A

\* Edges cut during the manufacturing process will be unfinished. See page 110 more more information

THRU HOLE DISCRETE SEMICONDUCTOR PACKAGES

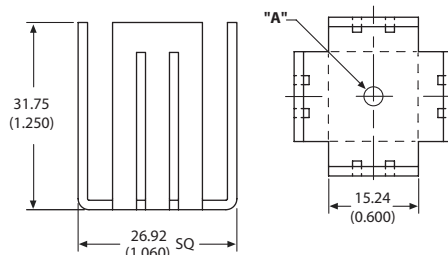
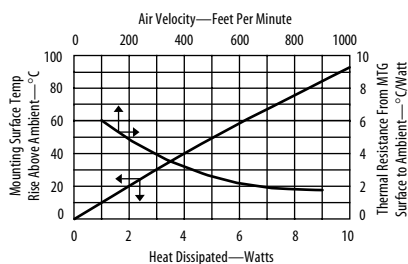
Bridge Rectifiers



6222, 6223, 6224 Square basket style heat sink for bridge rectifiers



Square basket style heat sink for bridge rectifiers uses no additional board space. Available with three different mounting hole diameters.



Material: 1.27 (0.050) Thick Aluminum  
Finish: Black Anodize

ORDERING INFORMATION

Part Number	"A" Dim
6222B	3.61 (0.142) Dia Thru
6223B	4.14 (0.163) Dia Thru
6224B	4.77 (0.188) Dia Thru

Thermal solutions go beyond the heat dissipator itself. Aavid Thermalloy offers a total solution package, which includes a number of option and accessory items described in this section of the catalog.

A total thermal solution includes an efficient thermal interface and means of mechanical attachment. Aavid Thermalloy has a full-line of interface materials that can be pre-applied or supplied as an accessory item. Mechanical assembly options include attachment of semiconductors to heat sinks, heat sinks to printed circuit boards, and heat sinks to sockets of CPU's.

Aavid Thermalloy offers the most complete line of value added options of any supplier in the industry. Our full line of accessories includes mounting kits, shoulder washers, insulators, mounting pads, and various grease products and epoxies, which are sold separately, and can be used with a variety of Aavid heat sinks.

This section will provide the most complete solution to your thermal requirement.

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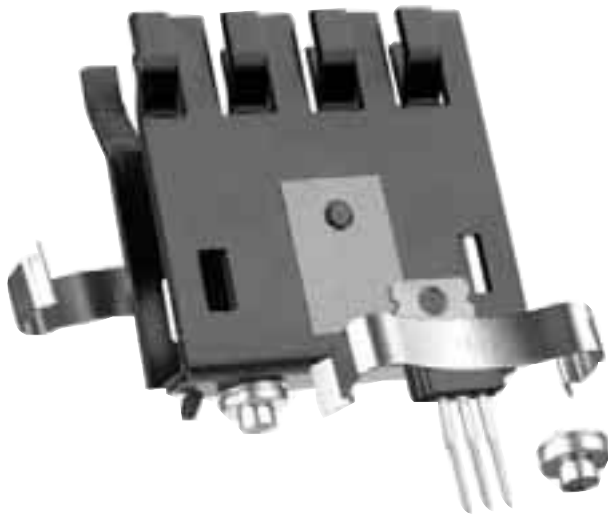
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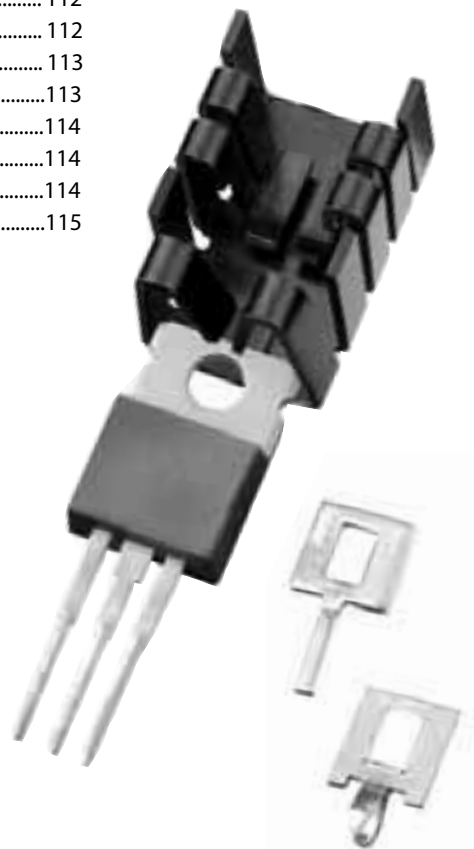
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## How to decipher an Aavid standard 12 digit part number?

Aavid Thermalloy's standard product line in most cases consists of a 12-digit part number sequence. In most standard offerings, Digits 1 through 4, define the model basic part number. Digits 5 and 6 designate the package style that a particular heat sink is designed to cool. The 7th digit determines the finish, and the 8th identifies the interface material, if one can be used for that particular style heat sink. The 9th and 10th digits define the PC board mounting method, and the 11th and 12th digits define the method of attachment of the package to the heat sink. For digits 8,9,10,11 and 12, the absence of any of those options is always designated by a zero in those positions. Important NOTE: The 12 digit part number sequence is a general format. Due to the different variations and styles of heat sinks, we have included an option index on pages 82–84 to show available options and accessories for the products covered in this catalog.

Standard board level: **5748 02 B 0 37 00**  
A B C D E F

- A** = Base part number
- B** = Package style
- C** = Finish
- D** = Interface material
- E** = PC Board mounting
- F** = Package mounting

To order most Aavid Thermalloy heat sinks, you must use a 12 digit part number using the following options:

### Digits 5-6: Package style

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
10	Multiwatt/SIP
21	Dual TO-218
22	Dual TO-220

### Digit 7: Finish

CODE	DESCRIPTION
B	Black anodize
C	Gold chromate
D	Solderable tin finish
J	Pre-black anodize
M	Green anodize
T	Black paint with solderable tabs
U	Unfinished

For additional information see page 110

### Digit 8: Interface material

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

Kon-Dux™ is both thermally and electrically conductive. Factory applied only.

In-Sil-8™ is thermally conductive and electrically isolating.

For additional information see page 86

### Digits 9-10: PC Board mounting

#### Solderable Wave-On™ mounts

CODE	STAND-OFF	THREAD
01	0.100"	#6-32
02	0.100"	#4-40
03	0.045"	#4-40
04*	0.100"	#6-32
05	0.045"	#6-32
07	0.100"	3.5mm
09	0.200"	#6-32
13	0.129	#6-32

\* .090 PCB (others .062")

For additional information see page 89

#### Solderable pins

##### for Board mounted extrusions

CODE	DESCRIPTION
21	Solid pin with stand off shoulder .050"
25	Solid solderable pin

For additional information see page 94

#### Solderable nut

CODE	DESCRIPTION	LENGTH
13	SNE-2 6-32 UNC-2B	0.305
14	SNE-4 4-40 UNC-2B	0.305

For additional information see page 94

#### Solderable staked on \*\*tabs

CODE	DESCRIPTION	
28	Shur-Lock™ Tab	(.130 for .062" PC Boards)
31	Centered horizontal	(.050 W x .130 L)
32	Centered horizontal	(.050 W x .130 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	(.100 W x .150 L)
37	Centered step	(.062 W x .250 L with .125 wide step)
39	Centered vertical	(.050 W x .375 L)
40	Centered vertical	(.050 W x .245 L)
43	Centered step	(.050 W x .375 L)
53	MT Tab Vertical pair	(.090 W x .125 L)
54	MT2 Tab Vertical pair	(.090 W x .125 L)
55	MT3 Tab Vertical pair	(.090 W x .125 L)
56	Bifurcated Tab Vertical pair	(.110 W x .125 with .190 step)
57	Bifurcated Tab Vertical pair	(.110 W x .125 with .100 step)

For additional information see pages 91–93

\*\*For additional tab options, please contact Application Engineering at (603) 224-9988

### Digits 11-12: Package Mounting

#### Semiconductor mounts

CODE	DESCRIPTION	LENGTH
01	#6-32 female	
02	#4-40 female	
03	M-3 female	
04	#6-32 male	.380"
05	#4-40 male	.380"

For additional information see page 90

#### Standard clips

CODE	PART#
	Kool-Klips™
	Sold separately
50	115000
51	115100
52	115200
53	115300
54	115400
62	116000

For additional information see page 97

#### Thermal clips

Factory applied to heat sink

CODE	PART#
32	TC-1
33	TC-10
34	TC-11
35	TC-12

For additional information see page 98

#### Stud

CODE	DESCRIPTION	LENGTH
06	SE-2 Stud #6-32	.485"
07	SM-3 M-3 Male	.350"
08	SE-1 Stud #6-32	.350"
09	SE-3 Stud #4-40	.350"
11	SF-1 M3 x 0.5	.302"
14	SE-4 Stud #6-32	.350"
17	SM-1M-3 Male	.350"

For additional information see page 96

#### Clinch nuts

CODE	DESCRIPTION
12	CNE-42 4-40 Clinch nut
13	CNM-1 M3 X 0.5 Clinch nut

For additional information see page 95

## How to decipher a Thermalloy origin part number?

Aavid Thermalloy features a variety of Thermalloy origin standard products that consist of a different part number sequence than the standard Aavid 12 digit part numbering system. In most cases, digits 1 through 4, designate the basic model number of the heat sink. Digits 5-6, designate the finish of the heat sink. Digits 6-13 can designate any number of different options that come with a specific model number. (Please refer to Option Index D on page 85 to see Aavid Thermalloy's offerings per base number.)

**To order most Thermalloy origin heat sinks you must use the basic part numbering system below:**

Standard board level:

**6021** -      -      -      -       
A      B      C      D

A = Model number

B = Finish

C = Productivity enhancement (if applicable)

D = Second productivity enhancement (if applicable)

### Popular finishes\*

(followed after base number in Figure B above)

B=Black anodize  
PB= Pre-black anodized  
B-TT= Black paint w/tinned tabs  
C=Gold chromate  
D=Tin plated  
U=Clean, no finish

### Popular productivity enhancing options:

Digits (Figure C-D above)

P\_= Solderable roll pins (see page 94)  
TC\_\_ = Thermal clip (see page 98)  
CNE\_\_ = Clinch nuts (see page 95)  
CNM\_ = Clinch nuts metric (see page 95)  
MT= Mounting tabs (see page 93)  
8223-CL03,8241-CL11 = Alignment pad (see page 87)  
SE\_= Solderable studs (see page 96)  
SF\_= Mounting studs (see page 96)  
G\_ = Grafoil™ pad (see page 87)  
SNM\_ = Solderable nuts metric (see page 94)  
SNE= Solderable nuts (see page 94)  
BGS\_ = BGS clip (See BGA-Fluted Fin page 20)

\*For additional information see page 110

Note: For a wide range of part number specific options, please see our Aavid Option Index D on Page 85

# Option Index A

Available option codes for Aavid 12 digit part numbers. For additional information on option codes see "How to decipher an Aavid 12 digit part number" on page 80. To find the appropriate Option Index for a selected part number please refer to the main product section in the front of the catalog or "How to use this catalog" on page 2.

## Ordering Codes

Base part	Finishes (page 110)	Solderable tabs (page 91-93)	Clips (page 97)	Wave-On™ mounts (page 89)	Kondux™ pads (page 86)	In-Sil-8™ pads (page 86)	Semiconductor mnts (page 90)	Studs (page 96)
504102	B U	53 54 55 56 57		01 02 03 05	1	3		
504222	B U			01 02 03 05	2	4	01 02 03 05	07 08
506902	B U			01 02 03 05	1	3		
507002	B U J	53 54 55 56 57		01 02 03 05	1	3	01 02 03 05	07 08
507102	B U J							
507222	B U J C	53 54 55 56 57		01 02 03 05	1 2	3 4	01 02 03 05	07 08
507302	B U J C	33 36 39 40		01 02 03 05	1	3	01 02 03 05	07 08
530101	B U C		50	01 04 05 07	1 2	3 4		
530102	B U		50	01 04 05 07	1 2	3 4		
530161	B U		62	01 04 05 07	1 2	3 4		
530162	B U		62	01 04 05 07	1 2	3 4		
530401	B		50	01 04 05 07	1 2	3 4		
530402	B U		50	01 04 05 07	1 2	3 4		
530613	B U J C	53 54 55 56 57			1	3		
530614	B U J	53 54 55 56 57			1	3		
530714	B U C	53 54 55 56 57			1	3		
530801	B U		50	01 04 05 07	1 2	3 4		
530802	B U		50	01 04 05 07	1 2	3 4		
530861	B U		62	01 04 05 07	1 2	3 4		
530862	B U		62	01 04 05 07	1 2	3 4		
534202	B U	28 34 35	53		1	3		
542502	B U J T			05	1	3	01 02 03 05	07 08
551002	B C			01 02 03 05	1	3	01 02 03 05	07 08
563002	B U J T							
569022	B U			01 02 03 05			01 02 03 05	07 08
574102	B U	32 33 36 37 39 40						
574402	B	32 33 36 37 39 40						
574502	B U C	32 33 36 37 39 40						
574602	B U	32 33 36 37 39 40						
574802	B U	33 37						
574902	B U	28 33 36 37 39 40 43						
575002	B U T							
575102	B U C				1	3		
576012	B U C				1	3		
576014	B U C				1	3		
576602	B U D T							
577002	B U C	33 36 39 40		01 02 03 05	1	3	01 02 03 05	07 08
577102	B U C	33 36 39 40		01 02 03 05	1	3	01 02 03 05	07 08
577202	B U J C	33 36 39 40		01 02 03 05	1	3	01 02 03 05	07 08
577922	B U C				2	4		
578622	B U C	28 32 34 35			2	4	01 02 03 05	07 08
579302	B U							
579402	B U							
579802	B U	33						
579902	B U	33						
590102	B U	36						
590302	B U	36						
592201	B U	34						
592502	B U	28 34 35		01 02 03 05	1	3	01 02 03 05	07 08
592902	B U	28 34			1	3	01 02 03 05	07 08
593002	B U C	28 34 35			1	3	01 02 03 05	07 08
593101	B U	36			1	3		
593202	B U C	28 34 35		01 02 03 05	1	3	01 02 03 05	07 08

Available Option codes for Aavid 12 digit part numbers. For additional information on option codes see "How to decipher an Aavid 12 digit part number" on page 80. To find the appropriate Option Index for a selected part number please refer to the main product section in the front of the catalog or "How to use this catalog" on page 2.

## Ordering Codes

Base part	Finishes (page 110)	Clips (page 97-98)	Kondux pads (page 86)	In-Sil-8™ pads (page 86)	Semiconductor mounts (page 90)	Solderable pins (page 94)	Studs (page 96)	Clinch nuts (page 95)
513001	B U		1 2	3 4	01 03	21 25		
513002	B U		1 2	3 4		21 25		
513101	B U		1 2	3 4		21 25		
513102	B U		1 2	3 4	01 02 03	21 25		
513201	B U		1 2	3 4	01 05	21 25		
513202	B U C		1 2	3 4	01 02 03	21 25		
513301	B U		1 2	3 4	02	21 25		
513302	B U C		1 2	3 4	01 02	21 25		
529701	B		1 2	3 4		21 25		
529702	B		1 2	3 4		21 25		
529801	B		1 2	3 4	01 02	21 25	11	12
529802	B		1 2	3 4	01 02	21 25	11	12
529901	B	33 34	1 2	3 4	01 02 05	21 25	11	13
529902	B	33 34	1 2	3 4	01 02 05	21 25		
530001	B U	33	1	3	01	21 25		
530002	B U		1	3	02	21 25		
531002	B U C		1	3		21 25		
531102	B U C		1	3	02 03	21 25		
531202	B U C		1	3	01 02	21 25		
531302	B U C		1	3	02	21 25		
532602	B		1	3	01 02	21 25		
532702	B		1	3	01	21 25		
532802	B		1	3	02	21 25		
533001	B U	51	1	3		21 25		
533002	B U	51	1	3		21 25		
533101	B U	51	1	3		21 25		
533102	B U	51	1	3		21 25		
533201	B U	51	1	3		21 25		
533202	B U	51	1	3		21 25		
533301	B U	51	1	3		21 25		
533302	B U	51	1	3		21 25		
533401	B	52				21 25		
533402	B	52	1 2	3 4		21 25		
533421	B	52	1 2	3 4		21 25		
533422	B	52	1 2	3 4		21 25		
533501	B	52	1 2	3 4		21 25		
533502	B	52	1 2	3 4		21 25		
533521	B	52				21 25		
533522	B	52	1 2	3 4		21 25		
533601	B	52	1 2	3 4		21 25		
533602	B	52	1 2	3 4		21 25		
533621	B	52	1 2	3 4		21 25		
533622	B	52	1 2	3 4		21 25		
533701	B	52				21 25		
533702	B	52	1 2	3 4		21 25		
533721	B	52	1 2	3 4		21 25		
533722	B	52	2	4		21 25		
533802	B U	54	1 2	3 4		21 25		
533902	B U	54	1 2	3 4		21 25		
534002	B U	54	1 2	3 4		21 25		
581001	B U		1	3		21 25		
581002	B U C		1	3		21 25		
581101	B U		1	3		21 25		
581102	B U		1	3		21 25		
581201	B U		1	3		21 25		
581202	B U		1	3		21 25		

# Option Index C

Available option codes for Aavid 12 digit part numbers. For additional information on option codes see "How to decipher an Aavid 12 digit part number" on page 80. To find the appropriate Option Index for a selected part number please refer to the main product section in the front of the catalog or "How to use this catalog" on page 2.

## Ordering Codes

Base Part	Finishes (page 110)	Wave-On™ mounts (page 89)	Kondux™ pads (page 86)	In-Sil-8™ pads (page 86)	Semiconductor mounts (page 90)	Solderable tabs (page 91-93)	Solderable nuts (page 94)	Solderable studs (page 96)
500103	B U	01 02 04 05 07	1	3				06 08 09
500203	B U	01 02 04 05 09	1	3				06 08 09
500303	B U	01 02 03 04 05	1	3				06 08 09
500403	B U	01 02 03 04 05	1	3				06 08 09
501303	B U	01 03 04 05 07	1	3			13	06 07 08 09
501403	B U	01 02 03 05 07	1	3			13	06 08 17
501503	B U C	01 03 05 07 09	1	3	04		13	06 08 17
501603	B U C	01 02 04 05 07	1	3			13 14	08 17
505103	B U	01 02 03 04 05	1	3				
505303	B U	01 02 03 04 05	1	3				
505403	B U	01 02 03 04 05	1	3				
506003	B U						13 14	
506304	B U	01				53	14	
519703	B U	01 03 04 05 07	1	3				
519803	B U	01 03 04 05 07	1	3				
519903	B U C	01 03 04 05 09	1	3				
520103	B U C	01 04 05 07 09	1	3				
520328	B U C							
520329	B U C							08
566010	B U					28 31 34 37		
566902	B U					31 37 39 40		
569003	B U C	01 02 04 05	1	3				06 08 17
574204	B U					32 33		
575603	B U C	01 03 04 05	1	3				
575703	B U	01 03 04 05	1	3				
575803	B U	01 04 05 07 09	1	3				
575903	B U	01 03 04 05 07	1	3				
576103	B U C	01 02 03 04 05	1	3				
576203	B U C	01 02 03 04 05	1	3				
576303	B U	01 02 04 05	1	3				
576403	B U C	01 02 04 05	1	3				
576802	B U C					31 32 33 37 39 40		
576904	B U	01 02 03 05						
577304	B U	01 02 03 05			01			
577404	B U C	01 02 03 05			05			09 11
579003	B U	05						
579604	B U					32 33		
579704	B U					32 33		
584000	B U					33 35		
591202	B U					31 33 37 39 40		
591302	B U					28 40		

Available option codes for Thermalloy origin part numbers. For additional information on option codes see "How to decipher a Thermalloy Origin part number" on page 81. To find the appropriate Option Index for a selected part number, refer to the main product section in the front of the catalog or "How to use this catalog" on page 2.

## Ordering Codes

Base Part	Finishes (page 110)	Mounting tabs (page 93)	Clips (page 98)	Solderable studs & pins (page 94-96)	Device mtg. studs (page 96)	Clinch nuts (page 95)	Solderable nuts (page 94)	Alignment pads (page 87)	Grafoil™ pads (page 87)
6021	B U PB				SF1	CNM1			G5
6022	B U PB				SF1 SF2	CNM1			
6025	PB B-TT		TC-10		SF1 SF3	CNE42			G5
6109	B U PB	MT MT5	TC-1	SE3 SE1	SF1	CNE42			G5
6110	B U PB	MT		SE1 SM3		CNE42			
6225	B U PB	MT	TC-10		SF1				G5
6230	B U PB B-TT								
6232	B U PB	MT MT3 MT5	TC-1		SF1				G5
6238	B U PB	MT MT5 MT6							G5
6239	B U	MT							
6374	B			P2					
6380	B			P2		CNE42			
6396	B			P2 P3		CNM1 CNM2			
6398	B		TC-6	P2		CNE42 CNE43			G7
6399	B		TC-6	P2		CNM2			G7
6400	B			P2					
7019	B U PB	MT MT6		SE3	SF1		SNM1		
7020	B U	MT MT2 MT5 MT6	TC-10 TC-11 TC-12	SE3		CNM1 CNE42		8223-CL03	G5 G4
7021	B U	MT MT5 MT6	TC-10 TC-11 TC-12			CNE42		8223-CL03	G5
7022	B U PB	MT MT5	TC-1 TC-11 TC-12	SE3	SF1			8241-CL11 8223-CL03	
7023	B U	MT MT5	TC-1 TC-6 TC-7 TC-12				SNE2		G4
7025	B U	MT MT3 MT6	TC-12	SE3				8223-CL03	

# Interface Material/Pads

Thermal interface pads are thicker than double-sided tapes, but can be provided without adhesive if removal of the pad may be necessary. Pads can also be either electrically conductive or isolating. Performance of the interface pad is dependent on maintaining correct, constant mounting pressure.

## In-Sil-8™

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 AC. 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.

Figure A

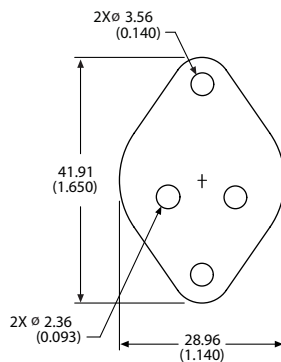


Figure B

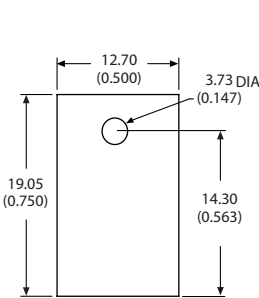
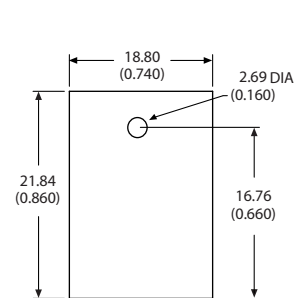


Figure C



### ORDERING INFORMATION

example 12 digit part **507222B\_0000**

Ordering code

The shape and hole pattern of the heat sink will determine the shape and hole pattern of the pad. If you are ordering a heat sink which mounts to a semiconductor on both sides, the ordering code for two pads should be used. To order additional In-Sil™ pads separate, or factory applied variations please contact an Aavid sales rep for inquiries.

Ordering code	Description
0	No pads
3	One In-Sil-8™ pad
4	Two In-Sil-8™ pads

### MATERIAL PROPERTIES

	TO-3	TO-220	TO-218
Adhesive one side	yes	yes	yes
Color	Grey	Grey	Grey
Thickness	0.18 (0.007)	0.18 (0.007)	0.18 (0.007)
Thermal res. (°C/W)	0.33	1.25	0.77
Breakdown voltage	4000	4000	4000
Dielectric constant	5.5	5.5	5.5
Figure	A	B	C

## Kon-Dux™

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 Soffface™ for low-volume applications. This material is ideal for use with small, discrete semiconductors.

Figure A

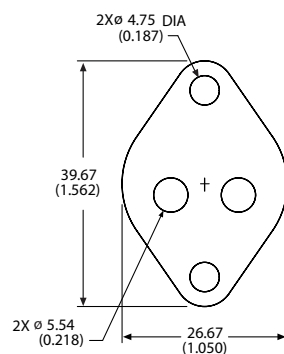


Figure B

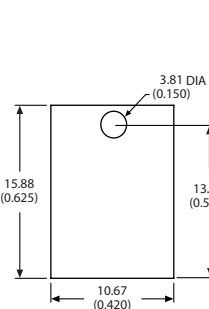
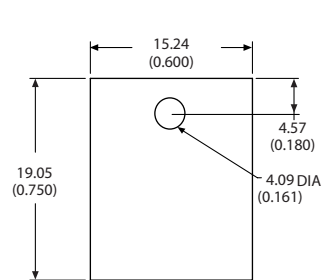


Figure C



### ORDERING INFORMATION

example 12 digit part **575703B\_0000**

Ordering code

The shape and hole pattern of the heat sink will determine the shape and hole pattern of the pad. If you are ordering a heat sink which mounts to a semiconductor on both sides, the ordering code for two pads should be used.

Ordering code	Description
0	No pads
1	One Kon-Dux™ pad
2	Two Kon-Dux™ pads

\*Factory applied only

### MATERIAL PROPERTIES

	TO-3	TO-220	TO-218
Color	Black (metallic)	Black (metallic)	Black (metallic)
Thickness	0.13 (0.005)	0.13 (0.005)	0.13 (0.005)
Thermal resistance	0.08 °C-in <sup>2</sup> /W	0.08 °C-in <sup>2</sup> /W	0.08 °C-in <sup>2</sup> /W
Electrical resistivity	15 x 10 <sup>6</sup> Ohms	15 x 10 <sup>6</sup> Ohms	15 x 10 <sup>6</sup> Ohms
Compression strength:	580 psi	580 psi	580 psi
for 10% reduction in thickness			
Tensile strength	650 psi	650 psi	650 psi
Ultimate compression strength	12500 psi	12500 psi	12500 psi
Service temperature	-240°C to +300°C	-240°C to +300°C	-240°C to +300°C
Liner	None	None	None
Figure	A	B	C



## Grafoil™ Conducta-Pad

Grafoil™ is a non-insulating material which reduces interface thermal resistance in a bare joint application. A dry material, basically a graphite compound, Grafoil™ was originally developed for high temperature gasketing applications and is covered by U.S. Patent 3,404,061 granted to Union Carbide. Basic shapes in stock are designed to accommodate TO-3, TO-218, TO-220, and Multiwatt case styles. Grafoil™ is factory applied to the heat sink and is available on all stamped and extruded models.

FIGURE A

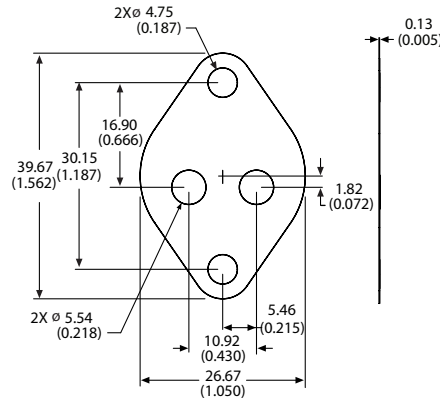
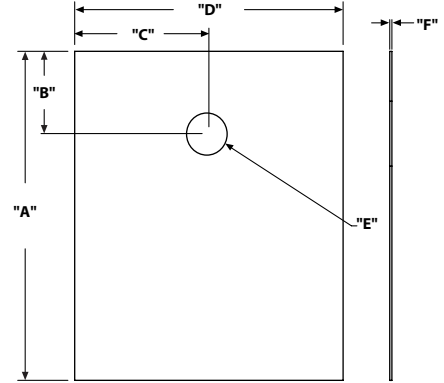


FIGURE B



### ORDERING INFORMATION

example

Thermalloy origin part **6109** - - **A = Model number**  
**A** **B** **C** **B = Finish**  
**C = Grafoil™ pad**

Suffix	Device	Figure	"A" Dim	"B" Dim	"C" Dim	"D" Dim	"E" Dim	"F" Dim
G1	TO-3	A						
G4	TO-218	B	19.30 (0.760)	4.83 (0.190)	7.87 (0.310)	15.75 (0.620)	3.81 (0.150)	0.13 (0.005)
G5	TO-220	B	16.51 (0.650)	3.43 (0.135)	5.33 (0.210)	10.67 (0.420)	3.43 (0.135)	0.13 (0.005)
G7	Multiwatt	B	17.53 (0.690)	2.92 (0.115)	10.03 (0.395)	20.07 (0.790)	3.81 (0.150)	0.13 (0.005)

Note: Grafoil is used as an alternative to thermal grease, and provides essentially the same thermal performance.

## Alignment Pads

Solderable alignment pads are an innovative way to attach the heat sink to your transistor that could cut your assembly time by more than half. Alignment pads provide cost effective solderability, while providing numerous additional benefits. Alignment pads are factory applied and can be bought separately as well. Please refer to accessory Index D on page 85.

### ORDERING INFORMATION

example

Thermalloy origin part **7022B-8223-CL03**  
**A** **B**

Suffix	Device	Figure
8223-CL03	TO-220	B
8241-CL11	TO-218	A

**A = Model number**  
**B = Alignment pad**

### Typical installation

Shown with part number 8241-CL11

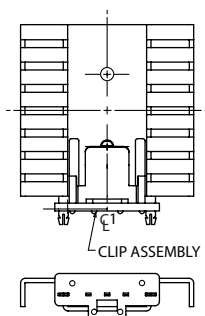
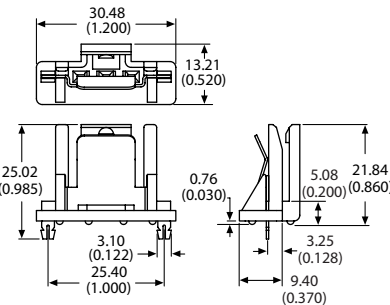


Figure A



Recommended hole pattern for 8223-CL03

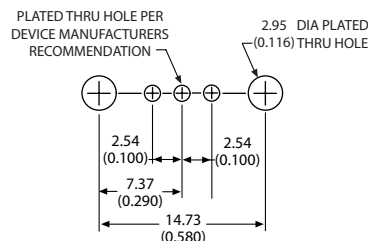
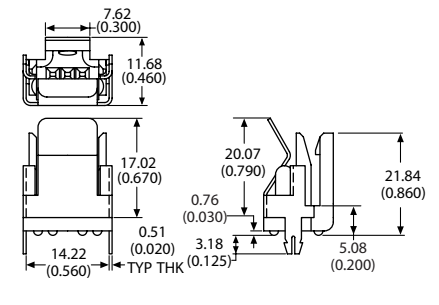
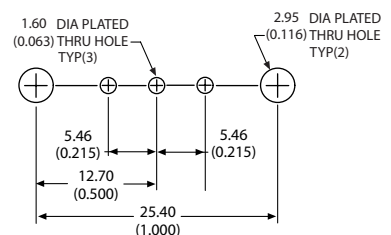


Figure B



Recommended hole pattern for 8241-CL11



# Interface Material / Double Sided Tape

Double-sided thermal tapes adhere the heat sink to the device and offer good thermal characteristics. They are easy to apply, require no curing time, can be electrically conductive or isolating, and need no mechanical support to provide thermal or physical contact between the device and the heat sink. Aavid can apply one side to a heat sink.

## ORDERING INFORMATION

example 12 digit part **375224B000** \_ \_ \_

Ordering code	Tape option	Ordering code
31	T404	
32	T405	
33	T412	
34	T410	
35	T411	

### Ther-A-Grip™ 1050 / T404 for ceramic or metal packages

Ther-A-Grip™ 1050 uses a 0.001 inch (0.03 mm) Kapton MT™ filled polyimide film coated on both sides with high-bond strength, pressure-sensitive acrylic adhesive that is loaded with aluminum oxide particles. This provides both good thermal performance and excellent electrical isolation.

<b>Color</b>	Beige
<b>Electrical function</b>	Insulating
<b>Thickness</b>	0.127 mm (0.005)
<b>Carrier</b>	Kapton MT™
<b>Thermal impedance</b>	0.60 °C-in <sup>2</sup> /w
<b>Thermal resistance</b>	0.37 w/m-k
<b>Breakdown voltage</b>	5000 VAC
<b>Volume resistivity</b>	3 x 10 <sup>14</sup> Ohm-cm
<b>UL flammability</b>	V-O
<b>Lap shear adhesion</b>	125 (0.862) psi
<b>Die shear adhesion</b>	
Aluminum 25°C	130 psi
Aluminum 150°C	50 psi
Alum. Oxide 25°C	170 psi
Alum. Oxide 150°C	50 psi
<b>Creep adhesion</b>	
25°C @ 12psi	>50 days
150°C @ 12psi	>50 days

### Ther-A-Grip™ 1070 / T405 for ceramic or metal packages

Ther-A-Grip™ 1070 uses a 0.002 inch (0.05 mm) aluminum foil core coated on both sides with high-bond strength, pressure-sensitive acrylic adhesive that is loaded with aluminum oxide particles. The aluminum foil provides added thermal conductivity for applications where electrical isolation is not required. The combination of filter, expanded metal and embossed surface enhances both tape conformability and thermal performance.

<b>Color</b>	White
<b>Electrical Function</b>	Conductive
<b>Thickness</b>	0.006 (0.015)
<b>Carrier</b>	Aluminum
<b>Thermal Impedance</b>	0.54 °C-in <sup>2</sup> /w
<b>Thermal Conductivity</b>	0.50 w/m-k
<b>Breakdown Voltage</b>	N/A
<b>Volume Resistivity</b>	3 x 10 <sup>-2</sup> Ohm-cm
<b>UL Flammability</b>	94V-0
<b>Rating</b>	U.L.94
<b>Lap Shear Adhesion</b>	134 psi
<b>Die Shear Adhesion</b>	
Aluminum 25°C	125 psi
Aluminum 150°C	55 psi
Alum.Oxide 25°C	145 psi
Alum.Oxide 150°C	60 psi
<b>Creep Adhesion</b>	
25°C @ 12 psi	>50 days
150°C @ 12 psi	>50 days

### Ther-A-Grip™ 1090 / T412 for ceramic or metal packages

Ther-A-Grip™ 1090 uses an expanded foil carrier coated on both sides with high-bond strength, pressure sensitive acrylic that is loaded with titanium diboride particles. The combination of filter, expanded metal and embossed surface enhances both tape conformability and thermal performance.

<b>Color</b>	Grey
<b>Electrical Function</b>	Conductive
<b>Thickness</b>	0.009 (0.23)
<b>Carrier</b>	Expanded aluminum
<b>Thermal impedance</b>	0.25 °C-in <sup>2</sup> /w
<b>Thermal conductivity</b>	1.40 w/m-k
<b>Breakdown voltage</b>	N/A
<b>Volume resistivity</b>	N/A
<b>UL flammability</b>	N/A
<b>Lap shear adhesion</b>	70 psi
<b>Die shear adhesion</b>	
Aluminum 25°C	135 psi
Aluminum 150°C	25 psi
Alum.oxide 25°C	125 psi
Alum.oxide 150°C	40 psi
<b>Creep adhesion</b>	
25°C @ 12 psi	>50 days
150°C @ 12 psi	>10 days

### T410 / T411 for plastic packages

**T410 thermally conductive tape** consists of a high bond strength, pressure sensitive acrylic adhesive loaded with aluminum oxide and coated onto a 0.002 inch (0.05mm) aluminum foil carrier. The other side of the foil carrier has a silicone pressure sensitive adhesive which provides excellent adhesion to silicone-contaminated plastics and other low energy surfaces.

**T411 thermally conductive tape** consists of a high bond strength, pressure sensitive adhesive with an aluminum mesh carrier layer. The mesh carrier allows the tape to conform to curved surfaces of plastic molded IC packages, providing a high adhesive strength attachment for heat sinks. The high performance silicone PSA allows adhesion to silicone-contaminated plastics and other low energy surfaces.

Typical properties	T410	T411
<b>Construction</b>	Acrylic	Silicone
<b>Adhesive (to heat sink side)</b>		
<b>Color</b>	White	Clear (silver)
<b>Carrier</b>	Aluminum foil	Aluminum mesh
<b>Adhesive (onto component side)</b>	Silicone	Silicone
<b>Color (to component side)</b>	Clear (Silver)	Clear (Silver)
<b>Thickness, mm (inch)</b>	0.18 (0.007)	0.28 (0.011)
<b>Thermal impedance @ &lt;1 psi °C-cm<sup>2</sup>/w (°C-in<sup>2</sup>/w)</b>	7.1 (1.1)	6.5 (1.0)
<b>Operating temperature range, °C</b>	-50 to + 150	-50 to + 150
<b>Lap shear adhesion, psi (MPa)</b>	60 (0.414)	14 (0.094)
<b>Die shear adhesion, psi (MPa) steel/FR4</b>		
25°C	170 (1.172)	80 (0.552)
125°C	40 (0.276)	20 (0.138)

Note: Double Sided Tapes are factory applied only.

## Wave-On™ Mounts

Solderable mounts can be factory installed to practically every board-mountable heat sink and flat sided extrusion. The female threaded through holes permit pre-assembly to the semiconductor via machine screws, allowing the heat sink/semiconductor package to be treated as one unit when fitted in PC board through holes for wave soldering.

### FEATURES

#### Saves production time and cost

- Cuts production steps by half
- Factory installation eliminates steps
- Permits soldering in one step
- All the benefits of female threaded mount
- Automated fastening
- Excellent solderability

#### Better thermal performance

- Built in stand-off adds air space between PC and heat sink for improved air flow and easier cleaning reduces inventory requirements
- No lockwashers, nuts or separate mounts with various thread lengths

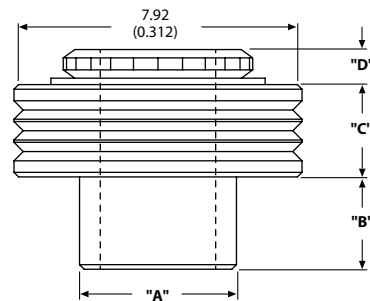
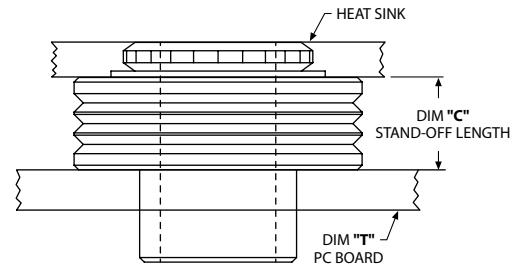
### ORDERING INFORMATION

example part **574802B0** \_ \_ 00  
Ordering code

Ordering code	Model	"A" Dim	"B" Dim	"C" Dim	"D" Dim	Threaded thru holes
01	E	4.32 (0.170)	2.54 (0.100)	2.54 (0.100)	0.96 (0.038)	#6-32
02	EA	3.43 (0.135)	2.54 (0.100)	2.54 (0.100)	0.96 (0.038)	#4-40
03	EG	3.43 (0.135)	2.54 (0.100)	1.14 (0.045)	0.96 (0.038)	#4-40
04	EH	4.32 (0.170)	3.43 (0.135)	2.54 (0.100)	0.96 (0.038)	#6-32
05	EK	4.32 (0.170)	2.54 (0.100)	1.14 (0.045)	0.96 (0.038)	#6-32
07	EM	4.32 (0.170)	2.54 (0.100)	2.54 (0.100)	0.96 (0.038)	3.5MM
09	ER	4.32 (0.170)	2.54 (0.100)	5.08 (0.200)	0.96 (0.038)	#6-32

Model	Dia of PCB Plated thru hole	PCB thickness "T"
EA, EG	3.68 (0.145)	1.57 (0.062)
E, EK, EM, ER	4.75 (0.187)	1.57 (0.062)
EH, EP	4.75 (0.187)	2.29 (0.090)

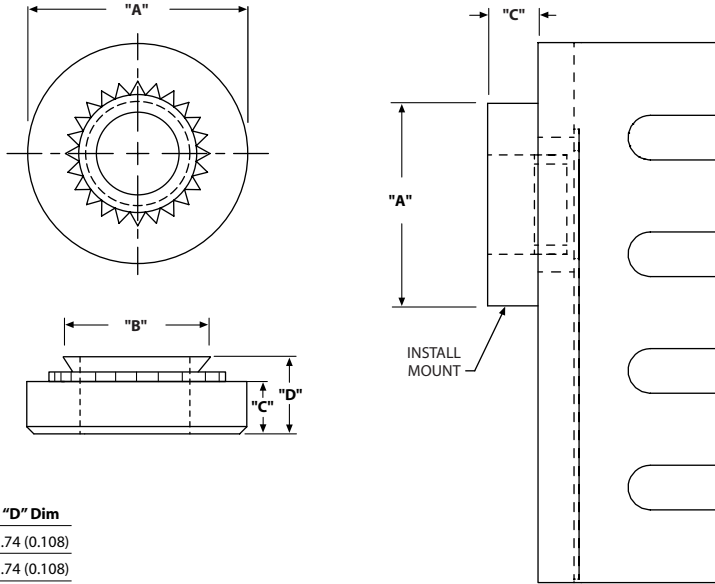
### Typical Wave-On™ mount installation




# Semiconductor Mounts

## Female Semiconductor Mounts

- Fastens semiconductor to heat sink fast and efficiently
- Up to 10 times faster than fastening with standard nuts and bolts
- Used with most JEDEC case sizes, factory installed



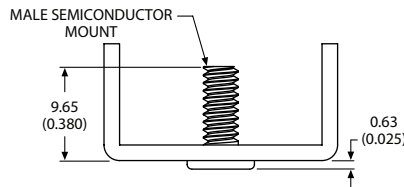
### ORDERING INFORMATION

example 12 digit part **542502B000**   
Ordering code


Ordering code	Thread	"A" Dim	"B" Dim	"C" Dim	"D" Dim
01	#6-32	7.11 (0.280)	4.75 (0.187)	1.78 (0.070)	2.74 (0.108)
02	#4-40	6.35 (0.250)	4.19 (0.165)	1.78 (0.070)	2.74 (0.108)
03	3.00(0.118)	6.35 (0.250)	4.22 (0.166)	1.50 (0.059)	2.47 (0.097)

## Male Semiconductor Mounts

- Captive male studs for semiconductor attachments
- Used with most JEDEC case sizes, factory installed



### ORDERING INFORMATION

example 12 digit part **507302B000**   
Ordering code

Ordering code	Thread
04	#6-32
05	#4-40

**Shur-Lock™ Tabs**

**Aavid's Shur-Lock™ self locking stand-off tab** (U.S. Patent #5,437,561) positively secures any heat sink to the printed circuit board. This Shur-Lock™ tab exhibits many unique design features.

The rounded and bifurcated tip of the Shur-Lock™ solderable tab has been designed to easily snap into any 0.093" diameter hole. Once through the hole, the tab provides a positive resistance to backing or falling out of the hole. In addition, the spring action between the tab and the plated through hole prevents leaning or lift-off of the heat sink prior to or during the soldering process. The tip extension of the Shur-Lock™ tab has been designed to protrude less than 0.060" beyond the back of a standard .0625" PC board, which is below the normal lead trimming allowance for assembled PCBs. Shur-Lock's™ stand-off design facilitates the cleaning of assembled PCBs and permits electrical traces to be routed under the heat sink. The wide base supports of the tab further improve the stability of the heat sink assembly.

**FEATURES**

- Positive PCB engagement
  - Integrated PCB stand-off
  - Quick "snap-in" assembly design
  - Reduces installed assembly cost
  - Designed for rugged shock and vibration environments
  - Can be installed on a variety of stamped and extruded board level heat sinks
- Factory applied only

**ORDERING INFORMATION**

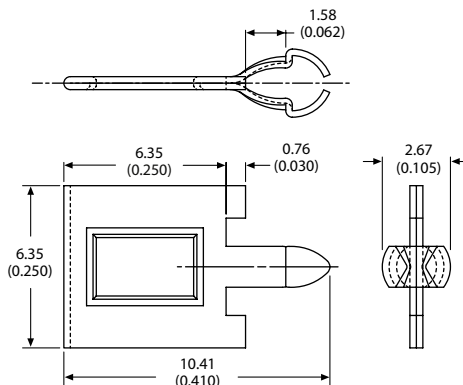
example 12 digit part **574802B0** \_\_ **00**  
 Ordering code

**PRODUCT INFORMATION**

<b>Material</b>	Spring steel
<b>Finish</b>	Tin plating over a copper flash
<b>Pull-out force*</b>	70 lbs/tab minimum
<b>Recommended PCB hole diameter</b>	0.092" - 0.096
<b>PCB thickness</b>	.065" - 0.068"

Variations of the above specifications are possible. Contact Aavid Thermalloy for additional details for use with thicker PCB sizes, such as .093" or other hole diameters.  
 \*Vertical force applied to the sink-tab joint.

**Tab ordering code 28**



**Solderable Staked on Tabs**

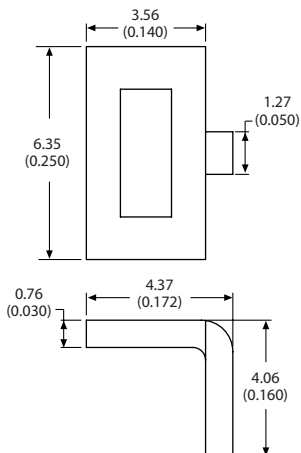
Aavid solderable tabs stake onto heat sinks for solder mounting into the PC board. The tabs are available in a variety of lengths, widths and thickness. Tabs are factory applied for both vertical and horizontal mountings including: step tabs, which keep the heat sink elevated above the board, and tabs with a triangular base for extra stability.

Many of Aavid's tabs are customized. Below are examples of standard tabs. Please consult Aavid's customer service department for information about other tab options.

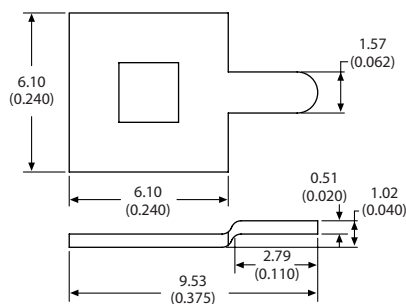
**ORDERING INFORMATION**

example 12 digit part **574802B0** \_\_ **00**  
 Ordering code

**Tab ordering code 31**

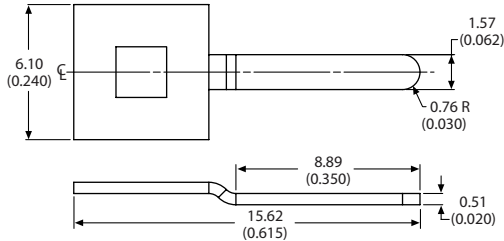


**Tab ordering code 32**

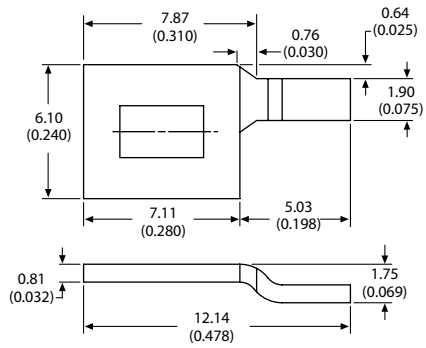


# Tabs

**Tab ordering code 33**

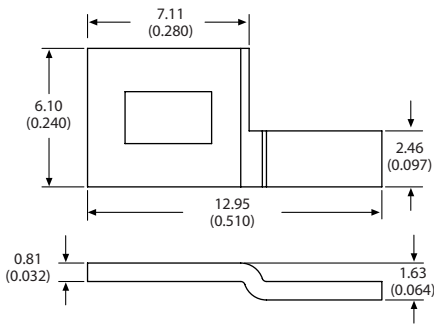


**Tab ordering code 34**

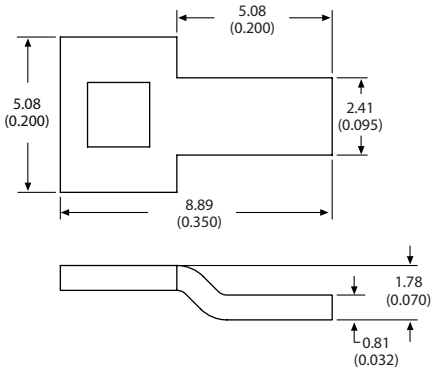


Note: The drawing above shows the right hand of a matched pair which are supplied, mounted to the heat sink.

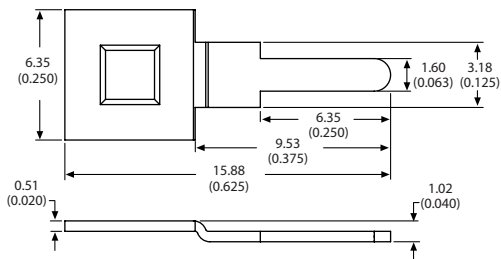
**Tab ordering code 35**



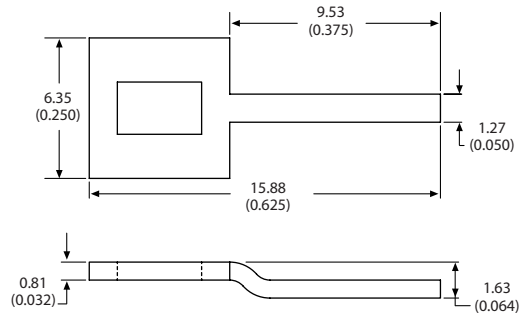
**Tab ordering code 36**



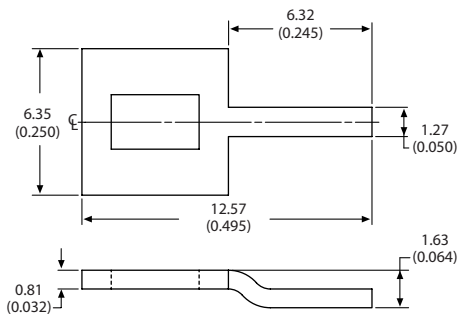
**Tab ordering code 37**



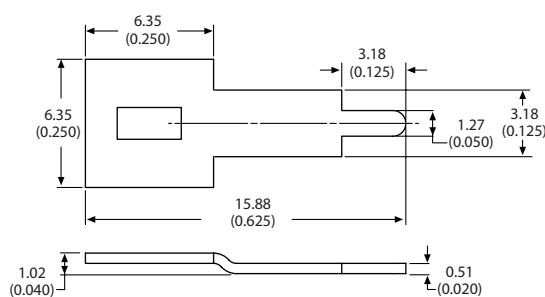
**Tab ordering code 39**



Tab ordering code 40



Tab ordering code 43



Solderable Mounting Tabs

Heat sinks ordered with solderable mounting tabs have tin-plated spring steel tabs permanently locked onto the heat sink to provide wave solderability. The solderable tabs are mounted on the heat sink after anodizing, thus eliminating any special coating or handling. The result is a wave solderable heat sink with black anodized performance.

ORDERING INFORMATION

example 12 digit part 574802B0 \_\_ 00

Ordering code

example

Thermalloy origin part 6070B-

A

B

A = Model number  
B = Mounting tab suffix

FIGURE A

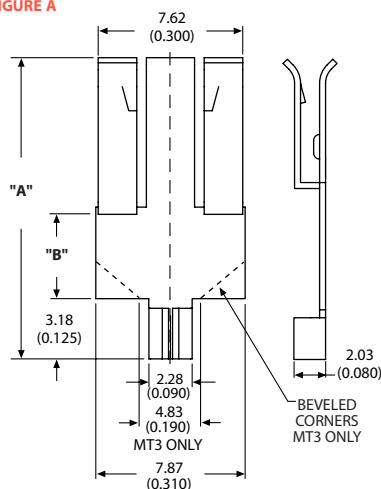
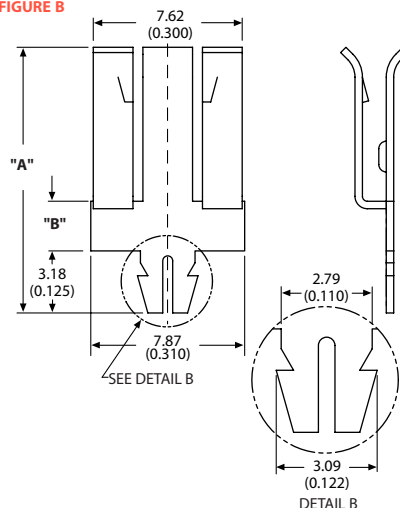
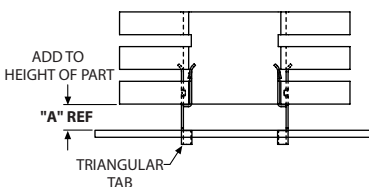


FIGURE B



Typical Installation



Suffix	Ordering code	Stand-off height	Features	"A" DIM	"B" DIM	Figure	Recommended PCB plated thru hole:
MT	53	5.21(0.205)	Solderable mounting tab	15.88 (0.625)	4.83 (0.190)	A	2.90 ± 0.10 (0.114 ± 0.004)
MT2	54	8.51 (0.335)	Solderable mounting tab	19.18 (0.755)	8.13 (0.320)	A	2.90 ± 0.10 (0.114 ± 0.004)
MT3	55	5.21 (0.205)	50 degree beveled corners on stand-off portion reducing board footprint from 7.87 (0.310) to 4.83 (0.190)width. Only tab with this feature.	15.88 (0.625)	4.83 (0.190)	A	2.90 ± 0.10 (0.114 ± 0.004)
MT5	56	5.21 (0.205)	Bifurcated tabs in lieu of triangular shape	15.88 (0.625)	4.83 (0.190)	B	2.95 ± 0.05 (0.116 ± 0.002)
MT6	57	2.92 (0.115)	Bifurcated tabs in lieu of triangular shape	13.59 (0.535)	2.54 (0.100)	B	2.95 ± 0.05 (0.116 ± 0.002)

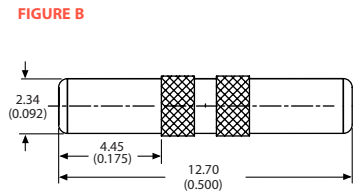
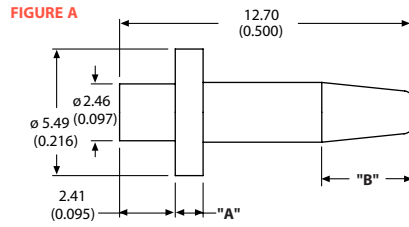
Notes: Mounting tabs have unique locking features built into their design. Aavid Thermalloy adds to standard and custom heat sinks. For this reason, the tabs are factory applied, and cannot be sold separately. Please see page 85 for additional tab options.



# Solderable Pins / Solderable Nuts

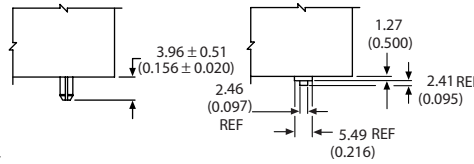
## Solderable Pins

Vertically mounted, extruded heat sinks are converted to wave solderable with the addition of solderable roll pins. Roll pins are available with stand-off shoulders in different heights for easier cleaning after wave soldering.

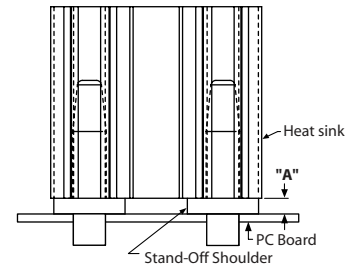


Pin 25

Pin P2-P3



Typical installation P2-P3



### ORDERING INFORMATION

example 12 digit part **529902B0** -- **00**

example Thermalloy origin part **6396B-** A = Model number  
B = Solid pin suffix

Suffix	Ordering code	Description	Stand-off height	"A" DIM	"B" DIM	Figure
P2	21	Solid pin w/stand-off shoulder 0.050"	0.050 + 0.015/-0.005 (1.27 + 0.38/-0.13)	0.050	0.155	A
P3	N/A	Solid pin w/stand-off shoulder 0.125"	0.125 + 0.015/0.005 (3.18 + 0.38/-0.13)	0.125	0.130	A
NA	25	Solid solderable pin				B

## Solderable Nuts

Solderable nuts are permanently swaged into the heat sink for quick pre-assembly with the transistor. Screws are used to mount to the heat sink and are installed from the top. Solderable nuts feature a closed end that prevents solder from wicking into threads and trapping contaminants or flux. Heat sink and transistor are then handled as a single component and dropped into plated-thru holes in the PC board for wave soldering. (Solderable nuts require slightly larger printed circuit board hole sizes)

### FEATURES

- Pre-mounted to heat sink at factory
- Ease of pre-assembly in production
- Mechanical and electrical integrity
- Wave solderability

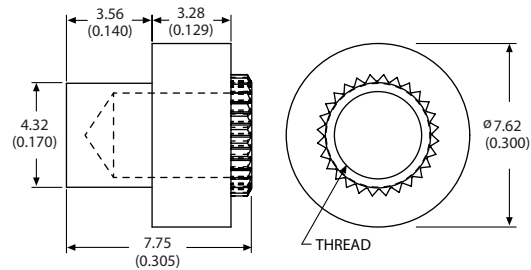
### ORDERING INFORMATION

example 12 digit part **506003B0** -- **00**

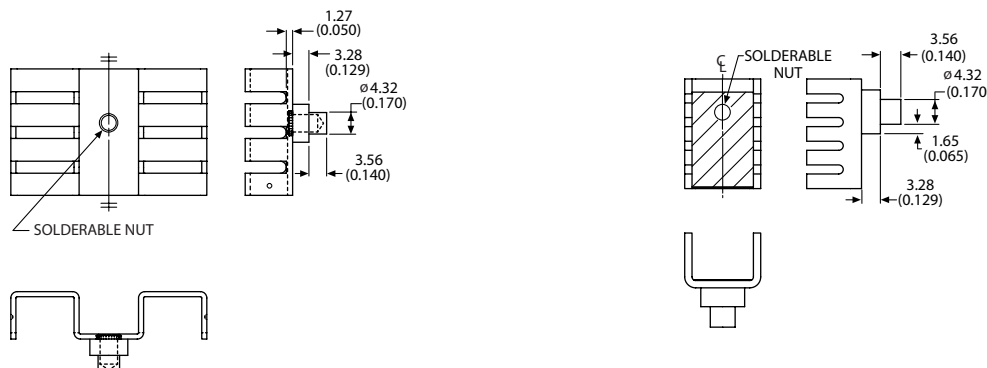
example Thermalloy origin part **7019B-** A = Model number  
B = Solderable nut suffix

Suffix	Ordering code	Dia of PCB thru hole	Thread
SNM-1	N/A	3.81, 4.78 (0.150, 0.188)	M3X0.5
SNE-1	14	3.81, 4.78 (0.150, 0.188)	4-40 UNC-2B
SNE-2	13	3.81, 4.78 (0.150, 0.188)	6-32 UNC-2B

Note: If a part number requires 2 solderable nuts, simply add a "/2" after the solderable nut character suffix on Thermalloy origin parts.



### Mechanical drawings showing heat sinks with solderable nuts



## Clinch Nuts

Clinch nuts are threaded nuts that allow quick assembly of the transistor to the heat sink. A single screw mounts the transistor to the heat sink, reducing your hardware requirements. Clinch nuts are permanently pressed into the heat sink, and come in a variety of English and Metric threads—CNE designates an English thread, and CNM designates a Metric thread.

FIGURE A

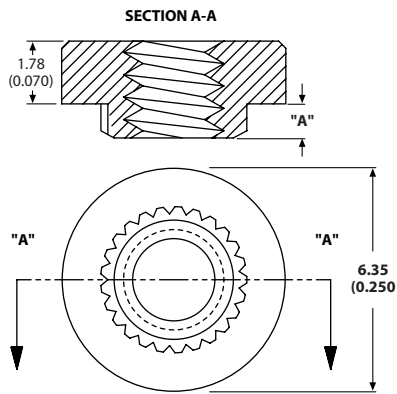
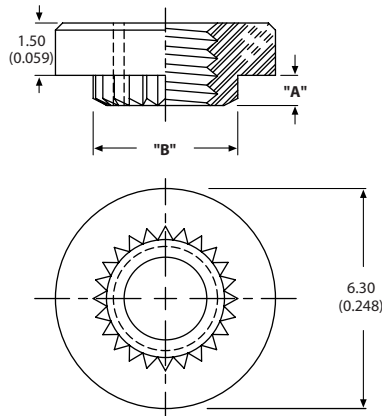


FIGURE B



### ORDERING INFORMATION

example 12 digit part **529801B000**

example  
Thermalloy origin part **7019B-**

Ordering code

A

B

A = Model number  
B = Clinch nut suffix

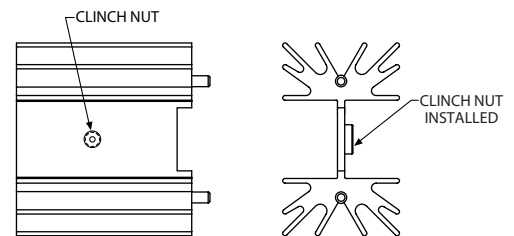
Suffix	Ordering code	Thread	"A" Dim	"B" Dim	Figure	Min mat'l thickness
CNE42	12	4-40 UNC-2B	0.96 (0.038)		A	1.02 (0.040)
CNE43	N/A	4-40 UNC-2B	1.37 (0.054)		A	1.42 (0.056)
CNM1	13	M3 X 0.5	0.76 (0.030)	4.06 (0.160)	B	0.79/0.99 (0.031/0.039)
CNM2	N/A	M3 X 0.5	0.96 (0.038)	4.22 (0.166)	B	0.79/0.99 (0.031/0.039)

Note: Minimum recommended distance from center line of mounting hole to material edge:

4.83 (0.190) for 4-40

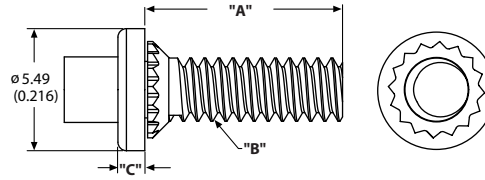
4.80 (0.189) for M3

Mechanical drawing showing heat sink with clinch nut



## Solderable Studs

Threaded solderable studs are permanently swaged in place for quick pre-assembly with the transistor. The device is placed over the stud (s) followed by the lock washer and nut. This entire component is then dropped into plated-through holes in the printed circuit board for wave soldering. The end of the stud is tin-plated for excellent solderability and extends only 0.040" below a 0.062" PC board to clear lead trimming saws.



### ORDERING INFORMATION

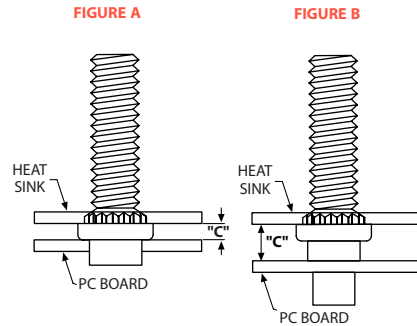
example 12 digit part **501303B000**

example Thermalloy origin part **7022B-**  
 A = Model number  
 B = Stud Suffix

Suffix	Ordering code	Dia of PCB thru hole	"A" Dim	"B" Dim	"C" Dim	Figure
SE-1	08	3.81, 4.78 (0.150, 0.188)	8.89 (0.350)	6-32	1.13-1.26 (0.045-0.050)	A
SE-2	06	3.81, 4.78 (0.150, 0.188)	12.32 (0.485)	6-32	1.14-1.27 (0.045-0.050)	A
SE-3	09	3.81, 4.78 (0.150, 0.188)	8.89 (0.350)	4-40	1.14-1.26 (0.045-0.050)	A
SE-4	14	4.78 (0.188)	8.89 (0.350)	6-32	3.05 (0.120)	B
SM-1	17	3.81, 4.78 (0.150, 0.188)	8.89 (0.350)	M3 x 0.5	3.05 (0.120)	B
SM-3	07	3.81, 4.78 (0.150, 0.188)	8.89 (0.350)	M3 x 0.5	1.13-1.26 (0.045-0.050)	A

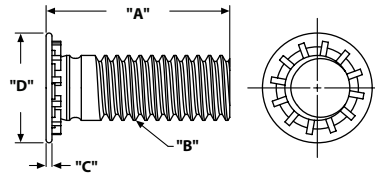
Note: Factory installed only

### Typical installation



## Device Mounting Studs

Device mounting studs for "Thermalloy-origin" items are available as options on certain vertical and board mount heat sinks as a labor-saving aid for mounting semiconductors. This optional feature speeds production assembly time and reduces hardware requirements.



### ORDERING INFORMATION

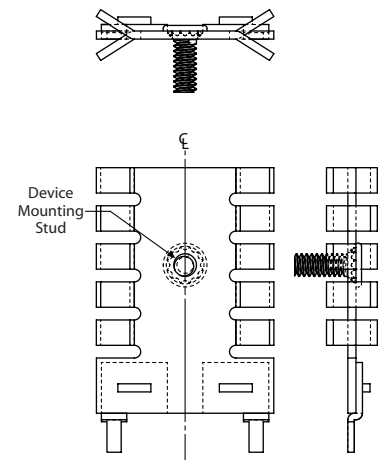
example 12 digit part **529801B000**

example Thermalloy origin part **7019B-**  
 A = Model number  
 B = Stud suffix

Suffix	Ordering code	Dia of PCB thru hole	"A" Dim	"B" Dim	"C" Dim	"D" Dim
SF1	11	3.18 (0.125)	7.92 (0.312)	4-40 UNC-2A	0.25 (0.010)	4.75 (0.187)
SF2	N/A	3.18 (0.125)	8.00 (0.315)	M3 x 0.5	0.25 (0.010)	4.60 (0.181)
SF3	N/A	3.48 (0.137)	7.92 (0.312)	6-32 UNC-2A	0.25 (0.010)	5.23 (0.206)

Note: Factory installed only

### Mechanical drawing showing heat sink with device mounting studs



**Aavid Kool-Klips™**

These one piece stainless steel clips eliminate the need for screws, lock washers and nuts in the assembly process, therefore reducing assembly time and cost. These can be bought separately, or found in the 11th or 12th position when deciphering an Aavid Standard product. Please reference indexes to see which clips are popular with which product offering. Note: These clips are sold separately using Aavid part number below.

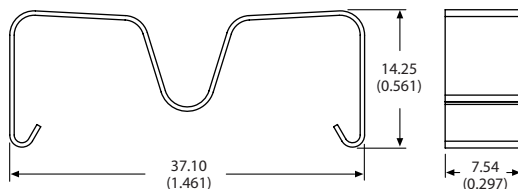
**ORDERING INFORMATION**

example 12 digit part **530101B000**

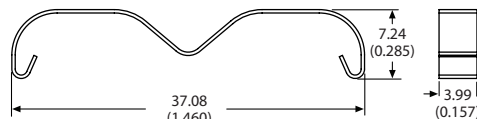
Ordering code

Part Number	Transistor case style	Ordering code
115000F00000	TO-220, TO-218	50
115100F00000	TO-220, TO-218	51
115200F00000	TO-220, TO-218	52
115300F00000	TO-220, TO-218	53
115400F00000	TO-220	54
116200F00000	TO-220, TO-218	62
5901	TO-220, TO-218, TO-247	Sold separately only
6801	TO-220, TO-218, TO-247	Sold separately only
7701	TO-220	Sold separately only

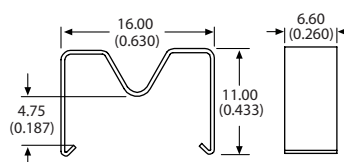
**6801**



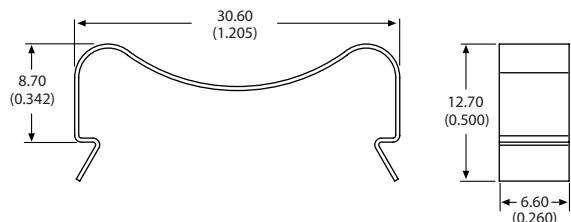
**5901**



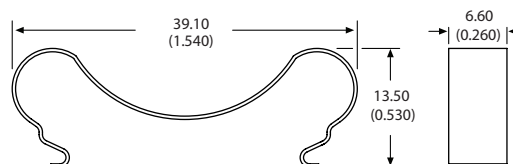
**7701**



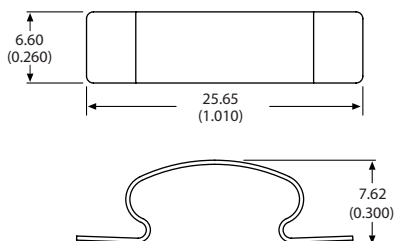
**115000F00000 Code 50**



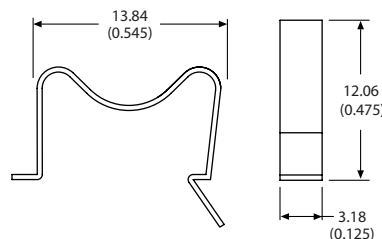
**115100F00000 Code 51**



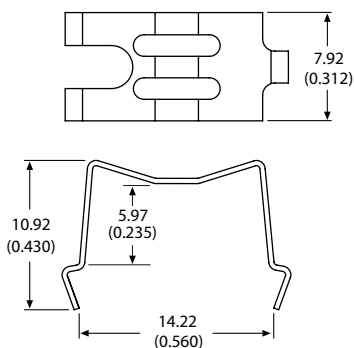
**115200F00000 Code 52**



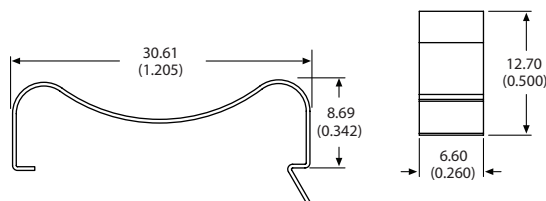
**115300F00000 Code 53**



**115400F00000 Code 54**



**116200F00000 Code 62**



## Thermal Clips

**Factory-installed ONLY thermal clips**, available on many standard heat sinks (shown below) eliminate the use of screws and nuts in assembling the heat sink and transistor. Plastic case transistors slip into place for easy assembly. Thermal clips are available in a variety of configurations. Locking clips have an internal tab to lock the transistor permanently in place.

### ORDERING INFORMATION

example 12 digit part **530600B000**

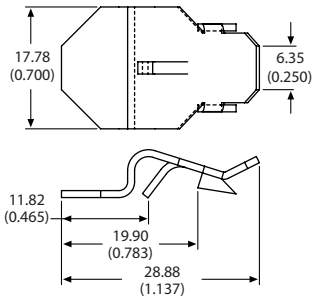
example  
Thermalloy origin part **7023B**

Ordering code

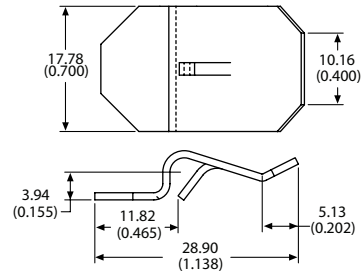
A = Model number  
B = Clip suffix

Suffix	Ordering code	Transistor case style	Clip/Cover features
TC1	32	TO-220	Locking
TC6	36	TO-218, TO-220, Multiwatt	Locking
TC7	N/A	ITO-218, TO-220, Multiwatt	Insulated
TC10	33	TO-220, TO-218	Locking
TC11	34	TO-220	Insulated
TC12	35	TO-218, TO-220	Locking

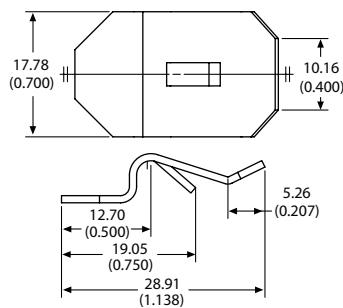
### TC-1 Code 32



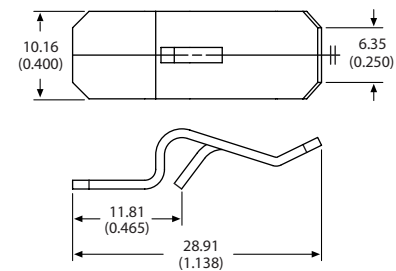
### TC-6 Code 36



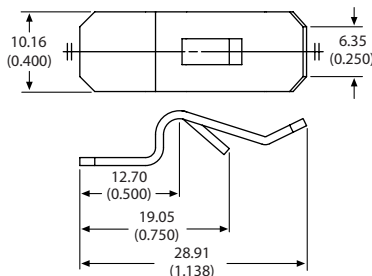
### TC-7 Code N/A



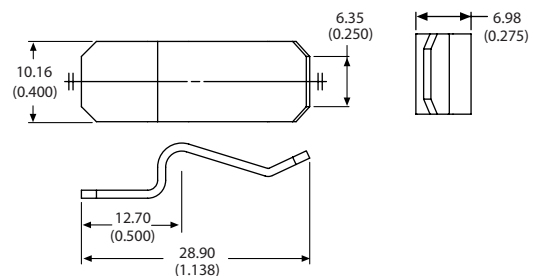
### TC-10 Code 33



### TC-11 Code 34



### TC-12 Code 35



## FEATURES

- Pre-packaged in heat-sealed plastic bags for use on assembly line.
- Stock mounting hardware using one number for better control and identification. Part number can be printed on the bag if requested.
- Standard kit contains Thermalfilm™ insulator. For high maximum operating temperatures (550°C), order a mica insulator by adding suffix letter "M" to the part number. For electrical isolation and excellent thermal resistance, use Thermalsil™ III for an insulator by adding suffix letter "S" to the part number.
- Other insulator materials available include: hard anodized aluminum and aluminum oxide.
- Refer to proper product section for drawings of insulators and shoulder washers used in the mounting kits.

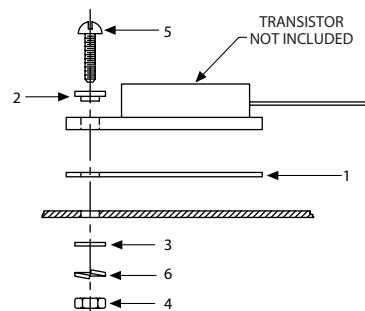
## TO-220 Mounting Kit part number 4880

### ORDERING INFORMATION

- No. 4880 (Thermalfilm™)
- No. 4880M (Mica Insulator)
- No. 4880S (Thermalsil™ III)

Part Number	Item	Qty	Description
	1	1	Insulator Thermalfilm™ (see page xxx) Mica (see page xxx) Thermalsil™ III (see page xxx)
7721-7PPS	2	1	Shoulder washer
MS15795-804	3	1	Flat washer #4 No. 4-40 UNC-2B
MS35649-244	4	1	Hex nut No. 4-40 UNC-2A X
MS51957-17	5	1	1/2 Long phillips pan head screw
MS35338-135	6	1	Lock washer, No. 4

Note: Smooth side of flat washer should be placed against insulator when using the kit.



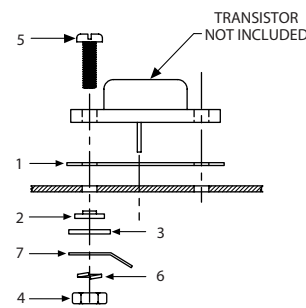
## TO-3 Mounting Kit part number 4804

### ORDERING INFORMATION

- No. 4804 (Thermalfilm)
- No. 4804M (Mica Insulator)
- No. 4804S (Thermalsil III)

Part Number	Item	Qty	Description
	1	1	Insulator Thermalfilm™ (see page xxx) Mica (see page xxx) Thermalsil™ III (see page xxx)
7721-5PPS	2	2	Shoulder washer
MS15795-805	3	2	Flat washer #6
MS35649-264	4	2	No. 6-32 UNC-2B Hex nut
MS 51957-30	5	2	No. 6-32 UNC-2A X 1/2 Long phillips pan head screw
MS35338-136	6	2	Lock washer, No. 6
322-156	7	1	Solder lug

Note: Smooth side of flat washer should be placed against insulator when using the kit.



# Insulating Shoulder Washers

## FEATURES

- 40% glass filled polyphenylene sulfide (PPS).
- Chemically inert [no known solvents under 200°C (392°F)].
- Maximum recommended service temperature of 260°C (500°F).
- Recommended torque is .565Nm to .678Nm (5 to 6 inch-pounds) on all shoulder washers except -7, which has recommended torque of .452Nm (4 inch-pounds).

## Polyphenylene Sulfide PPS Shoulder Washers

FIGURE A

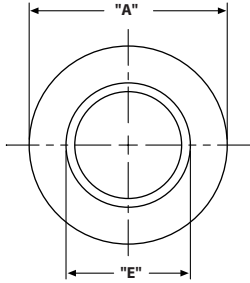
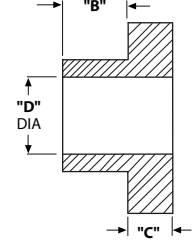
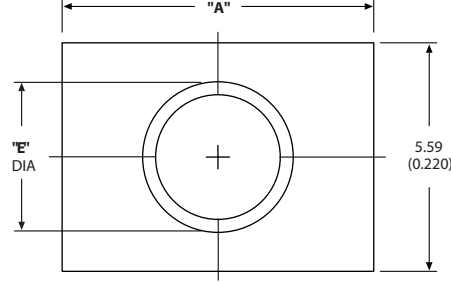


FIGURE B



Note: This figure is common to figures A and B

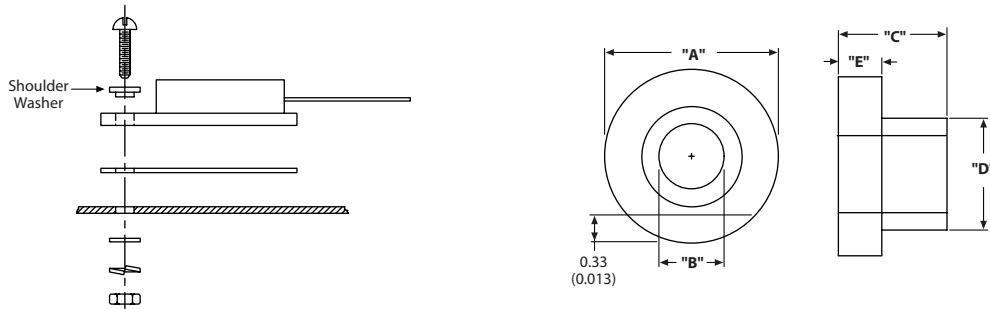
Part Number	"A" Dim	"B" DIM	"C" Dim	"D" Dim	"E" Dim	Screw size	Figure
7721-1PPS	7.11 (0.280)	3.18 (0.125)	1.07 (0.042)	2.84 (0.112)	3.81 (0.150)	4	A
7721-2PPS	7.11 (0.280)	4.70 (0.185)	1.07 (0.042)	2.84 (0.112)	3.81 (0.150)	4	A
7721-3PPS	7.11 (0.280)	3.18 (0.125)	1.07 (0.042)	2.84 (0.112)	3.56 (0.140)	4	A
7721-5PPS	7.92 (0.312)	0.79 (0.031)	1.19 (0.047)	3.66 (0.144)	4.50 (0.177)	6	A
7721-6PPS	7.11 (0.280)	0.79 (0.031)	1.19 (0.047)	3.00 (0.118)	3.68 (0.145)	4	A
7721-7PPS*	5.46 (0.215)	0.81 (0.032)	1.02 (0.040)	2.95 (0.116)	3.43 (0.135)	4	A
7721-10PPS	7.62 (0.300)	2.41 (0.095)	1.40 (0.055)	2.97 (0.117)	3.56 (0.140)	4 **	B

Note: A single gate extension, not to exceed 0.64 (0.025) in length, is allowable on the outside of all shoulder washers.

\* Design allows insertion in the tab of a TO-220.

\*\* Also for M3 screw.

## Nylon Shoulder Washers



Material is nylon type 6

Part Number	"A" DIM	"B" DIM	"C" Dim	"D" Dim	"E" Dim
7721-11N	7.80 / 8.05 (0.307 / 0.317)	2.87 / 3.00 (0.113 / 0.118)	3.56 / 3.81 (0.140 / 0.150)	3.76 / 3.89 (0.148 / 0.153)	1.09 / 1.35 (0.043 / 0.053)
7721-13N	5.89 / 6.05 (0.232 / 0.238)	2.87 / 3.00 (0.113 / 0.118)	N/A	3.43 / 3.56 (0.135 / 0.140)	1.19 / 1.40 (0.047 / 0.055)
7721-15N	5.59 / 6.10 (0.220 / 0.240)	2.90 / 2.95 (0.114 / 0.116)	1.73 / 1.91 (0.068 / 0.075)	3.43 / 3.58 (0.135 / 0.140)	.51 / .64 (0.020 / 0.025)

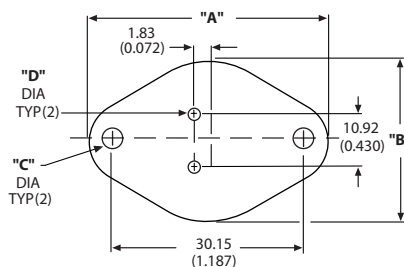


## Thermalfilm™ for TO-3

### ORDERING INFORMATION

Part Number	"A" DIM	"B" DIM	"C" DIM	"D" DIM
43-03-2	42.04(1.655)	27.00(1.063)	3.96(0.156)	1.57(0.062)
43-03-4	39.70(1.563)	26.67(1.050)	3.56(0.140)	1.57(0.062)

Thermalfilm™ information on page 102



## Thermalfilm™ for TO-5 and TO-18

### ORDERING INFORMATION

Part Number	Device	Figure	"A" DIM	"B" DIM	"C" DIM
43-05-1	TO-5	A	9.91(0.390)	5.08(0.200)	0.91(0.036)
43-05-2	TO-5	B	9.91(0.390)	5.08(0.200)	0.91(0.036)
43-18-1	TO-18	A	6.35(0.250)	2.54(0.100)	0.91(0.036)

Thermalfilm™ information on page 102

FIGURE A

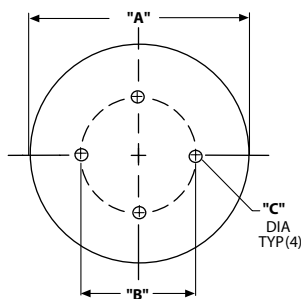
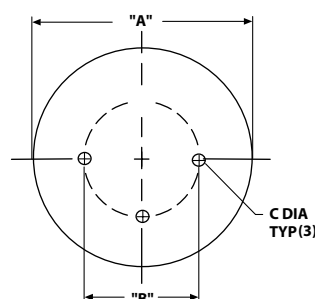


FIGURE B



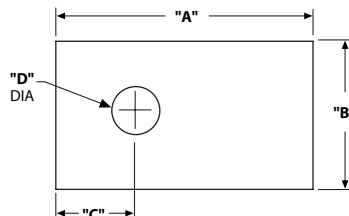
## Thermalfilm™ for TO-220, TO-126, Case 77, Case 199, Case 90, TO-218 and TO-3P

### ORDERING INFORMATION

Part Number	Device	"A" DIM	"B" DIM	"C" DIM	"D" DIM
43-77-1	TO-126, Case 77	11.10 (0.437)	7.92 (0.312)	3.56 (0.140)	2.36 (0.093)
43-77-2	Case 90, Case 199	17.45 (0.687)	14.27 (0.562)	5.54 (0.218)	3.18 (0.125)
43-77-8	Case 90, Case 199	18.92 (0.745)	13.84 (0.545)	5.38 (0.212)	3.81 (0.150)
43-77-9	TO-220	18.42 (0.725)	13.21 (0.520)	4.32 (0.170)	2.92 (0.115)
46-77-9*	TO-220	18.42 (0.725)	13.21 (0.520)	4.32 (0.170)	2.92 (0.115)
43-77-20	TO-220, TO-218, TO-3P	23.24 (0.915)	18.80 (0.740)	6.98 (0.275)	3.66 (0.144)

\* Thermalfilm™ MT part numbers begin with "46"

Thermalfilm™ information on page 102



## Thermalfilm™ Polyimide Plastic Films

Thermalfilm™ and Thermalfilm™ MT are low cost polyimide plastic insulating films designed to be an improved replacement for mica. These insulators have a distinctive amber color and can be easily recognized and assembled on a production line.

Thermalfilm™ MT, made from high performance Kapton™ MT material, provides thermal conductivity nearly 2-5 times greater than standard Thermalfilm™. Both insulators have an extremely high resistance to flow or thin out under high compressive stresses, particularly at elevated temperatures. Excellent physical, mechanical and electrical properties remain nearly constant over a wide range of temperatures and frequencies. They are radiation resistant, have no melting points, and have no known organic solvents. The polyimide plastic film is UL listed as a component in UL's publication "Component - Plastic Material" dated September 18, 1969. The UL card number is E39505R, Guide QMFZ2 filed by E. I. du Pont de Nemours & Co., Inc. Thermalfilm™ is rated 94-V/0.

### ORDERING INFORMATION

For standard pre-cut sizes of Thermalfilm™ and Thermalfilm™ MT see page 101.

#### ELECTRICAL - TYPICAL VALUE @ 25° C

PROPERTY	THERMALFILM™	THERMALFILM™ MT	TEST METHOD
Dielectric strength	0.03mm (1-mil)	177.2 x 10 <sup>3</sup> volts/mm	ASTM D149-64
	275.6 x 10 <sup>3</sup> volts/mm (7,000 volts/mil)	(4500 volts/mm)	
Dielectric constant	3.5	4.3	ASTM D150-64T
Dissipation factor	0.002	0.002	ASTM D150-64T
Volume resistivity	10 <sup>17</sup> ohm-cm	10 <sup>17</sup> ohm-cm	ASTM D257-61
Surface resistivity	10 <sup>16</sup> ohms	10 <sup>16</sup> ohms	ASTM D257-61
Corona start voltage .025mm (1-mil)	465 volts	465 volts	ASTM D1868-61T
Insulation resistance	100.000 megohm mfd.	100.000 megohm mfd.	Based on 0.05 mfd wound capacitor using 0.25 mm (1-mil) Film

#### PHYSICAL

Ultimate tensile strength (MD)	1.72 x 10 <sup>8</sup> Pa (25,000 psi)	103 MPa (1500 psi)	ASTM D882-64T
Bursting strength Test (Mullen)	3.10 x 10 <sup>5</sup> Pa (45 psi)	0.31 MPa (45 psi)	ASTM D774-63
Tear strength - initial	27,559 gm/mm (700 gm/mil)	35,433 gm/mm (900 gm/mil)	ASTM D1004-61
Density	1.42 gm/cm <sup>3</sup> (88.7 lb/ft <sup>3</sup> )	1.78 gm/cm <sup>3</sup> (111.1 lb/ft <sup>3</sup> )	ASTM D1505-63T
Folding endurance (MIT)	>10,000 cycles	>10,000 cycles	ASTM D2176-63T

#### THERMAL

Melting point	NONE	NONE	
Zero strength temperature	815°C (1499°F)	815°C (1499°F)	Hot Bar (Du Pont test)
Cut through temperature	435°C (815°F)	435°C (815°F)	Weighted probe on heated film (Du Pont test)
	525°C (977°F)	525°C (977°F)	
Service temperature	-260°C to 240°C	-260°C to 240°C	
	(-436°F to 464°F)	(-436°F to 464°F)	
Thermal conductivity	0.156Wm <sup>-K</sup>	0.379 Wm <sup>-K</sup>	Model TC-1000 twin heatmeter Comparitive tester
	(.09 BTU/hr-ft <sup>-°F</sup> )	(.219 BTU/hr-ft <sup>-°F</sup> )	
Flammability	V-0, UL "E" card E39505	V-0, UL "E" card E39505	UL 94

Notes: One mil equals .001 inch

Thermalfilm™ MT part numbers begin with "46"

Insulator thickness is .05mm (.002") unless otherwise specified.

Dimensional tolerances are ± .38mm (.015"), hole diameters are ± .25mm (.010") and angularity is ± 1 1/2° unless otherwise specified.

## Mica and Thermalsil™ III

Thermalsil™ III provides excellent thermal conductivity and thermal resistance. It is used as an electrically-isolating interface material composed of silicone elastomer binder with a thermally conductive filler. It is reinforced with glass cloth to resist tearing and cut-through due to burrs on transistors or heat sinks.

Thermalsil™ III eliminates the need for grease application and conforms to mounting surfaces under clamping pressure for optimum heat conduction. The finely woven glass cloth provides the thinnest possible matrix for enhanced thermal resistance. Thermalsil™ III is available in any configuration with adhesive backing.

Mica insulators provide high maximum operating temperatures (550° C) and excellent electrical properties.

FIGURE A

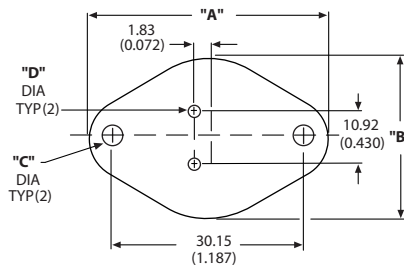
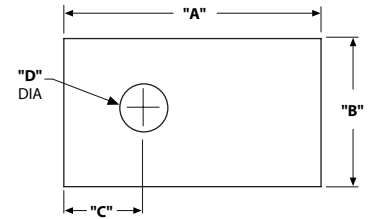


FIGURE B



### ORDERING INFORMATION

Part number	Description	Device	"A" Dim	"B" Dim	"C" Dim	"D" Dim	Figure
56-77-9	Mica	TO-220	18.42 (0.725)	13.21 (0.520)	4.32 (0.170)	2.92 (0.115)	B
56-03-2	Mica	TO-3	42.04 (1.655)	27.00 (1.063)	3.96 (0.156)	1.57 (0.062)	A
53-77-9	Thermalsil™ III	TO-220	18.42 (0.725)	13.21 (0.520)	4.32 (0.170)	2.92 (0.115)	B
53-03-2	Thermalsil™ III	TO-3	42.04 (1.655)	27.00 (1.063)	3.96 (0.156)	1.57 (0.062)	A

### TYPICAL PROPERTIES FOR MICA INSULATORS

Property	Electrical
<b>Dielectric strength</b> 0.025 mm to 0.076 mm thick in air (1 to 3 mils thick in air)	172 X 10 <sup>3</sup> volts/mm (4500 volts/mil)
<b>Dielectric constant</b>	6.5 to 8.7
<b>Dissipation factor</b> 10 <sup>6</sup> cycles	.0001-.0004
<b>Volume resistivity</b>	10 <sup>15</sup> ohm-cm
Physical	
<b>Modules of elasticity in tension</b>	172 X 10 <sup>3</sup> Mpa (25 X 10 <sup>3</sup> psi)
<b>Tensile strength</b>	310 Mpa (45,000 psi)
<b>Hardness mohs, shore</b>	3.0, 115
<b>Compressive strength</b>	2.21 X 10 <sup>8</sup> Pa (32,000 psi)
<b>Specific gravity</b>	2.9
Thermal	
<b>Thermal conductivity</b>	0.528 w/m (-1 °C -1) (.30 Btu/hr-ft °F)
<b>Coefficient of thermal expansion</b>	3.24 X 10 <sup>-5</sup> /°C (1.8 X 10 <sup>-5</sup> °F)
<b>Specific heat</b>	0.084 KJ/Kg °C (0.02 Btu/Lb °F)
<b>Melting point</b>	1275 °C (2327 °F)
<b>Max. operating temperature</b>	550 °C (1022 °F)

### TYPICAL PROPERTIES FOR THERMALSIL™ III

Property	Typical value 25°C	Test Method
Electrical		
<b>Dielectric constant</b>	2.5@50 Hz 2.5@10 <sup>3</sup> Hz 2.5@10 <sup>6</sup> Hz	ASTM D-150
<b>Dielectric breakdown voltage</b>	26.3 x 10 <sup>3</sup> volts/mm (667 volts/mil)	ASTM D-149
<b>Volume resistivity</b>	5.7 x 10 <sup>15</sup> ohm-cm	ASTM D-257
<b>Dielectric dissipation factor</b>	.008@50 Hz .004 @10 <sup>3</sup> Hz .004 @10 <sup>6</sup> Hz	ASTM D-150
Physical		
<b>Thickness</b>	.15 + .03/- .05mm (.006 + .001/- .002 in.)	
<b>Color</b>	Gray-Green	
<b>Tensile strength</b>	6.1 x 10 <sup>7</sup> Pa (8786 psi)	
<b>Hardness, shore A</b>	87	
<b>Elongation</b>	2% or less	
Thermal		
<b>Thermal conductivity</b>	0.0022 cal/sec. cm °C(0.532 Btu/hr. ft °F)	
<b>Flame resistance</b>	UL 94V-0	UL card #E-58126 (S)
<b>Service temperature</b>	-60°C to 180°C (-76°F to 356°F)	

# Insulators – Aluminum Oxide

## Aluminum Oxide

Aluminum oxide insulating washers have a dielectric strength of approximately  $21.7 \times 10^3$  volts/mm for .76mm material (550 volts/mil for 0.030 inch material) and  $16.9 \times 10^3$  volts/mm for 1.57mm material (430 volts/mil for 0.062 inch material). The thermal conductivity of aluminum oxide is 0.036cal/cm-sec °C at 75°C (167°F) [ 8.71 Btu/hr-ft-°F].

Aluminum oxide has unique thermal conductivity qualities and features low loss factors at high frequencies. It has high compressive strengths, high volume resistivity, low thermal expansion and resists radiation.

Note: Hole diameters are  $\pm 0.13\text{mm}$  (.005"), angularity is  $\pm 1^\circ$  and flatness is 0.05mm (0.002") TIR unless otherwise specified.

PROPERTY	CHEMICAL – TYPICAL VALUE	TEST METHOD
A1 <sub>2</sub> O <sub>3</sub>	94% nominal	Spectrographic Analysis (100%-% by wt. of total metallic impurity)
<b>ELECTRICAL</b>		
Dielectric Constant 25°C (77°F)	8.9 (1MHz)	ASTM D150-70
	8.9 (10GHz)	ASTM D2520-70
Dissipation Factor 25°C (77°F)	0.0001 (MHz)	ASTM D150-70
	0.0010 (10GHz)	ASTM D2520-70
Electrical Resistivity 25°C (77°F)	>10 <sup>11</sup> ohm-cm	ASTM D1829-66
Dielectric Strength (AC)	8.66 x 10 <sup>3</sup> volts/mm (6.35mm thick)	ASTM D116-69
	[220 volts/mil (0.250" thick)]	
	16.73 x 10 <sup>3</sup> volts/mm (1.27mm thick)	
	[425 volts/mil (0.050" thick)]	
	28.35 x 10 <sup>3</sup> volts/mm (0.25mm thick)	
	[720 volts/mil (0.010" thick)]	
<b>PHYSICAL</b>		
Density	3.62 g/cm <sup>3</sup> (226 lb/ft <sup>3</sup> )	ASTM C20-70
Hardness	78 (Rockwell 45 N)	ASTM E18-67
<b>MECHANICAL</b>		
Flexural Strength 25°C (77°F)	3.17 x 10 <sup>8</sup> Pa (minimum) [46.00 psi (minimum)]	ACMA Test #2
	3.52 x 10 <sup>8</sup> Pa (typical) [51,000 psi (typical)]	
Modules of Elasticity	2.83 x 10 <sup>11</sup> Pa (41 x 10 <sup>4</sup> psi)	ASTM C623-69T
Poisson's Ratio	0.21	ASTM C623-69T
Tensile Strength 25°C (77°F)	1.93 x 10 <sup>8</sup> Pa (28,000 psi)	ACMA Test #4
Compressive Strength 25°C (77°F)	2.10 x 10 <sup>8</sup> Pa (305,000 psi)	ASTM C528-63T
<b>THERMAL</b>		
Coefficient of Thermal Expansion	7.9 x 10 <sup>-6</sup> /°C (4.4 x 10 <sup>-6</sup> /°F)	ASTM C372-56
Thermal Conductivity	18.0067 Wm / °K-1 [10.40 Btu/hr-ft °F (68°F)]	ASTM C408-58
	14.2379 Wm / °K-1 [8.22 Btu/hr-ft °F (212°F)]	
	79.564 Wm / °K-1 400°C [4.60 Btu/hr-ft °F (752°F)]	
Specific Heat (100°C)	8.79 x 10 <sup>3</sup> KJ/kg°C [2.1 x 10 <sup>4</sup> Btu/lb °F]	ASTM C351-61
Melting Point	>3600°C (6512°F)	
Maximum Temperature for Continuous Use	1700°C (3100°F)	

## Aluminum Oxide for TO-3

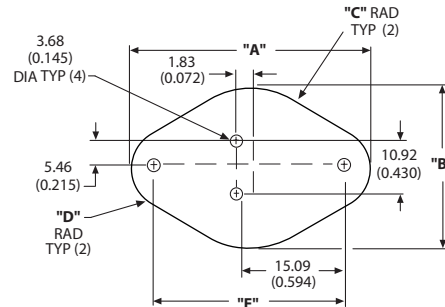
### ORDERING INFORMATION

Part Number	"A" DIM	"B" DIM	"C" DIM	"D" DIM	"E" DIM
4103*	39.70 (1.563)	26.67 (1.050)	13.34 (0.525)	4.75 (0.187)	30.40 (1.197)
4104*	44.45 (1.750)	31.75 (1.250)	15.88 (0.625)	7.16 (0.282)	30.15 (1.187)

\* Thickness:

4103: 1.78 (0.070) to 2.03 (0.080)

4104: 1.52 (0.060) to 2.03 (0.080)



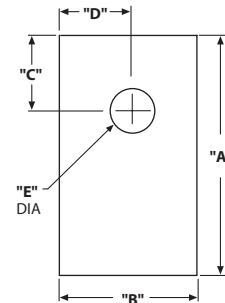
## Aluminum Oxide ceramic for TO-220

### ORDERING INFORMATION

Part Number	"A" DIM	"B" DIM	"C" DIM	"D" DIM	"E" DIM
4169*	19.30 (0.760)	13.97 (0.550)	4.78 (0.188)	6.98 (0.275)	3.68 (0.145)
4170**	19.30 (0.760)	13.97 (0.550)	4.78 (0.188)	6.98 (0.275)	3.68 (0.145)
4171**	16.51 (0.650)	12.70 (0.500)	4.32 (0.170)	6.35 (0.250)	3.81 (0.150)
4177**	17.45 (0.687)	14.27 (0.562)	5.54 (0.218)	7.14 (0.281)	3.18 (0.125)

\* Thickness 1.57mm  $\pm$  0.08 (0.062"  $\pm$  0.003"); surface flatness is .10mm (0.004") TIR

\*\* Thickness 1.52 (0.060) to 2.03 (0.080)

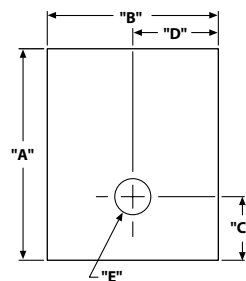


## Aluminum Oxide Ceramic for TO-218, TO-247, and TO-3P

### ORDERING INFORMATION

Part Number	"A" DIM	"B" DIM	"C" DIM	"D" DIM	"E" DIM
4180*	23.24 (0.915)	18.80 (0.740)	6.98 (0.275)	9.40 (0.370)	3.96 (0.156)

\* Thickness 1.52 (0.060) to 2.03 (0.080)



## 8923-1, 8923-2, 8924 Stanchion Pads

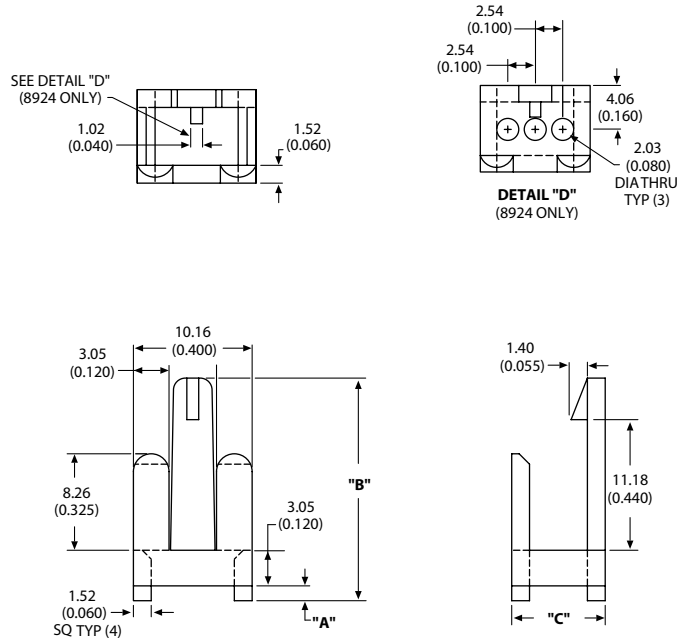
### FEATURES

- Reduces stress on leads during wave solder and post-soldering operations
- Provides stable mount to resist shock and vibration damage to leads
- 8923-1, 8923-2, and 8924 fit the TO-220

### ORDERING INFORMATION

Part Number	"A" DIM	"B" DIM	"C" DIM
8923-1	2.54 (0.100)	20.32 + .00/-0.25 (0.800 + .00/-0.010)	8.00 (0.315)
8923-2	1.27 (0.050)	19.05 + .00/-0.25 (0.750 + .00/-0.010)	8.00 (0.315)
8924	1.27 (0.050)	19.05 (0.750)	7.87 (0.310)

Note: Tolerances  $\pm 0.25$  (0.010") unless otherwise specified.  
Material is nylon 6/6 rated 94 V-0



## TO-3 Insulating Covers

Insulating covers are designed to provide protection from accidental shock during field service or repair. Included are No. 6 split washers as inserts to provide electrical connection of mounting screws to the TO-3 collector and an insulating snap-in cover for the screw heads.

Pan head screws not provided – MS 51957-30 or equivalent recommended-secure the cover to the TO-3. At the typical mounting screw torque of .68-.90 Nm (6-8 inch pounds), the TO-3 cover material cold-flows around the screw head to securely fasten the cover.

The 8903VB is made from thermoplastic polyester that meets the requirements of UL Bulletin 94 V-O. In addition to its excellent flammability rating, thermoplastic polyester offers resistance to most chemical environments, heat deflection temperature to 215.6 °C (420 °F) and UL continuous use temperature of 130 °C (266 °F).

Designed to prevent accidental electrical shock, the 8909 fits TO-3 case styles. A test probe hole in top eliminates the need to remove cover for testing. Friction fit for easy snap on assembly. Recommended for low vibration applications.

### ORDERING INFORMATION

Part Number	Figure	Material	Color	Flammability standards
8903NW	A	Nylon	White	Self-extinguishing UL 94 V-2
8903VB	A	Thermoplastic polyester	Black	Self-extinguishing UL 94 V-0 UL 492 Type 1
8909NB	B	Nylon	Black	U.L. 94V-2

FIGURE A

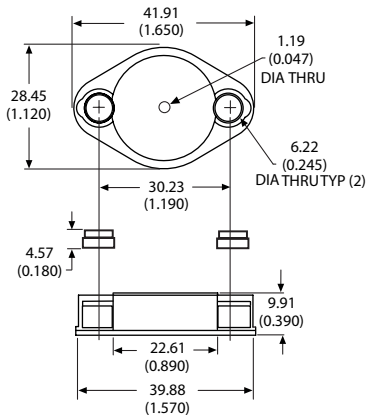
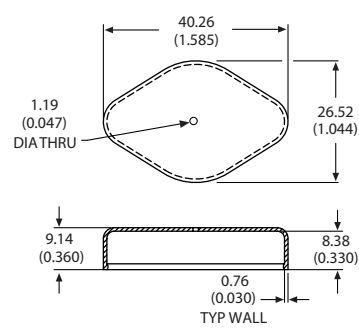
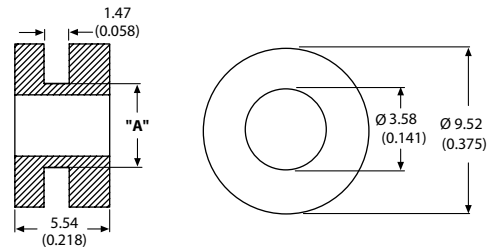


FIGURE B



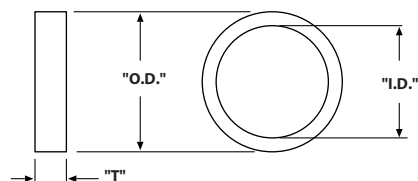
## Teflon-filled Acetal Insulators for To-3

Part Number	Fits notch	"A" Dim
103	4.83 (0.190)	4.90 (0.193)
109	6.35 (0.250)	6.35 (0.250)



## Teflon-filled Acetal Bushings for To-3

Part Number	"I.D."	"O.D."	"T"
110	5.03 / 5.21(.198 / .205)	6.81 / 6.98(.268 / .275)	1.57 / 1.40(.062 / .055)
113	6.43 / 6.60(.253 / .260)	7.82 / 8.00(.308 / .315)	1.57 / 1.40(.062 / .055)



## FEATURES

- Prevent heat damage during soldering
- Facilitate board clean-up
- Prevent solder bridges
- Assure uniform device height

## PRODUCT INFORMATION

Suffix	Base material	MAXIMUM OPERATING TEMPERATURE		Color
		Continuous	Deflection	
N	Nylon base resin per ASTM STD D4066-82-PA111	121.0°C 250°F	243.3°C 470°F	Natural
DAP*	Diallyl phthalate per MIL-M-14G type SDG	204.4°C 400°F	282.2°C 540°F	Black only

\* All "DAP" mounting pads meet UL 94 V-0

Note: Please specify material for each mounting pad: "N" = nylon; "DAP" = Diallyl Phthalate.  
Example: 7717-3N, 7717-86DAP

## Index of Semiconductor Lead Conversion Pads

### ORDERING INFORMATION

Part Number	Converts lead spacing from	To	# of Leads	Outside dia	Thickness
<b>For epoxy transistors</b>					
7717-130	0.05 In-Line	TO-92 & TO-15	3	5.84 (0.230)	1.02 (0.040)
<b>For TO-18</b>					
7717-247	TO-18	TO-5	3	7.11 (0.280)	3.81 (0.170)
7717-26	TO-18	TO-5	3	8.71 (0.343)	3.05 (0.120)
7717-44	TO-18	TO-5	4	7.75 (0.305)	3.18 (0.125)

See pages 108 and 109 for mechanical drawings

## Index of Semiconductor Mounting Pads

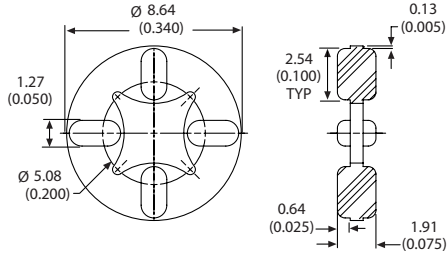
### ORDERING INFORMATION

Part Number	Leads	Outside dia	Thickness
<b>For TO-5</b>			
7717-86	3	8.71 (0.343)	1.91 (0.075)
7717-178	3	8.89 (0.350)	0.53 (0.021)
7717-79	3	9.02 (0.355)	0.97 (0.038)
7717-3	3-4	8.64 (0.340)	1.91 (0.075)
7717-15	4	8.89 (0.350)	0.51 (0.020)
7717-5	4	8.89 (0.350)	3.18 (0.125)
7717-4	4	9.53 (0.375)	1.91 (0.075)
<b>For TO-18</b>			
7717-16	4	5.08 (0.200)	0.51 (0.020)
7717-18	4	5.08 (0.200)	2.54 (0.100)
7717-108	4	5.16 (0.203)	1.78 (0.070)
7717-89	4	6.35 (0.250)	2.03 (0.080)
7717-7	4	6.35 (0.250)	3.18 (0.125)
<b>For integrated circuits</b>			
7717-122	8	9.27 (.365)	1.78 (0.070)
7717-8	8	9.53 (0.375)	1.91 (0.075)
7717-156	14	19.05 x 11.43 (0.750 x 0.450)	1.27 (0.050)
<b>Misc. mounting pads</b>			
7717-175	Crystal Can Relay	10.16/20.32 (0.400 x 0.800)	1.27 (0.050)

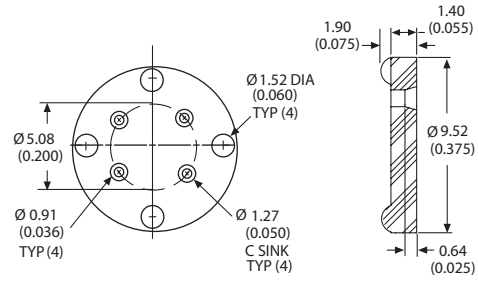
See pages 108 and 109 for mechanical drawings



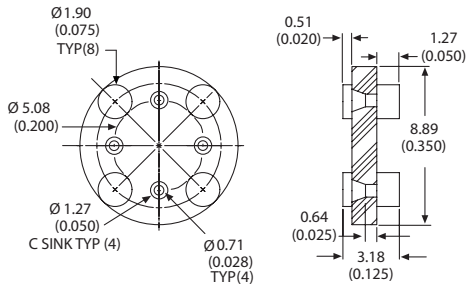
**7717-3**



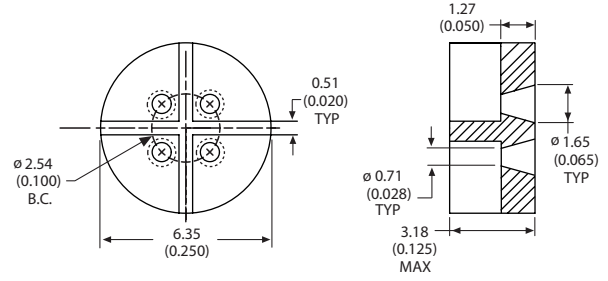
**7717-4**



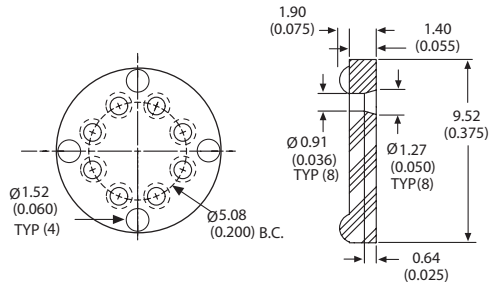
**7717-5**



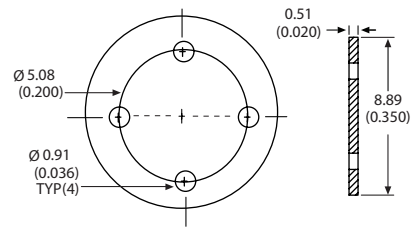
**7717-7**



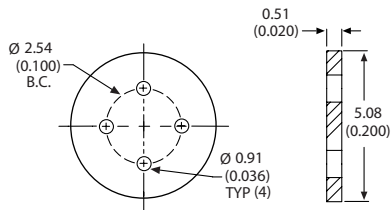
**7717-8**



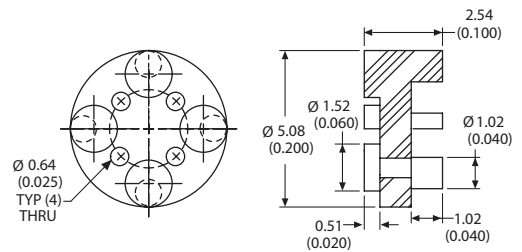
**7717-15**



**7717-16**

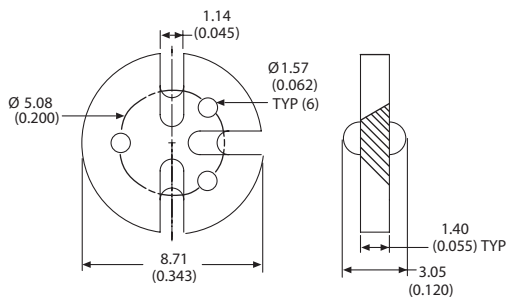


**7717-18**



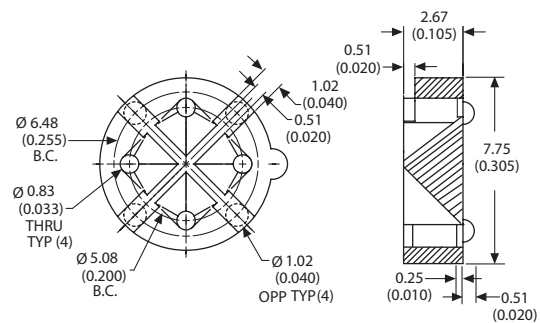
**7717-26**

**Lead Conversion**

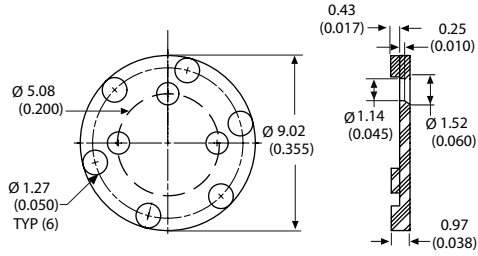


**7717-44**

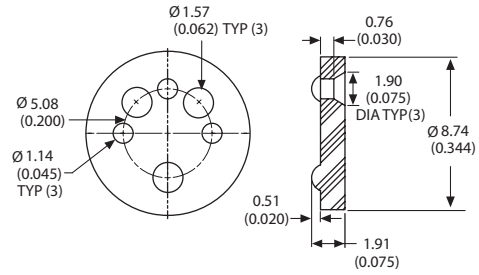
**Lead Conversion**



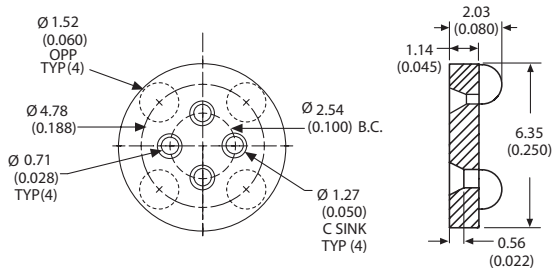
**7717-79**



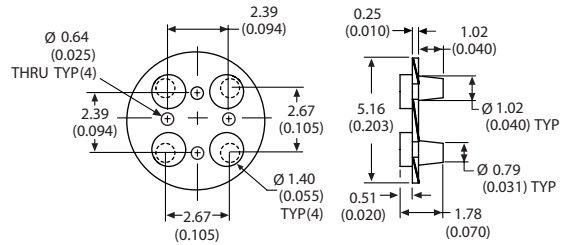
**7717-86**



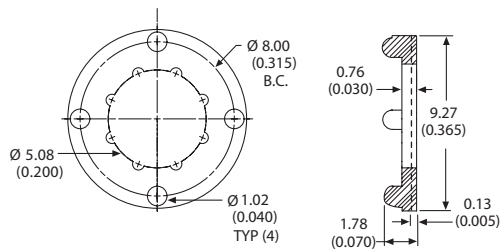
**7717-89**



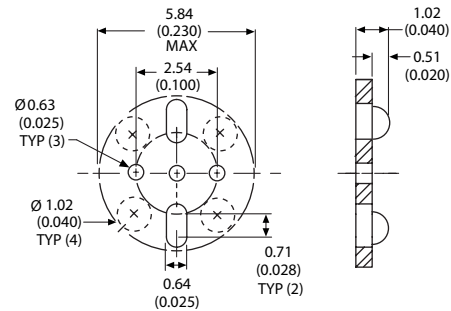
**7717-108**



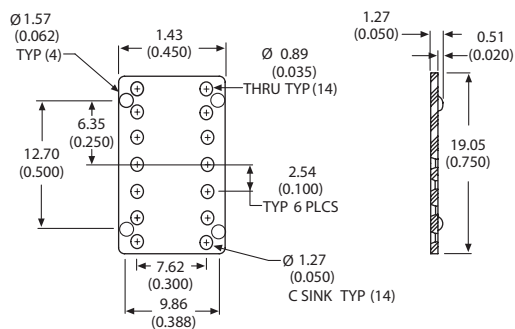
**7717-122**



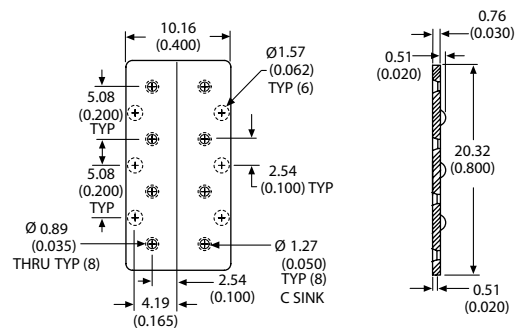
**7717-130 Lead Conversion**



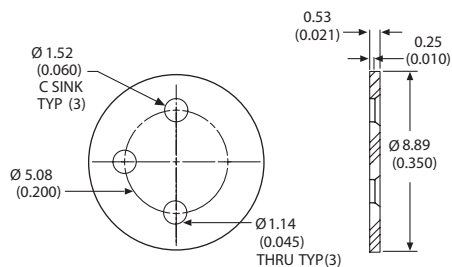
**7717-156**



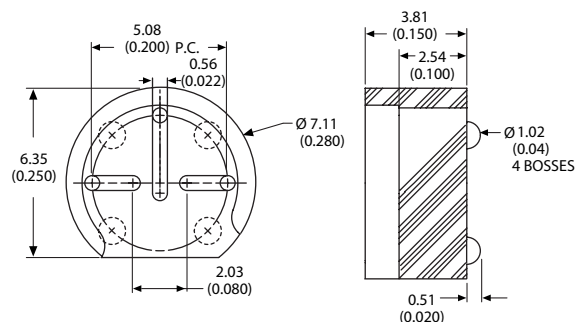
**7717-175**



**7717-178**



**7717-247 Lead Conversion**



Finish	Aavid Code	Thermalloy Suffix	Description
Black Anodize	B	B	Recommended for increased thermal performance. Anodize is electrically isolating and does not provide electrical insulation.
Gold Chromate	C	C	For corrosion protection or painting only. Color variation may be expected with this finish. Chromate is electrically conductive. Does not provide electrical insulation.
Tin Plating	D	D	Allows heat sink to be soldered to the PC Board. Raw material is tin plated prior to processing.
Pre-Black Anodized	J	PB	Edges cut during the manufacturing process will be unfinished.
Pre-Tin Plated		PD	Raw material is tin coated prior to processing. Edges cut during the manufacturing process will be unfinished.
Green Anodize	M		Alternative finish to Black anodize. Recommended for increased thermal performance. Electrically isolating but does not provide electrical insulation.
Black Paint with Solderable Tabs	T	B-TT	Black paint finish with tin plated tabs for soldering heat sink to PC board.
Unfinished	U	U	Clean, no finish.

### ORDERING INFORMATION

**Aavid Thermalloy code** – Finish option must be noted by one of the above letters in the 7th position. Aavid's standard finish is black anodize (B) unless otherwise noted.

example 12 digit part **530122B00000**

A	B	

A = Base part  
B = Finish code

**Thermalloy origin suffix** – The suffixes should be added after the model number to indicate the desired finish

example  
Thermalloy origin part **6396B**

A	B	

A = Model number  
B = Finish suffix

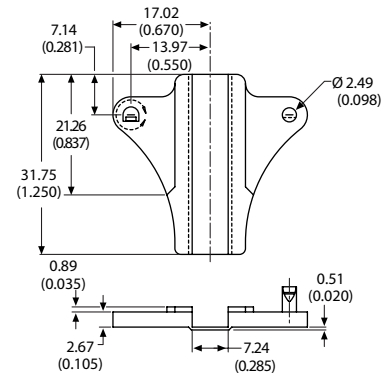
Note : All thermal graphs reflect black anodize finish.

## Snap-On Ejectors / Pullers

### FEATURES

- Saves time – no roll pin required
- Excellent for retrofit applications
- Material is nylon per ASTM D4066-82PA162F11
- Cost no more than conventional ejector/puller
- Rated at 222.5N (50 lbs.) / ejector force per pair
- One piece – no assembly required
- May be heat stamped

5021N Ejector



## Standard Ejectors / Pullers

### FEATURES

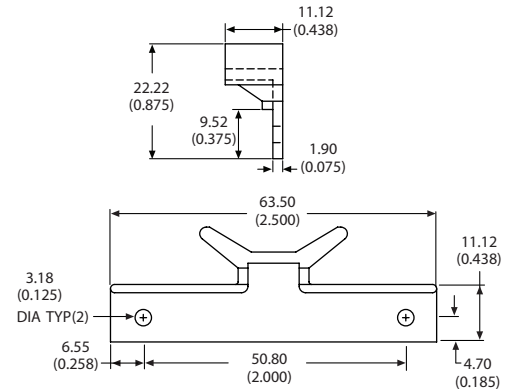
- Lever action releases card from its connector safely and quickly
- Cards, their components and connectors are less frequently damaged when extracting PC boards
- No special extraction tools are needed for board removal
- Material is nylon per ASTM D4066-82 PA120B4413F24, UL 94 V-O rated (natural color)
- Roll pins are provided (NAS 561-P3-4)

### ORDERING INFORMATION

Part Number	Figure
5005-09 N	A
5005-08 N	B
5005-25 N	C

FIGURE A

5005-09N PULLER \*



\*No roll pins provided

FIGURE B

5005-08N SLIM FACE/ FLAT

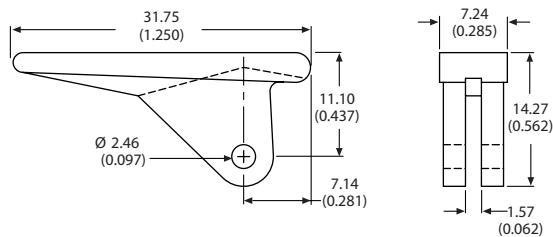
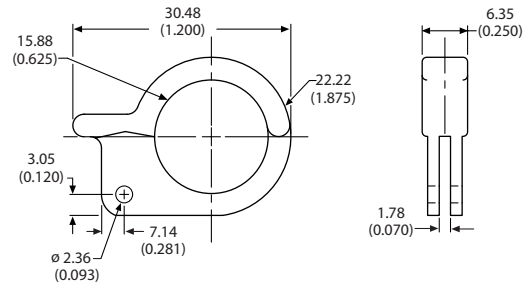


FIGURE C

5005-25N COMBINATION EJECTOR/PULLER



## Sil-Free™

Sil-Free™ 1020 is a metal-oxide-filled, silicone-free synthetic grease specially formulated to enhance heat transfer across the interface between the semiconductor case and the heat sink without the migration or contamination associated with silicone-based products.

Dry interface case-to-sink thermal resistance is typically reduced 50% to 75% with proper application of Sil-Free™ 1020.

This virtually "no-bleed", high-performance compound 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 (10-5 Torr, 24 hours@100°C), Sil-Free™ 1020 exhibits virtually "no bleed" or evaporation.

### ORDERING INFORMATION

Part Number	Package	Size
101700F00000	Syringe	43 grams (1.5 Oz.)
101800F00000	Tube	57 grams (2.0 Oz.)
101900F00000	Jar	57 grams (2.0 Oz.)
102000F00000	Tube	143 grams (5.0 Oz.)
102100F00000	Jar	457 grams (16.0 Oz.)

### PRODUCT INFORMATION

Color	White
Thermal conductivity	0.79 W/(m·°C)
Operating Temperature range	-40°C to +200°C
Volume	10 <sup>12</sup> Ohm-cm 2.3 ± 0.5
Weight	47.5 grams
Dielectric strength	225 Volts/mil
Consistency	Paste
Bleed	0.09 max % after 24hr @ 200°C
Specific gravity	2.8 ± 0.2
Shelf Life	Indefinite (unopened)

## Ther-O-Link™

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.

### ORDERING INFORMATION

Part Number	Package	Size
100000F00000	Ampule	1g. (0.03 oz.)
100100F00000	Syringe	35.7 grams (1.25 oz.)
100200F00000	Tube	57 grams (2.0 oz.)
100500F00000	Tube	143 grams (5.0 oz.)
100800F00000	Can	228.6 grams (8.0 oz.)
101600F00000	Can	.45 kg (1 lb)
108000F00000	Can	2.27 kg (5 lb)
132000F00000	Can	9.07 kg (20 lb)

### PRODUCT INFORMATION

Color	White
Thermal conductivity	0.73 W/(m·K)
Operating Temperature range	-40°C to +200°C
Volume resistivity	1.0 x 10 <sup>15</sup> Ohm-cm
Dielectric strength	250 Volts/mil
Consistency	Paste
Bleed	0.6 max
Specific gravity	2.8
Shelf life	Indefinite (unopened)

## Ultrastick™

Aavid's Ultrastick™ is a unique phase-change thermal interface material that surpasses grease in thermal performance and long-term stability. This solid, silicone-free, paraffin-based thermal compound changes phase at 60°C, with a concurrent volumetric expansion that fills gaps between the mating surfaces. Ultrastick™ comes in a convenient applicator bar, allowing for neat, fast application to both heat sink and component surfaces. One cost-effective application leaves a thin, film-like deposit, providing excellent heat transfer and low interface thermal resistance.

### ORDERING INFORMATION

Part Number	Package	Size
100300F00000	Bar	47.5 grams (0.16 oz.)

### PRODUCT INFORMATION

Temperature range	-40°C to +200°
Volume resistivity	1.0 X 1.0 <sup>15</sup> Ohm-cm
Dielectric strength	250 volts/mil
Consistency	Paste
Bleed	0.6 max
Specific gravity	0.28
Color	Opaque White
Thermal resistance	0.03°C/W per square inch @ 20 psi 0.02°C/W per square inch @ 100 psi
Shelf Life	Indefinite*

\* Recommended max. storage temperature: 40°C (105°F)

**Thermalcote™**

Thermalcote™ is a superior thermal joint compound of thermally loaded silicone based grease for use with all heat sinks. It improves the transfer of thermal energy across the metal to metal interfaces between the transistor or rectifier case and the heat sink. Thermalcote™ conducts heat approximately 15 times better than air and more than 4 times better than unloaded silicone grease. It is non-toxic, extremely stable, and neither cakes or runs from -40° to 204°C (-40°F to 399°F).

**ORDERING INFORMATION**

Part Number	Net weight
249	28 grams (1 oz) tube
250	57 grams (2 oz) tube
251	0.45Kg. (1 lb) can
252	2.27Kg. (5 lb) can
253	4.54Kg. (10 lb) can

**PRODUCT INFORMATION**

<b>Color</b>	Opaque white
<b>Operating Temperature range</b>	-40°C to 204°C (-40°F to 399°F)
<b>Thermal conductivity</b>	0.765Wm-1°C-1 (.226 Btu/hr ft °F)
<b>Dielectric strength</b>	11.8 x 10 <sup>3</sup> volts/mm (300volts/mil) 1.27 mm gap(.050" gap)
<b>Cleaning solvent</b>	Mineral spirits or turpentine
<b>Specific gravity</b>	1.6
<b>Evaporation, 24 hours@200°C (392°F), wt%</b>	1
<b>Shelf life</b>	Indefinite (unopened)

**Thermalcote™ II**

Thermalcote™ II was developed as the sensible alternative to silicone-based thermal greases. Thermalcote™ II employs a highly conductive synthetic base fluid that enables the finished product to exhibit the same thermal characteristics as the silicone-based products. Thermalcote™ II contains no silicone. The high lubricity of the base oil permits efficient application to both semiconductor case or heat sink, and it will effectively fill the microscopic air gaps on the metal-to-metal mating surfaces. It is non-toxic, extremely stable, and neither cakes or runs from -40° to 200°C (-40°F to 392°F).

**ORDERING INFORMATION**

Part Number	Net weight
349	28 grams (1 oz) tube
350	57 grams (2 oz) jar
351	.45Kg. (1 lb) can

**PRODUCT INFORMATION**

<b>Color</b>	Blue
<b>Operating Temperature range</b>	-40°C to 200°C (-40°F to 392°F)
<b>Thermal conductivity</b>	0.699Wm-1°C-1 (.204 Btu/hr ft °F)
<b>Dielectric strength</b>	7.9 x 10 <sup>3</sup> volts/mm (200volts/mil) 1.27 mm gap (.050" gap)
<b>Cleaning solvent</b>	Mineral spirits or turpentine
<b>Specific gravity</b>	2.93@60°F(15.6°C)
<b>Evaporation, 24 hours@200°C (392°F), wt%</b>	0.6 max
<b>Shelf life</b>	Indefinite (unopened)

## Ther-O-Bond™ Adhesive

### ORDERING INFORMATION

Part Number	Description	Package/Kit	Size
159900F00000	Ther-O-Bond™ 1500	Resin and hardener	0.946 liter (1 Qt.)
161000F00000	Ther-O-Bond™ 1600	2-Part plastic kit	10gm (0.35 oz.)
164000F00000	Ther-O-Bond™ 1600	2-Part plastic kit	40gm (1.40 oz.)
200000F00000	Ther-O-Bond™ 2000	Adhesive syringe Activator bottle	25ml 13ml

### Ther-O-Bond™ 1500

Ther-O-Bond™ 1500 is a versatile epoxy casting system developed for high performance, production potting and encapsulating applications where low shrinkage and rapid air evacuation are required. This formulation has a very low surface tension and a flowable viscosity, which affords excellent air release. Ther-O-Bond™ 1500 adheres to rigid plastics and laminates, metals and ceramics, has a low coefficient of thermal expansion and is readily machined and shaped with ordinary shop tools. The fully cured epoxy system is an excellent electrical insulator which provides good resistance to electrolysis, leakage and corrosion from water, weather, gases and chemical compounds.

### HANDLING CHARACTERISTICS

Mix Ratio by Weight, Resin to Hardener:	100 to 15
Mixed Viscosity @ 25°C, cps:	1000 - 1500
Work-Life @ 25°C	45 Minutes
Gel Time @ 25°C	3-6 Hours
Cure Schedule @ 25°C	8 Hours
Cure Schedule @ 65°C	1 Hour
Cure Schedule @ 100°C	0.5 Hour

### PHYSICAL PROPERTIES

Color	Black
Specific Gravity	1.5
Operating Temp, °C	-60 to 155
Heat Distortion Temp, °C	100
Hardness, Shore D:	88
Thermal Conductivity W/(m°C)	1.26
Compressive Strength, psi	14,000
Dissipation Factor,	0.01
Self Extinguishing?:	yes
C.T.E. (ppm/°C)	25
Tensile Strength (@25°C)	9200 psi
Dielectric	800
Shelf Life	12 months From D.O.M.

### Ther-O-Bond™ 1600

For smaller applications, Ther-O-Bond™ 1600 produces a stable, durable, high-impact bond, with good heat transfer characteristics. It is a thixotropic (smooth paste) thermally conductive epoxy system used for staking thermistors, diodes, resistors, integrated circuits and other heat sensitive components to printed circuit boards. This two-part adhesive develops strong, durable, high impact bonds at room temperature, which improve heat transfer while maintaining electrical insulation. Ther-O-Bond™ 1600 bonds readily to itself, to metals, silica, steatite, alumina, sapphire and other ceramics, glass, plastics and many other materials because its coefficient of thermal expansion provides a good match for those materials over a fairly wide temperature range.

### HANDLING CHARACTERISTICS

Mix Ratio by Weight, Resin to Hardener:	100 to 5
Mixed Viscosity @ 25°C, cps:	33,000
Work-Life @ 25°C	45 Minutes
Gel Time @ 25°C	3-6 Hours
Cure Schedule @ 25°C	8 Hours
Cure Schedule @ 65°C	1 Hour
Cure Schedule @ 100°C	0.5 Hour

### PHYSICAL PROPERTIES

Color	Blue
Specific Gravity:	2.30
Operating Temp, °C	-70 to 115
Hardness, Shore D:	90
Izod impact, F1 Lbs/Inch of Notch	0.49
Thermal Conductivity W/(m-°C)	0.85
C.T.E. (ppm/°C)	25
Tensile Strength (@25°C)	9200 psi
Tensile Lap Shear, psi	2900
Dielectric Strength (volts/mil)	410
Dielectric Constant (1 KHz @ 25°C)	5.9
Dissipation Factor, KH @ 25°C	5.9
Shelf Life	12 months From D.O.M.

### Ther-O-Bond™ 2000

Ther-O-Bond™ 2000 acrylic adhesive cures rapidly at room temperature, while providing a repairable, thermally conductive bond.

### PRODUCT INFORMATION

Color	White
Thermal Conductivity W/(m-°C)	0.48
C.T.E. (ppm/°C)	25
Tensile Strength (@25°C)	2360 psi
Dielectric Strength (volts/mil)	220
Shelf Life	12 months From D.O.M.



**Thermalbond™**

Thermalbond™ is a thermally conductive, high strength epoxy adhesive. It provides exceptional adhesion to copper, aluminum, steel, glass, ceramics, and most plastics. Thermalbond™ also has a coefficient of thermal expansion compatible with aluminum, copper, and brass, making it particularly well suited for thermally bonding semiconductors and other components to chassis or heat sinks.

**ORDERING INFORMATION**

Part Number	Net weight
4949	0.8 oz. (25 gram kit)
4950	1.7 oz (50 gram kit)
4951	3.5 oz. (100 gram kit)
4952	7.0 oz (200 gram kit)
4953	4 lbs (1814 grams)
4954	15 lbs (6804 grams)

**MIXING INSTRUCTIONS**

Mix resin thoroughly before removing material. Add 7.1 parts of RT-7 hardener to 100 parts of resin by weight, or 17 parts of RT-7 hardener to 100 parts of resin by volume. Adhesive will set up in:

24 hrs at 25°C (77°F)	1 hr. at 100°C (212°F)
2 hrs. at 65°C (149°F)	30min. at 130°C (266°F)

Note: For maximum electrical and physical properties, a post cure is necessary. Post cure at room temperature for 4 days or for 4 hours at 93°C (200°F).

**HANDLING CHARACTERISTICS**

Typical electrical and physical properties at room temperature with RT-7 hardener

Characteristics	Typical Values
Color	Green
Specific gravity	2.35
Working viscosity	25,000 cps
Thermal conductivity	1.34Wm <sup>-1</sup> °C <sup>-1</sup> (.77 Btu/hr ·ft· °F)
Thermal resistivity	29.4°C in/watt
Tensile strength	6.34 x 10 <sup>7</sup> Pa(9,2000 psi)
Compressive strength	1.44 x 10 <sup>8</sup> Pa(20,9000 psi)
Bond shear strength aluminum to aluminum, 25.4mm (1") overlap @ 25°C, (77°F)	3.17 x 10 <sup>7</sup> Pa(4,6000 psi)
Thermal coefficient of expansion	24 x 10 <sup>-6</sup> /°C (1.32 x 10 <sup>-6</sup> /°F)
Water absorption, % after 10 days@ 25°C (77°F)	0.20
Hardness, Shore D	86
Volume resistivity	1.0 x 10 <sup>16</sup>
Dielectric strength	59.1 x 10 <sup>3</sup> volts/mm (1500 volts/mil)
Dielectric constant@25°C (77°F) 100KHz	6.1
Dielectric factor@25°C (77°F) 100KHz	0.020
Operating temperatures	-65°C to 155°C (-85°F to 311°F)
Linear shrinkage	0.002 in/in
Shelf life	12 months* from D.O.M.
Pot life@25°C (77°F)	2-3 hours
Suggested stripping agent	Miller-Stephenson MS 111
Cleaning solvent	Acetone

\*It is recommended that the containers be turned over every six months to minimize settling for ease of mixing.

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