

THERMAL MANAGEMENT SOLUTIONS & THERMAL INTERFACE

Thermal Management Solutions for BGAs 7
Thermal Interface 8

BGA THERMAL SOLUTIONS MATRIX

The following table represents Wakefield-Vette's recommendations for a variety of standard BGA sizes. However, this is by no means a complete list of components that can be used with these heat sinks. To determine suitability for your particular component, request a BGA heat sink evaluation kit.

| BGA Sizes (mm) | Heat Sink Footprint (mm) | Heat Sink Height (inches) | Recommended Series # | Attachment Method |
|----------------|--------------------------|---------------------------|----------------------|-------------------|
| 17 | 17 x 17 | .40 | D10650 | Adhesive |
| 19 | 19 x 19 | 1.00 | 602 | Adhesive |
| 21 | 21 x 21 | .40 | D10850 | Adhesive |
| 21 | 21 x 21 | .25 .35 .45 .60 | 624 | Adhesive |
| 23 | 22 x 22 | .40 .60 | 604 | Adhesive |
| 23 | 22 x 22 | .75 | 605 | Adhesive |
| 25 | 25 x 25 | .25 .35 .45 .60 | 625 | Adhesive |
| 27 | 28 x 28 | .25 .35 .45 .60 | 658 | Adhesive |
| 29 | 30 x 30 | .77 | 606 | Adhesive |
| 31 | 31 x 28 | .65 | 607 | Adhesive |
| 31 | 31 x 31 | .80 | 611 | Adhesive |
| 33 | 32 x 32 | .35 .40 | 610 | Adhesive |
| 35 | 35 x 35 | .65 | 612 | Adhesive |
| 35 | 35 x 35 | .25 .35 .45 .60 | 642 | Adhesive |
| 35 | 35 x 35 | .25 .35 .45 .60 | 630 | Adhesive |
| 37.5 | 37 x 37 | .50 | 613 | Adhesive |
| 37.5 | 37 x 37 | .65 | 659 | Adhesive |
| 45.7 x 35.5 | 37 x 47 | .80 | 617 | Adhesive |
| 40 | 38 x 38 | .30 .50 1.00 | 614 | Adhesive |
| 37.5 | 38 x 38 | .29 | 660 | Adhesive |
| 40 | 40 x 28 | .35 | 643 | Clip |
| 40 | 40 x 40 | .26 .53 | 655 | Adhesive |
| 42.5 | 41 x 41 | .41 | 615 | Adhesive |
| 45 | 43 x 43 | .20 .25 .35 .45 .60 | 628 | Adhesive |
| 45 | 43 x 43 | .15 | 662 | Adhesive |
| 47.5 | 47 x 47 | .80 | 616 | Adhesive |
| 50 | 50 x 50 | .40 .65 .80 1.00 | 698 | Adhesive |
| 50 | 51 x 51 | .20 1.00 | 618 | Adhesive |
| 50 | 52 x 51 | .80 | 622 | Adhesive |
| 50 | 53 x 47 | .40 .65 .80 1.00 | 798 | Adhesive |
| 50 | 64 x 51 | .24 | 620 | Adhesive |
| up to 45 | 73 x 50 | .50 1.00 | 609 | Clip |
| up to 45 | 73 x 50 | .95 | 619 | Clip |

RoHS COMPLIANCE

Please note that Wakefield-Vette part numbers designated with an "E" in this catalog denote new parts in compliance with the RoHS initiative, with the exception of our Precision Clamps. Wakefield-Vette will still continue to offer non-RoHS compliant versions of these parts. Please be aware that many Wakefield-Vette Standard parts have always been compliant since their design inception and therefore will not carry the "E" designation.

Wakefield-Vette requests that you refer to the RoHS compliance tool on our website at www.wakefield-vette.com to verify RoHS compliance. If you require further clarification or information regarding RoHS, please contact the factory.

THERMAL INTERFACE MATERIAL PART NUMBER GUIDE

All of the heat sinks shown in this catalog are available with any of the following thermal tape and interface materials, pre-applied at the factory. Use the "T" series, thermally enhanced, pressure sensitive adhesives to attach the heat sink to the electronic package and provide a good thermal link to the heat sink. Specify these materials in applications where the heat sink will be fixed to the electronic package by some mechanical means other than a tape. Please note that none of these materials are for use in applications requiring electrical isolation from the electronic device. All options other than -T1 and -T4 are RoHS compliant.

Note: To obtain the estimated thermal resistance of the interface material in your application, divide the thermal impedance value by the area of the pad in square inches. For example, a 2" x 2" piece of T4 has a resistance of $1.10 \text{ C-in}^2/\text{W} \div 4 \text{ in}^2 = 0.275 \text{ C/W}$

"T" Series Thermally Enhanced Pressure Sensitive Adhesives

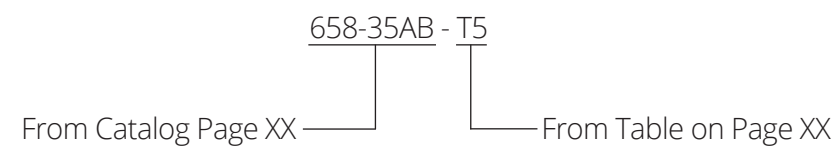
| Suffix | Manufacturer Product | Thermal Impedance C-in ² /W | Thickness, Inches | Package Surface, Comments |
|--------|----------------------|--|-------------------|---|
| -T1 | Chomerics, T405 | 0.47 | 0.006 | Metal/ceramic; aluminum carrier |
| -T1E | Chomerics, T405R | 0.47 | 0.006 | RoHS-compliant version of -T1 |
| -T3 | Chomerics, T412 | 0.25 | 0.009 | Metal/ceramic; very good performance and conformity |
| -T4 | Chomerics, T410 | 1.10 | 0.007 | Plastic |
| -T4E | Chomerics, T410R | 1.10 | 0.007 | RoHS-compliant version of -T4 |
| -T5 | Chomerics, T411 | 1.00 | 0.011 | Plastic; conforms to out-of-flat packages |
| -T6 | 3M, 8810 | 0.88 | 0.010 | Metal/ceramic; very good adhesion and conformity |
| -T7 | Bergquist, BP 108 | 1.28 | 0.008 | Metal/ceramic; electrically insulating |

ORDERING INFORMATION

Once you have chosen heat sink and thermal interface material that meets your thermal & mechanical requirements it is easy to designate the part number. Simply add the interface material suffix referenced on the chart above to the base part number for the heat sink. The base part number already includes information regarding its size and finish.

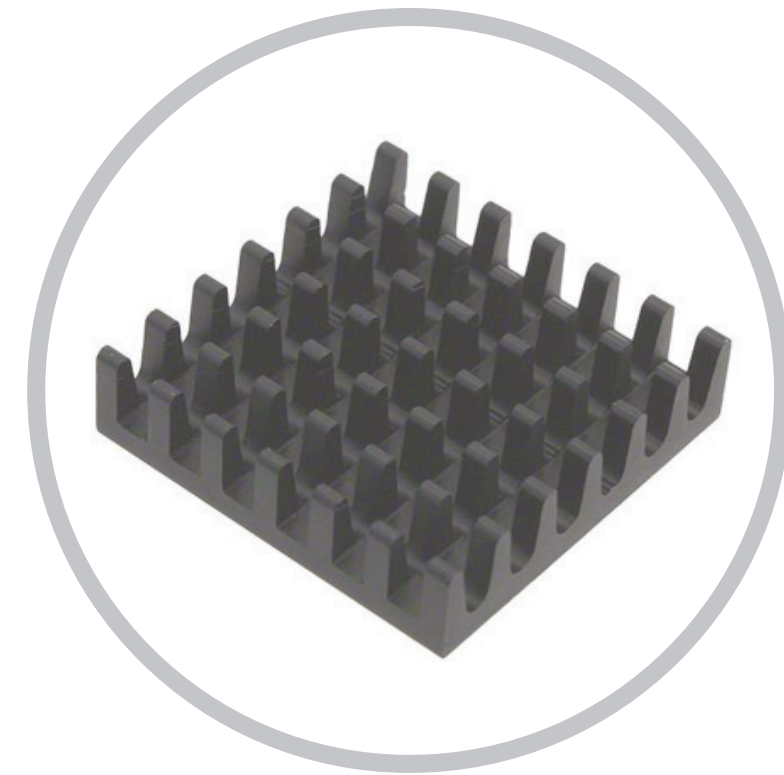
Example:

To order the 658 Series heat sink at .350" tall with the T5 thermal interface material, specify part number:



INTEGRATED CIRCUIT COOLING HEAT SINKS

| | |
|--|--------------|
| <i>Heat Sinks For BGAs, Super BGAs, & FPBGAs</i> | <i>12-27</i> |
| <i>Deltem™ Composite Heat Sinks For BGAs</i> | <i>18</i> |
| <i>Heat Sinks For Microprocessors & ASICs.....</i> | <i>28-30</i> |
| <i>Pin Fin Heat Sinks</i> | <i>31</i> |
| <i>Elliptical Fin Heat Sinks.....</i> | <i>32</i> |
| <i>Pin Fin & Elliptical Fin Heat Sinks</i> | <i>33</i> |
| <i>Ceramic Heat Sink For To Devices w/ OmniKlip</i> | <i>34-35</i> |
| <i>Wave Series Heat Sink With Integrated Clip Assembly</i> | <i>36-43</i> |

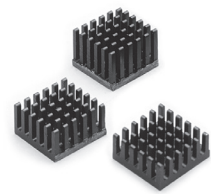


With the increase in heat dissipation from microelectronics devices and the reduction in overall form factors, thermal management becomes a more important element of electronic product design.

Both the performance reliability and life expectancy of electronic equipment are inversely related to the component temperature of the equipment. The relationship between the reliability and the operating temperature of a typical silicon semi-conductor device shows that a reduction in the temperature corresponds to an exponential increase in the reliability and life expectancy of the device. Therefore, long life and reliable performance of a component may be achieved by effectively controlling the device operating temperature within the limits set by the device design engineers.

Heat sinks are devices that enhance heat dissipation from a hot surface, usually the case of a heat generating component, to a cooler ambient, usually air. For the following discussions, air is assumed to be the cooling fluid. In most situations, heat transfer across the interface between the solid surface and the coolant air is the least efficient within the system, and the solid-air interface represents the greatest barrier for heat dissipation. A heat sink lowers this barrier mainly by increasing the surface area that is in direct contact with the coolant. This allows more heat to be dissipated and/or lowers the device operating temperature. The primary purpose of a heat sink is to maintain the device temperature below the maximum allowable temperature specified by the device manufacturers.

HEAT SINKS FOR BGAs, SUPER BGAs, PBGAs, & FPBGAs



624 SERIES OMNIDIRECTIONAL PIN FIN HEAT SINK FOR BGAs

The **624 Series** is an omnidirectional pin fin heat sink for both natural and forced-convection applications.

Applications include network routers and switches, high-resolution printers, digital cameras, consumer video games, digital video disks (DVD) and global positioning systems (GPS).

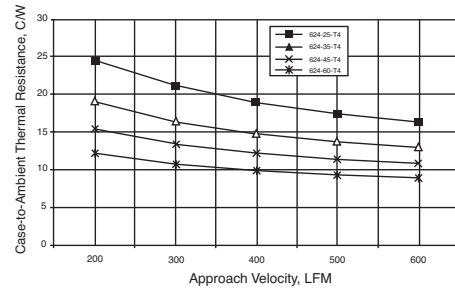
| Standard P/N | Base Dimensions in. Sq. | Fin Height "A" in. (mm) | Typical Applications | Weight lbs. (grams) |
|--------------|-------------------------|-------------------------|----------------------|---------------------|
| 624-25AB | .827 (21) | .250 (6.4) | 21mm BGA | .009 (4.09) |
| 624-35AB | .827 (21) | .350 (8.9) | 21mm BGA | .011 (4.99) |
| 624-45AB | .827 (21) | .450 (11.4) | 21mm BGA | .015 (6.81) |
| 624-60AB | .827 (21) | .600 (15.2) | 21mm BGA | .026 (11.80) |

Material: Aluminum, Black Anodized

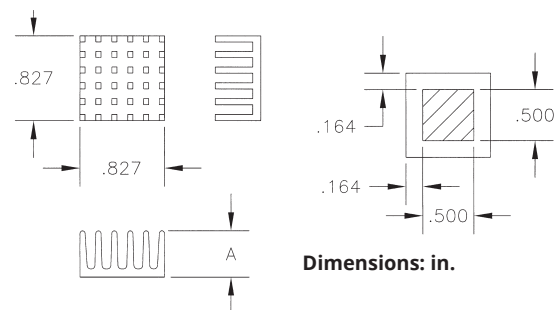
PRODUCT FEATURES

- Available in four standard heights, .25 inch, .35 inch, .45 inch, and .60 inch.
- Available with pressure sensitive adhesives for quick and easy mounting. See Page 8.

624 THERMAL PERFORMANCE



MECHANICAL DIMENSIONS



OMNIDIRECTIONAL PIN FIN HEAT SINK FOR BGAs **625 SERIES**

PRODUCT FEATURES

- Available in four standard heights, .25 inch, .35 inch, .45 inch, and .60 inch.
- Available with pressure sensitive adhesives for quick and easy mounting. See Page 8.

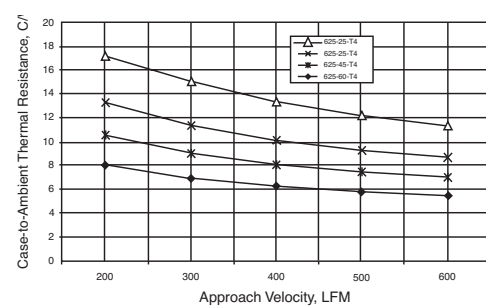
The **625 Series** is an omnidirectional pin fin heat sink for both natural and forced-convection applications.

Applications include network routers and switches, high-resolution printers, digital cameras, consumer video games, digital video disks (DVD) and global positioning systems (GPS).

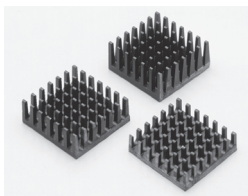
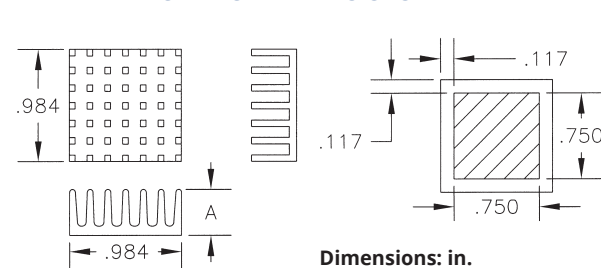
| Standard P/N | Base Dimensions in. Sq. | Fin Height "A" in. (mm) | Typical Applications | Weight lbs. (grams) |
|--------------|-------------------------|-------------------------|----------------------|---------------------|
| 625-25AB | .984 (25) | 0.250 (6.4) | 25 mm BGA | .012 (5.45) |
| 625-35AB | .984 (25) | 0.350 (8.9) | 25 mm BGA | .014 (6.36) |
| 625-45AB | .984 (25) | 0.450 (11.4) | 25 mm BGA | .018 (8.17) |
| 625-60AB | .984 (25) | 0.600 (15.2) | 25 mm BGA | .030 (13.62) |

Material: Aluminum, Black Anodized

625 THERMAL PERFORMANCE



MECHANICAL DIMENSIONS



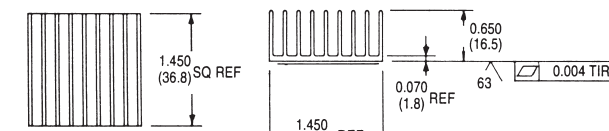
UNIDIRECTIONAL FIN HEAT SINK FOR BGAs **659 SERIES**



| Standard P/N | Base Dimensions in. (mm) | Height in. (mm) | Typical Application | Heat Sink Finish | Weight lbs. (grams) |
|--------------|--------------------------|-----------------|---------------------|------------------|---------------------|
| 659-65AB | 1.45 (36.8) sq0 | .650 (16.5) | 37mm BGA | Black Anodized | 0.050 (22.68) |

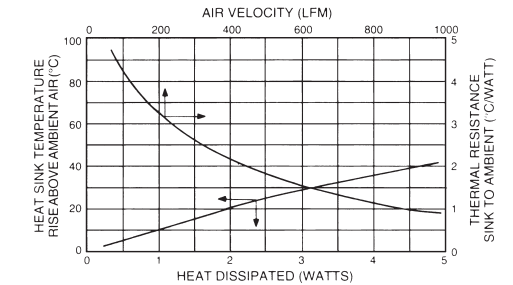
Notes: 1. Optional factory pre-applied pressure-sensitive adhesive. See Page 8.

MECHANICAL DIMENSIONS

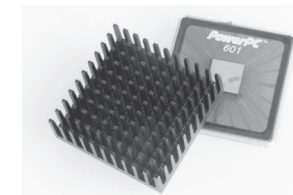


Dimensions: in. (mm)

NATURAL AND FORCED CONVECTION CHARACTERISTICS



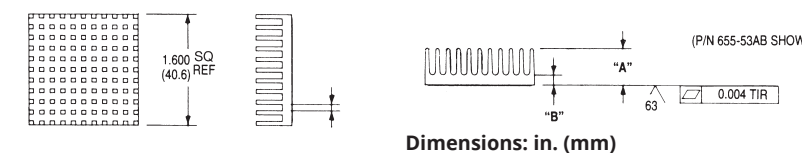
OMNIDIRECTIONAL PIN FIN HEAT SINK FOR BGAs AND POWERPC™ **655 SERIES**



| Standard P/N | Base Dimensions in. (mm) | Dimension "A" in. (mm) | Dimension "B" in. (mm) | Typical Applications | Heat Sink Finish | Weight lbs. (grams) |
|--------------|--------------------------|------------------------|------------------------|----------------------|------------------|---------------------|
| 655-26AB | 1.600 (40.6) sq | 0.260 (6.6) | 0.125 (3.2) | 40mm BGA | Black Anodized | 0.038 (17.01) |
| 655-53AB | 1.600 (40.6) sq | 0.525 (13.3) | 0.145 (3.7) | 40mm BGA | Black Anodized | 0.050 (22.68) |

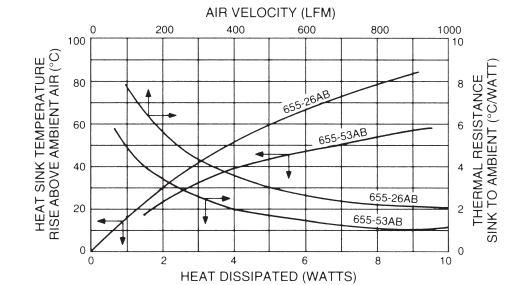
Notes: 1. Optional factory pre-applied pressure-sensitive adhesive. See Page 8.

MECHANICAL DIMENSIONS

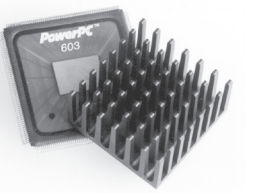


Dimensions: in. (mm)

NATURAL AND FORCED CONVECTION CHARACTERISTICS



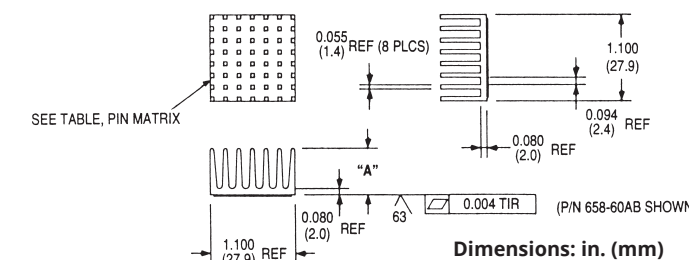
OMNIDIRECTIONAL PIN FIN HEAT SINK FOR BGAs AND POWERPC™ **658 SERIES**



| Standard P/N | Base Dimensions in. (mm) | Dimension "A" in. (mm) | Typical Applications | Heat Sink Finish | Weight lbs. (grams) |
|--------------|--------------------------|------------------------|----------------------|------------------|---------------------|
| 658-25AB | 1.100 (27.9) sq | 0.250 (6.4) | 27mm BGA | Black Anodized | 0.013 (5.67) |
| 658-35AB | 1.100 (27.9) sq | 0.350 (8.9) | 27mm BGA | Black Anodized | 0.015 (6.70) |
| 658-45AB | 1.100 (27.9) sq | 0.450 (11.4) | 27mm BGA | Black Anodized | 0.019 (8.50) |
| 658-60AB | 1.100 (27.9) sq | 0.600 (15.2) | 27mm BGA | Black Anodized | 0.031 (14.17) |

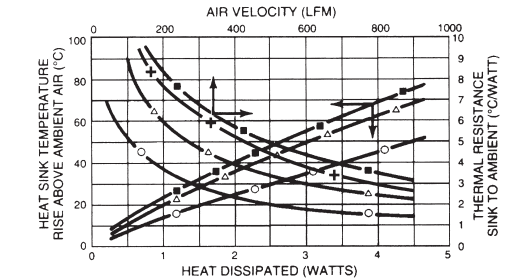
Notes: 1. Optional factory pre-applied pressure-sensitive adhesive. See Page 8.

MECHANICAL DIMENSIONS



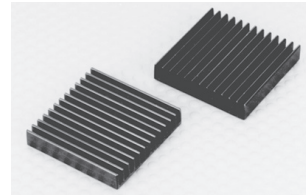
Dimensions: in. (mm)

NATURAL AND FORCED CONVECTION CHARACTERISTICS



KEY:
 ■ 658-25AB
 + 658-35AB
 △ 658-45AB
 ○ 658-60AB

HEAT SINKS FOR BGAs, SUPER BGAs, PBGAs, & FPBGAs

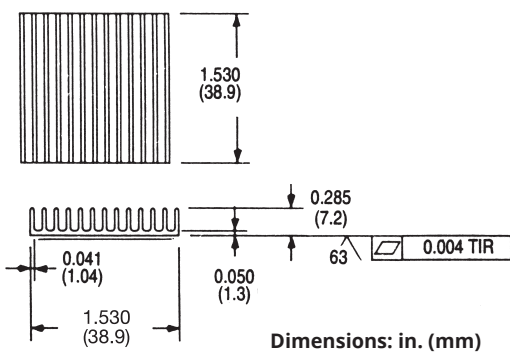


660 SERIES UNIDIRECTIONAL FIN HEAT SINK FOR BGAs

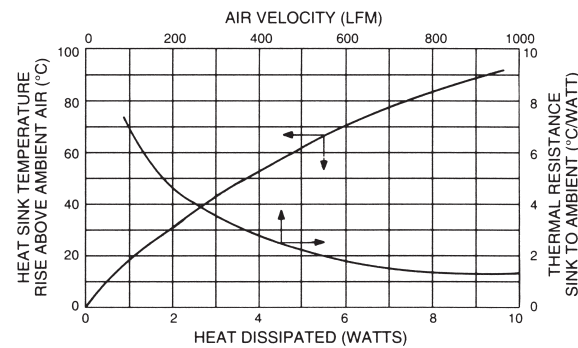
| Standard P/N | Base Dimensions in. (mm) | Height in. (mm) | Typical Application | Heat Sink Finish | Weight lbs. (grams) |
|--------------|--------------------------|-----------------|---------------------|------------------|---------------------|
| 660-29AB | 1.530SQ. (38.9)SQ. | 0.285 (7.2) | 37mm BGA | Black Anodized | 0.031 (14.17) |

Notes: 1. Optional factory pre-applied pressure-sensitive adhesive. See Page 8.

MECHANICAL DIMENSIONS



NATURAL AND FORCED CONVECTION CHARACTERISTICS



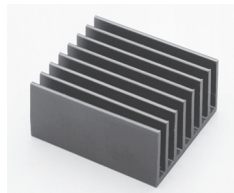
UNIDIRECTIONAL FIN HEAT SINK FOR BGAs 642 SERIES

PRODUCT FEATURES

- Available in four standard heights, .25 inch, .35 inch, .45 inch, and .60 inch.
- Available with pressure sensitive adhesives for quick and easy mounting. See Page 8.

The **642 Series** is an unidirectional pin fin heat sink for both natural and forced-convection applications.

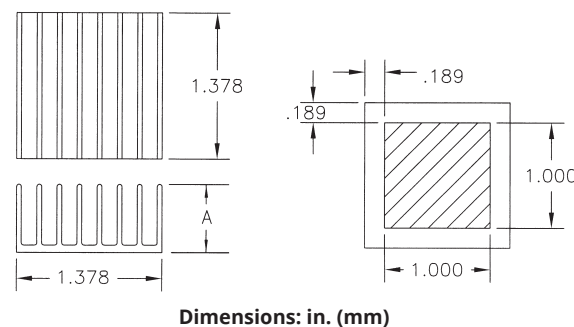
Applications include network routers and switches, high-resolution printers, digital cameras, consumer video games, digital video disks (DVD) and global positioning systems (GPS).



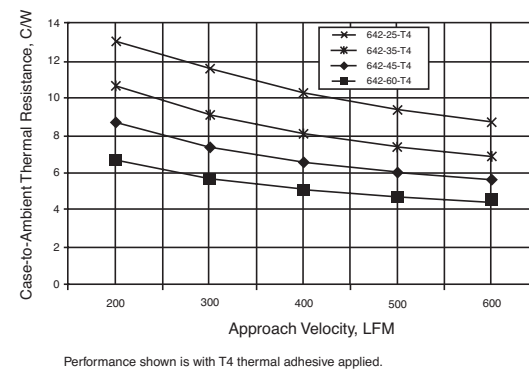
| Standard P/N | Base Dimensions in. Sq. | Fin Height "A" in. (mm) | Typical Applications | Weight lbs. (grams) |
|--------------|-------------------------|-------------------------|----------------------|---------------------|
| 642-25AB | 1.378 (35) | .250 (6.4) | 35 mm BGA | .022 (9.99) |
| 642-35AB | 1.378 (35) | .350 (8.9) | 35 mm BGA | .027 (12.26) |
| 642-45AB | 1.378 (35) | .450 (11.4) | 35 mm BGA | .031 (14.07) |
| 642-60AB | 1.378 (35) | .600 (15.2) | 35 mm BGA | .039 (17.71) |

Material: Aluminum, Black Anodized

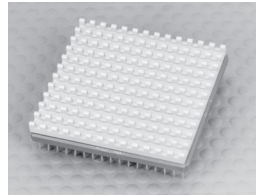
MECHANICAL DIMENSIONS



642 THERMAL PERFORMANCE



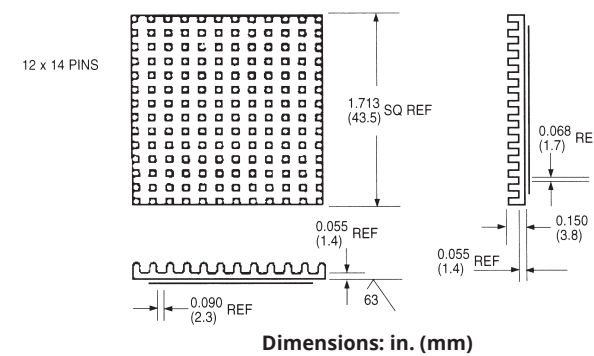
OMNIDIRECTIONAL PIN FIN HEAT SINK FOR LIMITED HEIGHT BGAs 662 SERIES



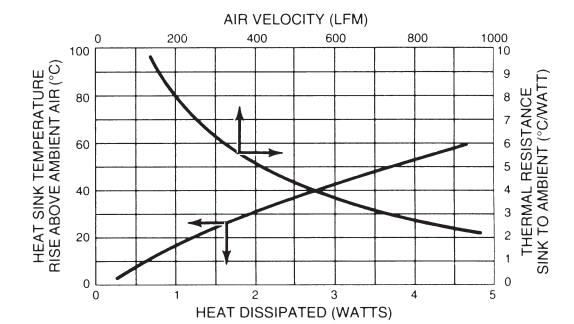
| Standard P/N | Base Dimensions in. (mm) | Height in. (mm) | Typical Applications | Heat Sink Finish | Weight lbs. (grams) |
|--------------|--------------------------|-----------------|----------------------|------------------|---------------------|
| 662-15AG | 1.713 (43.5) sq | 0.150 (3.8) | 45mm BGA | Gold Iridite | 0.019 (8.50) |
| 662-15AB | 1.713 (43.5) sq | 0.150 (3.8) | 45mm BGA | Black Anodized | 0.019 (8.50) |

Notes: 1. Optional factory pre-applied pressure-sensitive adhesive. See Page 8.

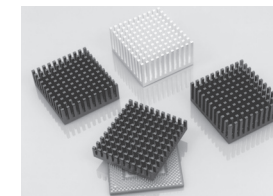
MECHANICAL DIMENSIONS



NATURAL AND FORCED CONVECTION CHARACTERISTICS



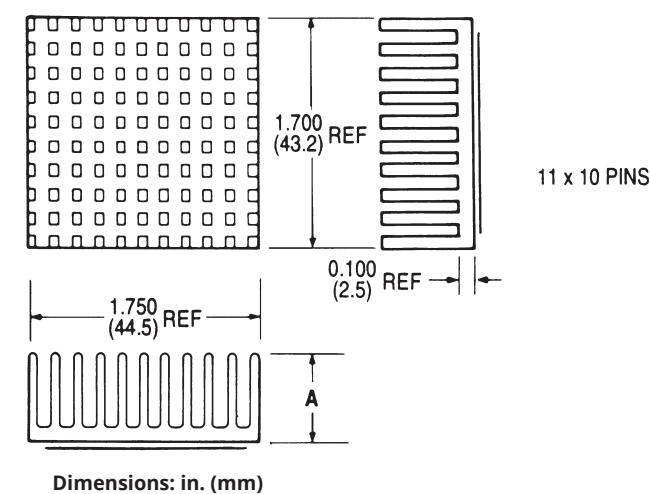
628 SERIES OMNIDIRECTIONAL PIN FIN HEAT SINK FOR BGAs



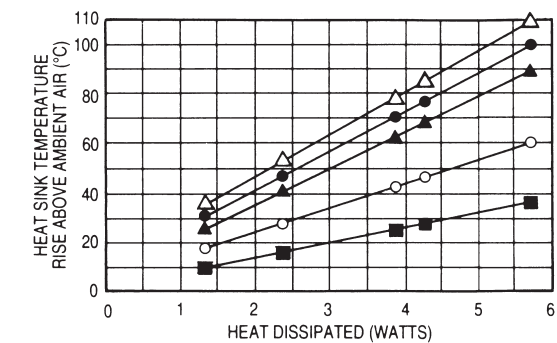
| Standard P/N | Base Dimensions in. (mm) | Dimensions "A" in. (mm) | Typical Applications | Heat Sink Finish | Weight lbs. (grams) |
|--------------|-----------------------------|-------------------------|----------------------|------------------|---------------------|
| 628-20AB | 1.750 (44.5) x 1.700 (43.2) | 0.200 (5.1) | 45mm BGA | Black Anodized | 0.031 (14.17) |
| 628-25AB | 1.750 (44.5) x 1.700 (43.2) | 0.250 (6.4) | 45mm BGA | Black Anodized | 0.038 (17.01) |
| 628-35AB | 1.750 (44.5) x 1.700 (43.2) | 0.350 (8.9) | 45mm BGA | Black Anodized | 0.044 (19.84) |
| 628-40AB | 1.750 (44.5) x 1.700 (43.2) | 0.400 (10.2) | 45mm BGA | Black Anodized | 0.050 (22.68) |
| 628-65AB | 1.750 (44.5) x 1.700 (43.2) | 0.650 (16.5) | 45mm BGA | Black Anodized | 0.056 (25.51) |

Notes: 1. Optional factory pre-applied pressure-sensitive adhesive. See Page 8.

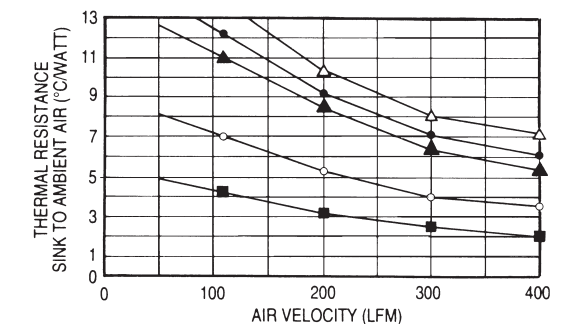
MECHANICAL DIMENSIONS



NATURAL CONVECTION CHARACTERISTICS

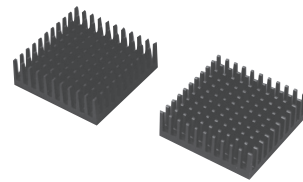


FORCED CONVECTION CHARACTERISTICS



KEY:
 △ 628-20AB
 ● 628-25AB
 ▲ 628-35AB
 ○ 628-40AB
 ■ 628-65AB

HEAT SINKS FOR BGAs, SUPER BGAs, PBGAs, & FPBGAs



630 SERIES OMNIDIRECTIONAL PIN FIN HEAT SINK FOR BGAs

The **630 Series** is an omnidirectional pin fin heat sink for both natural and forced-convection applications.

Applications include network routers and switches, high-resolution printers, digital cameras, consumer video games, digital video disks (DVD) and global positioning systems (GPS).

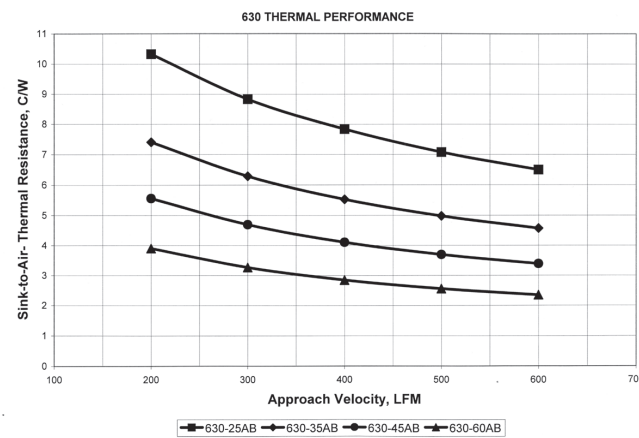
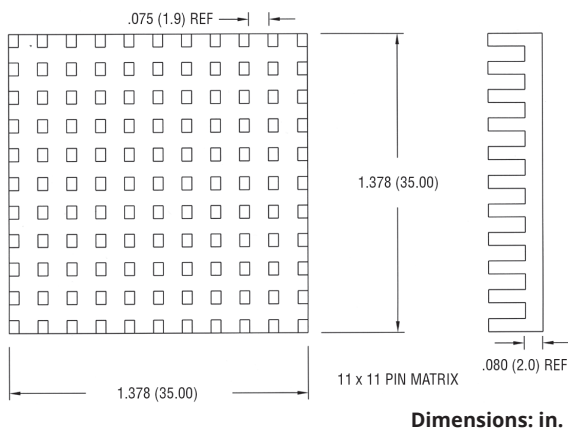
| Standard P/N | Base Dimensions in. Sq. | Fin Height "A" in. (mm) | Typical Applications | Weight lbs. (grams) |
|--------------|-------------------------|-------------------------|----------------------|---------------------|
| 630-25AB | 1.378 (35) | .250 (6.4) | 35mm BGA | .009 (4.09) |
| 630-35AB | 1.378 (35) | .350 (8.9) | 35mm BGA | .011 (4.99) |
| 630-45AB | 1.378 (35) | .450 (11.4) | 35mm BGA | .015 (6.81) |
| 630-60AB | 1.378 (35) | .600 (15.2) | 35mm BGA | .026 (11.80) |

Material: Aluminum, Black Anodized

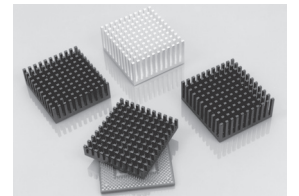
PRODUCT FEATURES

- Available in four standard heights, .25 inch, .35 inch, .45 inch, and .60 inch.
- Available with pressure sensitive adhesives for quick and easy mounting. See Page 8.

MECHANICAL DIMENSIONS

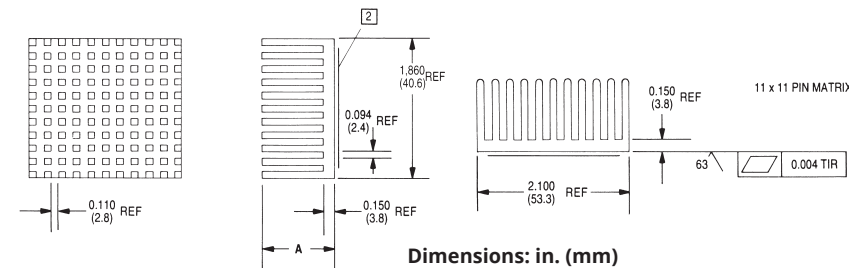


PIN FIN HEAT SINK FOR BGAs 798 SERIES

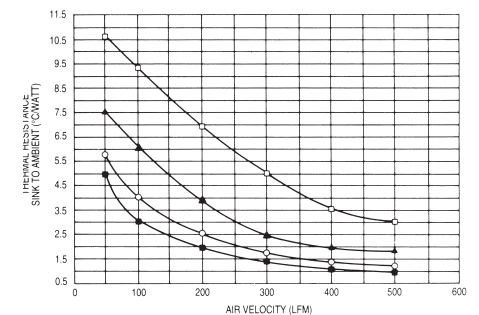


| Standard P/N | Base Dimensions in. (mm) | Dimensions "A" in. (mm) | Typical Applications | Heat Sink Finish | Weight lbs. (grams) |
|--------------|-----------------------------|-------------------------|----------------------|------------------|---------------------|
| 798-40AB | 2.100 (53.3) x 1.860 (47.2) | 0.400 (10.2) | 45mm BGA | Black Anodized | 0.063 (28.35) |
| 798-65AB | 2.100 (53.3) x 1.860 (47.2) | 0.650 (16.5) | 45mm BGA | Black Anodized | 0.106 (48.19) |
| 798-80AB | 2.100 (53.3) x 1.860 (47.2) | 0.800 (20.3) | 45mm BGA | Black Anodized | 0.113 (51.03) |
| 798-100AB | 2.100 (53.3) x 1.860 (47.2) | 1.000 (25.4) | 45mm BGA | Black Anodized | 0.131 (59.53) |

MECHANICAL DIMENSIONS



FORCED CONVECTION THERMAL PERFORMANCE DATA (FLOW PARALLEL TO EXTRUSION DIRECTION)



NOTES:

1. Heat sink mounting surface flatness: 0.004" TIR
2. Optional factory pre-applied pressure-sensitive adhesive. See Page 8.

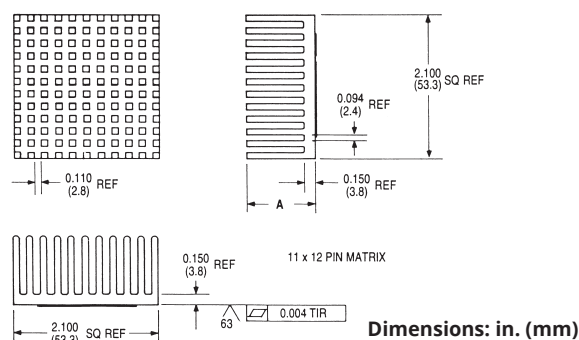
KEY:
 □ 798-40AB ▲ 798-65AB ○ 798-80AB ■ 798-100AB

OMNIDIRECTIONAL PIN FIN HEAT SINK FOR BGAs 698 SERIES

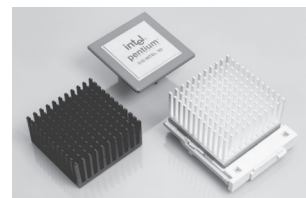
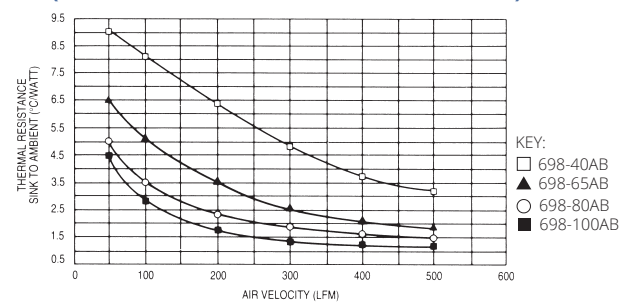
| Standard P/N | Base Dimensions in. (mm) | Dimensions "A" in. (mm) | Typical Applications | Heat Sink Finish | Weight lbs. (grams) |
|--------------|--------------------------|-------------------------|----------------------|------------------|---------------------|
| 698-40AB | 2.100 (53.3) sq. | 0.400 (10.2) sq. | 45mm BGA | Black Anodized | 0.075 (34.02) |
| 698-65AB | 2.100 (53.3) sq. | 0.650 (16.5) sq. | 45mm BGA | Black Anodized | 0.119 (53.86) |
| 698-80AB | 2.100 (53.3) sq. | 0.800 (20.3) sq. | 45mm BGA | Black Anodized | 0.125 (56.70) |
| 698-100AB | 2.100 (53.3) sq. | 1.000 (25.4) sq. | 45mm BGA | Black Anodized | 0.144 (65.20) |

Notes: 1. Optional factory preapplied pressure-sensitive adhesive. See Page 8.

MECHANICAL DIMENSIONS



FORCED CONVECTION THERMAL PERFORMANCE DATA (FLOW PARALLEL TO EXTRUSION DIRECTION)



643 SERIES OMNIDIRECTIONAL PIN FIN HEAT SINK FOR BGAs

The **Series 643-35AP** is an omnidirectional pin fin heat sink for both natural and forced-convection applications designed to fit a 40 mm BGA.

Applications include network routers and switches, high-resolution printers, digital cameras, consumer video games, digital video disks (DVD) and global positioning systems (GPS).

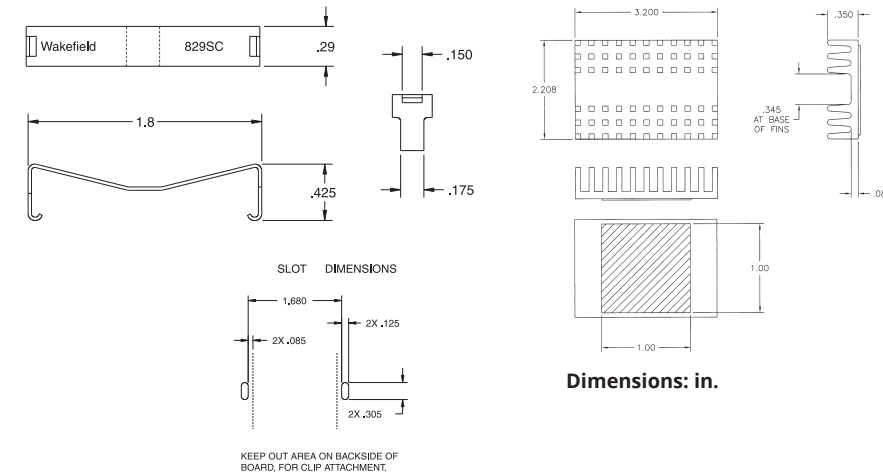
PRODUCT FEATURES

- Available with pressure sensitive adhesives to ensure good thermal performance. See page 8.
- Can be ordered with the **829SC clip**. Order clip separately. (Clip cannot be purchased without heat sink)

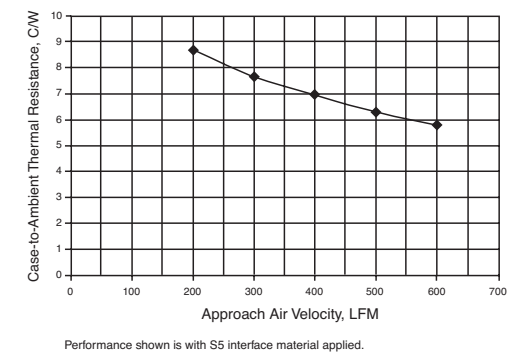
| Standard P/N | Base Dimensions in. (mm) | Fin Height in. (mm) | Typical Applications | Weight lbs. (grams) |
|--------------|-----------------------------|---------------------|----------------------|---------------------|
| 643-35AP | 1.60 (40.64) x 1.10 (27.94) | 0.350 (8.89) | 40 mm BGA | .070 (31.78) |

Material: Aluminum, Plain Finish

MECHANICAL DIMENSIONS

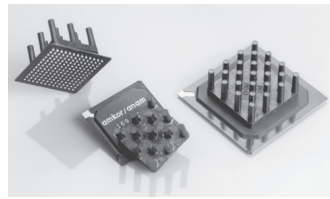


643 THERMAL PERFORMANCE



Performance shown is with S5 interface material applied.

DELTEM™ COMPOSITE HEAT SINKS FOR BGAs

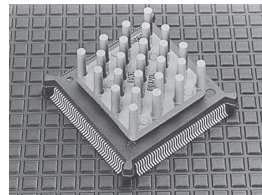


DELTEM™ D10650-40 PIN FIN HEAT SINK

| Standard P/N | Base Dimensions in. (mm) | Height in. (mm) | Weight lbs. (grams) |
|--------------|--------------------------|-----------------|---------------------|
| D10650-40 | 0.650 (16.5) sq | 0.400 (10.2) | 0.004 (1.91) |

Notes: Available with pressure sensitive adhesives for quick and easy mounting. See Page 8.

PIN FIN HEAT SINK DELTEM™ D10850-40

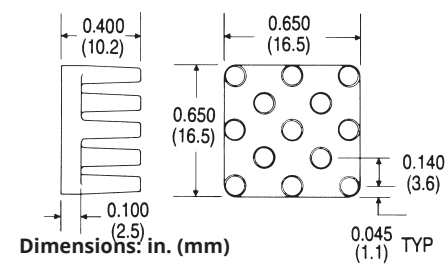


| Standard P/N | Base Dimensions in. (mm) | Height in. (mm) | Typical Applications | Weight lbs. (grams) |
|--------------|--------------------------|-----------------|----------------------|---------------------|
| D10850-40 | 0.850 (21.6) sq | 0.400 (10.2) | 21mm BGA | 0.006 (3.9) |

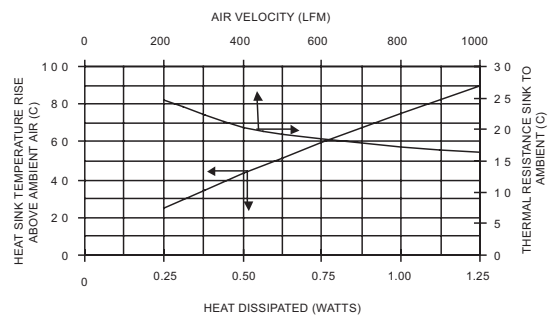
Notes: Available with pressure sensitive adhesives for quick and easy mounting. See Page 8.

MECHANICAL DIMENSIONS

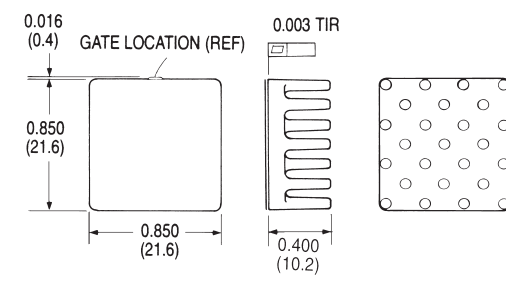
DELTEM™ D10650-40 PIN FIN HEAT SINK



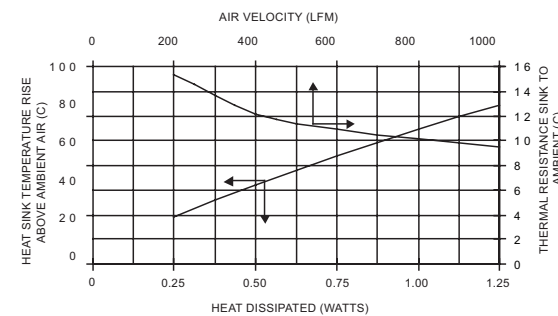
NATURAL AND FORCED CONVECTION CHARACTERISTICS



DELTEM™ D10850-40 PIN FIN HEAT SINK



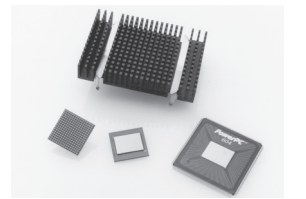
NATURAL AND FORCED CONVECTION CHARACTERISTICS



HEAT SINKS FOR BGAs, SUPER BGAs, PBGAs, & FPBGAs

PIN FIN HEAT SINK FOR BGAs HEAT SINK/CLIP ASSEMBLY FOR BGAs AND POWERPC™ PACKAGES

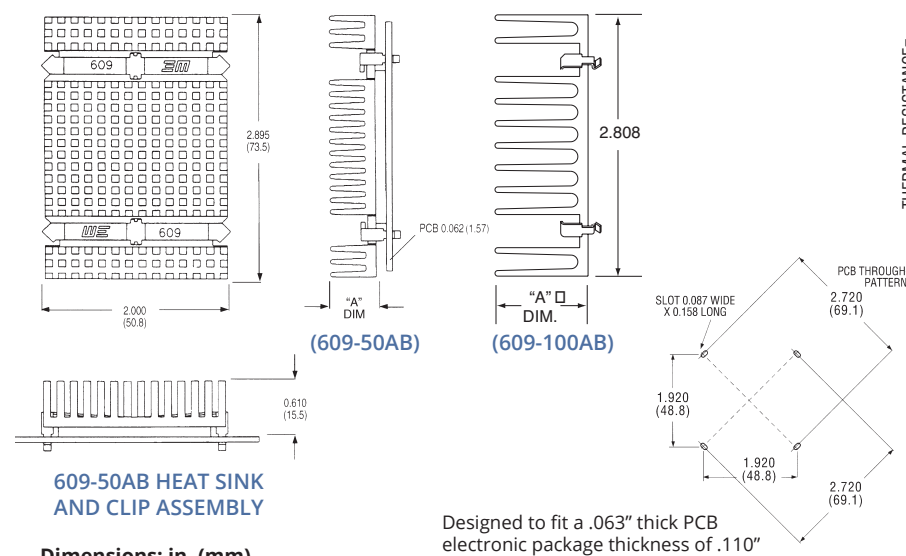
609 SERIES



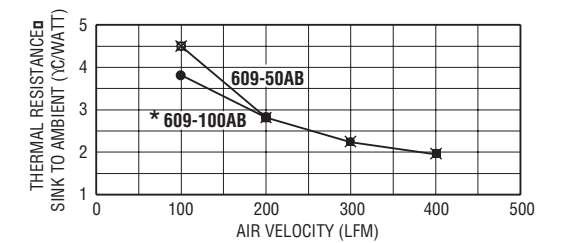
| Standard P/N | Base Dimensions in. (mm) | Dimensions "A" in. (mm) | Typical Applications | Heat Sink Finish | Weight lbs. (grams) |
|--------------|------------------------------|-------------------------|----------------------|------------------|---------------------|
| 609-50AB | 2.895 (73.5) x 2.000 (50.8) | 0.500 (12.7) | 40&45mm BGA | Black Anodized | 0.094 (42.5) |
| 609-100AB | 2.808 (71.32) x 1.700 (43.2) | 1.00 (25.4) | 40&45mm BGA | Black Anodized | 0.130 (59.0) |

Note: Optional factory pre-applied thermal interface material.
S3 (Bergquist Q-Pad 3, 0.14 °C in²/w)
S4 (Bergquist Softface, 0.07 °C in²/w)

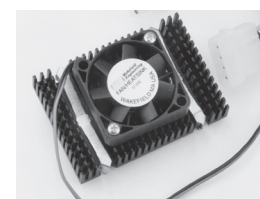
MECHANICAL DIMENSIONS



FORCED CONVECTION THERMAL PERFORMANCE DATA (FLOW PARALLEL TO EXTRUSION DIRECTION)



*Performance is for shrouded conditions. 609-100 will perform better than 609-50 in cases with bypass.

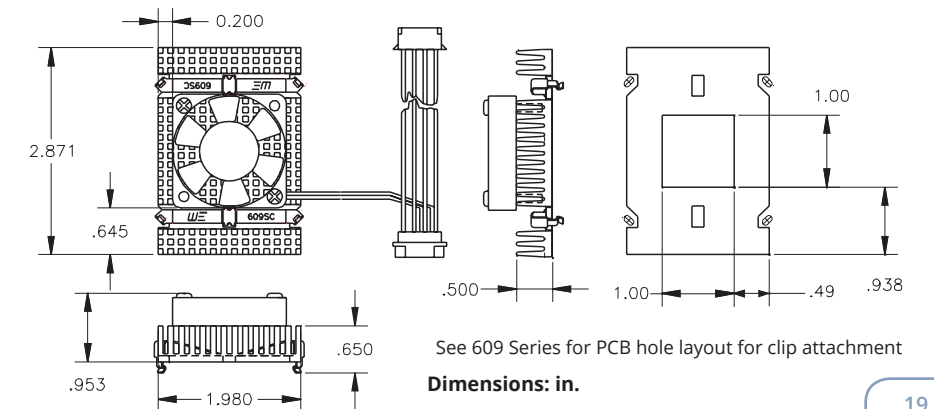


619 SERIES FAN HEAT SINK FOR BGA AND POWERPC™ PACKAGES

| Standard P/N | Base Dimensions in. (mm) | Height in. (mm) | Typical Applications | Heat Sink Finish | Thermal Performance | Weight lbs. (grams) |
|--------------|------------------------------|-----------------|----------------------|------------------|---------------------|---------------------|
| 61995AB124D1 | 2.871 (72.92) x 1.98 (50.29) | 0.953 (24.21) | 40&45mm BGA | Black Anodized | 1.2° C/W | .150 (68.10) |
| 61995AB054D1 | 2.871 (72.92) x 1.98 (50.29) | 0.953 (24.21) | 40&45mm BGA | Black Anodized | 1.2° C/W | .150 (68.10) |

Note: Optional factory pre-applied thermal interface material. See 609 series.

MECHANICAL DIMENSIONS



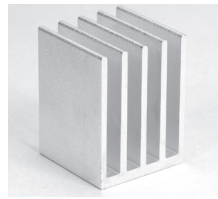
See 609 Series for PCB hole layout for clip attachment

Dimensions: in.

FEATURES AND BENEFITS

- Captivated clips for ease of assembly.
- Low acoustic noise.
- Impingement air flow.
- Accommodates BGA packages up to 45 mm in size.

HEAT SINKS FOR BGAs, SUPER BGAs, PBGAs, & FPBGAs



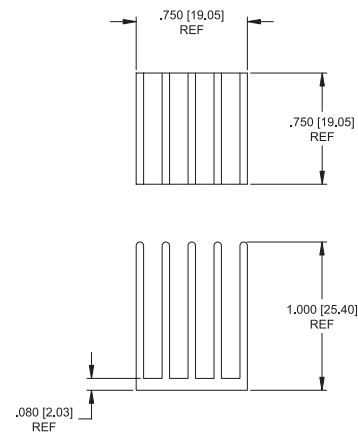
602 SERIES

UNIDIRECTIONAL FIN HEAT SINK FOR BGAs

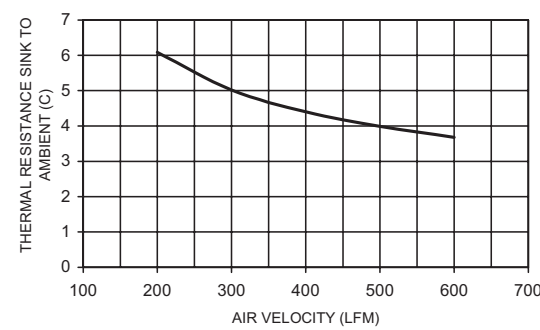
| Standard P/N | Base Dimensions in. (mm) | Height in. (mm) | Heat Sink Finish | Weight lbs. (grams) |
|--------------|--------------------------|-----------------|------------------|---------------------|
| 602-100AP | .750 (19.1) sq | 1.000 (25.4) | Plain | .021 (9.59) |

Material: Aluminum, Plain Finish

MECHANICAL DIMENSIONS

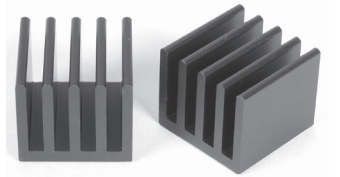


602 THERMAL PERFORMANCE



UNIDIRECTIONAL FIN HEAT SINK FOR BGAs

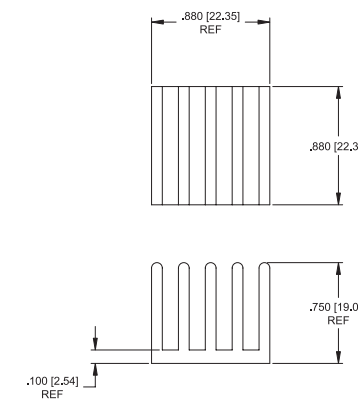
605 SERIES



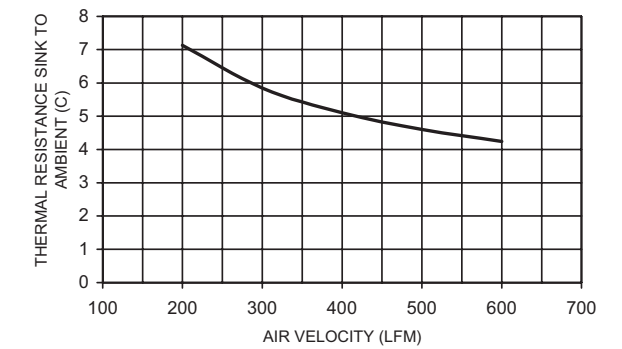
| Standard P/N | Base Dimensions in. (mm) | Height in. (mm) | Heat Sink Finish | Weight lbs. (grams) |
|--------------|--------------------------|-----------------|------------------|---------------------|
| 605-75AB | .880 (22.4) sq | .750 (19.1) | Black Anodized | .030 (13.5) |

Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS

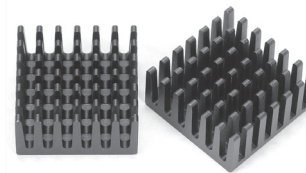


605 THERMAL PERFORMANCE



OMNIDIRECTIONAL PIN FIN HEAT SINK FOR BGAs

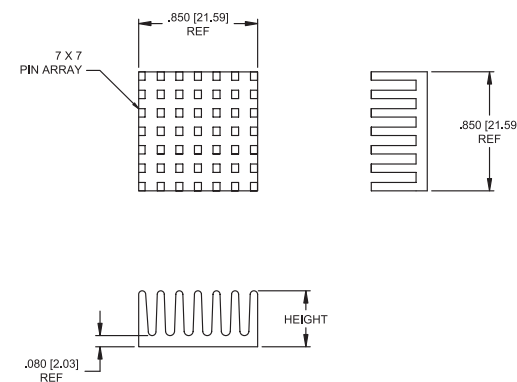
604 SERIES



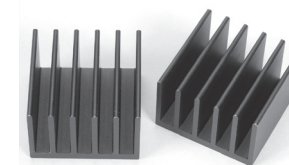
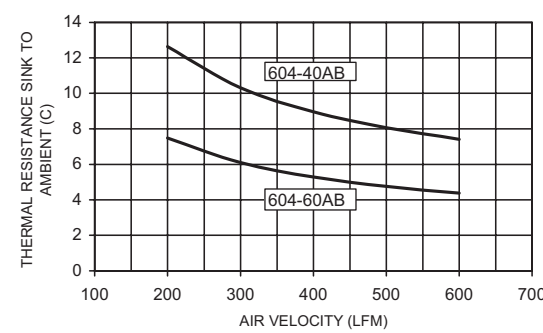
| Standard P/N | Base Dimensions in. (mm) | Height in. (mm) | Heat Sink Finish | Weight lbs. (grams) |
|--------------|--------------------------|-----------------|------------------|---------------------|
| 604-40AB | .850 (21.6) sq | .400 (10.2) | Black Anodized | .012 (5.60) |
| 604-60AB | .850 (21.6) sq | .600 (15.2) | Black Anodized | .016 (7.47) |

Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS



604 THERMAL PERFORMANCE



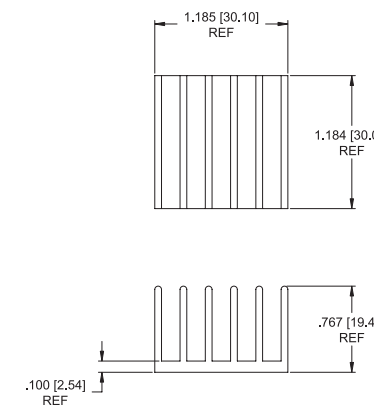
606 SERIES

UNIDIRECTIONAL FIN HEAT SINK FOR BGAs

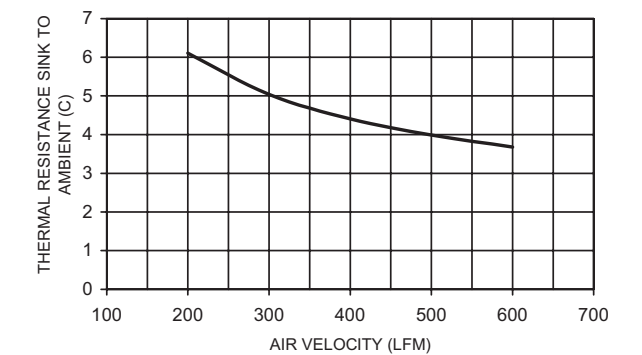
| Standard P/N | Base Dimensions in. (mm) | Height in. (mm) | Heat Sink Finish | Weight lbs. (grams) |
|--------------|--------------------------|-----------------|------------------|---------------------|
| 606-77AB | 1.185 (30.1) sq | .767 (19.5) | Black Anodized | .041 (18.7) |

Material: Aluminum, Black Anodized

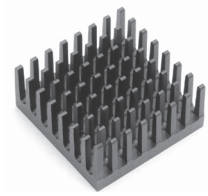
MECHANICAL DIMENSIONS



606 THERMAL PERFORMANCE



HEAT SINKS FOR BGAs, SUPER BGAs, PBGAs, & FPBGAs

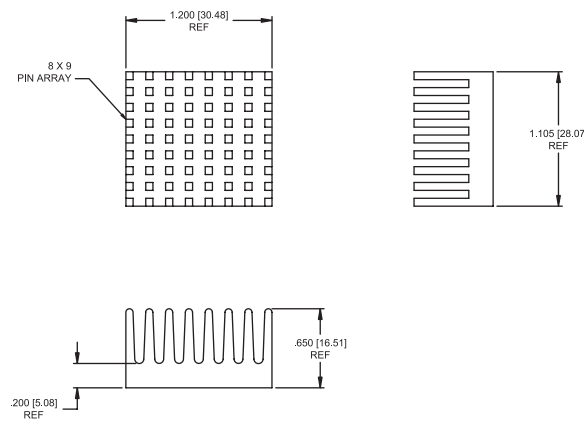


607 SERIES

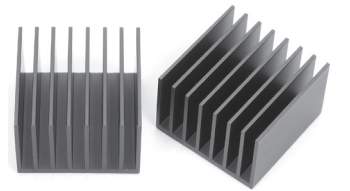
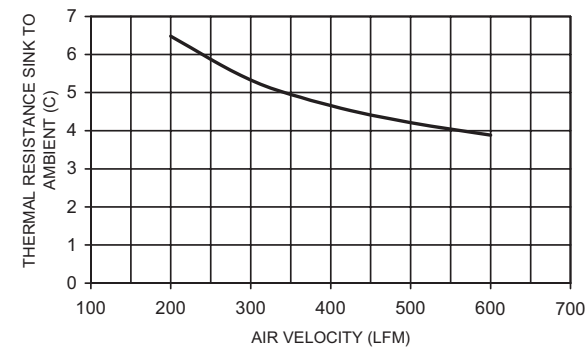
UNIDIRECTIONAL FIN HEAT SINK FOR BGAs

| Standard P/N | Base Dimensions in. (mm) | Height in. (mm) | Heat Sink Finish | Weight lbs. (grams) |
|---|-----------------------------|-----------------|------------------|---------------------|
| 607-65AB | 1.200 (30.5) x 1.105 (28.1) | .650 (16.5) | Black Anodized | .041 (18.7) |
| Material: Aluminum, Black Anodized | | | | |

MECHANICAL DIMENSIONS



607 THERMAL PERFORMANCE

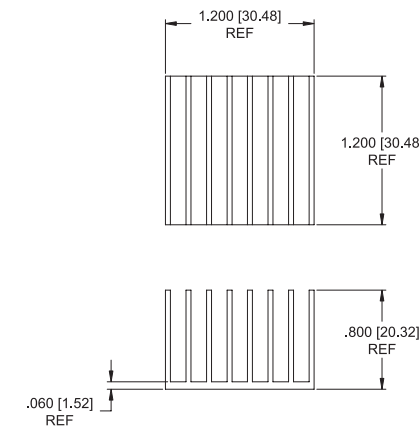


UNIDIRECTIONAL FIN HEAT SINK FOR BGAs

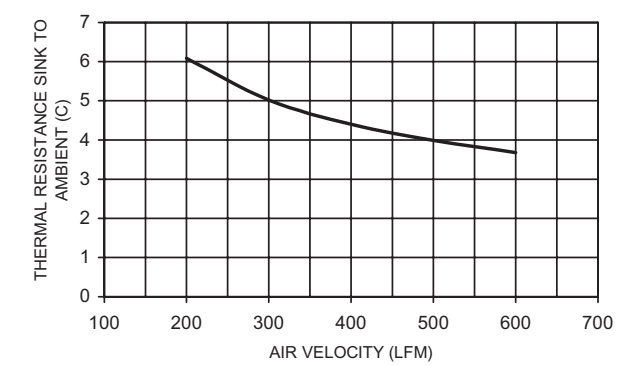
611 SERIES

| Standard P/N | Base Dimensions in. (mm) | Height in. (mm) | Heat Sink Finish | Weight lbs. (grams) |
|---|--------------------------|-----------------|------------------|---------------------|
| 611-80AB | 1.200 (30.5) sq | .800 (20.3) | Black Anodized | .036 (16.3) |
| Material: Aluminum, Black Anodized | | | | |

MECHANICAL DIMENSIONS

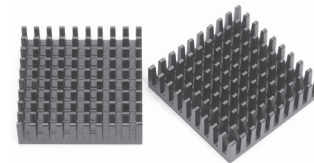


611 THERMAL PERFORMANCE



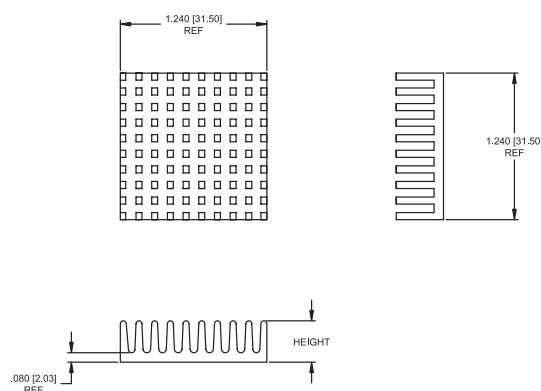
OMNIDIRECTIONAL PIN FIN HEAT SINK FOR BGAs

610 SERIES

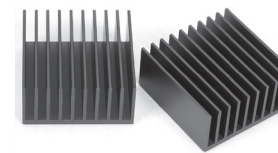
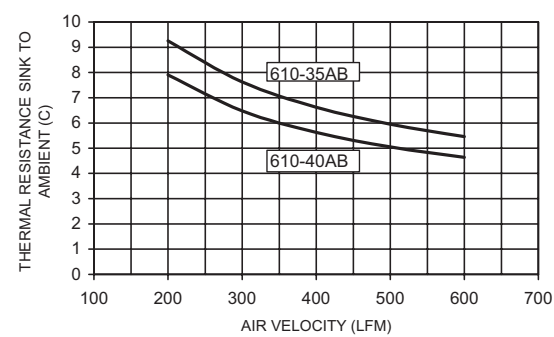


| Standard P/N | Base Dimensions in. (mm) | Height in. (mm) | Heat Sink Finish | Weight lbs. (grams) |
|---|--------------------------|-----------------|------------------|---------------------|
| 610-35AB | 1.240 (31.5) sq | .350 (8.9) | Black Anodized | .022 (10.0) |
| 610-40AB | 1.240 (31.5) sq | .400 (10.2) | Black Anodized | .024 (10.8) |
| Material: Aluminum, Black Anodized | | | | |

MECHANICAL DIMENSIONS



610 THERMAL PERFORMANCE

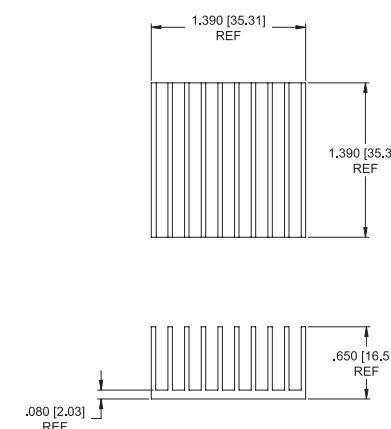


612 SERIES

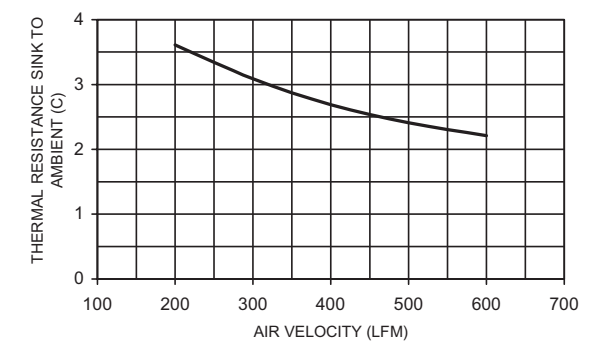
UNIDIRECTIONAL FIN HEAT SINK FOR BGAs

| Standard P/N | Base Dimensions in. (mm) | Height in. (mm) | Heat Sink Finish | Weight lbs. (grams) |
|---|--------------------------|-----------------|------------------|---------------------|
| 612-65AB | 1.390 (35.3) sq | .650 (16.5) | Black Anodized | .054 (24.5) |
| Material: Aluminum, Black Anodized | | | | |

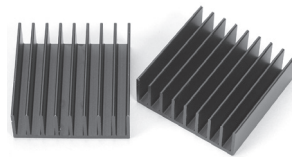
MECHANICAL DIMENSIONS



612 THERMAL PERFORMANCE



HEAT SINKS FOR BGAs, SUPER BGAs, PBGAs, & FPBGAs

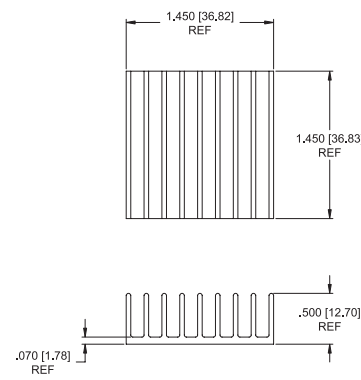


613 SERIES UNIDIRECTIONAL FIN HEAT SINK FOR BGAs

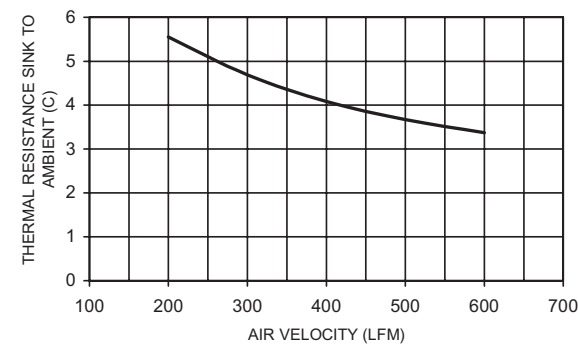
| Standard P/N | Base Dimensions in. (mm) | Height in. (mm) | Heat Sink Finish | Weight lbs. (grams) |
|--------------|--------------------------|-----------------|------------------|---------------------|
| 613-50AB | 1.450 (36.8) sq | .500 (12.7) | Black Anodized | .046 (20.8) |

Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS

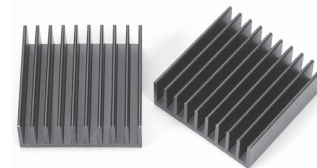


613 THERMAL PERFORMANCE



UNIDIRECTIONAL FIN HEAT SINK FOR BGAs

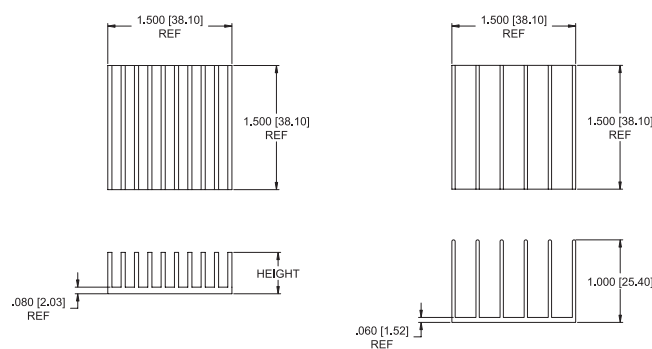
614 SERIES



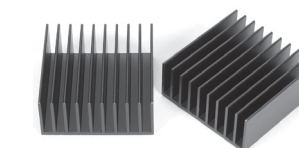
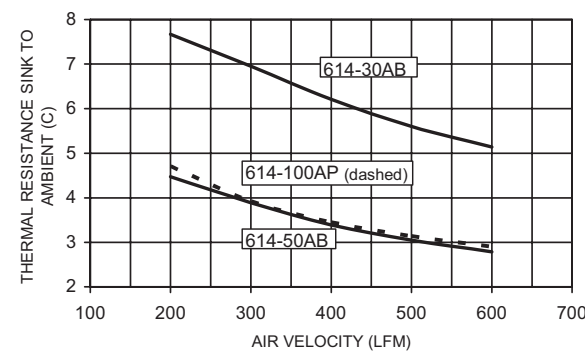
| Standard P/N | Base Dimensions in. (mm) | Height in. (mm) | Heat Sink Finish | Weight lbs. (grams) |
|--------------|--------------------------|-----------------|------------------|---------------------|
| 614-30AB | 1.500 (38.1) sq | .300 (7.6) | Black Anodized | .030 (13.8) |
| 614-50AB | 1.500 (38.1) sq | .500 (12.7) | Black Anodized | .048 (21.8) |
| 614-100AP | 1.500 (38.1) sq | 1.000 (25.4) | Plain | .046 (20.9) |

Material: Aluminum, Black Anodized or Plain

MECHANICAL DIMENSIONS



614 THERMAL PERFORMANCE



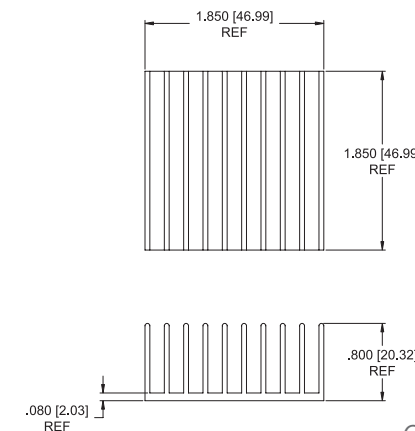
616 SERIES

UNIDIRECTIONAL FIN HEAT SINK FOR BGAs

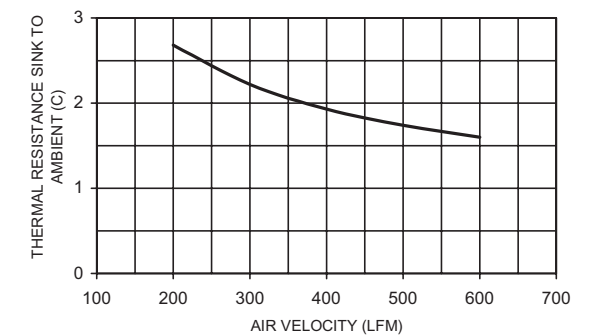
| Standard P/N | Base Dimensions in. (mm) | Height in. (mm) | Heat Sink Finish | Weight lbs. (grams) |
|--------------|--------------------------|-----------------|------------------|---------------------|
| 616-80AB | 1.85 (47.0) sq | .800 (20.3) | Black Anodized | .054 (24.5) |

Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS

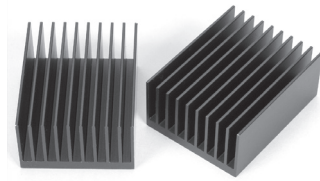


616 THERMAL PERFORMANCE



Contact us: (603) 635-2800

HEAT SINKS FOR BGAs, SUPER BGAs, PBGAs, & FPBGAs

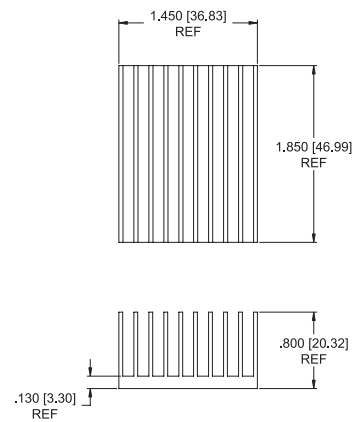


617 SERIES

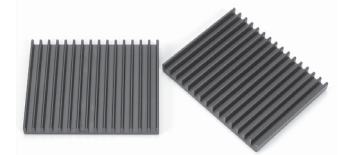
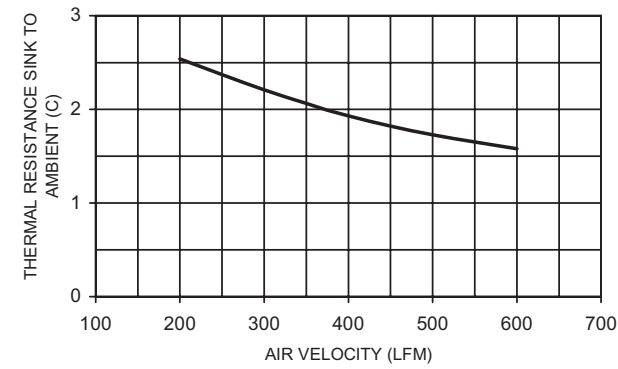
UNIDIRECTIONAL FIN HEAT SINK FOR BGAs

| Standard P/N | Base Dimensions in. (mm) | Height in. (mm) | Heat Sink Finish | Weight lbs. (grams) |
|---|-----------------------------|-----------------|------------------|---------------------|
| 617-80AB | 1.450 (36.8) x 1.850 (47.0) | .800 (20.3) | Black Anodized | .082 (37.2) |
| Material: Aluminum, Black Anodized | | | | |

MECHANICAL DIMENSIONS



617 THERMAL PERFORMANCE

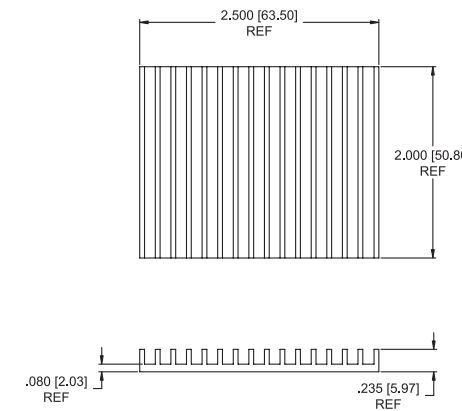


UNIDIRECTIONAL FIN HEAT SINK FOR BGAs

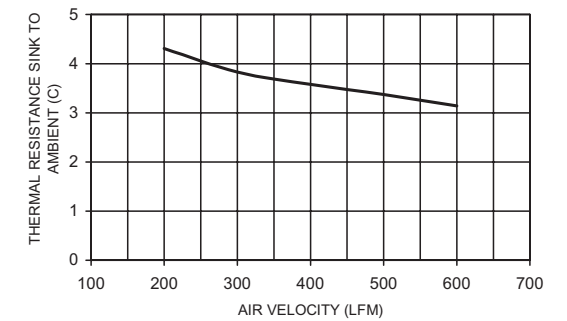
620 SERIES

| Standard P/N | Base Dimensions in. (mm) | Height in. (mm) | Heat Sink Finish | Weight lbs. (grams) |
|---|-----------------------------|-----------------|------------------|---------------------|
| 620-24AB | 2.500 (63.5) x 2.000 (50.8) | .235 (6.0) | Black Anodized | .063 (28.6) |
| Material: Aluminum, Black Anodized | | | | |

MECHANICAL DIMENSIONS

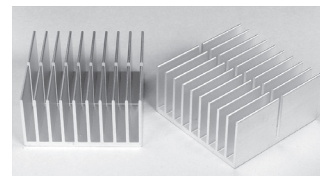


620 THERMAL PERFORMANCE



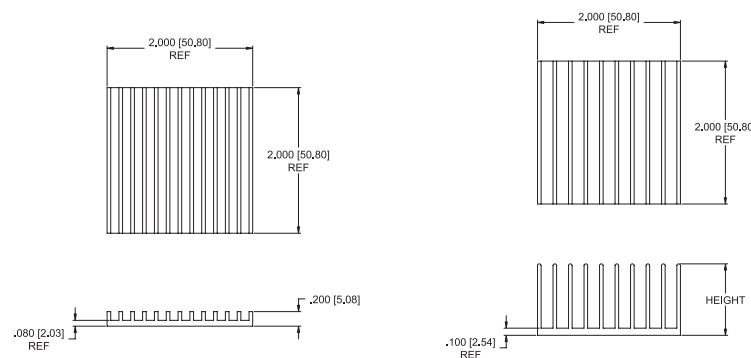
UNIDIRECTIONAL FIN HEAT SINK FOR BGAs

618 SERIES

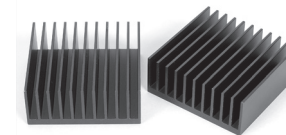
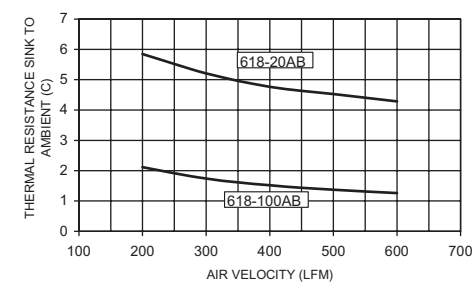


| Standard P/N | Base Dimensions in. (mm) | Height in. (mm) | Heat Sink Finish | Weight lbs. (grams) |
|--|--------------------------|-----------------|------------------|---------------------|
| 618-20AB | 2.00 (50.8) sq | .200 (5.1) | Black Anodized | .046 (21.0) |
| 618-100AP | 2.00 (80.8) sq | 1.000 (25.4) | Plain | .122 (55.5) |
| Material: Aluminum, Black Anodized or Plain | | | | |

MECHANICAL DIMENSIONS



618 THERMAL PERFORMANCE

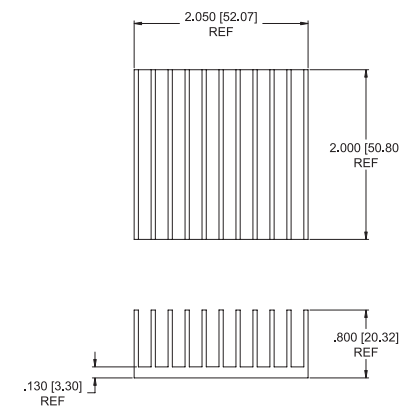


622 SERIES

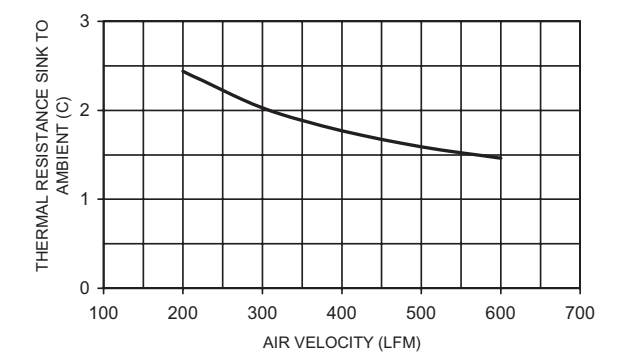
UNIDIRECTIONAL FIN HEAT SINK FOR BGAs

| Standard P/N | Base Dimensions in. (mm) | Height in. (mm) | Heat Sink Finish | Weight lbs. (grams) |
|---|-----------------------------|-----------------|------------------|---------------------|
| 622-80AB | 2.050 (52.1) x 2.000 (50.8) | .800 (20.3) | Black Anodized | .123 (56.0) |
| Material: Aluminum, Black Anodized | | | | |

MECHANICAL DIMENSIONS



622 THERMAL PERFORMANCE



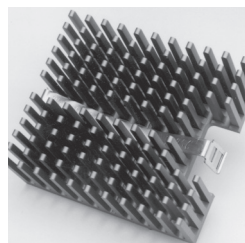
HEAT SINKS FOR MICROPROCESSORS & ASICs

569, 579, 589, 599 SERIES

HEAT SINKS & CLIP FOR INTEL'S PENTIUM, PENTIUM MMX, AMD'S K6 & K62, CYRIX'S 6X86 & MEDIA GX, CENTAUR/IDT'S WINCHIP C6

PRODUCT FEATURES

- Compact design heat sinks can comfortably fit a variety of Robust Socket 7-based PC boxes.
- Robust clip attachments.
- Clips are not captive to sink.
- To order heat sink with optional interface material pre-applied at the factory, add S4 or S5 suffix to the part number. (See Product Designation)

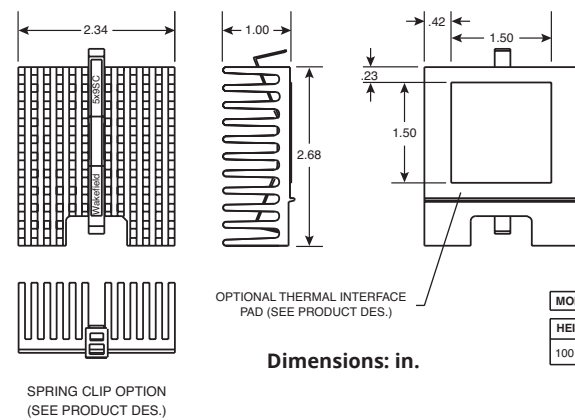


569-100AK SERIES

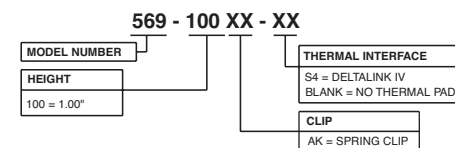
| Standard P/N | Base Dimensions in. (mm) | Fin Height in. (mm) | Thermal Resistance at 200 LFM (°C/W) | Interface Material Options |
|--------------|-----------------------------|---------------------|--------------------------------------|----------------------------|
| 569-100AK | 2.34 (59.44) x 2.68 (67.95) | 1.00 (25.4) | 1.7 | Pages 74-76 |
| 579-150AK | 2.15 (54.71) x 1.95 (49.53) | 1.50 (38.10) | 1.6 | Pages 74-76 |
| 589-150AK | 2.15 (54.71) x 3.10 (78.74) | 1.50 (38.10) | 1.5 | Pages 74-76 |
| 599X-100AB | 1.96 (49.78) x 2.67 (67.95) | 1.00 (25.4) | 1.9 | Pages 74-76 |

Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS



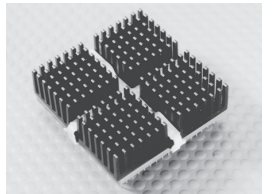
PRODUCT DESIGNATION



18 x 18 PGA

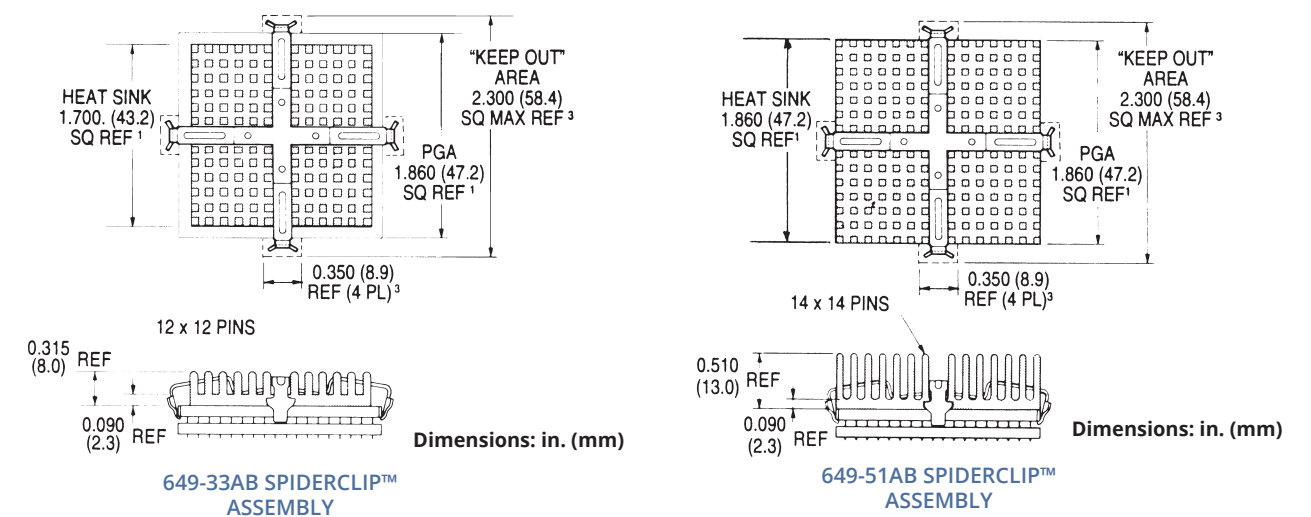
SPIDERCLIP™ HEAT SINK ASSEMBLY
FOR MOTOROLA MC68040™, MC68060

649 SERIES



| Standard P/N | Base Dimensions in. (mm) | Height in. (mm) | Base Thickness in. (mm) | Clip Color | Heat Sink Finish | Weight lbs. (grams) |
|--------------|--------------------------|-----------------|-------------------------|------------|------------------|---------------------|
| 649-33AB | 1.70 (43.2) sq | 0.315 (8.0) | 0.090 (2.3) | Gray | Black Anodized | 0.044 (19.84) |
| 649-51AB | 1.86 (47.2) sq | 0.510 (13.0) | 0.090 (2.3) | Gray | Black Anodized | 0.056 (25.51) |

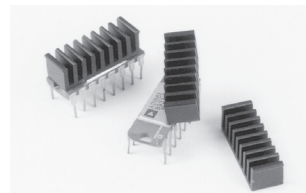
MECHANICAL DIMENSIONS



LOW-COST HEAT SINKS
FOR DIPs AND SRAMs

650 & 651 SERIES

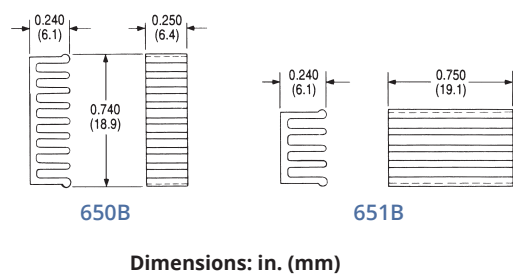
14-16 Pin DIPs



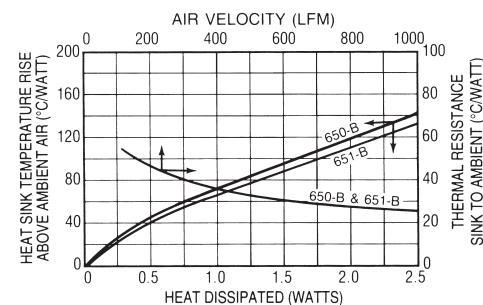
These extruded heat sinks serve as low-cost heat dissipation solutions for DIPs with pin counts from 14 to 16. Use an epoxy such as Wakefield-Vette Engineering DeltaBond™ 152 or 155, or use Wakefield-Vette 2-part DeltaBond™ 156 modified acrylic adhesive. The 650 and 651 are also available in natural aluminum finish. They can be ordered as 650P or 651P.

| Standard P/N | Length in. (mm) | Width in. (mm) | Height in. (mm) | Typical Applications | Weight lbs. (grams) |
|--------------|-----------------|----------------|-----------------|----------------------|---------------------|
| 650B | 0.250 (6.4) | 0.740 (18.9) | 0.240 (6.1) | 14-Pin, 16-Pin DIP | 0.003 (1.36) |
| 651B | 0.750 (19.1) | 0.415 (10.5) | 0.240 (6.1) | 14-Pin, 16-Pin DIP | 0.005 (2.27) |

MECHANICAL DIMENSIONS



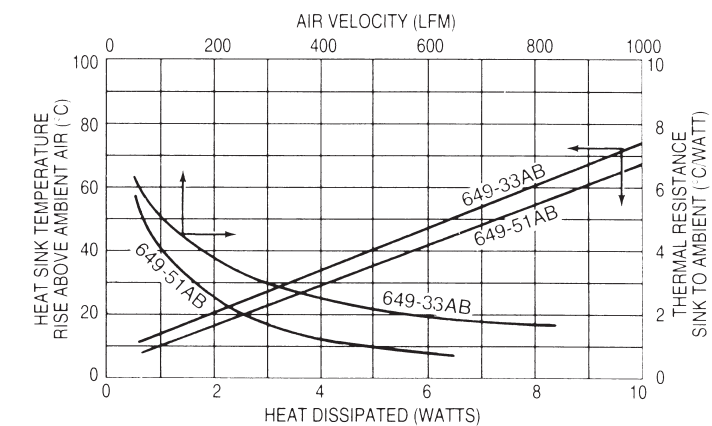
NATURAL AND FORCED CONVECTION CHARACTERISTICS



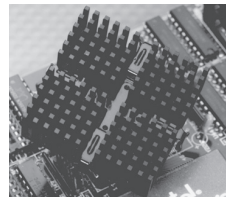
NOTES:

1. Finish: black anodize
2. TIR: Total Indicator Reading. This is a measure of flatness across the greatest dimension of a surface.

NATURAL AND FORCED CONVECTION CHARACTERISTICS



HEAT SINKS FOR MICROPROCESSORS & ASICs



669 SERIES

SPIDERCLIP™ HEAT SINK ASSEMBLY FOR INTEL DX4™, AMD AM486DX2, AND AM486DX4

17 x 17 SPGA

661 SERIES

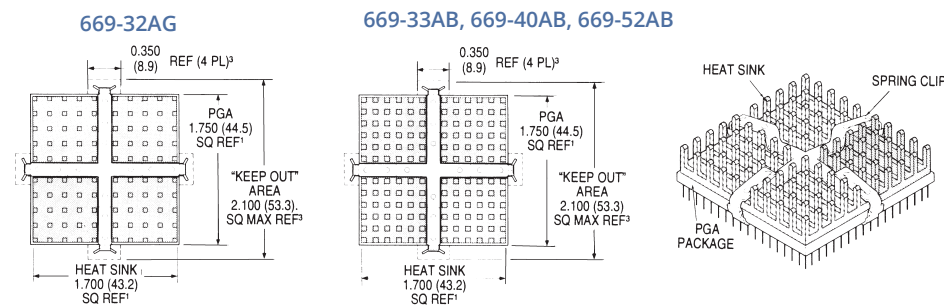
HEAT SINK WITHOUT CLIP

669 Series SpiderClip™ Heat Sink Assemblies may be applied to the following:

- Intel 80486DX and 80486DX2™ (168 PGA)
- Intel DX4™ (168 PGA)
- Intel 80486SX (168 PGA) and I860XR (208 PGA)
- AMD Am 486 Microprocessors AM486DX2, AM486DX4
- Intel 82495 Cache Controller
- AMD Am 29000 Microcontrollers
- Intel I960CA, I960CF Embedded Controllers

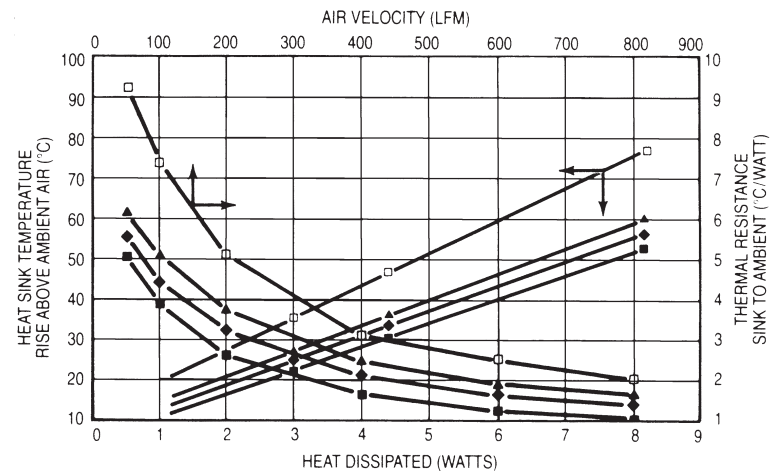
| Standard P/N | Base Dimensions in. (mm) | Dimensions "A" Height in. (mm) | Base Thickness in. (mm) | Clip Color | Standard Finish | Weight lbs. (grams) |
|--------------|--------------------------|--------------------------------|-------------------------|------------|-----------------|---------------------|
| 669-32AG | 1.70 (43.2) sq | 0.315 (8.0) | 0.090 (2.3) | Black | Gold Iridite | 0.044 (19.84) |
| 669-33AB | 1.70 (43.2) sq | 0.315 (8.0) | 0.090 (2.3) | Black | Black Anodized | 0.044 (19.84) |
| 669-40AB | 1.70 (43.2) sq | 0.400 (10.2) | 0.090 (2.3) | Black | Black Anodized | 0.044 (19.84) |
| 669-52AB | 1.70 (43.2) sq | 0.520 (13.2) | 0.090 (2.3) | Black | Black Anodized | 0.050 (22.68) |
| 661-32AG | 1.70 (43.2) sq | 0.315 (8.0) | 0.090 (2.3) | N/A | Gold Iridite | 0.044 (19.84) |
| 661-33AB | 1.70 (43.2) sq | 0.315 (8.0) | 0.090 (2.3) | N/A | Black Anodized | 0.044 (19.84) |
| 661-40AB | 1.70 (43.2) sq | 0.400 (10.2) | 0.090 (2.3) | N/A | Black Anodized | 0.044 (19.84) |
| 661-52AB | 1.70 (43.2) sq | 0.520 (13.2) | 0.090 (2.3) | N/A | Black Anodized | 0.050 (22.68) |

MECHANICAL DIMENSIONS



Dimensions: in. (mm)
Dielectric Breakdown (Nylon Clip Coating)
Dielectric Strength: 100 VDC/mil
Breakdown Voltage: 200 VDC (minimum)

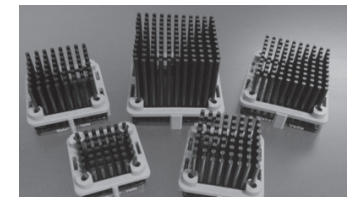
NATURAL AND FORCED CONVECTION CHARACTERISTICS



PIN FIN HEAT SINK



900 SERIES



Wakefield-Vette's 900 Series Heat Sinks for Chipset can match up to devices from Intel, Xilinx, TI, Motorola, ATI, AMD, Nvidia, Vishay, Powerex, Infineon, Microsemi, and many more.

These heat sinks are designed for air flow applications in the Telecom, Data Center, Networking, Cloud Computing, and many more Industries.

| Series | Height | Chip Size | Natural Convection | Forced Convection | | | Series | Height | Chip Size | Natural Convection | Forced Convection | | |
|--------|--------|-----------|--------------------|-------------------|----------|----------|--------|--------|-----------|--------------------|-------------------|----------|----------|
| | | | | 200 LFM | 400 LFM | 600 LFM | | | | | 200 LFM | 400 LFM | 600 LFM |
| 901 | 12 | 19mm | 12.74 C/W | 6.6 C/W | 4.79 C/W | 4.16 C/W | 906 | 12 | 31mm | 10.71 C/W | 3.49 C/W | 2.28 C/W | 1.69 C/W |
| | 15 | 19mm | 12.05 C/W | 6.3 C/W | 4.51 C/W | 3.86 C/W | | 15 | 31mm | 10.14 C/W | 3.18 C/W | 2.03 C/W | 1.5 C/W |
| | 18 | 19mm | 11.35 C/W | 5.97 C/W | 4.16 C/W | 3.47 C/W | | 18 | 31mm | 9.57 C/W | 2.93 C/W | 1.86 C/W | 1.33 C/W |
| | 21 | 19mm | 10.66 C/W | 5.66 C/W | 3.89 C/W | 3.21 C/W | | 21 | 31mm | 9.01 C/W | 2.72 C/W | 1.69 C/W | 1.2 C/W |
| | 23 | 19mm | 10.55 C/W | 5.36 C/W | 3.64 C/W | 2.99 C/W | | 23 | 31mm | 8.88 C/W | 2.5 C/W | 1.54 C/W | 1.07 C/W |
| | 28 | 19mm | 10.27 C/W | 4.91 C/W | 3.36 C/W | 2.71 C/W | | 28 | 31mm | 8.56 C/W | 2.26 C/W | 1.38 C/W | .96 C/W |
| 902 | 12 | 21mm | 12.4 C/W | 6.61 C/W | 4.37 C/W | 3.7 C/W | 907 | 12 | 33mm | 10.37 C/W | 3.32 C/W | 2.18 C/W | 1.62 C/W |
| | 15 | 21mm | 11.73 C/W | 5.84 C/W | 4.09 C/W | 3.42 C/W | | 15 | 33mm | 9.82 C/W | 3.14 C/W | 1.99 C/W | 1.45 C/W |
| | 18 | 21mm | 11.06 C/W | 5.51 C/W | 3.76 C/W | 3.07 C/W | | 18 | 33mm | 9.28 C/W | 2.89 C/W | 1.78 C/W | 1.3 C/W |
| | 21 | 21mm | 10.38 C/W | 5.20 C/W | 3.49 C/W | 2.84 C/W | | 21 | 33mm | 8.73 C/W | 2.67 C/W | 1.60 C/W | 1.13 C/W |
| | 23 | 21mm | 10.27 C/W | 4.9 C/W | 3.26 C/W | 2.62 C/W | | 23 | 33mm | 8.60 C/W | 2.45 C/W | 1.43 C/W | .99 C/W |
| | 28 | 21mm | 9.98 C/W | 4.55 C/W | 2.98 C/W | 2.42 C/W | | 28 | 33mm | 8.27 C/W | 2.24 C/W | 1.28 C/W | .87 C/W |
| 903 | 12 | 23mm | 12.06 C/W | 5.72 C/W | 3.95 C/W | 3.24 C/W | 908 | 12 | 35mm | 10.03 C/W | 3.06 C/W | 1.97 C/W | 1.49 C/W |
| | 15 | 23mm | 11.41 C/W | 5.39 C/W | 3.67 C/W | 2.99 C/W | | 15 | 35mm | 9.5 C/W | 2.85 C/W | 1.81 C/W | 1.34 C/W |
| | 18 | 23mm | 10.76 C/W | 5.05 C/W | 3.35 C/W | 2.67 C/W | | 18 | 35mm | 8.98 C/W | 2.6 C/W | 1.64 C/W | 1.19 C/W |
| | 21 | 23mm | 10.11 C/W | 4.74 C/W | 3.1 C/W | 2.46 C/W | | 21 | 35mm | 8.46 C/W | 2.4 C/W | 1.5 C/W | 1.07 C/W |
| | 23 | 23mm | 9.99 C/W | 4.44 C/W | 2.87 C/W | 2.31 C/W | | 23 | 35mm | 8.32 C/W | 2.19 C/W | 1.34 C/W | .97 C/W |
| | 28 | 23mm | 9.70 C/W | 4.09 C/W | 2.62 C/W | 2.12 C/W | | 28 | 35mm | 7.99 C/W | 1.97 C/W | 1.19 C/W | .83 C/W |
| 904 | 12 | 27mm | 11.38 C/W | 4.84 C/W | 3.11 C/W | 2.32 C/W | 909 | 12 | 37.5mm | 9.60 C/W | 2.93 C/W | 1.90 C/W | 1.36 C/W |
| | 15 | 27mm | 10.78 C/W | 4.48 C/W | 2.84 C/W | 2.12 C/W | | 15 | 37.5mm | 9.11 C/W | 2.71 C/W | 1.72 C/W | 1.19 C/W |
| | 18 | 27mm | 10.17 C/W | 4.13 C/W | 2.56 C/W | 1.88 C/W | | 18 | 37.5mm | 8.61 C/W | 2.52 C/W | 1.53 C/W | 1.05 C/W |
| | 21 | 27mm | 9.56 C/W | 3.82 C/W | 2.32 C/W | 1.72 C/W | | 21 | 37.5mm | 8.11 C/W | 2.25 C/W | 1.36 C/W | .88 C/W |
| | 23 | 27mm | 9.44 C/W | 3.51 C/W | 2.11 C/W | 1.6 C/W | | 23 | 37.5mm | 7.98 C/W | 2.04 C/W | 1.2 C/W | .75 C/W |
| | 28 | 27mm | 9.13 C/W | 3.26 C/W | 1.97 C/W | 1.49 C/W | | 28 | 37.5mm | 7.63 C/W | 1.82 C/W | 1.01 C/W | .63 C/W |
| 905 | 12 | 29mm | 11.04 C/W | 4.08 C/W | 2.55 C/W | 1.98 C/W | 910 | 12 | 40mm | 9.18 C/W | 2.84 C/W | 1.86 C/W | 1.36 C/W |
| | 15 | 29mm | 10.46 C/W | 3.82 C/W | 2.32 C/W | 1.78 C/W | | 15 | 40mm | 8.71 C/W | 2.64 C/W | 1.65 C/W | 1.18 C/W |
| | 18 | 29mm | 9.87 C/W | 3.58 C/W | 2.14 C/W | 1.58 C/W | | 18 | 40mm | 8.24 C/W | 2.4 C/W | 1.44 C/W | .98 C/W |
| | 21 | 29mm | 9.28 C/W | 3.33 C/W | 1.96 C/W | 1.44 C/W | | 21 | 40mm | 7.77 C/W | 2.21 C/W | 1.27 C/W | .86 C/W |
| | 23 | 29mm | 9.16 C/W | 3.13 C/W | 1.82 C/W | 1.34 C/W | | 23 | 40mm | 7.63 C/W | 2 C/W | 1.15 C/W | .73 C/W |
| | 28 | 29mm | 8.84 C/W | 2.82 C/W | 1.64 C/W | 1.2 C/W | | 28 | 40mm | 7.27 C/W | 1.77 C/W | .99 C/W | .62 C/W |

Material: AL 6063
Finish: Black Anodize

| Series | Chip Size | Construction | Height | Chip Height | Finish | Interface |
|--------|-----------|--------------|-----------|---------------------------|-------------|----------------------|
| | | | | | | |
| 901 | 19 | 2= Pin Fin | 12 = 11.6 | 1 = .9-2.1 2 = 2.2-3.4 | B = BLK ANO | 0 = None 1 = T725 |
| | 21 | | 15 = 14.6 | | | |
| | 23 | | 18 = 17.6 | | | |
| | 27 | | 21 = 20.6 | | | |
| | 29 | | 23 = 22.6 | | | |
| | 31 | | 28 = 27.6 | | | |
| | 33 | | 33 = 32.6 | | | |
| | 37.5 | | | | | |

Refer to Page 33 for
Installation Instructions