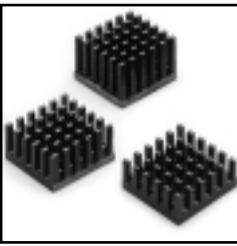




# PENGUIN™ COOLERS: HEAT SINKS FOR BGAs, SUPER BGAs, PBGAs, and FPBGAs



## 624 SERIES Omnidirectional Pin Fin Heat Sink for BGAs

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

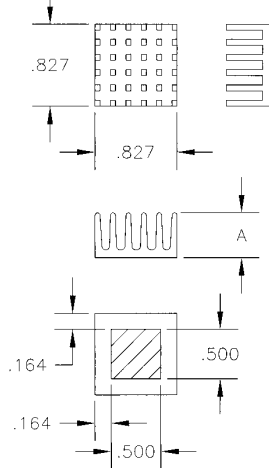
The 624 Series is an omnidirectional pin fin heat sink for both natural and forced-convection applications.

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

### PRODUCT FEATURES

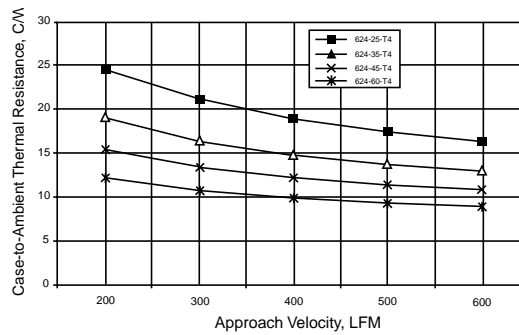
- Available in four standard heights, .25 inch, .35 inch, .45 inch, and .60 inch.
- Available with pressure sensitive adhesives for quick and easy mounting. See Page 2

### MECHANICAL DIMENSIONS

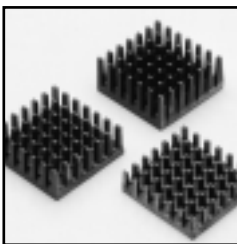


### 624 SERIES

### 624 THERMAL PERFORMANCE



Dimensions: in.



## 625 SERIES Omnidirectional Pin Fin Heat Sink for BGAs

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

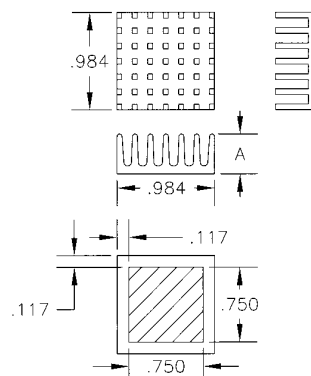
The 625 Series is an omnidirectional pin fin heat sink for both natural and forced-convection applications.

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

### PRODUCT FEATURES

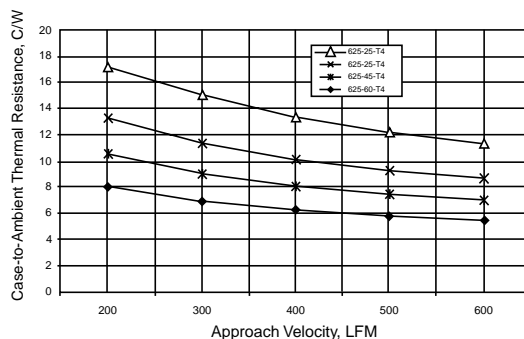
- Available in four standard heights, .25 inch, .35 inch, .45 inch, and .60 inch.
- Available with pressure sensitive adhesives for quick and easy mounting. See Page 2

### MECHANICAL DIMENSIONS



### 625 SERIES

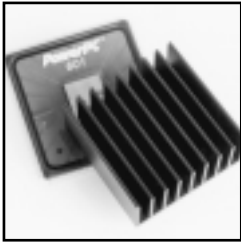
### 625 THERMAL PERFORMANCE



Dimensions: in.



**PENGUIN™ COOLERS: HEAT SINKS FOR BGAs, SUPER BGAs, PBGAs, and FPBGAs**

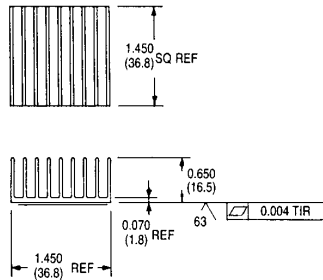


**659 SERIES Unidirectional Fin Heat Sink for BGAs**

Standard P/N	Base Dimensions in. (mm)	Height in. (mm)	Typical Application	Heat Sink Finish	Weight lbs. (grams)
659-65AB ▲	1.45 (36.8) sq	0.650 (16.5)	37mm BGA	Black Anodized	0.050 (22.68)

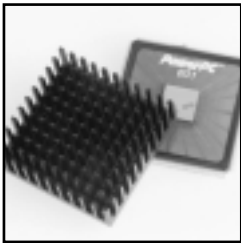
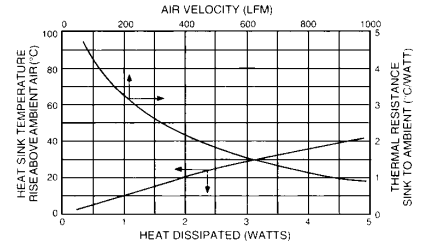
Notes: 1. Optional factory preapplied pressure-sensitive adhesive. See Page 2

**MECHANICAL DIMENSIONS**



Dimensions: in. (mm)

**NATURAL AND FORCED CONVECTION CHARACTERISTICS**

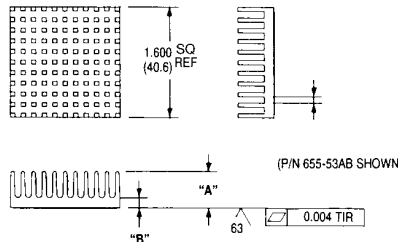


**655 SERIES Omnidirectional Pin Fin Heat Sink for BGAs and PowerPC™**

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)

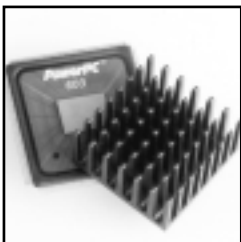
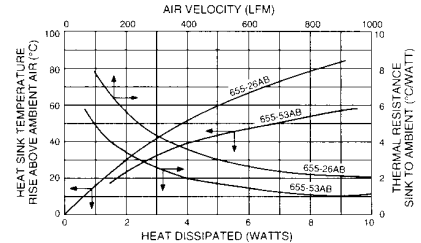
Notes: 1. Optional factory preapplied pressure-sensitive adhesive. See Page 2

**MECHANICAL DIMENSIONS**



Dimensions: in. (mm)

**NATURAL AND FORCED CONVECTION CHARACTERISTICS**

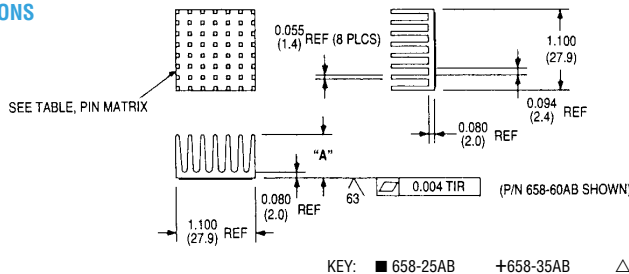


**658 SERIES Omnidirectional Pin Fin Heat Sink for BGAs and PowerPC™**

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 preapplied pressure-sensitive adhesive. See Page 2

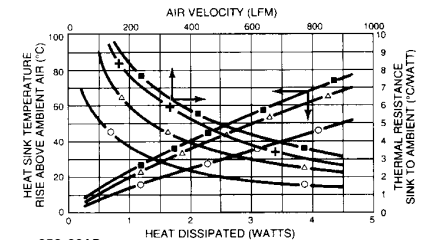
**MECHANICAL DIMENSIONS**



Dimensions: in. (mm)

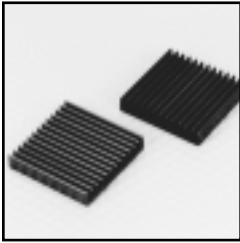
KEY: ■ 658-25AB +658-35AB ▲ 658-45AB ○ 658-60AB

**NATURAL AND FORCED CONVECTION CHARACTERISTICS**





**PENGUIN™ COOLERS: HEAT SINKS FOR BGAs, SUPER BGAs, PBGAs, and FPBGAs**

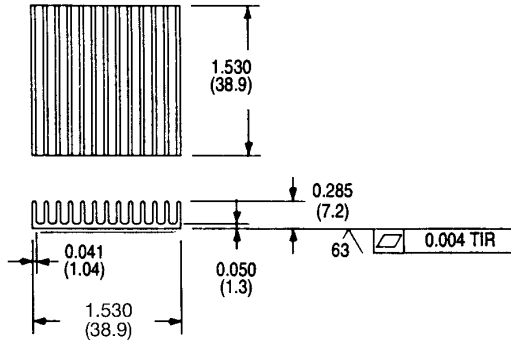


**660 SERIES Unidirectional Fin Heat Sink for BGAs**

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)

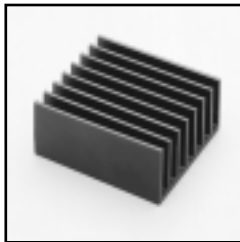
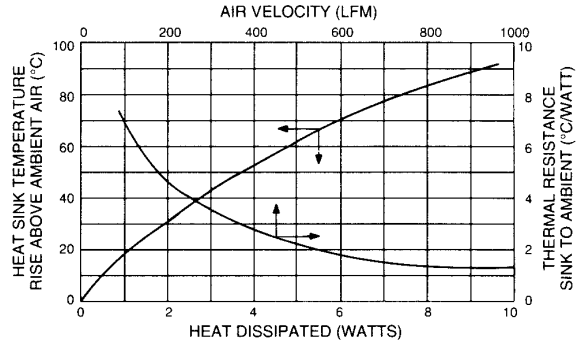
Notes: 1. Optional factory preapplied pressure-sensitive adhesive. See Page 2

**MECHANICAL DIMENSIONS**



Dimensions: in. (mm)

**NATURAL AND FORCED CONVECTION CHARACTERISTICS**



**642 SERIES Unidirectional Fin Heat Sink for BGAs**

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

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

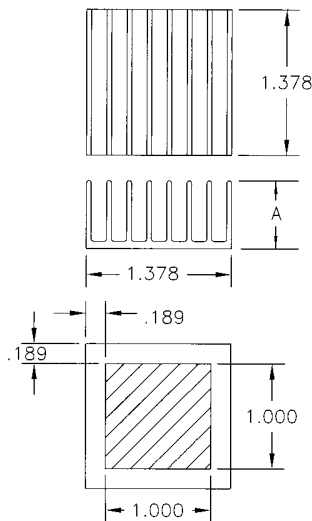
Applications include network routers and switches, high-resolution printers, digital cameras, consumer video games, digital video disks (DVD) and global positioning systems (GPS).

**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 2

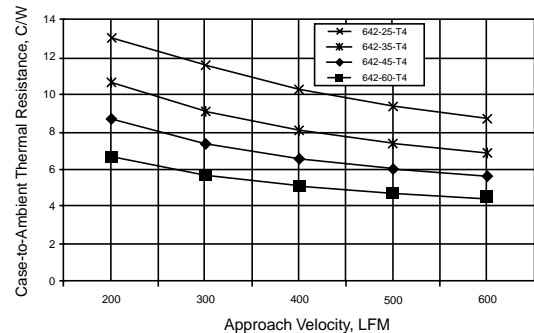
**MECHANICAL DIMENSIONS**

**642 SERIES**



Dimensions: in. (mm)

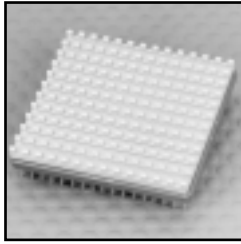
**642 THERMAL PERFORMANCE**



Performance shown is with T4 thermal adhesive applied.



**PENGUIN™ COOLERS: HEAT SINKS FOR BGAs, SUPER BGAs, PBGAs, and FPBGAs**

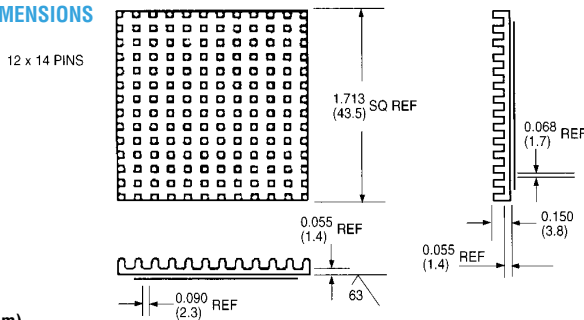


**662 SERIES Omnidirectional Pin Fin Heat Sink for Limited Height BGAs**

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)

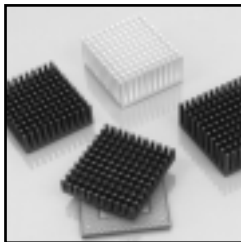
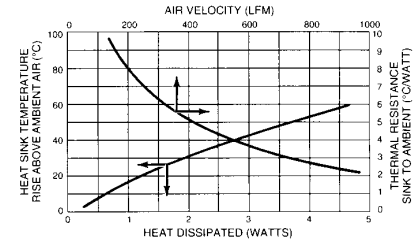
Notes: 1. Optional factory preapplied pressure-sensitive adhesive. See Page 2

**MECHANICAL DIMENSIONS**



Dimensions: in. (mm)

**NATURAL AND FORCED CONVECTION CHARACTERISTICS**

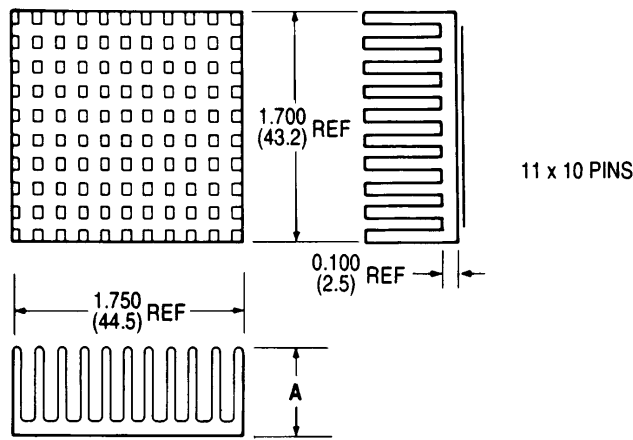


**628 SERIES Omnidirectional Pin Fin Heat Sink for BGAs**

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)

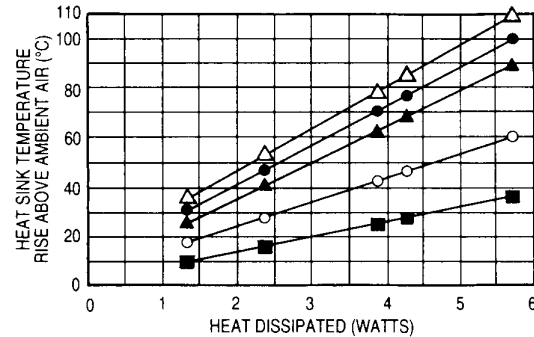
Notes: 1. Optional factory preapplied pressure-sensitive adhesive. See Page 2

**MECHANICAL DIMENSIONS**

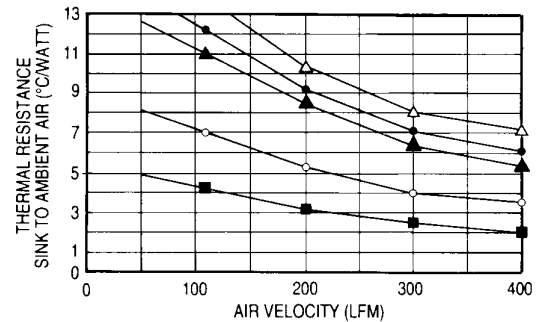


Dimensions: in. (mm)

**NATURAL CONVECTION CHARACTERISTICS**



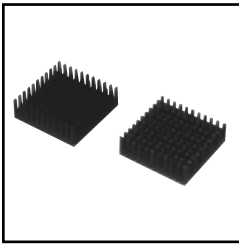
**FORCED CONVECTION CHARACTERISTICS**



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



**PENGUIN™ COOLERS: HEAT SINKS FOR BGAs, SUPER BGAs, PBGAs, and FPBGAs**



**630 SERIES Omnidirectional Pin Fin Heat Sink for BGAs**

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

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

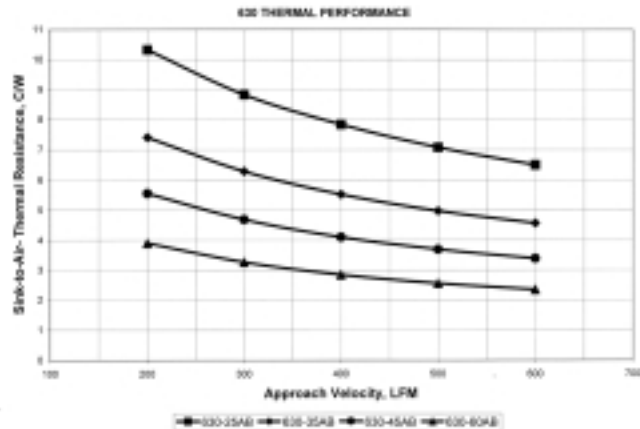
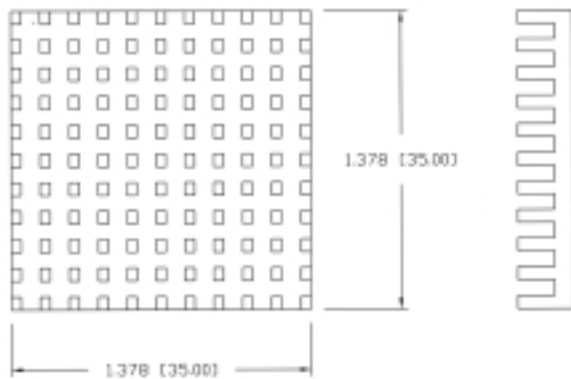
Applications include network routers and switches, high-resolution printers, digital cameras, consumer video games, digital video disks (DVD) and global positioning systems (GPS).

**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 2

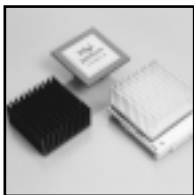
**MECHANICAL DIMENSIONS**

**630 SERIES**



Dimensions: in.

**PENGUIN™ COOLERS: HEAT SINKS FOR BGAs, SUPER BGAs, PBGAs, and FPBGAs**

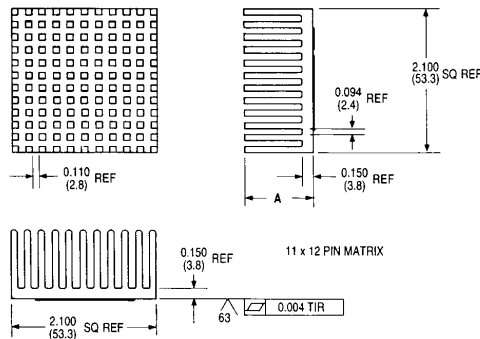


**698 SERIES Omnidirectional Pin Fin Heat Sink For BGAs**

Standard P/N	Base Dimensions in. (mm)	Dimensions "A" in. (mm)	Typical Applications	Heat Sink Finish	Weight lbs. (grams)
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)

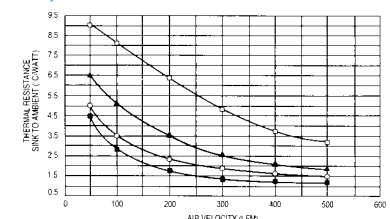
Notes: 1. Optional factory preapplied pressure-sensitive adhesive. See Page 2

**MECHANICAL DIMENSIONS**



Dimensions: in. (mm)

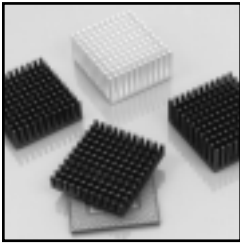
**FORCED CONVECTION THERMAL PERFORMANCE DATA (FLOW PARALLEL TO EXTRUSION DIRECTION)**



KEY: □ 698-40AB ▲ 698-65AB ○ 698-80AB ■ 698-100AB



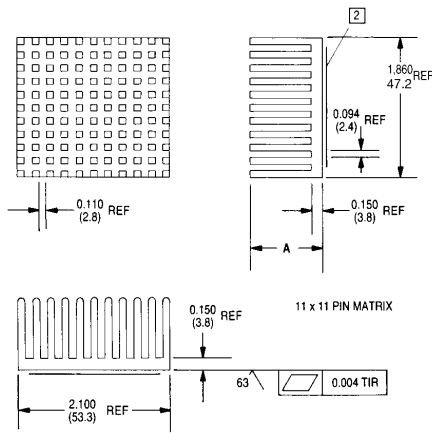
**PENGUIN™ COOLERS: HEAT SINKS FOR BGAs, SUPER BGAs, PBGAs, and FPBGAs**



**798 SERIES Pin Fin Heat Sink for BGAs**

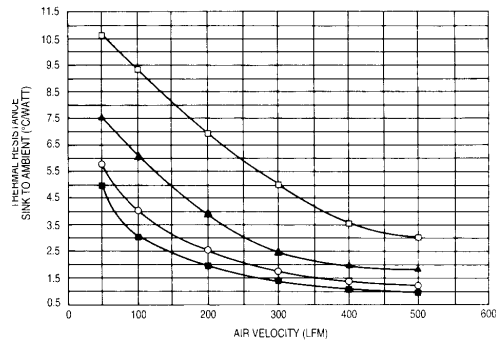
Standard P/N	Base Dimensions in. (mm)	Dimensions "A" in. (mm)	Typical Applications	Heat Sink Finish	Weight lbs. (grams)
798-40AB	2.100 (53.3) x 1.860 (47.2)	0.400 (10.2)	45mm BGA	Black Anodized	0.063 (28.35)
798-65AB	2.100 (53.3) x 1.860 (47.2)	0.650 (16.5)	45mm BGA	Black Anodized	0.106 (48.19)
798-80AB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



Dimensions: in. (mm)

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



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

- Notes:**
- Heat sink mounting surface flatness: 0.004" TIR
  - Optional factory preapplied pressure-sensitive adhesive. See Page 2



**643 SERIES Omnidirectional Pin Fin Heat Sink for BGAs**

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

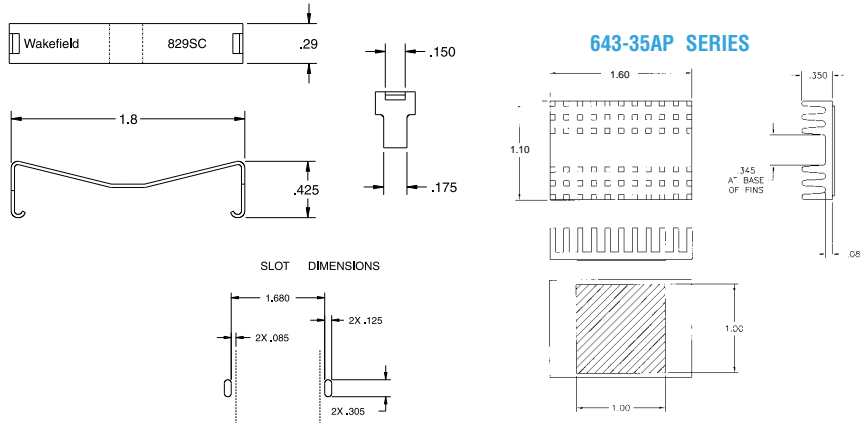
The Series 643-35AP is an omnidirectional pin fin heat sink for both natural and forced-convection applications designed to fit a 40 mm BGA.

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**

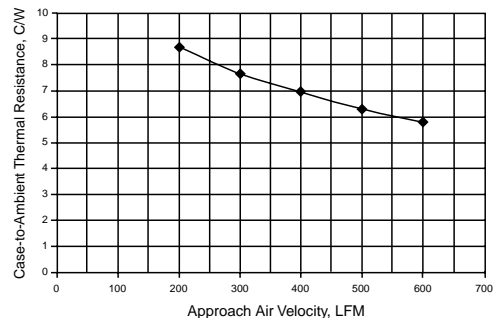
- Available with pressure sensitive adhesives to ensure good thermal performance. See Pages 2 and 3
- Can be ordered with the 829SC clip. Order clip separately. (Clip cannot be purchased without heat sink)

**MECHANICAL DIMENSIONS**



Dimensions: in.

**643 THERMAL PERFORMANCE**

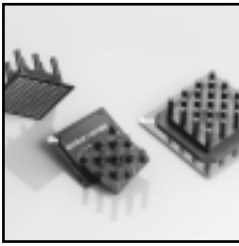


Performance shown is with S5 interface material applied.





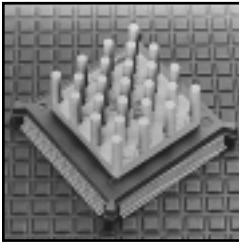
## DELTEM™ COMPOSITE HEAT SINKS FOR BGAs



**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)	0.013 (5.67)

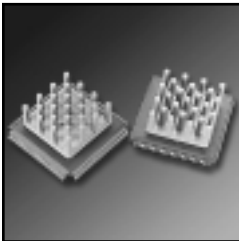
Notes: Available with pressure sensitive adhesives for quick and easy mounting. See Page 2



**Deltem™ D10850-40 Pin Fin Heat Sink**

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	0.019 (8.50)

Notes: Available with pressure sensitive adhesives for quick and easy mounting. See Page 2



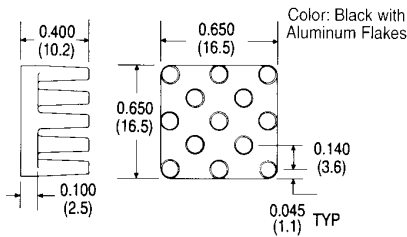
**Deltem™ II D20850-40 Pin Fin Heat Sink**

Standard P/N	Base Dimensions in. (mm)	Height in. (mm)	Typical Applications	Weight lbs. (grams)
D20850-40 ▲	0.850 (21.6) sq	0.400 (10.2)	21mm BGA	0.019 (8.5)

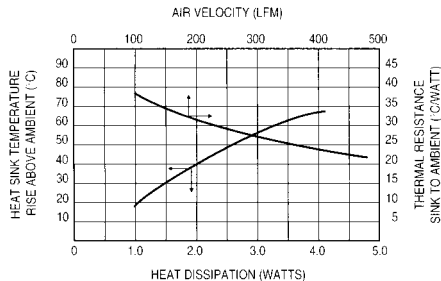
Notes: Available with pressure sensitive adhesives for quick and easy mounting. See Page 2

### MECHANICAL DIMENSIONS

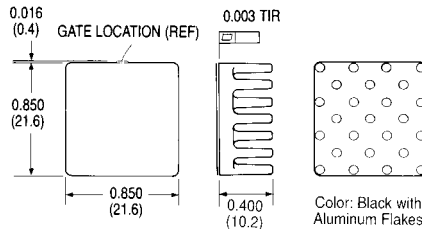
#### DELTEM™ D10650-40 PIN FIN HEAT SINK



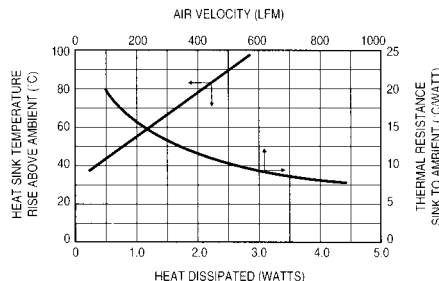
#### NATURAL AND FORCED CONVECTION CHARACTERISTICS



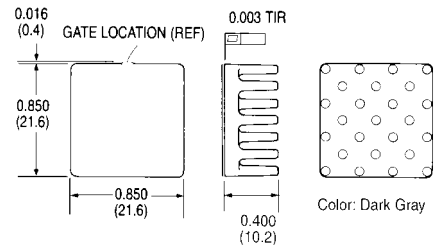
#### DELTEM™ D10850-40 PIN FIN HEAT SINK



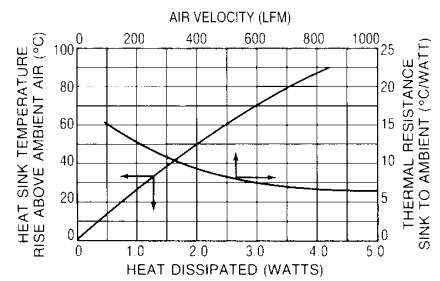
#### NATURAL AND FORCED CONVECTION CHARACTERISTICS



#### DELTEM™ II D20850-40 PIN FIN HEAT SINK



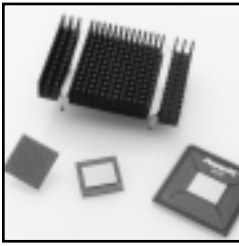
#### NATURAL AND FORCED CONVECTION CHARACTERISTICS



Dimensions: in. (mm)



**PENGUIN™ COOLERS: HEAT SINKS FOR BGAs, SUPER BGAs, PBGAs, and FPBGAs**

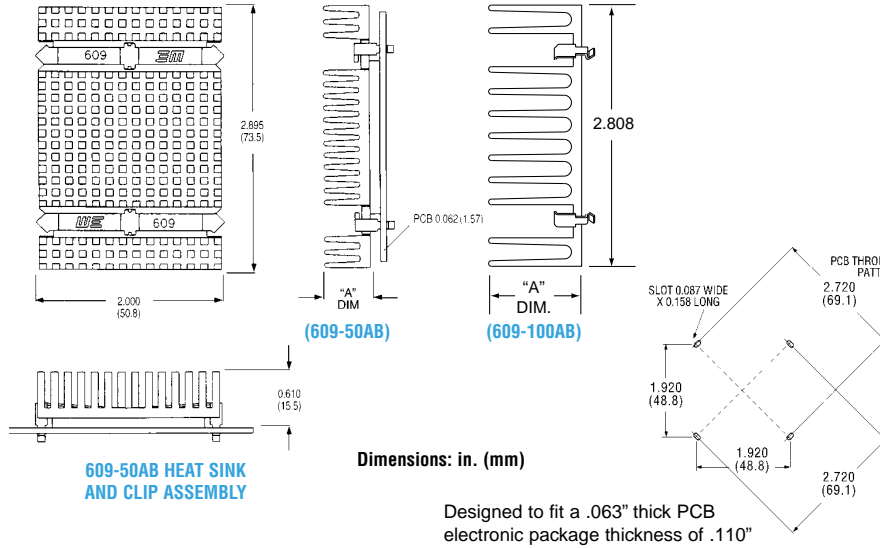


**609 SERIES Pin Fin Heat Sink/Clip Assembly for BGAs and PowerPC™ Packages**

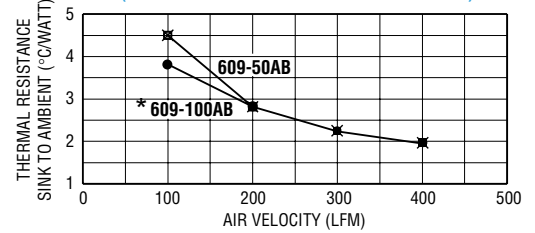
Standard P/N	Base Dimensions in. (mm)	Dimensions "A" in. (mm)	Typical Applications	Heat Sink Finish	Weight lbs. (grams)
609-50AB	2.895 (73.5) x 2.000 (50.8)	0.500 (12.7)	40&45mm BGA	Black Anodized	0.094 (42.5)
609-100AB	2.808 (71.32) x 1.700 (43.2)	1.00 (25.4)	40&45mm BGA	Black Anodized	0.130 (59.0)

Note: Optional factory preapplied thermal interface material.  
 S3 (Bergquist Q-Pad 3, 0.14 °C in<sup>2</sup>/w)  
 S4 (Bergquist Softface, 0.07 °C in<sup>2</sup>/w)

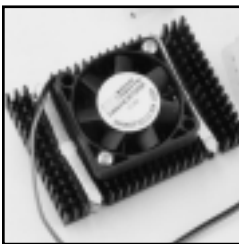
**MECHANICAL DIMENSIONS**



**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**

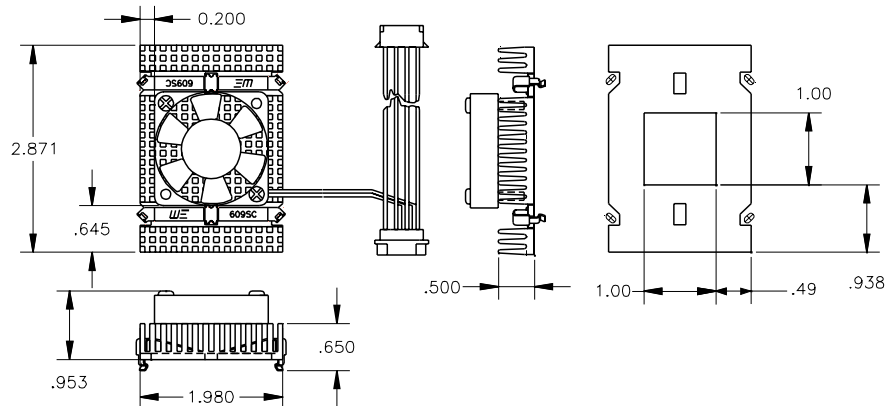
Standard P/N	Base Dimensions in. (mm)	Height in. (mm)	Typical Applications	Heat Sink Finish	Thermal Performance	Weight lbs. (grams)
61995AB124D1	2.871 (72.92) x 1.98 (50.29)	0.953 (24.21)	40&45mm BGA	Black Anodized	1.2° C/W	.150 (68.10)
61995AB054D1	2.871 (72.92) x 1.98 (50.29)	0.953 (24.21)	40&45mm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

Note: Optional factory preapplied thermal interface material. See 609 series.

**FEATURES AND BENEFITS:**

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

**MECHANICAL DIMENSIONS**







**PENGUIN™ COOLERS: HEAT SINKS FOR BGAs, SUPER BGAs, PBGAs, and FPBGAs**

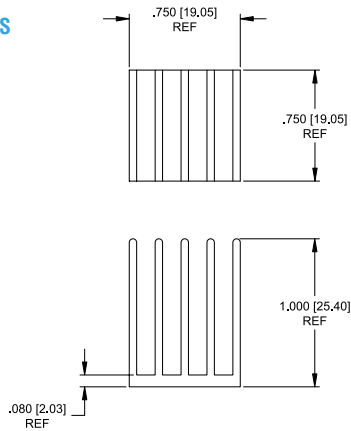


**602 SERIES** Unidirectional Fin Heat Sink for BGAs

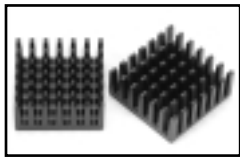
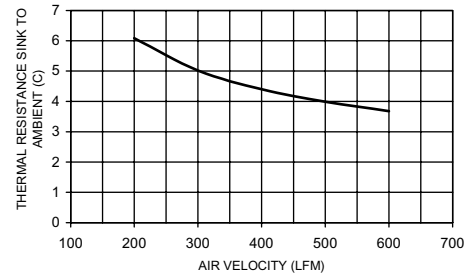
Standard P/N	Base Dimensions in.(mm)	Height in. (mm)	Heat Sink Finish	Weight lbs. (grams)
602-100AP	.750" (19.1) sq	1.000" (25.4)	Plain	.021 (9.59)

Material: Aluminum, Plain Finish

**MECHANICAL DIMENSIONS**



**602 THERMAL PERFORMANCE**

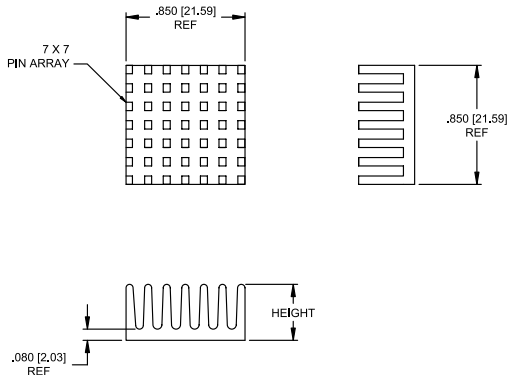


**604 SERIES** Omnidirectional Pin Fin Heat Sink for BGAs

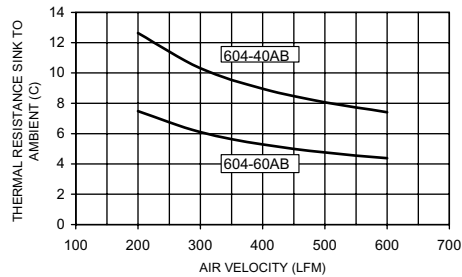
Standard P/N	Base Dimensions in.(mm)	Height in. (mm)	Heat Sink Finish	Weight lbs. (grams)
604-40AB	.850" (21.6) sq	.400" (10.2)	Black Anodized	.012 (5.60)
604-60AB	.850" (21.6) sq	.600" (15.2)	Black Anodized	.016 (7.47)

Material: Aluminum, Black Anodized

**MECHANICAL DIMENSIONS**



**604 THERMAL PERFORMANCE**





**PENGUIN™ COOLERS: HEAT SINKS FOR BGAs, SUPER BGAs, PBGAs, and FPBGAs**

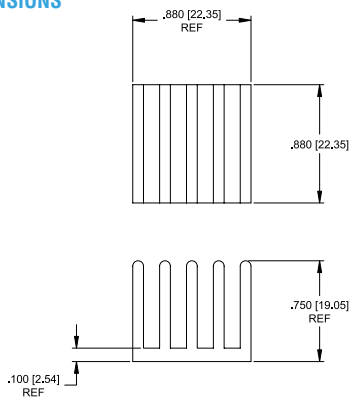


**605 SERIES** Unidirectional Fin Heat Sink for BGAs

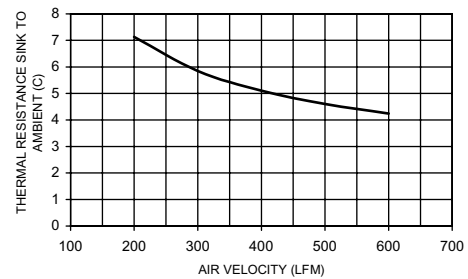
Standard P/N	Base Dimensions in.(mm)	Height in. (mm)	Heat Sink Finish	Weight lbs. (grams)
605-75AB	.880" (22.4) sq	.750" (19.1)	Black Anodized	.030 (13.5)

Material: Aluminum, Black Anodized

**MECHANICAL DIMENSIONS**



**605 THERMAL PERFORMANCE**

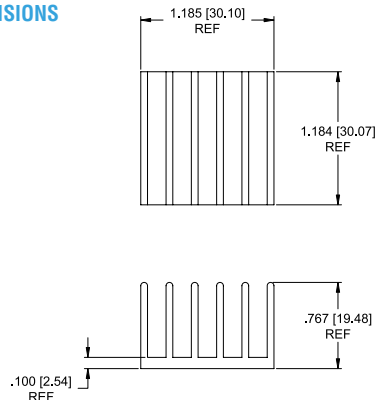


**606 SERIES** Unidirectional Fin Heat Sink for BGAs

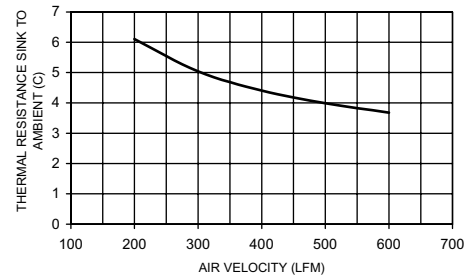
Standard P/N	Base Dimensions in.(mm)	Height in. (mm)	Heat Sink Finish	Weight lbs. (grams)
606-77AB	1.185" (30.1) sq	.767" (19.5)	Black Anodized	.041 (18.7)

Material: Aluminum, Black Anodized

**MECHANICAL DIMENSIONS**

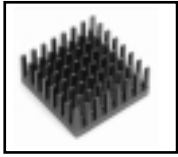


**606 THERMAL PERFORMANCE**





**PENGUIN™ COOLERS: HEAT SINKS FOR BGAs, SUPER BGAs, PBGAs, and FPBGAs**



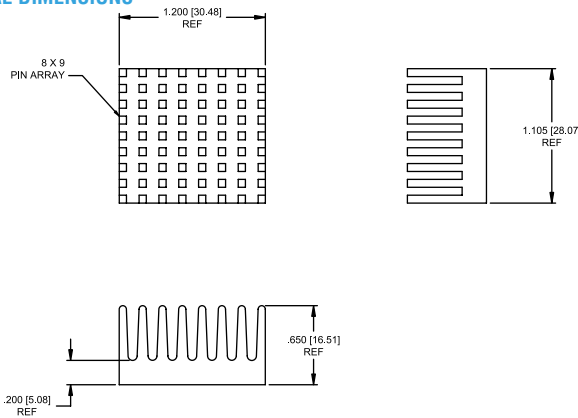
**607 SERIES**

Omnidirectional Pin Fin Heat Sink for BGAs

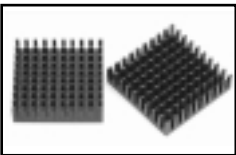
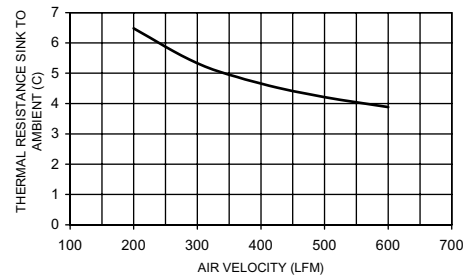
Standard P/N	Base Dimensions in.(mm)	Height in. (mm)	Heat Sink Finish	Weight lbs. (grams)
607-65AB	1.200" (30.5) x 1.105" (28.1)	.650" (16.5)	Black Anodized	.041 (18.7)

Material: Aluminum, Black Anodized

**MECHANICAL DIMENSIONS**



**607 THERMAL PERFORMANCE**



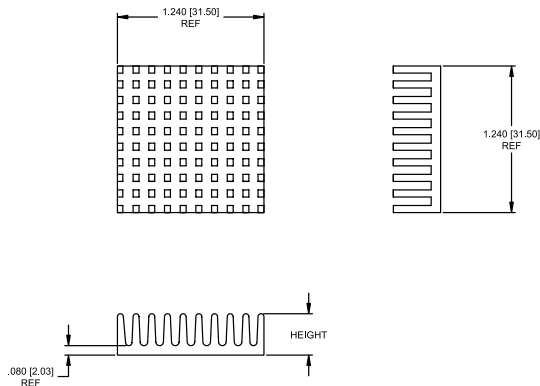
**610 SERIES**

Omnidirectional Pin Fin Heat Sink for BGAs

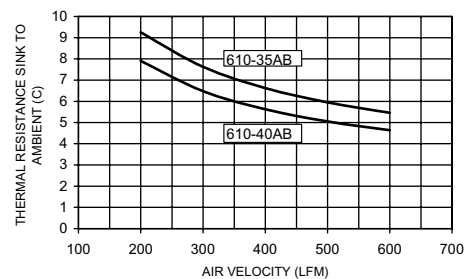
Standard P/N	Base Dimensions in.(mm)	Height in. (mm)	Heat Sink Finish	Weight lbs. (grams)
610-35AB	1.240" (31.5) sq	.350" (8.9)	Black Anodized	.022 (10.0)
610-40AB	1.240" (31.5) sq	.400" (10.2)	Black Anodized	.024 (10.8)

Material: Aluminum, Black Anodized

**MECHANICAL DIMENSIONS**

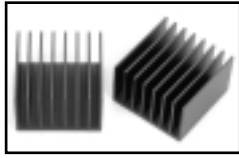


**610 THERMAL PERFORMANCE**





**PENGUIN™ COOLERS: HEAT SINKS FOR BGAs, SUPER BGAs, PBGAs, and FPBGAs**

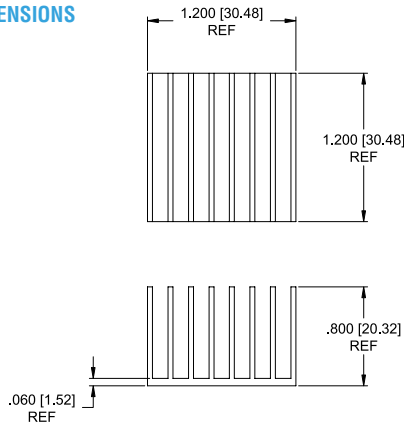


**611 SERIES** *Unidirectional Fin Heat Sink for BGAs*

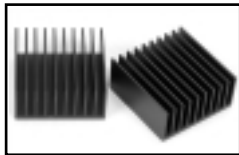
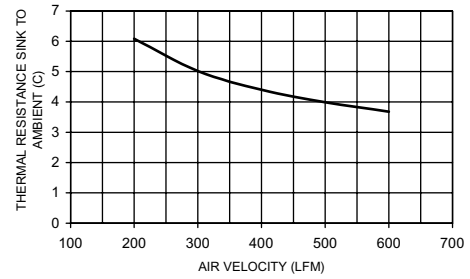
Standard P/N	Base Dimensions in.(mm)	Height in. (mm)	Heat Sink Finish	Weight lbs. (grams)
611-80AB	1.200" (30.5) sq	.800" (20.3)	Black Anodized	.036 (16.3)

Material: Aluminum, Black Anodized

**MECHANICAL DIMENSIONS**



**611 THERMAL PERFORMANCE**

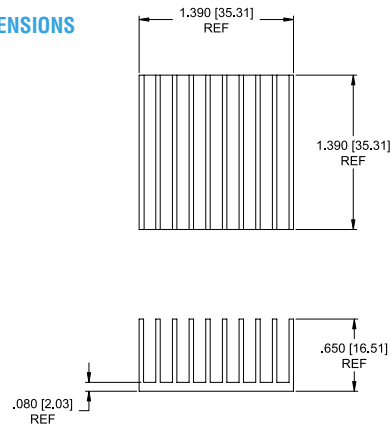


**612 SERIES** *Unidirectional Fin Heat Sink for BGAs*

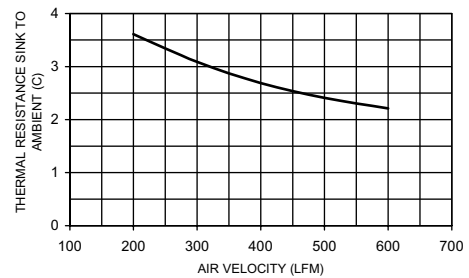
Standard P/N	Base Dimensions in.(mm)	Height in. (mm)	Heat Sink Finish	Weight lbs. (grams)
612-65AB	1.390" (35.3) sq	.650" (16.5)	Black Anodized	.054 (24.5)

Material: Aluminum, Black Anodized

**MECHANICAL DIMENSIONS**

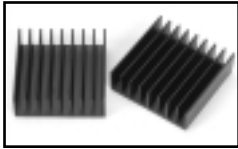


**612 THERMAL PERFORMANCE**





**PENGUIN™ COOLERS: HEAT SINKS FOR BGAs, SUPER BGAs, PBGAs, and FPBGAs**

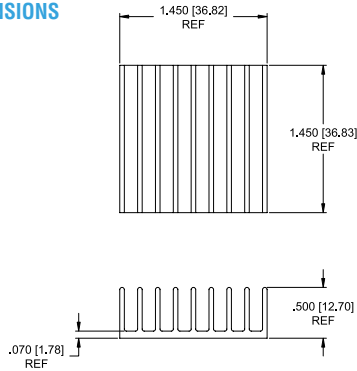


**613 SERIES** Unidirectional Fin Heat Sink for BGAs

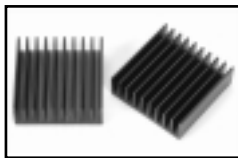
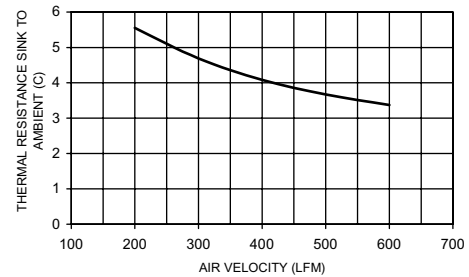
Standard P/N	Base Dimensions in.(mm)	Height in. (mm)	Heat Sink Finish	Weight lbs. (grams)
613-50AB	1.450" (36.8) sq	.500" (12.7)	Black Anodized	.046 (20.8)

Material: Aluminum, Black Anodized

**MECHANICAL DIMENSIONS**



**613 THERMAL PERFORMANCE**

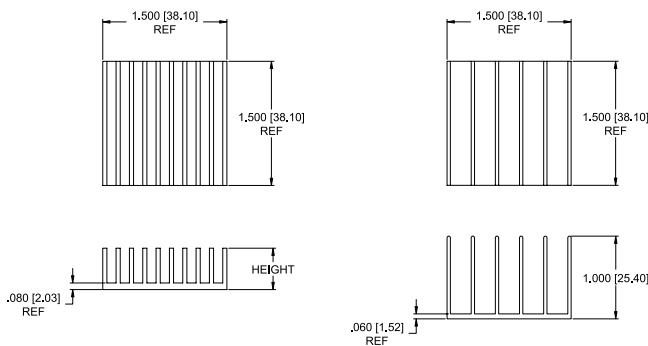


**614 SERIES** Unidirectional Fin Heat Sink for BGAs

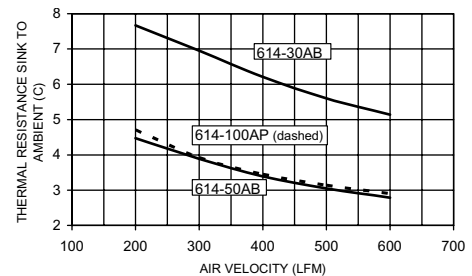
Standard P/N	Base Dimensions in.(mm)	Height in. (mm)	Heat Sink Finish	Weight lbs. (grams)
614-30AB	1.500" (38.1) sq	.300" (7.6)	Black Anodized	.030 (13.8)
614-50AB	1.500" (38.1) sq	.500" (12.7)	Black Anodized	.048 (21.8)
614-100AP	1.500" (38.1) sq	1.000" (25.4)	Plain	.046 (20.9)

Material: Aluminum, Black Anodize or Plain

**MECHANICAL DIMENSIONS**



**614 THERMAL PERFORMANCE**





**PENGUIN™ COOLERS: HEAT SINKS FOR BGAs, SUPER BGAs, PBGAs, and FPBGAs**

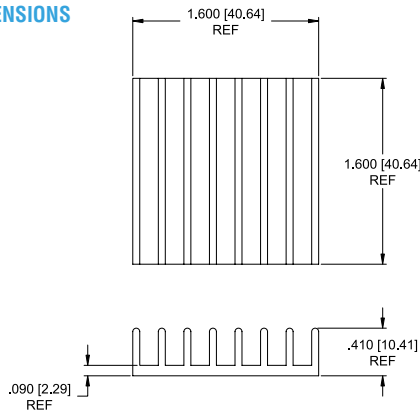


**615 SERIES** Unidirectional Fin Heat Sink for BGAs

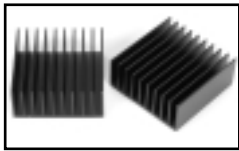
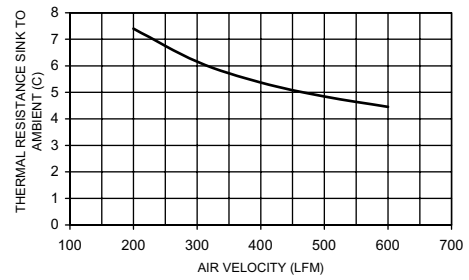
Standard P/N	Base Dimensions in.(mm)	Height in. (mm)	Heat Sink Finish	Weight lbs. (grams)
615-41AB	1.600" (40.6) sq	.410" (10.4)	Black Anodized	.046 (21.0)

Material: Aluminum, Black Anodized

**MECHANICAL DIMENSIONS**



**615 THERMAL PERFORMANCE**

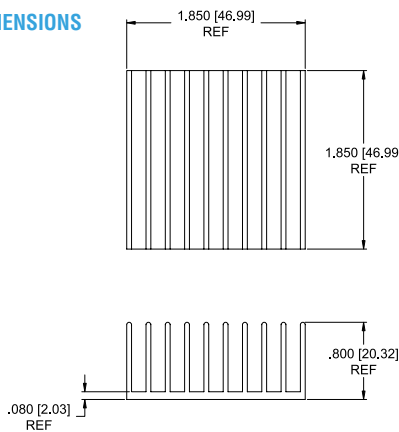


**616 SERIES** Unidirectional Fin Heat Sink for BGAs

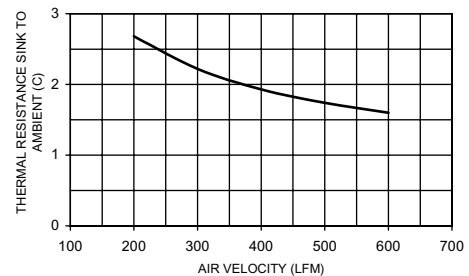
Standard P/N	Base Dimensions in.(mm)	Height in. (mm)	Heat Sink Finish	Weight lbs. (grams)
616-80AB	1.85" (47.0) sq	.800" (20.3)	Black Anodized	.054 (24.5)

Material: Aluminum, Black Anodized

**MECHANICAL DIMENSIONS**



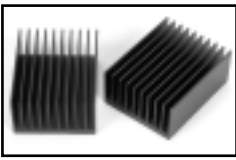
**616 THERMAL PERFORMANCE**







**PENGUIN™ COOLERS: HEAT SINKS FOR BGAs, SUPER BGAs, PBGAs, and FPBGAs**

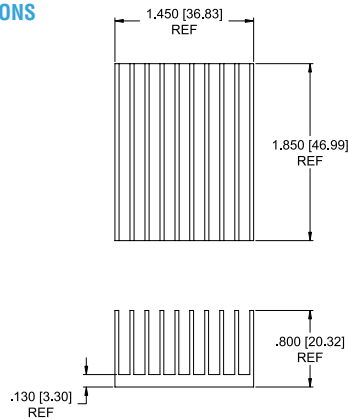


**617 SERIES** Unidirectional Fin Heat Sink for BGAs

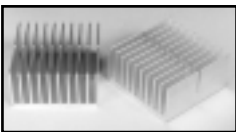
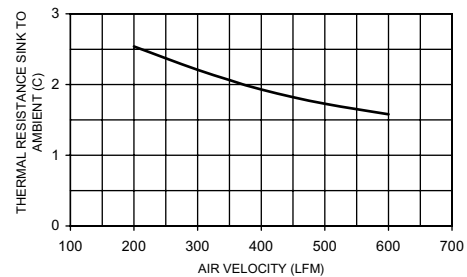
Standard P/N	Base Dimensions in.(mm)	Height in. (mm)	Heat Sink Finish	Weight lbs. (grams)
617-80AB	1.450" (36.8) x 1.850 (47.0)	.800" (20.3)	Black Anodized	.082 (37.2)

Material: Aluminum, Black Anodized

**MECHANICAL DIMENSIONS**



**617 THERMAL PERFORMANCE**

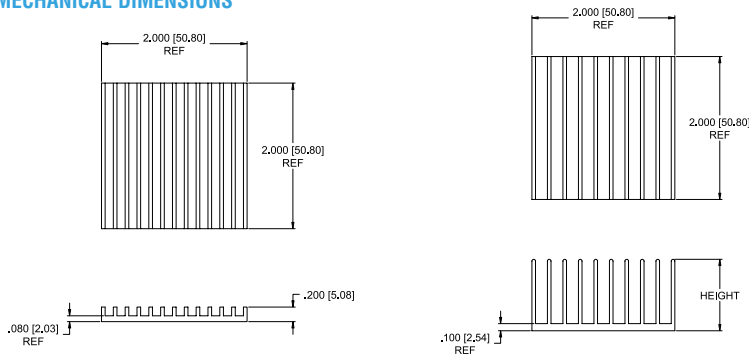


**618 SERIES** Unidirectional Fin Heat Sink for BGAs

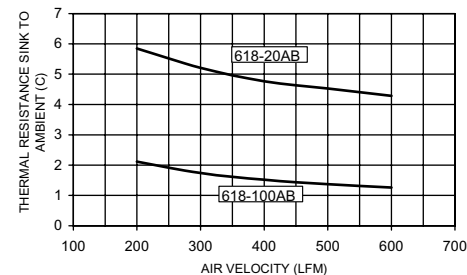
Standard P/N	Base Dimensions in.(mm)	Height in. (mm)	Heat Sink Finish	Weight lbs. (grams)
618-20AB	2.00" (50.8) sq	.200" (5.1)	Black Anodized	.046 (21.0)
618-100AB	2.00" (50.8) sq	1.000" (25.4)	Plain	.122 (55.5)

Material: Aluminum, Black Anodize or plain

**MECHANICAL DIMENSIONS**

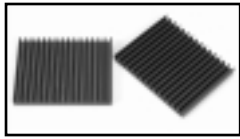


**618 THERMAL PERFORMANCE**





**PENGUIN™ COOLERS: HEAT SINKS FOR BGAs, SUPER BGAs, PBGAs, and FPBGAs**

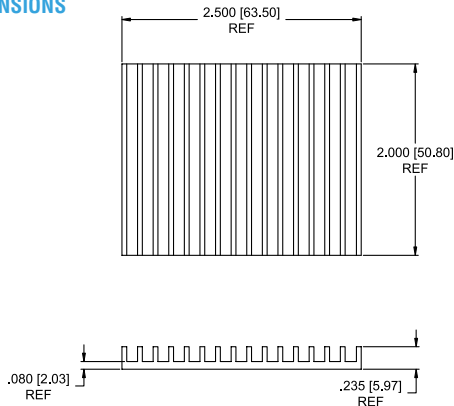


**620 SERIES** Unidirectional Fin Heat Sink for BGAs

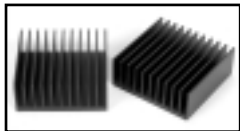
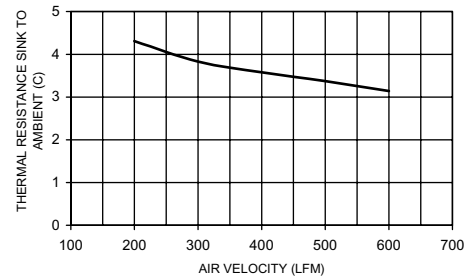
Standard P/N	Base Dimensions in.(mm)	Height in. (mm)	Heat Sink Finish	Weight lbs. (grams)
620-24AB	2.500" (63.5) x 2.000" (50.8)	.235" (6.0)	Black Anodized	.063 (28.6)

Material: Aluminum, Black Anodized

**MECHANICAL DIMENSIONS**



**620 THERMAL PERFORMANCE**

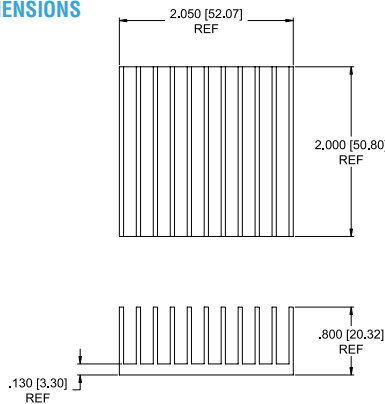


**622 SERIES** Unidirectional Fin Heat Sink for BGAs

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**

