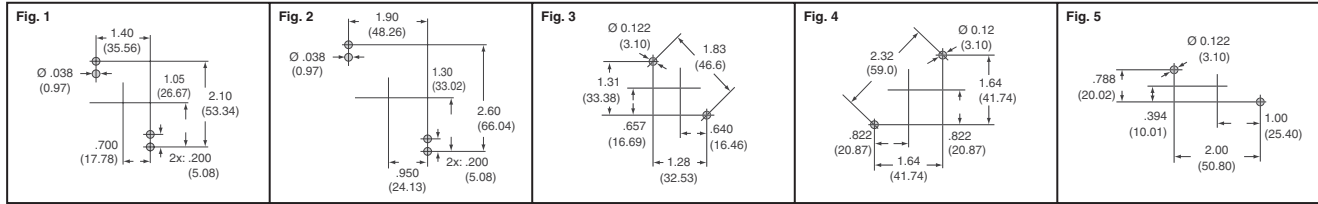




BGA Heat Sinks PCB Hole Patterns

Aavid Thermalloy's innovative BGA heat sinks include standard solutions to support the most demanding applications.
Features: • Flat base • Light weight • Long-term reliability

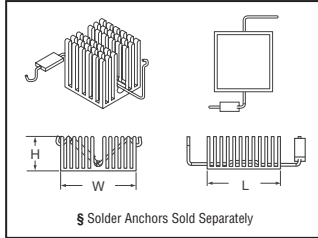


Solder Anchor Attachment Method

Features and Benefits:

- New unique wire clip design allows for complete reworkability after assembly without damage to the BGA package or PC Board
- Minimal PC Board real estate is required for mounting
- Solder Anchors provide the most rugged mounting in the industry
- Each Heat Sink utilizes a phase change pad as the interface for optimal thermal performance

Finish: Black Anodize

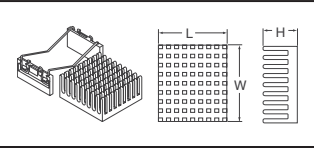


Clip Attachment Method

Features and Benefits:

- A unique clip eliminates the need for mounting holes in the PC Board
- Each Heat Sink utilizes a Phase Change Pad as the interface for optimal thermal performance
- The clips unique design eliminates the need for thermal tape attachment

Finish: Black Anodize



Width	Length	Height	Therm. Res. Nat.†	Therm. Res. Forced‡	Digi-Key Part No.	Price Each 1	Price Each 10	Price Each 100	Aavid Part No.
34.5	31.4	15.6	19.7	6.30	HS309-ND◆	5.57	5.02	3.90	25198-EP11-BGS5G
38.1	38.0	10.2	22.1	6.94	HS310-ND	5.47	4.93	3.83	25226-EP04-BGS5G

† Natural convection thermal resistance based on a 75°C heat sink temperature rise.
‡ Forced convection thermal resistance based on an entering 1.0 m/s (200 fpm) airflow.
◆ RoHS Compliant

Fig.	Width	Length	Height	Therm. Res. Nat.†	Therm. Res. Forced‡	Digi-Key Part No.	Price Each 1	Price Each 10	Price Each 100	Aavid Part No.
1	23.0	23.0	25.0	19.7	6.37	HS329-ND	3.55	3.20	2.49	374224B60023G
	27.0	27.0	25.0	16.5	5.47	HS330-ND	3.89	3.50	2.72	374524B60023G
	35.0	35.0	18.0	15.3	5.15	HS326-ND	3.16	2.85	2.22	374724B60024G
2	35.0	35.0	25.0	12.0	4.27	HS331-ND	4.63	4.17	3.25	374824B60024G
	40.0	40.0	10.0	20.3	6.46	HS327-ND	4.64	4.18	3.25	374924B60024G
	40.0	40.0	18.0	12.2	4.34	HS328-ND	4.85	4.37	3.40	375024B60024G
	40.0	40.0	25.0	10.3	3.83	HS332-ND	5.49	4.95	3.85	375124B60024G
	Solder Anchor						HS400-ND	.48	.44	.34

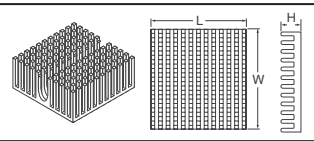
§ Solder anchors must be soldered to the PCB prior to attaching the heat sink clip.
† Natural convection thermal resistance based on a 75°C heat sink temperature rise.
‡ Forced convection thermal resistance based on an entering 1.0 m/s (200 fpm) airflow.

Tape Attachment Method

Features and Benefits:

- Tape mounted versions eliminate the need for mounting holes in the PC Board
- These Heat Sinks can be used with either plastic or metal/ceramic BGA Packages
- These Heat Sinks are compatible with Ther-a-grip Tapes

Finish: Black Anodize



Tape Surface	Width	Length	Height	Therm. Res. Nat.†	Therm. Res. Forced‡	Digi-Key Part No.	Price Each 1	Price Each 10	Price Each 100	Aavid Part No.
Plastic	23.0	23.0	10.0	40.0	11.69	HS316-ND◆	2.71	2.44	1.90	374024B00035G
	23.0	23.0	18.0	23.4	7.39	HS317-ND◆	2.77	2.49	1.94	374124B00035G
	27.0	27.0	10.0	30.6	9.35	HS318-ND◆	3.19	2.88	2.24	374324B00035G
	27.0	27.0	18.0	20.3	6.46	HS319-ND◆	3.41	3.08	2.39	374424B00035G
	30.0	30.0	9.4	29.4	9.11	HS390-ND◆	3.43	3.09	2.41	335824B00034G
	Metal	35.0	35.0	7.0	31.9	9.67	HS313-ND	3.73	3.36	2.61
35.0		35.0	7.0	31.9	9.67	HS392-ND◆	3.85	3.47	2.70	371824B00032G
35.0		35.0	7.0	31.9	9.67	HS393-ND◆	4.03	3.63	2.82	371824B00034G
35.0		35.0	10.0	23.4	7.55	HS395-ND◆	3.82	3.44	2.68	374624B00032G
35.0		35.0	10.0	23.4	7.55	HS321-ND◆	4.26	3.84	2.99	374624B00035G
35.0		35.0	18.0	15.3	5.15	HS322-ND	3.83	3.45	2.68	374724B00032G
35.0		35.0	18.0	15.3	5.15	HS396-ND◆	3.77	3.40	2.64	374724B00032G
35.0		35.0	18.0	15.3	5.15	HS323-ND◆	3.93	3.54	2.75	374724B00035G
37.4		37.4	6.0	32.6	9.91	HS394-ND◆	3.93	3.54	2.76	373324M00032G
40.0		40.0	10.0	20.3	6.46	HS397-ND◆	4.29	3.86	3.01	374924B00032G
40.0		40.0	18.0	12.2	4.34	HS398-ND◆	5.04	4.54	3.53	375024B00032G
40.1		40.1	11.4	18.4	6.02	HS312-ND	4.03	3.63	2.83	364424B00032G
40.1		40.1	11.4	18.4	6.02	HS391-ND◆	4.17	3.76	2.93	364424B00032G

† Natural convection thermal resistance based on a 75°C heat sink temperature rise.
‡ Forced convection thermal resistance based on an entering 1.0 m/s (200 fpm) airflow.
◆ RoHS Compliant

Push Pin Attachment Method

Features and Benefits:

- All Heat Sinks utilize industry standard hole patterns
- Plastic push pins are standard. Consult Aavid Thermalloy for versions available with brass push pins for more rugged applications
- Minimal diameter holes are necessary for mounting to PC Board

Finish: Black Anodize

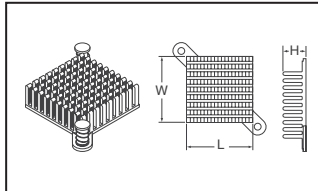


Fig.	Width	Length	Height	Therm. Res. Nat.†	Therm. Res. Forced‡	Digi-Key Part No.	Price Each 1	Price Each 10	Price Each 100	Aavid Part No.
3	28.5	28.5	10.0	30.6	9.26	HS306-ND	2.58	2.33	1.81	10-6327-01 REV B-G
4	37.4	37.4	6.0	32.6	9.91	HS308-ND§	3.39	3.06	2.38	372924M02000G
5	41.4	45.2	11.7	14.2	4.91	HS307-ND	3.24	2.92	2.27	10-L4L11G

† Natural convection thermal resistance based on a 75°C heat sink temperature rise.
‡ Forced convection thermal resistance based on an entering 1.0 m/s (200 fpm) airflow.
§ Finish: Green Anodize

Panasonic "PGS" (Pyrolytic Graphite Sheet) Heat Sink Sheets



PGS is a thermal interface material which is very thin, synthetically made, has high thermal conductivity, and is made from a highly oriented graphite polymer film. It is ideal for providing thermal management/heat-sinking in limited spaces or to provide supplemental heat-sinking in addition to conventional means. This material is flexible and can be cut into customizable shapes.

Features:

- Excellent Thermal Conductivity (2 - 4 times as high as copper, 3 - 6 times as high as aluminum) • Lightweight: Specific Gravity: 0.85 - 2.1 g/cm³ (1/4 - 1/10 of copper, 1/1.3 - 1/3 of aluminum in density) • Flexible and easy to be cut or trimmed (withstands repeated bending) • Low Thermal Resistance

Application Examples:

- Notebook PCs, DVDs, DVCs, Mobile Phones • Semiconductor Manufacturing Equipment (Sputtering, Dry Etching, Steppers) • Optical Communications Equipment

Characteristics	Specification		
Thickness	0.1±0.03mm	0.07±0.015mm	0.025±0.01mm
Density	0.85 g/cm ³	1.1 g/cm ³	2.1 g/cm ³
Thermal Conductivity (a-b plane)	600 - 800 W/(m.K)	750 - 950 W/(m.K)	1500 - 1700 W/(m.K)
Electrical Conductivity	10000 S/cm	10000 S/cm	20000 S/cm
Expansion Coefficient (a-b plane)	9.3 x 10 ⁻⁷ /K		
Expansion Coefficient (c axis)	3.2 x 10 ⁻⁵ /K		
Heat Resistance	400°C		
Bending (angle, R5)	10000 cycles		

Dimensions L x W (mm)	Digi-Key Part No.	Price Each	Panasonic Part No.
125 x 180	P11438-ND	104.48	EGY-S131810
125 x 90	P11439-ND	57.46	EGY-S091310
115 x 180	P13689-ND	71.38	EGY-S121807
115 x 180	P13691-ND	71.38	EGY-S121803
90 x 115	P12726-ND	36.44	EGY-S091210
90 x 115	P13688-ND	35.69	EGY-S091207
90 x 115	P13690-ND	35.69	EGY-S091203
60 x 90	P11440-ND	29.88	EGY-S060910
57 x 90	P12727-ND†	33.53	EGY-M060910SS
57 x 90	P12728-ND‡	19.92	EGY-A060910P
57 x 90	P12729-ND‡	19.92	EGY-A060910B

† With Silicon ‡ With Tape



Heat Sink Grease



For fast heat transfer from components.

Features:

- Nonflammable • Noncorrosive • Silicon • Will not dry out, harden or melt • 5 oz. tube • Meets MIL-C-47113
- Stable from: -40°F ~ 392°F (-40°C ~ 200°C)

Digi-Key Part No.	Price Each 1	Price Each 25	Price Each 100	ITW Chemtronics Part No.
CT40-5-ND	19.19	17.34	16.19	CT40-5

More Product Available Online: www.digkey.com

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