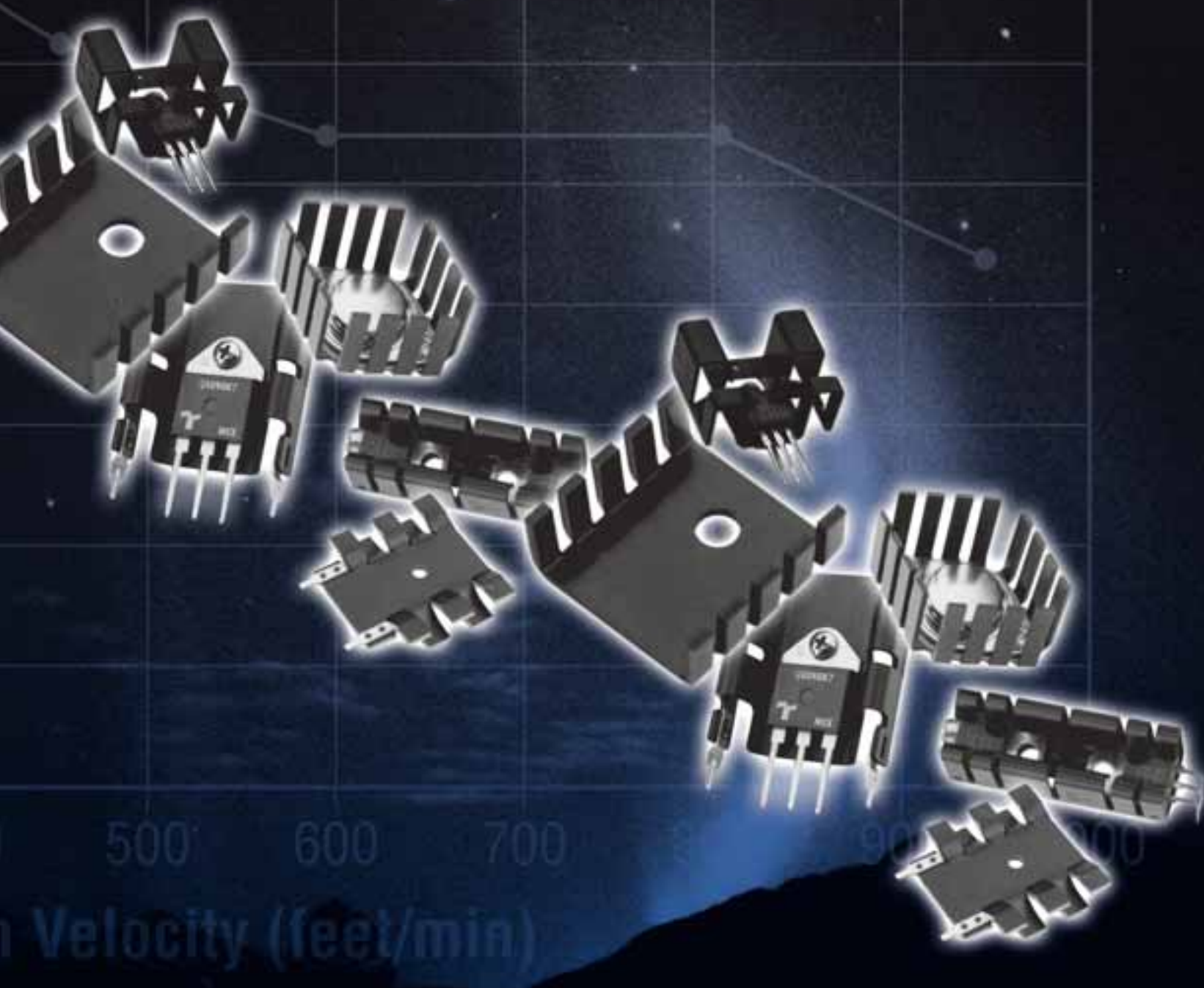
Wakefield Thermal Solutions

"Thermal Management Solutions and Aluminum Extrusions since 1957"

STAMPED HEAT SINKS

for Low Power Devices



INTRODUCTION

Wakefield Thermal Solutions, Inc. offers a wide range of board level power semiconductor heat sinks for surface mount and thru hole devices, including JEDEC/EIA registered outlines TO-3, TO-218, TO-247, and TO-263 (D2PAK). Also covered are MULTIWATT® and axial lead devices. These products are available in stamped aluminum, and selected stampings are manufactured from copper.

A Full line catalog is also available. To receive your copy, please contact your local sales representative, phone our corporate headquarters, email us at info@wakefield.com, or visit us on the web at www.wakefield.com.

DON'T FORGET THE ACCESSORIES!

Many of the heat sinks in this catalog are designed to attach to the component using Wakefield's SpeedClips™, clips integral to the heat sink, or threaded fasteners from other suppliers. Check the individual product descriptions for the appropriate mounting method.

Wakefield Thermal Solutions, Inc. thermal interface materials such as DeltaBOND™, DeltaPAD™, and 120/126 Series thermal joint compounds are designed to facilitate installation and improve thermal performance.
Check the full line catalog or web site for more information.

ABOUT WAKEFIELD THERMAL SOLUTIONS, INC.

Thermal Management Solutions for Electronics

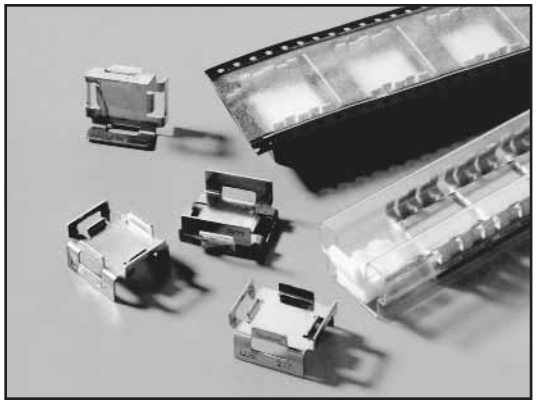
- *Leadership in design*
- *Applications Engineering and sales support worldwide*
- *Aggressive implementation of world-class manufacturing concepts*

Wakefield Thermal Solutions, Inc. is recognized as the worldwide leader in innovative thermal management solutions for a diverse range of commercial, industrial, and military markets.

More than 40 years of heat transfer design, analysis, manufacture, and fabrication expertise of components, systems, and assemblies is now joined with an aggressive commitment to customer support, product designs, and engineering services.

Wakefield Thermal Solutions, Inc. offers components and system level thermal management solutions for utilization in business equipment, computers, consumer electronics, automotive, industrial controls, instrumentation, integrated circuits, medical, laser, power conversion, telecommunications, transportation, and welding applications.

BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS



217 SERIES ***Surface Mount Heat Sinks***

D^2PAK, TO-220, SOT-223, SOL-20

Compatible with surface mount technology (SMT) automated production techniques for ease of assembly and a variety of soldering methods, these heat sinks allow greater packaging densities and reduction in PC-board area, increasing the power dissipation of surface mount devices (SMDs) while maintaining and improving manufacturers' component thermal specifications.

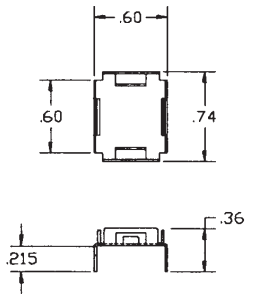
FEATURES AND BENEFITS:

- No interface material is needed
- Copper with tin-lead plating for improved solderability and assembly
- Both the component and the heat sink are installed on the PC-board utilizing standard SMT assembly equipment for "Tape & Reel" and "Tube" formats
- EIA standards and ESD protection are specified
- Can be used with water soluble or no clean SMT solder creams or other pastes

Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Package Format	Package Quantity	Thermal Performance at Typical Load Natural Convection	Forced Convection)
217-36CT6 ▲	.360 (9.1)	.600 (15.2) x .740 (18.8)	Bulk	1	55°C @ 1W	16.0°C/W @ 200 LFM
217-36CTT6	.360 (9.1)	.600 (15.2) x .740 (18.8)	Tube	20	55°C @ 1W	16.0°C/W @ 200 LFM
217-36CTR6▲	.360 (9.1)	.600 (15.2) x .740 (18.8)	Tape & Reel	250	55°C @ 1W	16.0°C/W @ 200 LFM

Material: Copper, Tin, Lead Plated

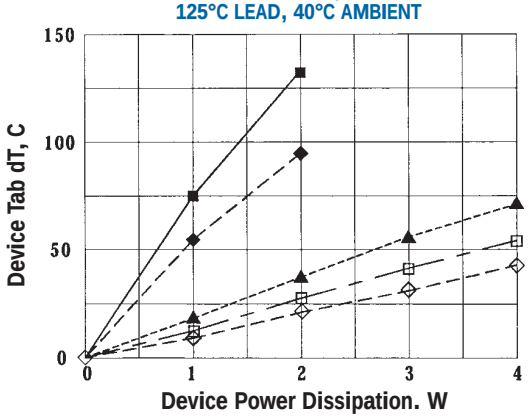
MECHANICAL DIMENSIONS



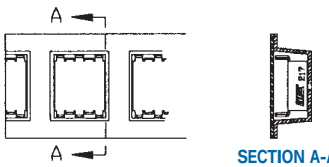
217-36CT6

217 HEAT SINK WITH DDPAK DEVICE

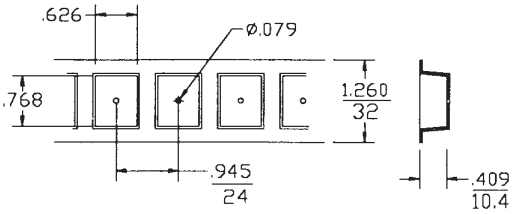
THERMAL PERFORMANCE 6 LAYER BOARD, D'PAK 125°C LEAD, 40°C AMBIENT



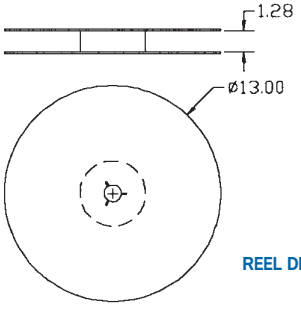
KEY: ■ Device only, NC ◆ Device + HS, NC ▲ Device + HS, 100 lfm □ Device + HS, 200 lfm ◇ Device + HS, 300 lfm



SECTION A-A



TAPE DETAILS



REEL DETAILS

NOTES
1. Material to be "ESD"
2. Approximately 6 Meters per Reel
3. 250 Pieces per Reel.

217-36CTR6

Dimensions: in.

BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS

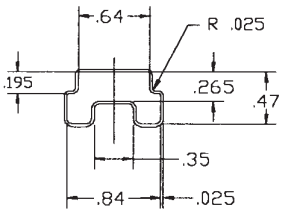
217 SERIES ***Surface Mount Heat Sinks***

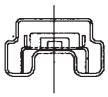
D^2PAK, TO-220, SOL-20

MECHANICAL DIMENSIONS

217 SERIES

TUBE DETAILS

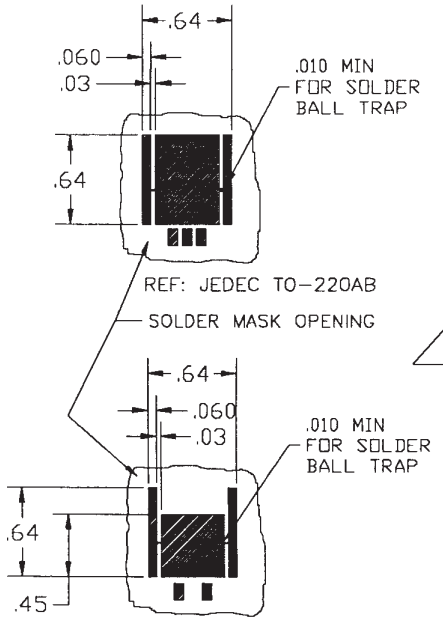




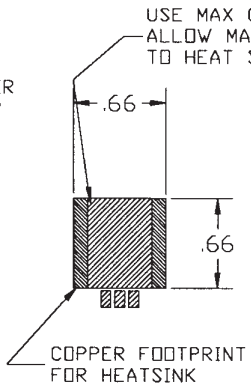
TUBE: 16.25 Inches Long,
Min. ESD Material with Nail Stops
20 Pieces per Tube

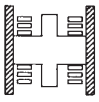
217-36CTT6

BOARD LAYOUT RECOMMENDATIONS

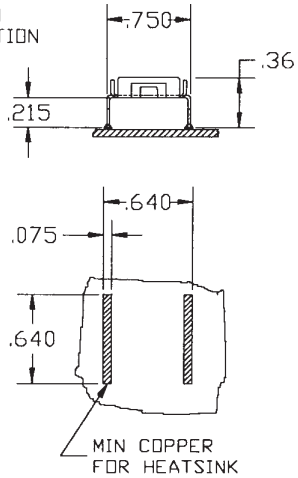


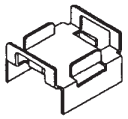
REF: JEDEC TO-263 (DD PAK)
REF: JEDEC MO-169 (DD PAK)





SOL 20





217-36CT6

Dimensions: in.

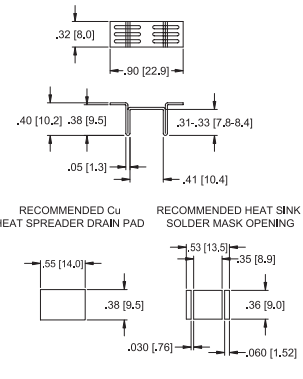
218 SERIES ***Surface Mount Heat Sink***

SMT Devices

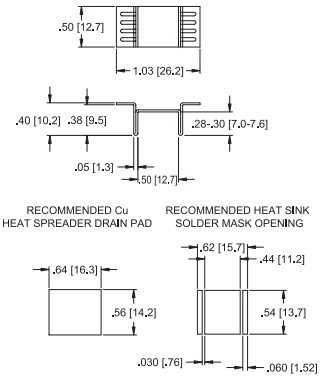
Standard P/N	Height Above PC Board	Maximum Footprint	Thermal Performance at Typical Load Natural Convection	Forced Convection
218-40CT3	.40" (10.2)	.90"(22.9) x .315"(8.0)	62°C rise @ 2W	21°C/W @ 200LFM
218-40CT5	.40" (10.2)	1.03"(26.2) x .50"(12.7)	62°C rise @ 2W	21°C/W @ 200LFM

Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS

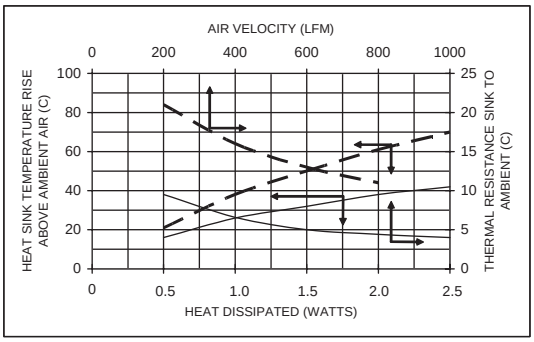


218-40CT3



218-40CT5

NATURAL AND FORCED CONVECTION CHARACTERISTICS



Solid line = 218-40CT5 Dashed Line = 218-40CT3

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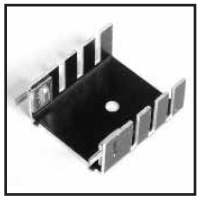
BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS



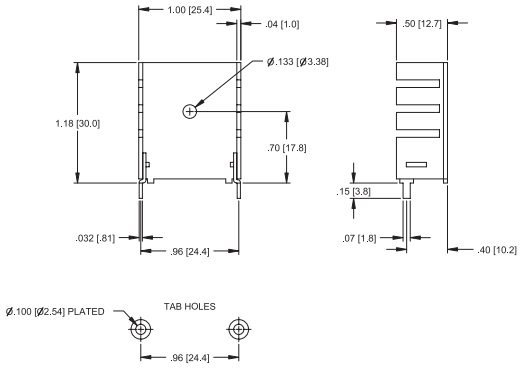
206 SERIES *Vertical Mount Heat Sink*

TO-220

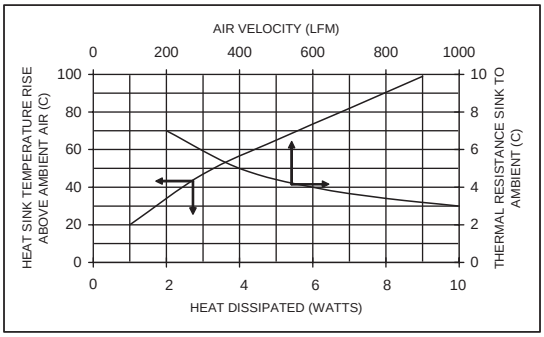
Standard P/N	Height Above PC Board	Maximum Footprint	Thermal Performance at Typical Load Natural Convection	Forced Convection
206-1PABH	1.18"(30.0)	1.00"(25.4) x .50"(12.7)	56°C rise @ 4W	7.3°C/W @ 200LFM

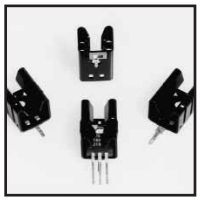
Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS



NATURAL AND FORCED CONVECTION CHARACTERISTICS





PATENT PENDING

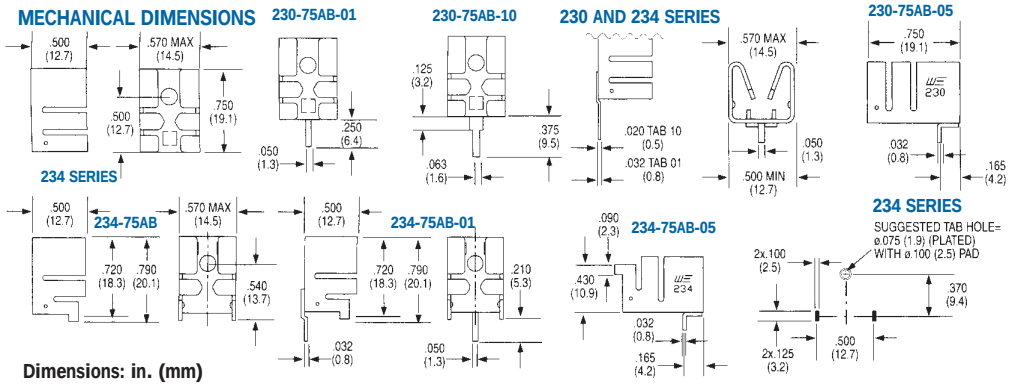
230 AND 234 SERIES *Compact, Wavesolderable Low-Profile Self-Locking Heat Sinks*

TO-220

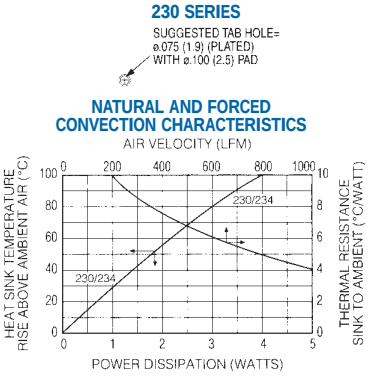
Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuation	Solderable Tab Option	Mounting Style	Thermal Performance at Typical Load Natural Convection	Forced Convection)
230-75AB ▲	.750 (19.1)	.570 (14.5) x .500 (12.7)	Vert./Horiz.	No Tab	Clip/Mtg Hole	57°C @ 2W	7.5°C/W @ 400 LFM
230-75AB-01	.750 (19.1)	.570 (14.5) x .500 (12.7)	Vertical	01	Clip/Mtg Hole	57°C @ 2W	7.5°C/W @ 400 LFM
230-75AB-05	.500 (12.7)	.750 (19.1) x .570 (14.5)	Horizontal	05	Clip/Mtg Hole	57°C @ 2W	7.5°C/W @ 400 LFM
230-75AB-10	.875 (22.2)	.570 (14.5) x .500 (12.7)	Vertical	10	Clip/Mtg Hole	57°C @ 2W	7.5°C/W @ 400 LFM
234-75AB	.790 (20.0)	.570 (14.5) x .500 (12.7)	Vert./Horiz	No Tab	Clip/Mtg Hole	57°C @ 2W	7.5°C/W @ 400 LFM
234-75AB-01	.790 (20.0)	.570 (14.5) x .500 (12.7)	Vertical	01	Clip/Mtg Hole	57°C @ 2W	7.5°C/W @ 400 LFM
234-75AB-05	.500 (12.7)	.790 (20.0) x .570 (14.5)	Horizontal	05	Clip/Mtg Hole	57°C @ 2W	7.5°C/W @ 400 LFM

Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS



230 SERIES



BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS

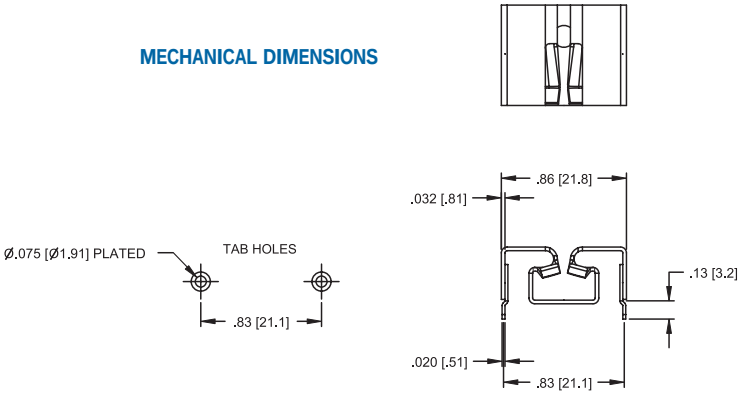
241 SERIES *Horizontal Mount Heat Sink*

TO-220

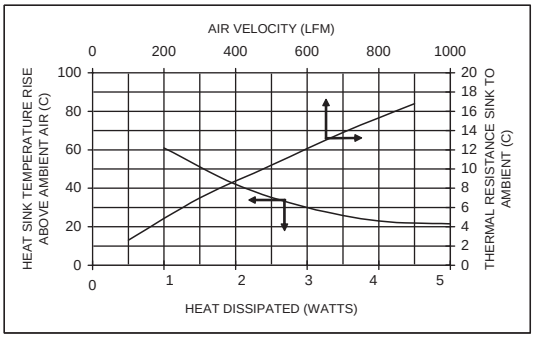
Standard P/N	Height Above PC Board	Maximum Footprint	Thermal Performance at Typical Load Natural Convection	Forced Convection
241-69AB-03	.39"(9.9)	.86"(21.8) x .69"(17.5)	77°C rise @ 4W	12°C/W @ 200LFM

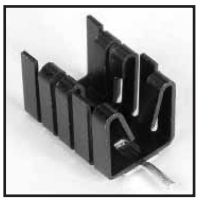
Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS



NATURAL AND FORCED CONVECTION CHARACTERISTICS





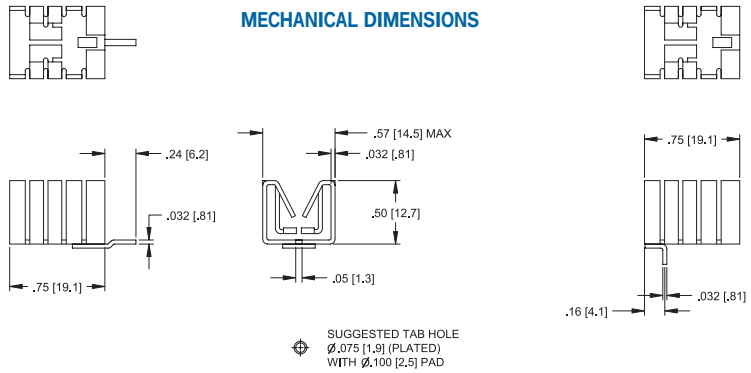
262 SERIES *Horizontal and Vertical Mount Heat Sink*

TO-220

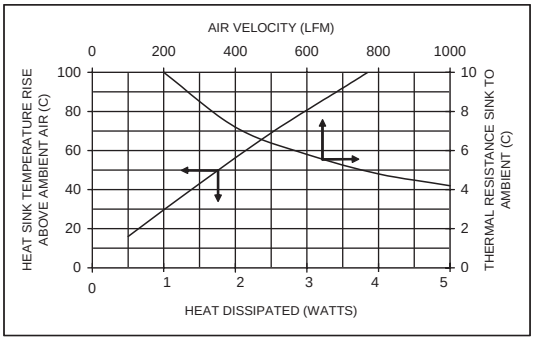
Standard P/N	Height Above PC Board	Maximum Footprint	Thermal Performance at Typical Load Natural Convection	Forced Convection
262-75AB-05	.53" (13.4)	.75"(19.1) x .50"(12.7)	80°C rise @ 3W	10°C/W @ 200LFM
262-75AB-01	.75" (19.1)	.53"(13.4) x .50"(12.7)	80°C rise @ 3W	10°C/W @ 200LFM

Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS



NATURAL AND FORCED CONVECTION CHARACTERISTICS



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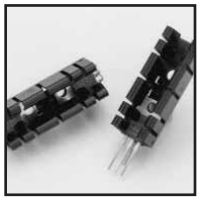
BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS



PATENT PENDING

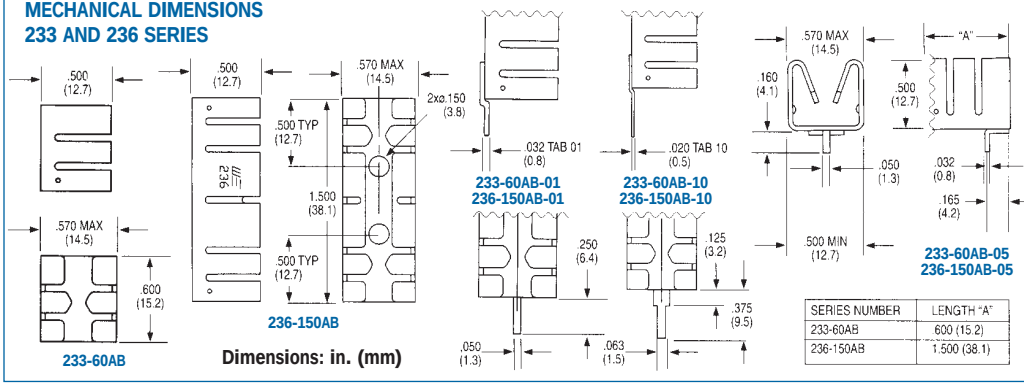
233 AND 236 SERIES — *Self-Locking Wavesolderable Heat Sinks*

TO-220

Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuration	Solderable Tab Options	Mounting Style	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection
233-60AB ▲	.600 (15.2)	.570 (14.5) x .500 (12.7)	Vert./Horiz.	No Tab	Clip/Mtg Hole	58°C @ 2W	11.0°C/W @ 400 LFM
233-60AB-01	.600 (15.2)	.570 (14.5) x .500 (12.7)	Vertical	01	Clip/Mtg Hole	58°C @ 2W	11.0°C/W @ 400 LFM
233-60AB-05	.500 (12.7)	.600 (15.2) x .570 (14.5)	Horizontal	05	Clip/Mtg Hole	58°C @ 2W	11.0°C/W @ 400 LFM
233-60AB-10 ▲	.725 (18.4)	.570 (14.5) x .500 (12.7)	Vertical	10	Clip/Mtg Hole	58°C @ 2W	11.0°C/W @ 400 LFM
236-150AB	1.500 (38.1)	.570 (14.5) x .500 (12.7)	Vert./Horiz	No Tab	Clip/Mtg Hole	58°C @ 2W	4.80°C/W @ 400 LFM
236-150AB-01	1.500 (38.1)	.570 (14.5) x .500 (12.7)	Vertical	01	Clip/Mtg Hole	58°C @ 2W	4.80°C/W @ 400 LFM
236-150AB-05 ▲	.500 (12.7)	1.500 (38.1) x .570 (14.5)	Horizontal	05	Clip/Mtg Hole	58°C @ 2W	4.80°C/W @ 400 LFM
236-150AB-10	1.625 (41.3)	.570 (14.5) x .570 (12.7)	Vetrical	10	Clip/Mtg Hole	58°C @ 2W	4.80°C/W @ 400 LFM

Material: Aluminum, Black Anodized

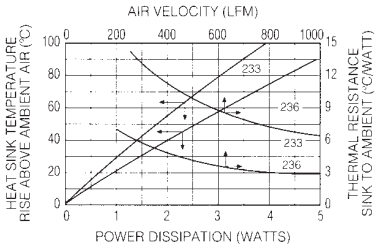
MECHANICAL DIMENSIONS 233 AND 236 SERIES



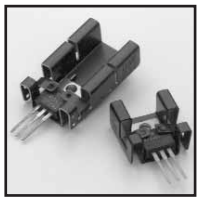
Dimensions: in. (mm)

SERIES NUMBER	LENGTH "A"
233-60AB	.600 (15.2)
236-150AB	1.500 (38.1)

NATURAL AND FORCED CONVECTION CHARACTERISTICS



SUGGESTED TAB HOLE = Ø.075 (1.9) (PLATED) WITH Ø.100 (2.5) PAD



PATENT 5381041

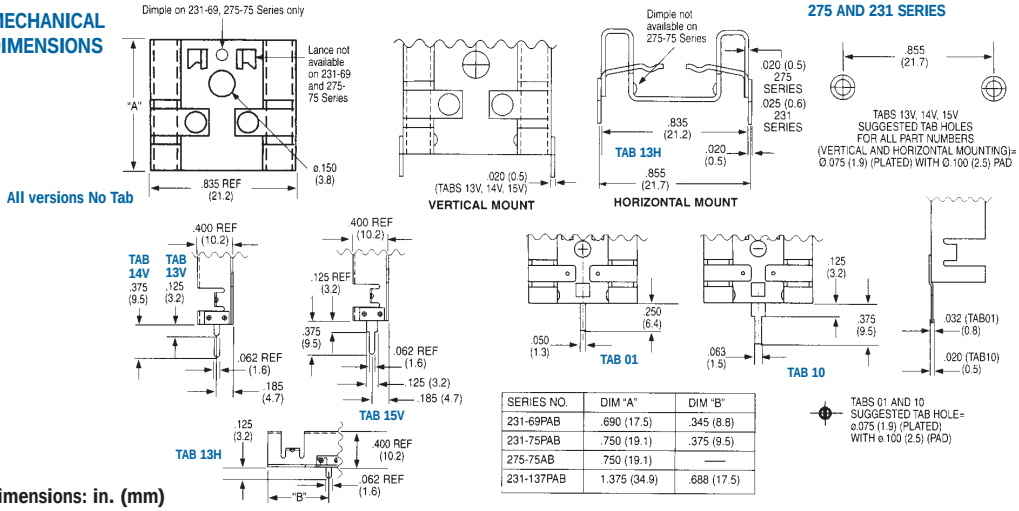
275 AND 231 SERIES — *Compact, Stress-Free Labor-Saving Locking-Tab Heat Sinks*

TO-220

Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuration	Solderable Tab Options	Mounting Style	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection
275-75AB	.750 (19.1)	.835 (21.2) x .400 (12.7)	Vert./Horiz.	No Tab	Clip/Mtg Hole	44 C @ 2W	7.9°C/W @ 400 LFM
275-75AB-01	.750 (19.1)	.835 (21.2) x .400 (12.7)	Vertical	01	Clip/Mtg Hole	44°C @ 2W	7.9°C/W @ 400 LFM
275-75AB-10	.875 (12.7)	.835 (21.2) x .400 (14.5)	Vertical	10	Clip/Mtg Hole	44°C @ 2W	7.9°C/W @ 400 LFM
231-69PAB	.690 (18.4)	.835 (21.2) x .400 (12.7)	Vert./Horiz.	No Tab	Clip/Mtg Hole	45°C @ 2W	8°C/W @ 400 LFM
231-69PAB-13H	.400 (38.1)	.690 (17.5) x .835 (12.7)	Horizontal	13H	Clip/Mtg Hole	45°C @ 2W	8°C/W @ 400 LFM
231-69PAB-XXX	.690 (38.1)	.835 (21.2) x .400 (12.7)	Vertical	13V, 14V, 15V	Clip/Mtg Hole	45°C @ 2W	8°C/W @ 400 LFM
231-75PAB	.750 (12.7)	.835 (21.2) x .400 (14.5)	Vert./Horiz.	No Tab	Clip/Mtg Hole	43°C @ 2W	7.9°C/W @ 400 LFM
231-75PAB-13H	.400 (41.3)	.750 (19.1) x .835 (12.7)	Horizontal	13H	Clip/Mtg Hole	43°C @ 2W	7.9°C/W @ 400 LFM
(14V ▲) 231-75PAB-XXX	.750 (34.9)	.835 (21.2) x .400 (12.7)	Vertical	13V, 14V, 15V	Clip/Mtg Hole	43°C @ 2W	7.9°C/W @ 400 LFM
231-137PAB	1.375 (10.2)	.835 (21.2 x .400 (12.7)	Vert./Horiz.	No Tab	Clip/Mtg Hole	32°C @ 2W	5.9°C/W @ 400 LFM
231-137PAB-13H	.400 (10.2)	1.375 (34.9) x .835 (12.7)	Horizontal	13H	Clip/Mtg Hole	32°C @ 2W	5.9°C/W @ 400 LFM
(15V▲) 231-137PAB-XXX	1.375 (10.2)	.835 (21.2) x .400 (12.7)	Vertical	13V, 14V, 15V	Clip/Mtg Hole	32°C @ 2W	5.9°C/W @ 400 LFM

Material: Aluminum, Pre-anodized Black (PAB), Anodized Black (AB)

MECHANICAL DIMENSIONS

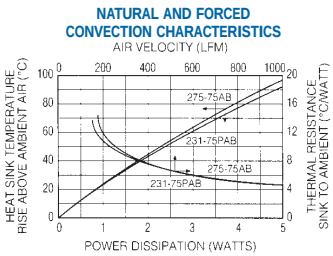


SERIES NO.	DIM "A"	DIM "B"
231-69PAB	.690 (17.5)	.345 (8.8)
231-75PAB	.750 (19.1)	.375 (9.5)
275-75AB	.750 (19.1)	—
231-137PAB	1.375 (34.9)	.688 (17.5)

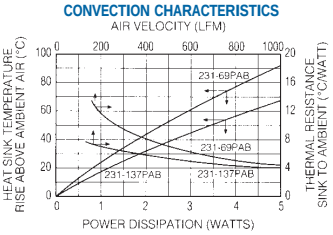
TABS 01 AND 10 SUGGESTED TAB HOLE= ø.075 (1.9) (PLATED) WITH ø.100 (2.5) (PAD)

Dimensions: in. (mm)

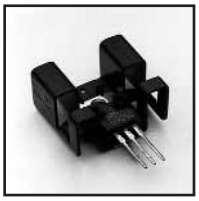
NATURAL AND FORCED CONVECTION CHARACTERISTICS



NATURAL AND FORCED CONVECTION CHARACTERISTICS



BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS



PATENT 5381041

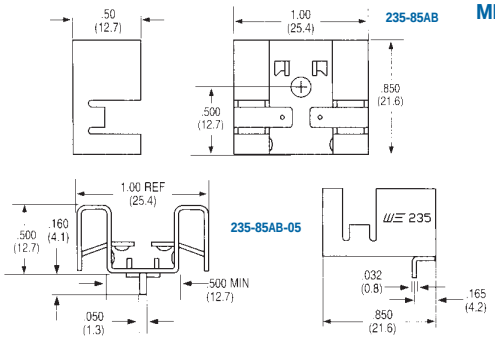
235 SERIES — *Compact, Stress-Free Labor-Saving Locking-Tab Heat Sinks*

TO-220

Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuration	Solderable Tab Options	Mounting Style	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection
235-85AB ▲	.850 (21.6)	1.000 (25.4) x .500 (12.7)	Vert./Horiz.	No Tab	Clip/Mtg Hole	40°C @ 2W	6.8°C/W @ 400 LFM
235-85AB-01	.850 (21.6)	1.000 (25.4) x .500 (12.7)	Vertical	01	Clip/Mtg Hole	40°C @ 2W	6.8°C/W @ 400 LFM
235-85AB-05	.500 (12.7)	.850 (21.6) x 1.000 (25.4)	Horizontal	05	Clip/Mtg Hole	40°C @ 2W	6.8°C/W @ 400 LFM
235-85AB-10	.975 (24.8)	1.000 (25.4) x .500 (12.7)	Vertical	10	Clip/Mtg Hole	40°C @ 2W	6.8°C/W @ 400 LFM

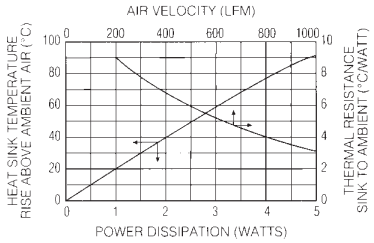
Material: Aluminum, Black Anodized

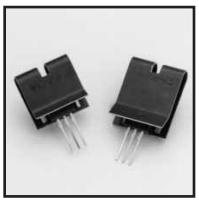
MECHANICAL DIMENSIONS



Dimensions: in. (mm)

235 SERIES — NATURAL AND FORCED CONVECTION CHARACTERISTICS





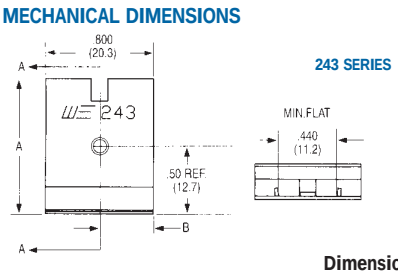
243 SERIES — *Labor-Saving Clip-On Heat Sinks*

TO-220

Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuration	Solderable Tab Options	Mounting Style	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection
243-1PAB	1.000 (25.4)	.800 (20.3) x .270 (6.9)	Vert./Horiz.	No Tab	Clip	50°C@ 2W	4.5°C/W @ 400 LFM
243-3PAB ▲	.800 (20.3)	.800 (20.3) x .270 (6.9)	Verl./Horiz.	No Tab	Clip	78°C@ 2W	8.2°C/W @ 400 LFM

Material: Aluminum, Pre-anodized Black

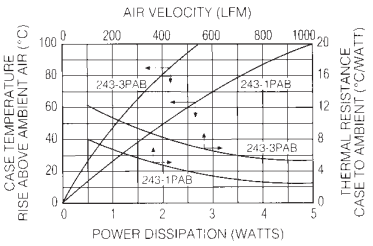
MECHANICAL DIMENSIONS



PART NUMBER	DIM A
243-1PAB	1.000 (25.4)
243-3PAB	.800 (20.3)

Dimensions: in. (mm)

NATURAL AND FORCED CONVECTION CHARACTERISTICS



PATENT PENDING

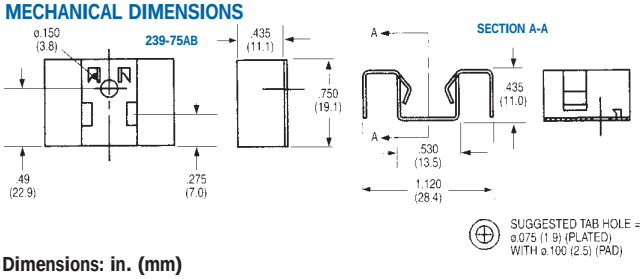
239 SERIES — *Snap-Down Self-Locking Heat Sinks*

TO-220

Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuration	Solderable Tab Options	Mounting Style	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection
239-75AB	.750 (19.1)	1.120 (28.4) x .435 (11.0)	Vert./Horiz	No Tab	Clip/Mtg Hole	38°C @ 2W	6°C/W @ 400 LFM
239-75AB-03	.750 (19.1)	1.120 (28.4) x .435 (11.0)	Vertical	03	Clip/Mtg Hole	38°C @ 2W	6°C/W @ 400 LFM
239-75AB-04	.750 (19.1)	1.120 (28.4) x .435 (11.0)	Vertical	04	Clip/Mtg Hole	38°C @ 2W	6°C/W @ 400 LFM

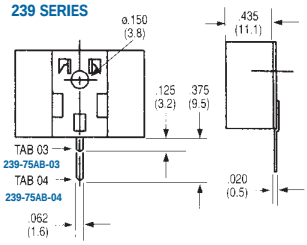
Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS

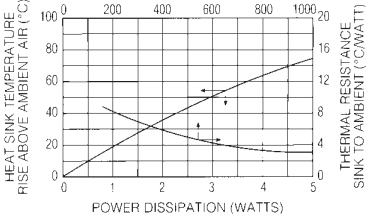


Dimensions: in. (mm)

239 SERIES



NATURAL AND FORCED CONVECTION CHARACTERISTICS



▲ Normally stocked

All other products, please contact factory for price, delivery, and minimums.

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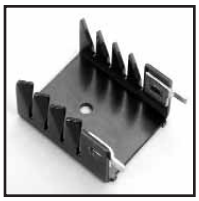
"Thermal Management Solutions and Aluminum Extrusions since 1957"

BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS



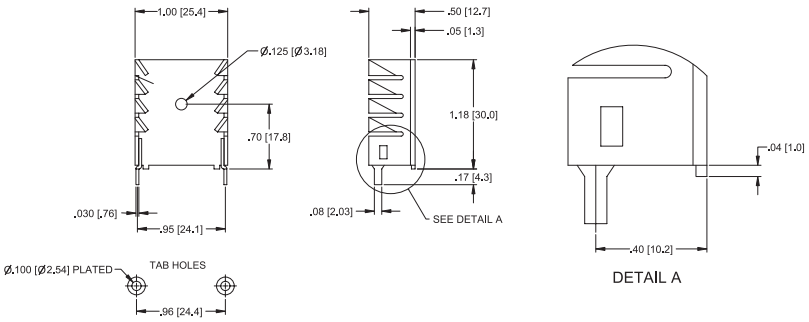
265 SERIES *Vertical Mount Heat Sink*

TO-220

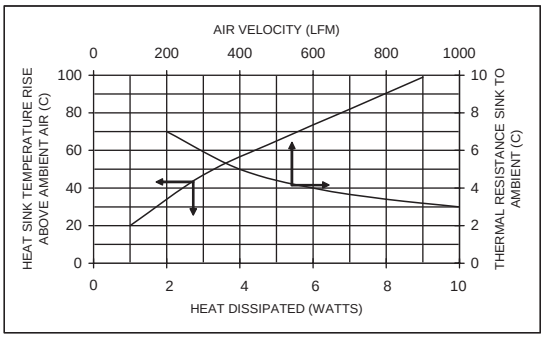
Standard P/N	Height Above PC Board	Maximum Footprint	Thermal Performance at Typical Load	
			Natural Convection	Forced Convection
265-118ABH-22	1.18"(30.0)	1.00"(25.4) x .50"(12.7)	56°C rise @ 4W	7.0°C/W @ 200LFM

Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS



NATURAL AND FORCED CONVECTION CHARACTERISTICS



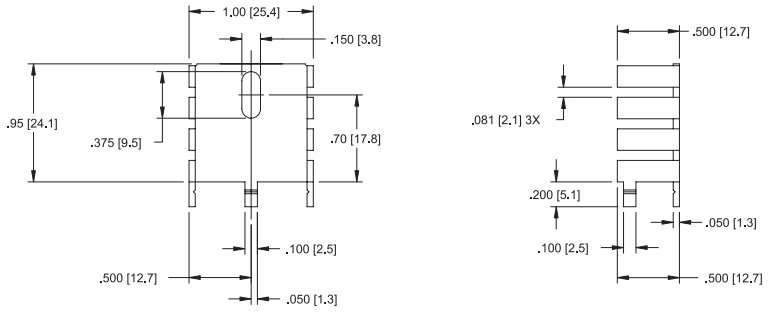
286DB SERIES *Vertical Mount Heat Sink*

TO-220

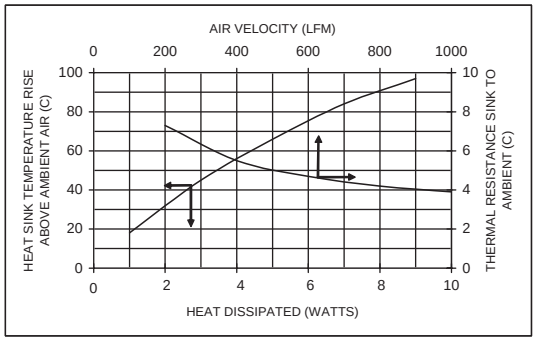
Standard P/N	Height Above PC Board	Maximum Footprint	Thermal Performance at Typical Load	
			Natural Convection	Forced Convection
286DB	.95" (24.1)	1.00"(25.4) x .50"(12.7)	65°C rise @ 4W	9.0°C/W @ 200LFM

Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS



NATURAL AND FORCED CONVECTION CHARACTERISTICS



BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS

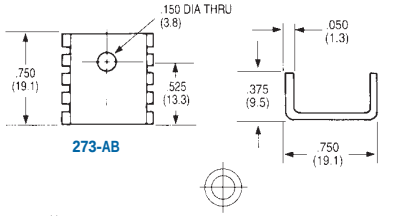
273 SERIES — *Low-Cost, Low-Height Wavesolderable Heat Sinks*

TO-218, TO-220

Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuration	Solderable Tab Options	Mounting Style	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection
273-AB ▲	.375 (9.5)	.750 (19.1) x .750 (19.1)	Vert./Horiz.	No Tab	Mtg Hole	49°C @ 2W	7.2°C/W @ 400 LFM
273-AB-01	.375 (9.5)	.750 (19.1) x .750 (19.1)	Vertical	01	Mtg Hole	49°C @ 2W	7.2°C/W @ 400 LFM
273-AB-02	.375 (9.5)	.750 (19.1) x .750 (19.1)	Vertical	02	Mtg Hole	49°C @ 2W	7.2°C/W @ 400 LFM

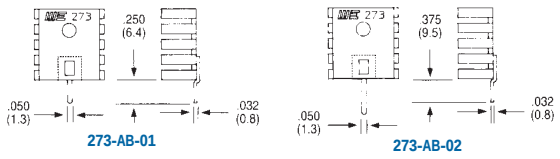
Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS



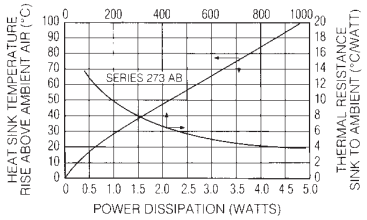
Note:
1. Suggested Tab Hole = ø.075 (1.9) (Plated) with ø.100 (2.5) pad

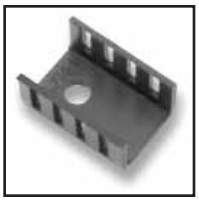
273 SERIES



Dimensions: in. (mm)

NATURAL AND FORCED CONVECTION CHARACTERISTICS





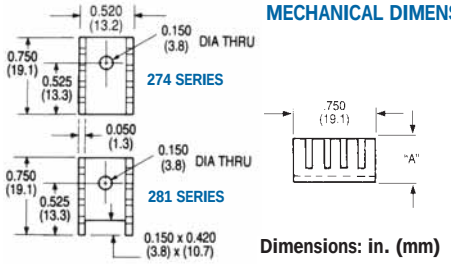
Material: Aluminum, Black Anodized

274 SERIES — *Low-Cost, Low-Height Wavesolderable Heat Sinks*

TO-220

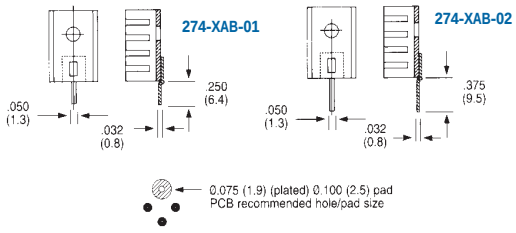
Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuration	Solderable Tab Options	Mounting Style	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection
274-1AB ▲	.375 (9.5)	.520 (13.2) x .750 (19.1)	Vert./Horiz.	No Tab	Mtg Hole	56°C @ 2W	8.0°C/W @ 400 LFM
274-1AB-01 ▲	.375 (9.5)	.520 (13.2) x .750 (19.1)	Vertical	01	Mtg Hole	56°C @ 2W	8.0°C/W @ 400 LFM
274-1AB-02	.375 (9.5)	.520 (13.2) x .750 (19.1)	Vertical	02	Mtg Hole	56°C @ 2W	8.0°C/W @ 400 LFM
274-2AB ▲	.500 (12.7)	.520 (13.2) x .750 (19.1)	Vert./Horiz.	No Tab	Mtg Hole	50°C @ 2W	7.0°C/W @ 400 LFM
274-2AB-01	.500 (12.7)	.520 (13.2) x .750 (19.1)	Vertical	01	Mtg Hole	50°C @ 2W	7.0°C/W @ 400 LFM
274-2AB-02	.500 (12.7)	.520 (13.2) x .750 (19.1)	Vertical	02	Mtg Hole	50°C @ 2W	7.0°C/W @ 400 LFM
274-3AB ▲	.250 (6.4)	.520 (13.2) x .750 (19.1)	Vert./Horiz.	No Tab	Mtg Hole	62°C @ 2W	9.0°C/W @ 400 LFM
274-3AB-01	.250 (6.4)	.520 (13.2) x .750 (19.1)	Vertical	01	Mtg Hole	62°C @ 2W	9.0°C/W @ 400 LFM
274-3AB-02	.250 (6.4)	.520 (13.2) x .750 (19.1)	Vertical	02	Mtg Hole	62°C @ 2W	9.0°C/W @ 400 LFM
281-1AB	.375 (9.5)	.520 (13.2) x .750 (19.1)	Vertical	No Tab	Mtg Hole	56°C @ 2W	8.0°C/W @ 400 LFM
281-2AB	.500 (12.7)	.520 (13.2) x .750 (19.1)	Vertical	No Tab	Mtg Hole	50°C @ 2W	7.0°C/W @ 400 LFM

MECHANICAL DIMENSIONS

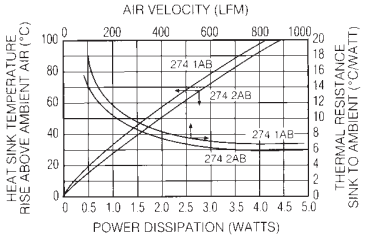


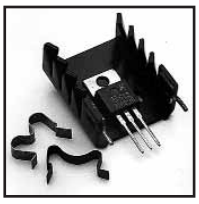
Dimensions: in. (mm)

274 SERIES



NATURAL AND FORCED CONVECTION CHARACTERISTICS





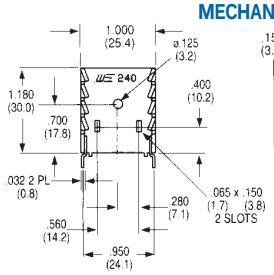
240 SERIES — *Labor-Saving Twisted Fin Heat Sinks*

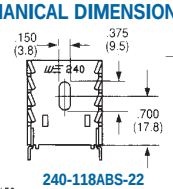
TO-220

Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuration	Solderable Tab Options	Mounting Style	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection
240-118ABH-22 ▲	1.180 (30.0)	1.000 (25.4) x .500 (12.7)	Vertical	22	Clip/Mtg Hole	55°C @ 4W	5.3°C/W @ 400 LFM
240-118ABS-22	1.180 (30.0)	1.000 (25.4) x .500 (12.7)	Vertical	22	Clip/Mtg Slot	55°C @ 4W	5.3°C/W @ 400 LFM

Material: Aluminum, Black Anodized

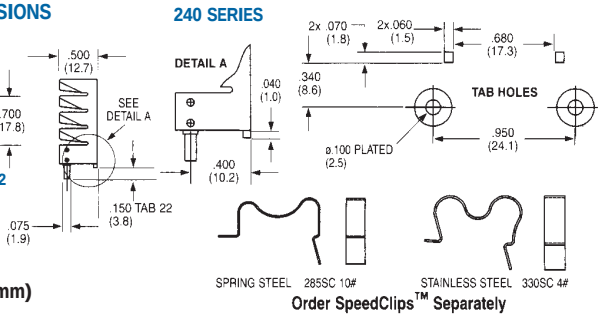
MECHANICAL DIMENSIONS





Dimensions: in. (mm)

240 SERIES



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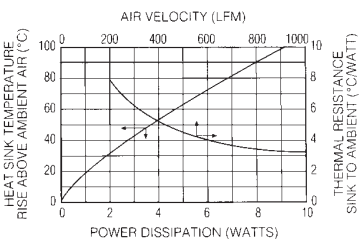
NATURAL AND FORCED CONVECTION CHARACTERISTICS



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BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS

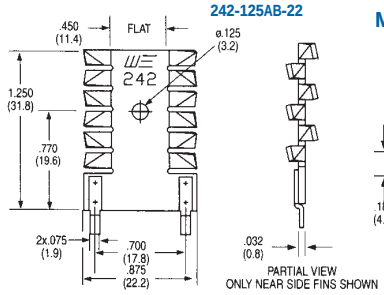
242 SERIES — *Low-Height, Low-Profile Twisted Fin Heat Sinks*

TO-220

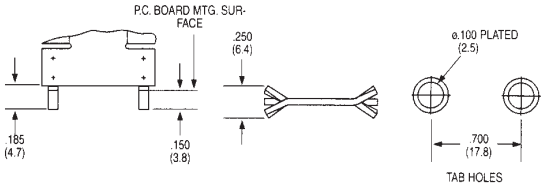
Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuration	Solderable Tab Options	Mounting Style	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection
242-125AB-22	1.285 (32.6)	.875 (22.2) x .250 (6.4)	Vertical	22	Mtg Hole	48°C @ 2W	6.2°C/W @ 400 LFM

Material: Aluminum, Black Anodized

242-125AB-22

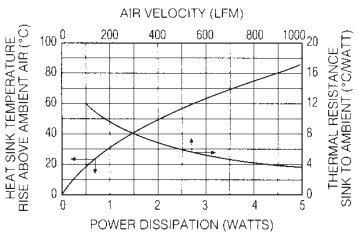


MECHANICAL DIMENSIONS — 242 SERIES



Dimensions: in. (mm)

NATURAL AND FORCED CONVECTION CHARACTERISTICS



232 AND 238 SERIES — *Staggered Fin Heat Sinks for Vertical Mounting*

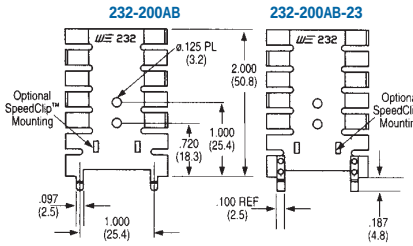
TO-202, TO-220

Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuration	Solderable Tab Options	Mounting Style	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection
232-200AB	2.000 (50.8)	1.380 (35.1) x .500 (12.7)	Vertical	2, Twisted	Clip/Mtg Hole	48°C @ 4W	3.3°C/W @ 400 LFM
232-200AB-23	2.000 (50.8)	1.380 (35.1) x .500 (12.7)	Vertical	2, Solderable	Clip/Mtg Hole	48°C @ 4W	3.3°C/W @ 400 LFM
238-200AB	2.000 (50.8)	1.380 (35.1) x .500 (12.7)	Verlical	2, Twisted	Mtg Slot	48°C @ 4W	3.3°C/W @ 400 LFM
238-200AB-23	2.000 (50.8)	1.380 (35.1) x .500 (12.7)	Verlical	2, Solderable	Mtg Slot	48°C @ 4W	3.3°C/W @ 400 LFM

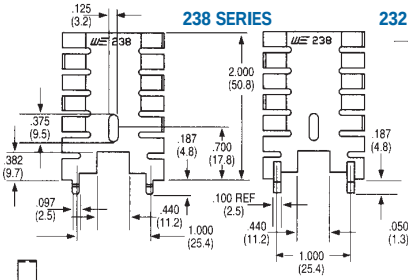
Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS

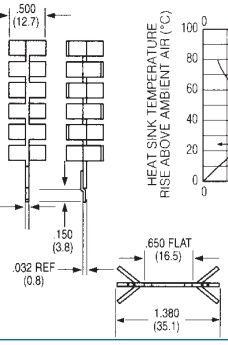
232-200AB / 232-200AB-23



238-200AB / 238-200AB-23 / 238 SERIES

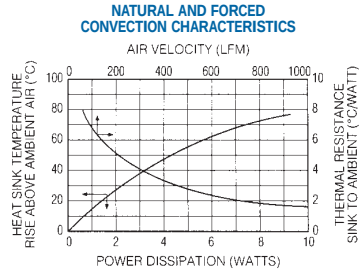


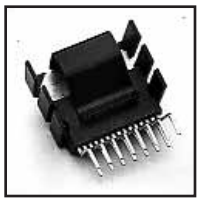
232 AND 238 SERIES



Dimensions: in. (mm)

NATURAL AND FORCED CONVECTION CHARACTERISTICS





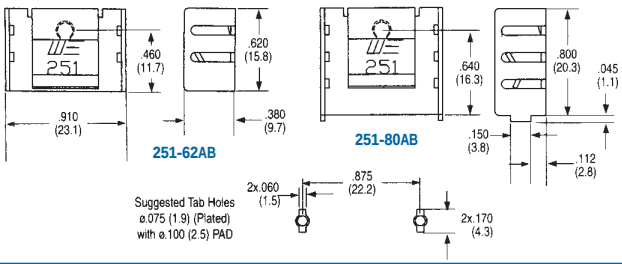
251 SERIES — *Slim-Profile Heat Sinks With Integral Clips*

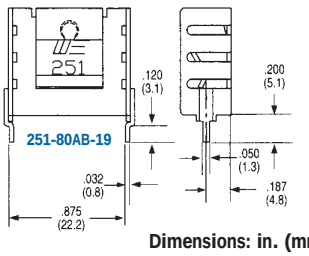
15 Lead Multiwatt

Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuration	Solderable Tab Options	Mounting Style	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection
251-62AB	.620 (15.7)	.910 (23.1) x .380 (9.7)	Vert./Horiz.	No Tab	Clip	66°C @ 3W	66°C/W @ 400 LFM
251-80AB	.845 (21.5)	.910 (23.1) x .380 (9.7)	Vert./Horiz.	No Tab	Clip	64°C @ 3W	66°C/W @ 400 LFM
251-80AB-19	.875 (22.2)	.910 (23.1) x .380 (9.7)	Vertical	19	Clip	64°C @ 3W	66°C/W @ 400 LFM

Material: Aluminum, Black Anodized

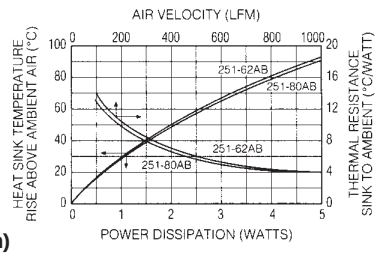
MECHANICAL DIMENSIONS — 251 SERIES





Dimensions: in. (mm)

NATURAL AND FORCED CONVECTION CHARACTERISTICS



BOARD LEVEL HEAT SINKS FOR TO-220, TO-218 AND MULTIWATT™ COMPONENTS

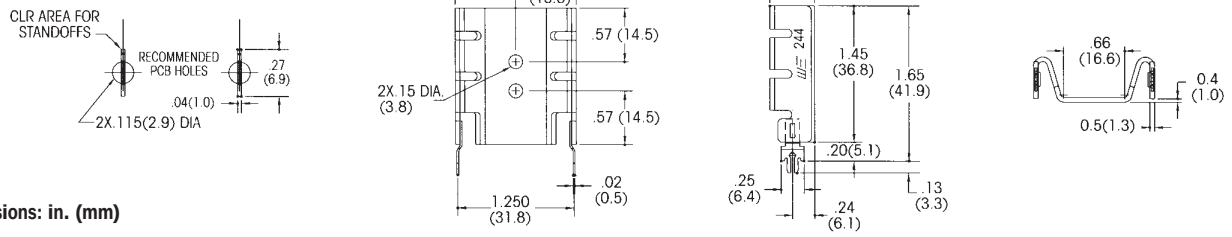
244 SERIES — *Low Height, Slim Profile Wavesolderable Folded Fin Heat Sinks*

MULTIWATT

Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuration	Solderable Tab Options	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection	Weight lbs. (grams)
244-145AB	1.450 (36.8)	1.300 (33.0) x 480 (12.1)	Vert/Horiz,	No Tab	44°C @ 4W	4.4°C/W @ 400 LFM	.0160 (7.25)
244-145AB-50	1.650 (41.9)	1.300 (33.0) x 480 (12.1)	Vertical	50	44°C @ 4W	4.4°C/W @ 400 LFM	.0170 (7.20)

Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS



Dimensions: in. (mm)

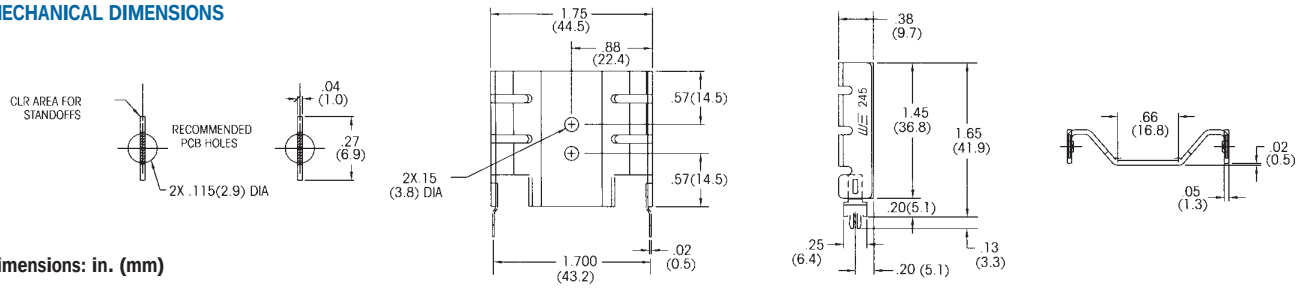
245 SERIES — *Low Height, Slim Profile Wavesolderable Folded Fin Heat Sinks*

MULTIWATT

Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuration	Solderable Tab Options	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection	Weight lbs. (grams)
245-145AB	1.450 (36.8)	1.750 (44.5) x .380 (9.7)	Ver.t/Horiz.	No Tab	38°C @ 4W	3.2°C/W @ 400 LFM	.0160 (7.25)
245-145AB-50	1.650 (41.9)	1.750 (44.5) x .380 (9.7)	Vertical	50	38°C @ 4W	3.2°C/W @ 400 LFM	.0170 (7.20)

Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS



Dimensions: in. (mm)

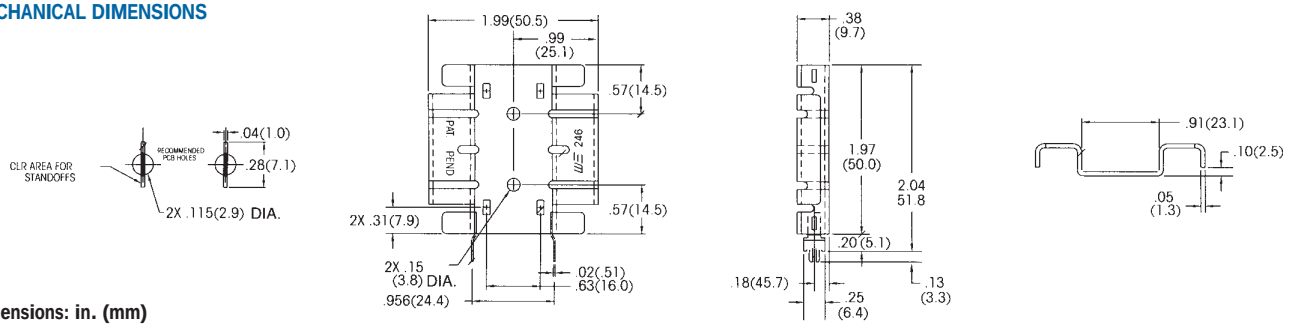
246 SERIES — *Medium Height, Slim Profile Wavesolderable Folded Fin Heat Sinks*

MULTIWATT

Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuration	Solderable Tab Options	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection	Weight lbs. (grams)
246-197AB	1.968 (50.0)	1.986 (50.4) x 3.75 (9.5)	Vert./Horiz.	No Tab	35°C @ 4W	2.8°C/W @ 400 LFM	.0240 (10.90)
246-197AB-50	2.168 (55.1)	1.986 (50.4) x 3.75 (9.5)	Vertical	50	35°C @ 4W	2.8°C/W @ 400 LFM	.0250 (11.40)

Order SpeedClip™ 285SC or 330SC separately. (See 248 Series section).
Material: Aluminum, Black Anodized

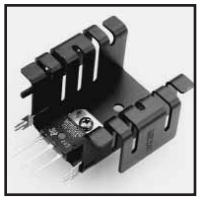
MECHANICAL DIMENSIONS



Dimensions: in. (mm)

WAKEFIELD Thermal Solutions
"Thermal Management Solutions and Aluminum Extrusions since 1957"

BOARD LEVEL HEAT SINKS FOR TO-220, TO-218 AND MULTIWATT™ COMPONENTS



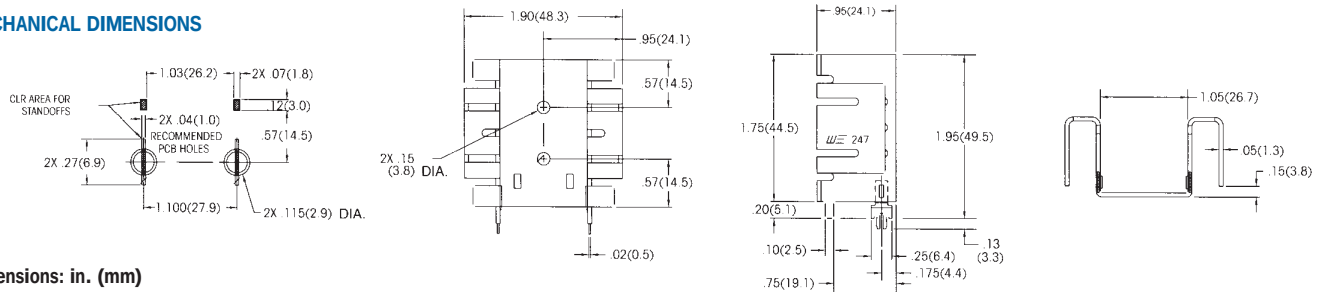
247 SERIES — *Medium Height, Deep Profile Wavesolderable Folded Fin Heat Sinks*

MULTIWATT

Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuration	Solderable Tab Options	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection	Weight lbs. (grams)
247-195AB	1.950 (49.5)	1.900 (48.3) x .950 (24.1)	Vert./Horiz.	No Tab	25°C@ 4W	2.4°C/W @ 400 LFM	.0330 (15.10)
247-195AB-50	1.950 (49.5)	1.900 (48.3) x .950 (24.1)	Vertical	50	25°C@ 4W	2.4°C/W @ 400 LFM	.0340 (15.60)

Order SpeedClip™ 285SC or 330SC separately. (See 248 Series section).
Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS



Dimensions: in. (mm)

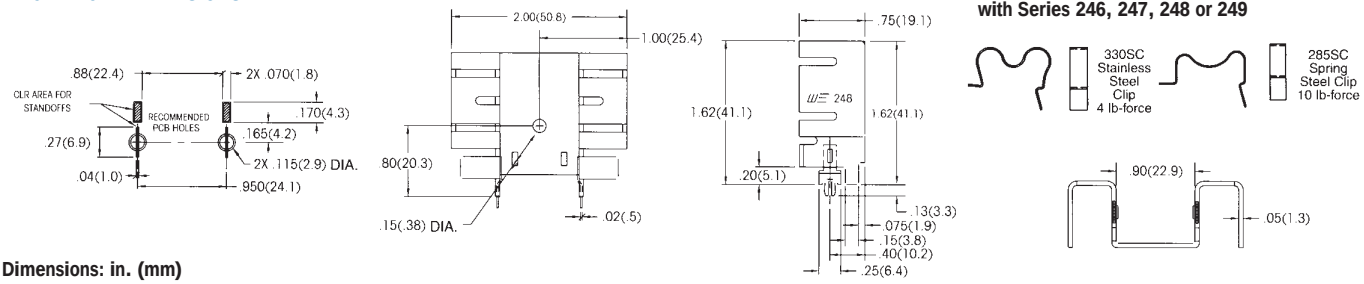
248 SERIES — *Low Height, Medium Profile Wavesolderable Folded Fin Heat Sinks*

MULTIWATT

Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuration	Solderable Tab Options	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection	Weight lbs. (grams)
248-162AB	1.620 (41.1)	2.000 (50.8) x .750 (19.1)	Vert/Horiz.	No Tab	35°C @ 4w	2.5°C/W @ 400 LFM	.026 (11.60)
248-162AB-50	1.620 (41.1)	2.000 (50.8) x .750 (19.1)	Vertical	50	35°C @ 4w	2.5°C/W @ 400 LFM	.027 (12.20)

Order SpeedClip™ 285SC or 330SC separately.
Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS



Order SpeedClips™ separately for use with Series 246, 247, 248 or 249

Dimensions: in. (mm)

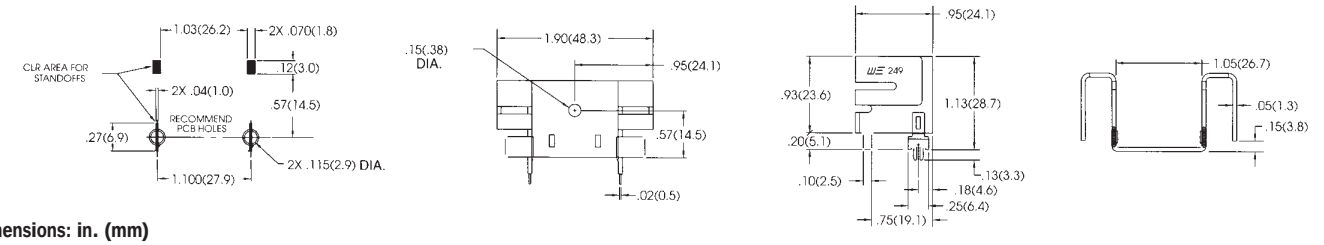
249 SERIES — *Medium Height, Deep Profile Wavesolderable Folded Fin Heat Sinks*

MULTIWATT

Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuration	Solderable Tab Options	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection	Weight lbs. (grams)
249-113AB	1.130 (28.7)	1.900 (48.3) x .950 (24.1)	Vert./Horiz.	No Tab	35°C@ 4W	3.29°C/W @ 400 LFM	.020 (8.90)
249-113AB-50	1.130 (28.7)	1.900 (48.3) x .950 (24.1)	Vertical	50	35°C@ 4W	3.29°C/W @ 400 LFM	.021 (9.40)

Order SpeedClip™ 285SC or 330SC separately. (See 248 Series section).
Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS



Dimensions: in. (mm)

BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS

288 SERIES — *Compact Wave-Solderable Low-Cost Heat Sinks*

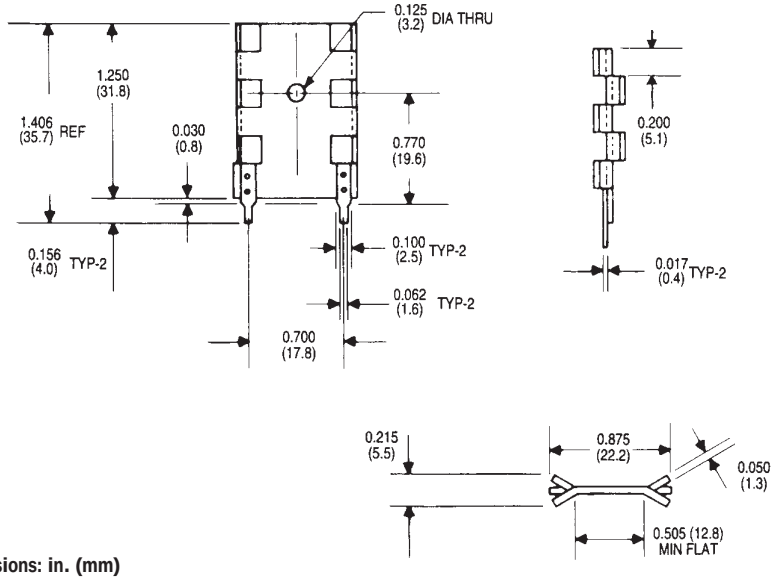
TO-220, TO-202

Standard P/N	Height Above PC Board in. (mm)	Maximum Footprint in. (mm)	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection	Weight lbs. (grams)
288-1AB ▲	1.250 (31.8)	0.875 (22.2) x 0.215 (5.5)	85°C @ 4W	12°C/W @ 200 LFM	0.0057 (2.59)

Mounting tabs are pre-tinned to ensure excellent wave-solder bond and good electrical connections for vertical mounting of TO-220 and TO-202 semiconductor packages. These heat sinks are designed for use where minimum PC board space is available. The 288-1AB is a stamped aluminum heat sink, black anodized, designed for applications requiring good heat dissipation from a heat sink occupying minimum space, available at minimum cost.

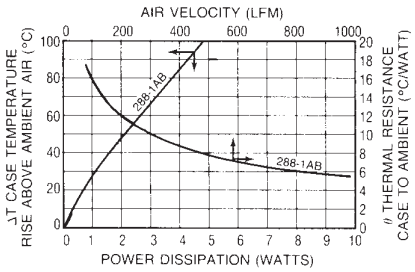
MECHANICAL DIMENSIONS

288 SERIES



Dimensions: in. (mm)

NATURAL AND FORCED CONVECTION CHARACTERISTICS



271 SERIES — *Top-Mount Booster Heat Sinks for Use with 270/272/280 Series*

TO-220

Standard P/N	Height Above Semiconductor Case in. (mm)	Horizontal Mounting Footprint Dimensions in. (mm)	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection	Weight lbs. (grams)
271-AB ▲	0.500 (12.7)	1.750 (44.5) x 0.700 (17.8)	62°C @ 4W (NOTE A) 31 °C @ 4W (NOTE B)	5.1°C/W @ 400 LFM 1.8°C/W 400 LFM (NOTE B)	0.0052 (2.36)

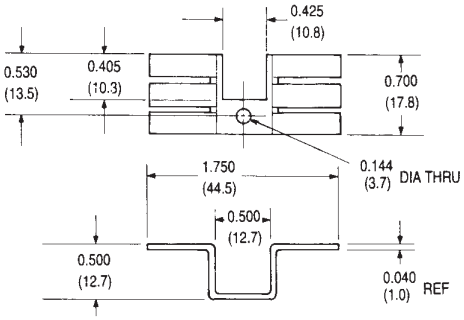
Material: Aluminum, Black Anodized

This top-hat style booster heat sink can be added to any of the 270, 272, or 280 Series for improved performance.

NOTE A: Thermal resistance with one 271-AB. NOTE B: Thermal resistance (total) as shown with (2) 271-AB types added to (1) 272-AB type.

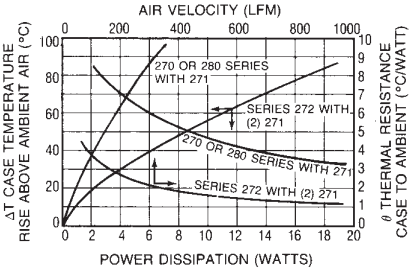
MECHANICAL DIMENSIONS

271 SERIES



Dimensions: in. (mm)

NATURAL AND FORCED CONVECTION CHARACTERISTICS



BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS

270/272/280 SERIES *Small Footprint Low-Cost Heat Sinks*

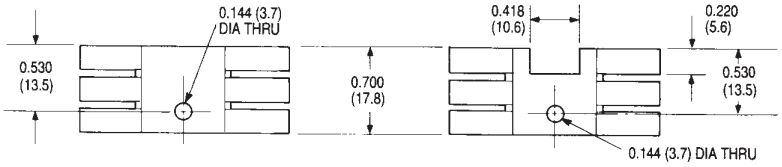
TO-220, TO-202

Standard P/N	Height Above PC Board in. (mm)	Horizontal Mounting Maximum Footing in. (mm)	Solderable Tab Options	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection	Weight lbs. (grams)
270-AB ▲	0.375 (9.4)	1.750 (44.5) x 0.700 (17.8)	—	70°C @ 4W	6.0°C/W @ 400 LFM	0.0052 (2.36)
272-AB ▲	0.375 (9.4)	1.750 (44.5) x 1.450 (36.8)	01,02	42°C @ 4W	3.6°C/W @ 400 LFM	0.0105 (5.72)
280-AB	0.375 (9.4)	1.750 (44.5) x 0.700 (17.8)	—	70°C @ 4W	6.0°C/W @ 400 LFM	0.0048 (2.18)

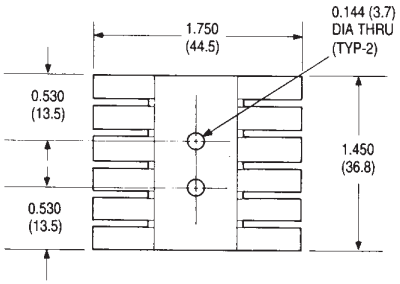
Material: Aluminum, Black Anodized

These exceptionally low-cost heat sinks can be mounted horizontally under a TO-220 or TO-202 case style with a maximum height of only 0.375 in. (9.4). For added performance, a 271 Series heat sink can also be used for double-sided heat dissipation. The 270-AB and 280-AB accept one power semiconductor; the 272-AB is designed for two power semiconductors. Specify solderable tab options for the 272 Series by the addition of suffix "01" or "02" to the standard part number (i.e. 272-AB01 or 272-AB02).

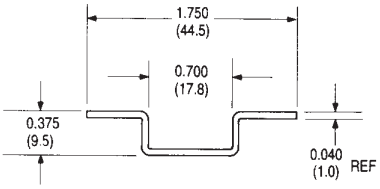
MECHANICAL DIMENSIONS



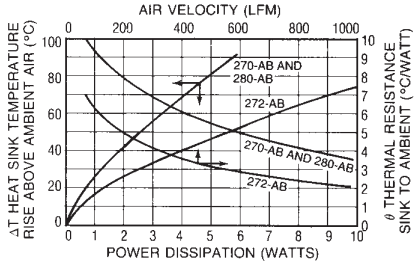
270 SERIES 280 SERIES

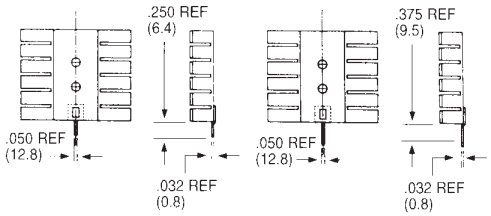


272 SERIES



NATURAL AND FORCED CONVECTION CHARACTERISTICS





272AB01 272AB02

Dimensions: in. (mm)

Note:
1. Suggested Tab Hole = 0.075 ±.003 plated with 0.100 pad

289 AND 290 SERIES *Low-Cost Single or Dual Package Heat Sinks*

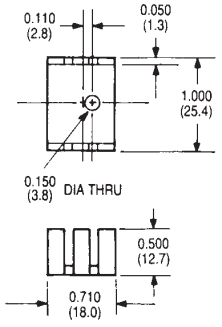
TO-218, TO-202, TO-220

Standard P/N	Height Above PC Board in. (mm)	Horizontal Mounting Maximum Footing in. (mm)	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection	Weight lbs. (grams)
289-AB ▲	0.500 (12.7)	1.000 (25.4) x 0.710 (18.1)	50°C @ 2W	9.0 C/W @ 400 LFM	0.0055 (2.49)
289-AP	0.500 (12.7)	1.000 (25.4) x 0.710 (18.1)	50°C @ 2W	9.0 C/W @ 400 LFM	0.0055 (2.49)
290-1AB ▲	0.500 (12.7)	1.000 (25.4) x 1.180 (30.0)	44°C @ 2W	7.0 C/W @ 400 LFM	0.0082 (3.72)
290-2AB ▲	0.500 (12.7)	1.000 (25.4) x 1.180 (30.0)	44°C @ 2W	7.0 C/W @ 400 LFM	0.0081 (3.67)

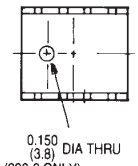
Material: Aluminum, Black Anodized

Low in cost and compact in overall dimensions, one 289 Series heat sink can accommodate one semiconductor; the 289 Series is available with a black anodized finish (289-AB) or with no finish (289-AP). Two semiconductors can be mounted to the 290-2AB style.

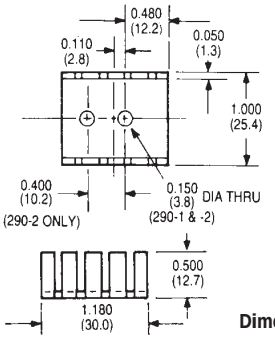
289 SERIES



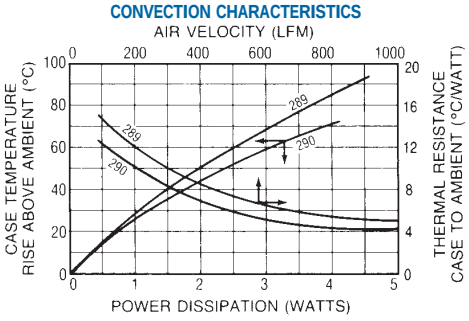
MECHANICAL DIMENSIONS



290 SERIES

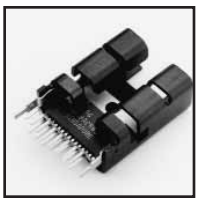


NATURAL AND FORCED CONVECTION CHARACTERISTICS



Dimensions: in. (mm)

BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS



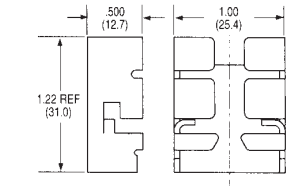
250 SERIES — *High-Performance Slim Profile Heat Sinks With Integral Clips*

Multiwatt

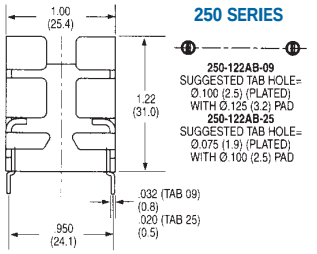
Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuration	Solderable Tab Options	Mounting Style	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection
250-122AB	1.220 (31.0)	1.000 (25.4) x .500 (12.7)	Vert./Horiz.	No Tab	Clip	50°C @ 4W	3.7°C/W @ 400 LFM
250-122AB-09 ▲	1.220 (31.0)	1.000 (25.4) x .500 (12.7)	Vertical	09	Clip	50°C @ 4W	3.7°C/W @ 400 LFM
250-122AB-25	1.380 (35.1)	1.000 (25.4) x .500 (12.7)	Vertical	25	Clip	50°C @ 4W	3.7°C/W @ 400 LFM

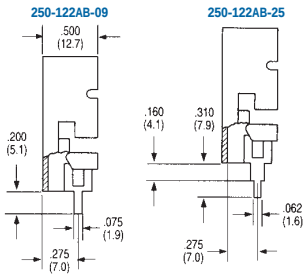
Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS

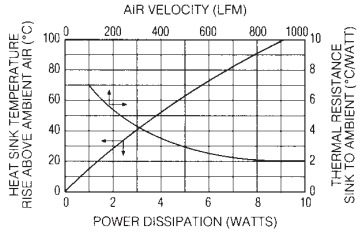


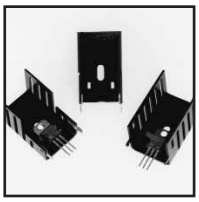
Dimensions: in. (mm)





NATURAL AND FORCED CONVECTION CHARACTERISTICS





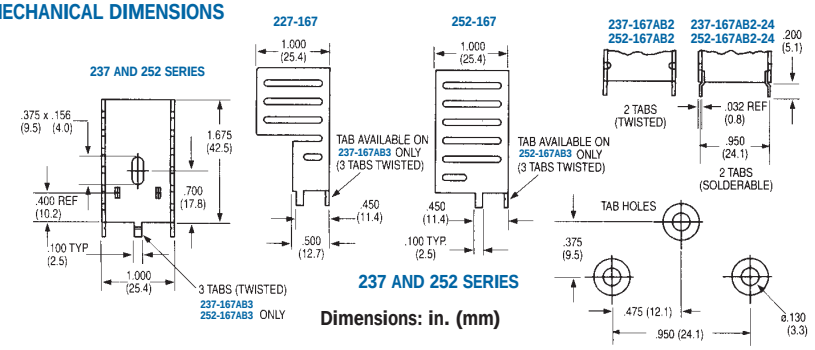
237 AND 252 SERIES — *High-Performance, High-Power Vertical Mount Heat Sinks*

TO-220

Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuration	Solderable Tab Options	Mounting Style	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection
237-167AB2	1.675 (42.5)	1.000 (25-4) x 1.000 (25.4)	Vertical	2, Twisted	Clip/Mtg Slot	46°C @ 4W	4.5°C/W @ 200 LFM
237-167AB3	1.675 (42.5)	1.000 (25.4) x 1.000 (25.4)	Vertical	3, Twisted	Clip/Mtg Slot	46°C @ 4W	4.5°C/W @ 200 LFM
237-167AB2-24	1.675 (42.5)	1.000 (25.4) x 1.000 (25.4)	Vertical	2, Solderable	Clip/Mtg Slot	46°C @ 4W	4.5°C/W @ 200 LFM
252-167AB2	1.675 (42.5)	1.000 (25.4) x 1.000 (25.4)	Vertical	2, Twisted	Clip/Mtg Slot	40°C @ 4W	4.5°C/W @ 200 LFM
252-167AB3	1.675 (42.5)	1.000 (25.4) x 1.000 (25.4)	Vertical	3, Twisted	Clip/Mtg Slot	40°C @ 4W	4.5°C/W @ 200 LFM
252-167AB2-24	1.675 (42.5)	1.000 (25.4) x 1.000 (25.4)	Vertical	2, Solderable	Clip/Mtg Slot	40°C @ 4W	4.5°C/W @ 200 LFM

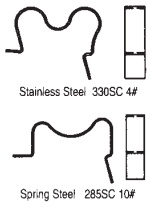
Order SpeedClips™ 285SC or 330SC separately for rapid component installation, lowering manufacturing costs. Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS

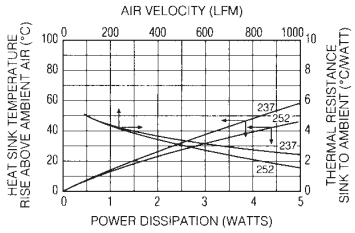


Dimensions: in. (mm)

Order SpeedClips™ Separately



NATURAL AND FORCED CONVECTION CHARACTERISTICS



291 SERIES — *Labor-Saving Clip-on Heat Sinks*

TO-220

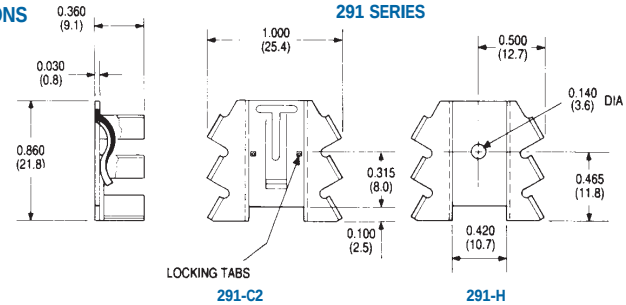
Standard P/N	Height Above PC Board in. (mm)	Vertical Mounting Footprint Dimensions in. (mm)	Mounting Style	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection	Weight lbs. (grams)
291-C236AB	0.860 (21.)9	1.100 (27.0) x 0.360 (9.1)	TO-220 (Clip)	80°C @ 2W	24°C/W @ 600 LFM	0.0026 (1.18)
291-H36AB ▲	0.860 (21.9)	1.100 (27.0) x 0.360 (9.1)	TO-220 (Mtg. Hole)	68°C @ 2W	16°C/W @ 600 LFM	0.0026 (1.18))

Material: Aluminum, Black Anodized

Designed for mounting horizontally or vertically on a circuit board, 291 Series heat sinks employ a unique clip for attachment of TO-220 case styles.

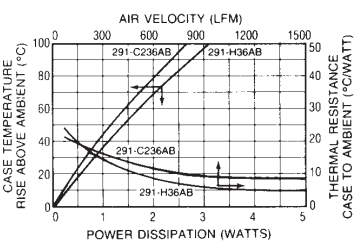
One type is available with a locking clip and one with a 0.140 in. (3.6) diameter mounting hole only.

MECHANICAL DIMENSIONS



Dimensions: in. (mm)

NATURAL AND FORCED CONVECTION CHARACTERISTICS



Wakefield Thermal Solutions
"Thermal Management Solutions and Aluminum Extrusions since 1957"

BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS

286 SERIES *Aluminum and Copper Low-Cost Wave-Solderable Heat Sinks*

See also 286DB Series on Page 7.

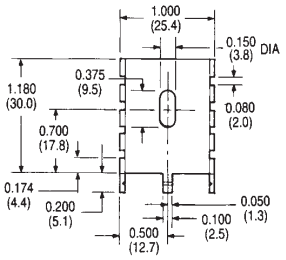
TO-220

Standard P/N	Height Above PC Board in. (mm)	Maximum Footprint in. (mm)	Material	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection	Weight lbs. (grams)
286-AB ▲	1.190 (30.2)	1.000 (25.4) x 0.500 (12.7)	Aluminum, Anodized	58°C @ 4W	7.4°CW @ 200 LFM	0.0085 (3.86)
286-CBT ▲	1.190 (30.2)	1.000 (25.4) x 0.500 (12.7)	Copper, Black	58°C @ 4W	7.4°CW @ 200 LFM	0.0250 (11.34)
286-CT	1.190 (30.2)	1.000 (25.4) x 0.500 (12.7)	Copper, Tinned	58°C @ 4W	7.4°CW @ 200 LFM	0.0250 (11.34)

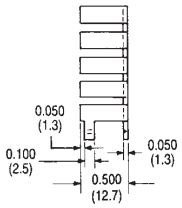
Efficient heat removal at low cost can be achieved by inserting the 286 Series directly into pre-drilled circuit boards; scored mounting tabs may be bent after insertion to provide added stability. The 286 Series can be wavesoldered directly to the board. Material: 286-AB style (aluminum, black anodized), 286-CBT style (copper, black paint tin tabs), and 286-CT style (copper, tinned).

MECHANICAL DIMENSIONS

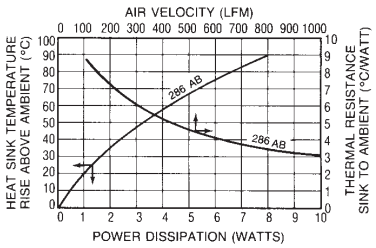
Dimensions: in. (mm)



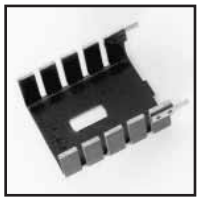
286 SERIES



NATURAL AND FORCED CONVECTION CHARACTERISTICS



287 SERIES *Wave-Solderable Low-Cost Heat Sinks*



TO-220

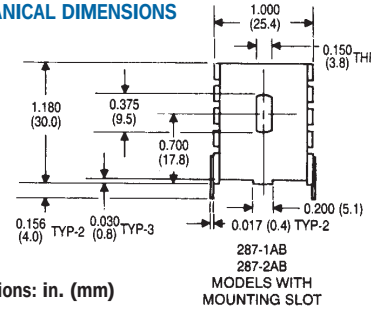
Standard P/N Mounting Slot	Standard P/N Mounting Hole	Height Above PC Board in. (mm)	Maximum Footprint "A" in. (mm)	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection	Weight lbs. (grams)
287-1AB ▲	287-1ABH ▲	1.180 (30.0)	1.000 (25.4) x 0.500 (12.7)	65°C @ 4W	7.8°CW @ 200 LFM	0.0090 (4.08)
287-2AB ▲	287-2ABH	1.180 (30.0)	1.000 (25.4) x 1.000 (25.4)	55°10 @ 4W	6.4°CW @ 200 LFM	0.0140 (6.35)

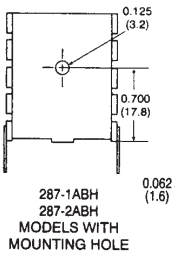
Material: Aluminum, Black Anodized

Mount these cost-effective TO-220 heat sinks vertically into pre-drilled printed circuit boards. Soldered, pre-tinned tabs can be wavesoldered directly to the board. A 0.375 in. (9.5 mm) mounting slot allows for correct positioning of TO-220 and similar semiconductor packages.

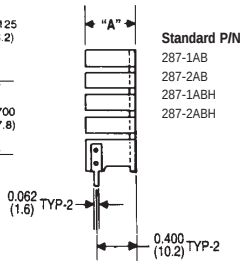
MECHANICAL DIMENSIONS

Dimensions: in. (mm)



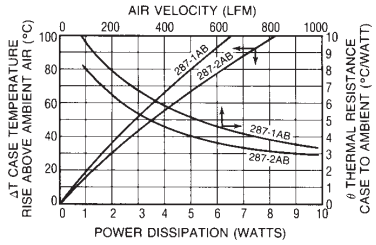


287 SERIES



Standard P/N	Dim. "A"
287-1AB	0.500 (12.7)
287-2AB	1.000 (25.4)
287-1ABH	0.500 (12.7)
287-2ABH	1.000 (25.4)

NATURAL AND FORCED CONVECTION CHARACTERISTICS



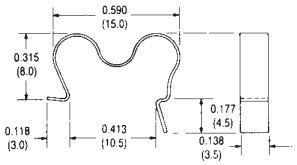
285 AND 330 SERIES *285 SC and 330 SC SpeedClips™*

Standard P/N	Nominal Installed Loading Force	For Use With Series	Material	Weight lbs. (grams)
285 SC	10 lbs	232, 237, 240, 252, 667	Carbon Steel	0.00053 (0.24)
330 SC	4 lbs	232, 237, 240, 252, 667	Stainless Steel	0.00074 (0.34)

SpeedClips™ employ a locking safety tab for mounting. Must be ordered separately for these heat sink series. Use these SpeedClips™ with our 237, 240, and 252 Series heat sinks for the lowest production assembly time and cost. Order one SpeedClip™ for each heat sink purchased. Must be purchased with heat sinks.

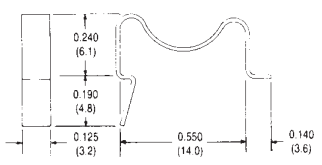
MECHANICAL DIMENSIONS

Dimensions: in. (mm)



Speed Clip 330 SC

4 lb Nominal Force Installed



Speed Clip 285 SC

10 lb Nominal Force Installed

BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS

260 SERIES ***Cup Clips for TO-5 Case Style Semiconductors***

TO-5

Characteristics	TO-5
Thermal Resistance – Epoxy Insulated	14° C/W
Breakdown Voltage – Epoxy Type (VAC), 60 Hz	500
Recommended Operating Voltage, AC or DC	
Clean Conditions: % Hipot Rating	50
Dusty Conditions: % Hipot Rating	30
Dirty Conditions: % Hipot Rating	10 to 20
Temperature Range — Continuous (C°)	-73/+149

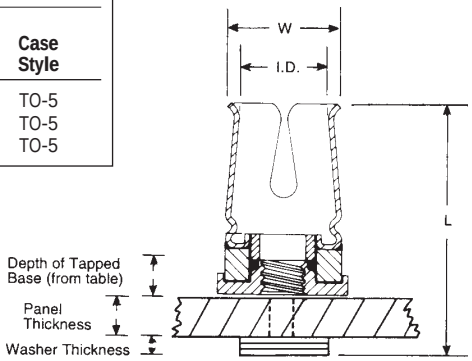
Model	Depth of Tapped Base
260-4T5E	0.093 (2.36)
260-4TH5E	0.125 (3.18)

Thread Size: 4 = #4-40 UNC; 6 = #6-32 UNC
Mounting Style: T = tapped; S = stud; P = plain
Base Style: H = hex
Semiconductor Case Style: 5 = TO-5
Insulation E = epoxy

TO-5 CASE STYLE CUP CLIPS — ORDERING GUIDE

Standard P/N	Insulation Type	Outline Dimension L x W x I.D. in. (mm)	Weight lbs. (grams)	Case Style
260-4T5E ▲	Epoxy Insulated	0.370 (9.4) x 0.380 (9.7) dia. x 0.290 (7.4)	0.0024 (1.09)	TO-5
260-4TH5E ▲	Epoxy Insulated	0.400 (10.2) x 0.370 (9.4) hex. x 0.290 (7.4)	0.0031 (1.41)	TO-5
260-6SH5E ▲	Epoxy Insulated	0.557 (14.1) x 0.370 (9.4) hex. x 0.290 (7.4)	0.0037 (1.68)	TO-5

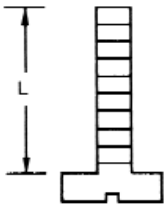
Materials and Finish: Cups – beryllium copper, black ebonol "C"; Bases – brass, black ebonol "C"



Base Mounting Configurations — TO-5
Plain Type — Epoxy bonded, or used with #4 pan head screws.
Tapped Base — #4-40 UNC screw (not supplied) fits tapped hole. Care should be taken not to use too long a screw, which could short against the semiconductor case. For correct screw lengths:

Correct Screw Length (L) = Depth of Base + Panel Thickness + Washer Thickness

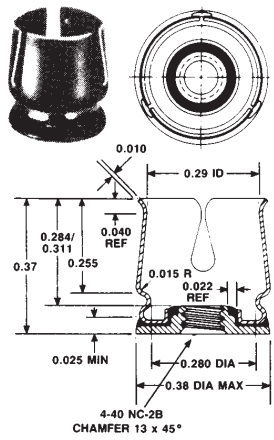
Stud Mounting Base. #6-32 UNC. Nuts and washers not supplied. Stud hole must be slightly countersunk to ensure flat mounting.



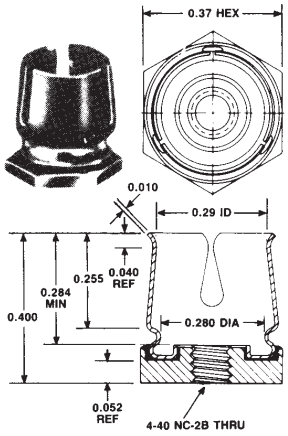
To determine the correct mounting screw lengths, add dimensions as follows:

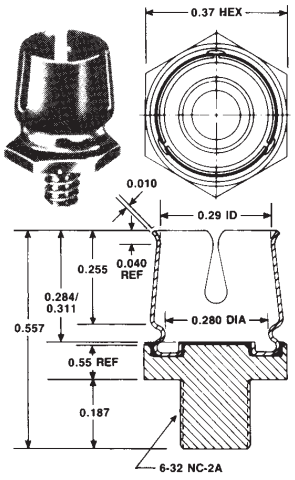
Correct Screw Length (L) = Depth of Base + Panel Thickness + Washer Thickness

Epoxy Insulated For TO-5



▲ 260-4T5E





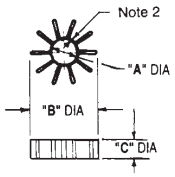
260-6SH5E

WAKEFIELD Thermal Solutions
"Thermal Management Solutions and Aluminum Extrusions since 1957"

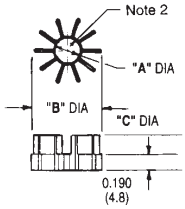
BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS

200 SERIES — *High-Efficiency Heat Sinks for Small Metal Can Power Semiconductors*

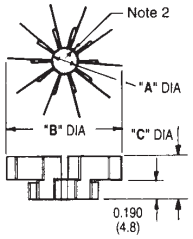
Single-Level Star
201, 202, 204, 205, 211 Series



Dual-Level Star
203,207,213 Series



Dual-Level Sunburst
209, 215 Series

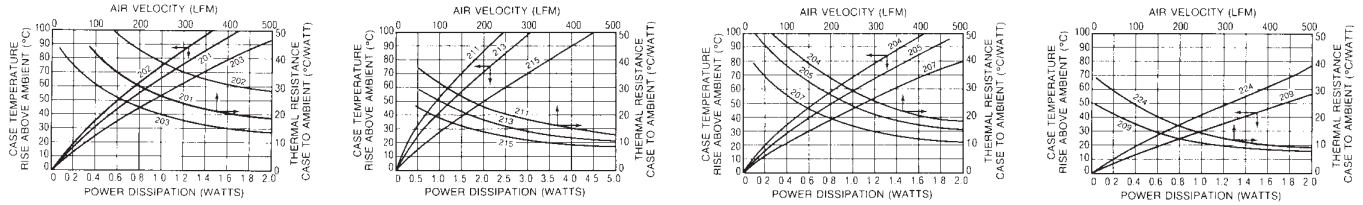


Available Standard P/N & Finish Types	Semiconductor Case Diameter Min/Max in. (mm)	Heat Sink Inside Dia. "A" in. (mm)	Heat Sink Outside Dia. "B" in. (mm)	Heat Sink Height "C" in. (mm)	Natural Convection Case Rise Above Ambient	Forced Convection (ΘCA@200 LFM)	Applicable Power Semiconductor Case Types
201AB	0.161 (4.1)/0.240 (6.1)	0.150 (3.8)	0.640 (16.2)	0.187 (4.8)	65°C @ 1W	31°C/W	TO-18, TO-24, TO-28, TO-40, TO-44
204SB	0.275 (7.0)/0.370 (9.4)	0.255 (6.5)	0.550 (4.8)	0.187 (4.8)	68°C @ 1W	35°C/W	TO-5, TO-9, TO-11,
205SB	0.275 (7.0)/0.370 (9.4)	0.255 (6.5)	0.720 (18.3)	0.187 (4.8)	59°C @ 1W	28°C/W	TO-12, TO-26, TO-29,
205AB, 205AP	0,275 (7.0)/0.370 (9.4)	0.255 (6.5)	0.720 (18.3)	0.187 (4.8)	68°C @ 1W	28°C/W	TO-33, TO-43, TO-45
207SB ▲	0.275 (7.0)/0.370 (9.4)	0.255 (6.5)	0.720 (18.3)	0.375 (9.5)	46°C @ 1W	20°C/W	
207AB ▲, 207AP	0.275 (7.0)/0.370 (9.4)	0.255 (6.5)	0.720 (18.3)	0.375 (9.5)	53°C @ 1W	20°C/W	
209SB	0.275 (7.0)/0.370 (9.4)	0.255 (6.5)	1.280 (32.5)	0.437 (11.1)	30°C @ 1W	13°C/W	
213SB	0.440 (11.2)/0.544 (13.8)	0.420 (10.7)	0.830 (21.1)	0.375 (9.5)	44°C @ 1W	19°C/W	TO-8, TO-38
213AB, 213AP	0.440 (11.2)/0.544 (13.8)	0.420 (10.7)	0.830 (21.1)	0.375 (9.5)	51°C @ 1W	19°C/W	
215AB	0.440 (11.2)/0.544 (13.8)	0.420 (10.7)	1.400 (35.6)	0.437 (11.1)	28°C @ 1W	15°C/W	
215AP	0.440 (11.2)/0.544 (13.8)	0.420 (10.7)	1.400 (35.6)	0.437 (11.1)	32°C @ 1W	15°C/W	

Materials and Finishes Available for 200 Series:

SB	Silver-bearing copper; black ebonol "C"
AB	Aluminum, black anodized
AP	Aluminum, no finish applied

NATURAL AND FORCED CONVECTION CHARACTERISTICS



258 SERIES — *Thermal Links for Fused Glass Diodes*

DIODES

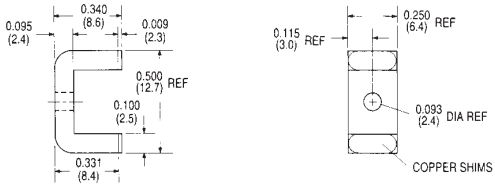
Standard P/N	Dimensions in. (mm)	Material	Finish	Weight lbs. (grams)
258 ▲	0.500 (12.7) x 0.250 (6.4) x 0.340 (8.6)	Aluminum	DeltaCoate™ 151 on all surfaces except solder pads and base	0.0018 (0.82)

The thermal resistance from diode leads to chassis or heat sink is 12°C/watt, when unit is mounted with TYPE 120 Joint Compound. If a 10°C/watt chassis or sink to ambient impedance is available, the thermal resistance from the diode leads to ambient is reduced from about 150°C/watt to 22°C/watt.

MECHANICAL DIMENSIONS

258 SERIES

Dimensions: in. (mm)



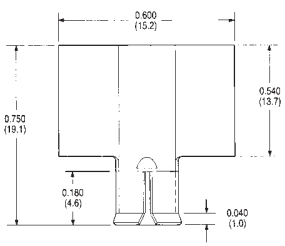
292 SERIES — *Heat Sink for Single TO-92*

TO-92

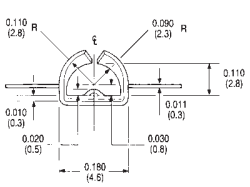
Standard P/N	Height Above PC Board in. (mm)	Overall Fin Width in. (mm)	Thermal Performance Natural Convection	Finish	Weight lbs. (grams)
292-AB ▲	0.750 (19.1)	0. 600 (15.3)	0.225°C/W @ 0.250 W	Black Anodized	0.00049 (0.22)

Power semiconductors packaged in a TO-92 style plastic case can be cooled effectively at little additional cost with the addition of the 292-AB heat sink. The 292-AB is effective over the typical power range of such devices. Material: Aluminum, Black Anodized.

MECHANICAL DIMENSIONS

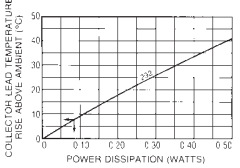


292 SERIES

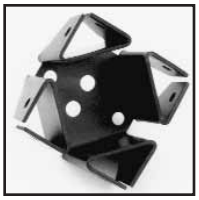


Dimensions: in. (mm)

NATURAL AND FORCED CONVECTION CHARACTERISTICS



BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS



690 SERIES — *HIghest Efficiency/Lowest Unit Cost Heat Sinks*

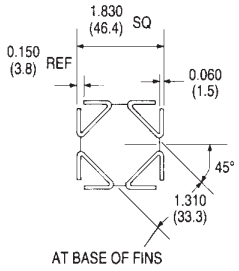
TO-3, TO-66, TO-220

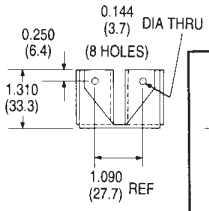
Standard P/N	Height Above PC Board in. (mm)	Outline Dimensions in. (mm)	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection	Semiconductor Mounting Hole Pattern	Weight lbs. (grams)
690-3B ▲	1.310 (33.3)	1.860 (47.2)-sq	44°C @ 7.5W	2.0°C/W @ 400 LFM	(1) TO-3	0.0700 (31.75)
690-66B	1.310 (33.3)	1.860 (47.2)-sq	44°C @ 7.5W	2.0°C/W @ 400 LFM	(1) TO-66	0.0700 (31.75)
690-220B	1.310 (33.3)	1.860 (47.2)-sq	44°C @ 7.5W	2.0°C/W @ 400 LFM	(2) TO-220	0.0700 (31.75)

Material: Aluminum, Black Anodized

These low-cost heat sinks provide the most power dissipation at the lowest unit cost and are available in three standard types to mount and cool one TO-3 or TO-66 metal power semiconductor type or two plastic package TO-220 power semiconductor types. For higher power semiconductors, the 690 Series can dissipate up to 20 watts while maintaining a mounting surface temperature rise above ambient air temperature of no more than 91°C.

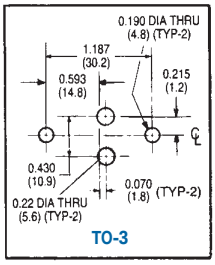
MECHANICAL DIMENSIONS



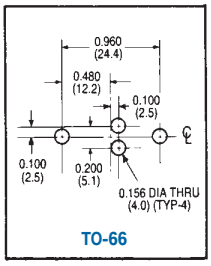


690 SERIES

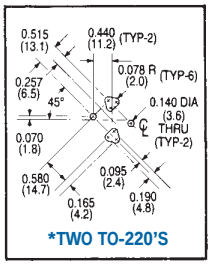
SEMICONDUCTOR MOUNTING HOLES



TO-3

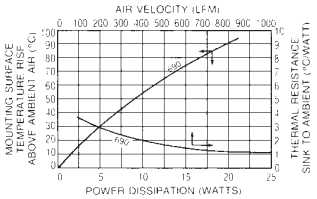


TO-66



*TWO TO-220'S

NATURAL AND FORCED CONVECTION CHARACTERISTICS



Dimensions: in. (mm)

635 SERIES — *Space-Saving Low-Cost Heat Sinks*

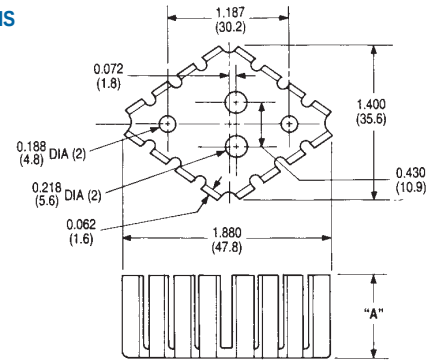
TO-3

Standard P/N	Height Above PC Board "A" in. (mm)	Outline Dimensions in. (mm)	Thermal Performance at Typical Load Natural Convection	Thermal Performance at Typical Load Forced Convection	Semiconductor Mounting Hole Pattern	Weight lbs. (grams)
635-5B2	0.500 (12.7)	1.900 (48.3) x 1.420 (36.0)	90°C @ 8.0W	6.0°C/W @ 300 LFM	TO-3	0.0200 (9.07)
635-75B2	0.750 (19.1)	1.900 (48.3) x 1.420 (36.0)	77°C @ 8.0W	4.8°C/W @ 300 LFM	TO-3	0.0220 (9.98)
635-10B2	1.000 (25.4)	1.900 (48.3) x 1.420 (36.0)	61°C @ 8.0W	3.6°C/W @ 300 LFM	TO-3	0.024 (10.89)
635-125B2	1.250 (31.8)	1.900 (48.3) x 1.420 (36.0)	53°C @ 8.0W	3.1°C/W @ 300 LFM	T0-3	0.028 (12.70)

Material: Aluminum Alloy, Black Anodized

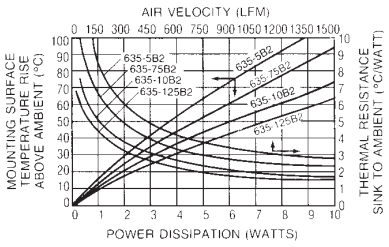
Use this low-cost TO-3 heat sink style for multiple TO-3 applications on a single printed circuit board, where two or more TO-3s must be placed in proximity and minimum space is available for heat sinking. Four different heights are available, all with TO-3 mounting hole pattern in the base. Consult factory for TO-66, TO-220, and multilead IC hole patterns.

MECHANICAL DIMENSIONS



635 SERIES

NATURAL AND FORCED CONVECTION CHARACTERISTICS



Dimensions: in. (mm)

NOTES:

FAX: TRANSMITTAL

Please copy and complete this form, then fax or mail to:

Wakefield Thermal Solutions
"Thermal Management Solutions and Aluminum Extrusions since 1957"

33 Bridge Street
Pelham, NH 03076
Phone: (603) 635-2800
Fax: (603) 635-1900

FROM: Total # pgs. being faxed _____

Name _____

Title _____

Company _____

Division/Department _____ Mail Stop _____

Address _____

City _____

State _____ Zip _____ Country _____

Telephone ( ) _____ Fax ( ) _____

Email _____

Product or project _____

APPLICATION INFORMATION REQUIRED:

1. What type of electronic device will be cooled?

2. How many of these devices will be cooled? _____

3. How many watts of power must be dissipated from each device and in aggregate?
Please specify: _____ Each device _____ Total Power
A sketch of the heat distribution on the base is attached. ❑ Yes ❑ No
A sketch of the component is also being faxed. ❑ Yes ❑ No

4. What is the maximum allowable junction temperature of the device? _____ °C
(See the manufacturer's data sheet).
If no junction temperature has been specified, what is the maximum case temperature? _____ °C

5. What is the thermal resistance of the semiconductor from junction to case - Θj - c?
(See the manufacturer's data sheet). Θ j - c _____

6. Is electrical isolation required between the device case and the heat sink? _____
At what voltage level? _____

7. What finish is required on the heat sink? _____ Anodize _____ Paint ____ Chromate
_____ Special _____ None What color? _____

8. What is the maximum ambient air temperature? _____ °C

9. What type of convection is required? _____ Forced _____ Natural

10. If forced convection have you chosen a fan? ❑ Yes ❑ No
Fan Manufacturer/Part Number _____ Fan Size _____
Free Flow (CFM) _____ Static Pressure (Inches H_20) _____

11. Will you shroud the air flow (i.e. , direct the air through the heat sink)? ❑ Yes ❑ No
If no, what is the cross-sectional size of the air space where the heat sink will be located?
_____ Width X _____ Height

12. How much space is available for this heat sink?
Length _____ Width _____ Height _____ in. or cm _____

Samples needed by: _____ Prototype completion date: _____

Pre-production target date: _____ Production target date: _____

Rate of usage: _____ Estimated Annual Usage (EAU): _____

Estimated program life expectancy: _____