

BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS



217 SERIES

Surface Mount Heat Sinks

D²PAK, 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:

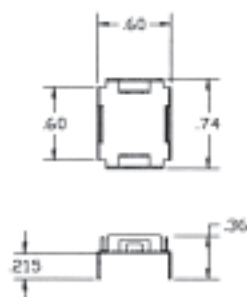
- No interface material is needed
- Copper with matte tin plating for improved solderability and assembly
- Both the component and the heat sink are installed on the PC-board utilizing standard SMT assembly equipment for "Tape & Reel" and "Tube" formats
- EIA standards and ESD protection are specified
- 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	Thermal Performance at Typical Load Forced Convection)
217-36CTE6	.360 (9.1)	.600 (15.2) x .740 (18.8)	Bulk	1	55°C @ 1W	16.0°C/W @ 200 LFM
217-36CTTE6	.360 (9.1)	.600 (15.2) x .740 (18.8)	Tube	20	55°C @ 1W	16.0°C/W @ 200 LFM
217-36CTRE6	.360 (9.1)	.600 (15.2) x .740 (18.8)	Tape & Reel	250	55°C @ 1W	16.0°C/W @ 200 LFM

Material: Copper, Matte Tin Plated

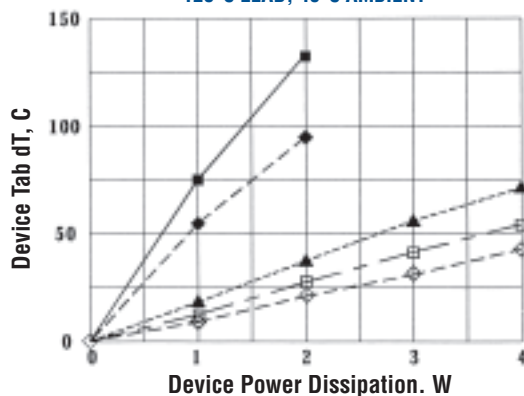
MECHANICAL DIMENSIONS

217 HEAT SINK WITH DPAK DEVICE

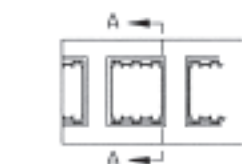


217-36CT6

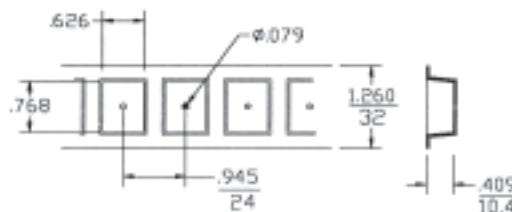
THERMAL PERFORMANCE 6 LAYER BOARD, D²PAK 125°C LEAD, 40°C AMBIENT



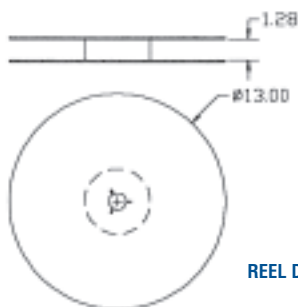
KEY: ■ Device only, NC ◆ Device + HS, NC ▲ Device + HS, 100 lfm □ Device + HS, 200 lfm ◇ Device + HS, 300 lfm



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

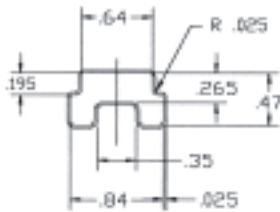
Surface Mount Heat Sinks

D²PAK, TO-220, SOL-20

MECHANICAL DIMENSIONS

217 SERIES

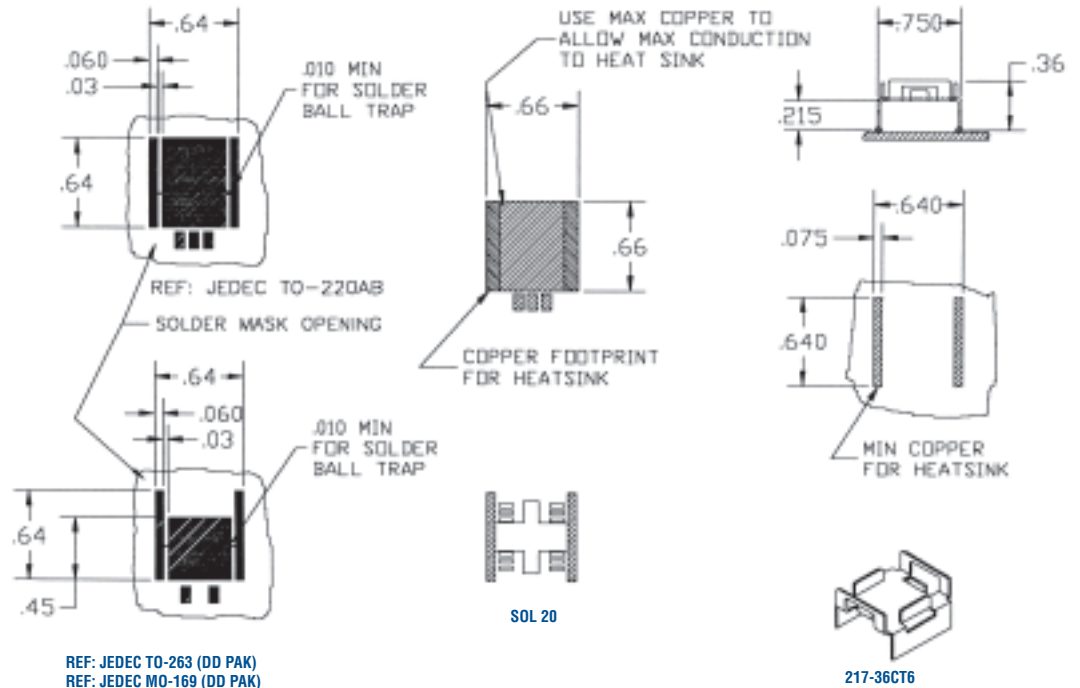
TUBE DETAILS



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

217-36CTT6

BOARD LAYOUT RECOMMENDATIONS



Dimensions: in.



218 SERIES

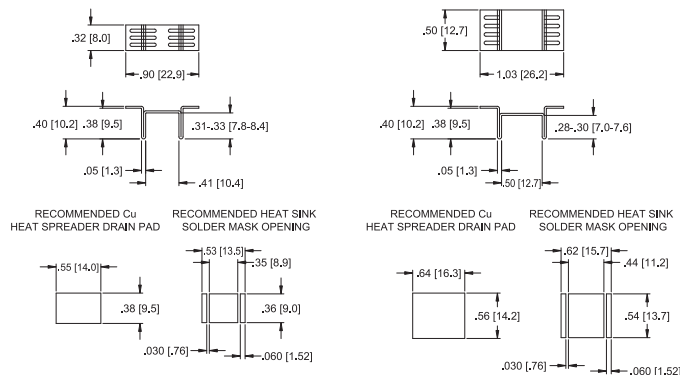
Surface Mount Heat Sink

SMT Devices

Standard P/N	Height Above PC Board in. (mm)	Maximum Footprint in. (mm)	Natural Convection	Thermal Performance at Typical Load Forced Convection
218-40CTE3	.40 (10.2)	.90 (22.9) x .315 (8.0)	62°C rise @ 2W	21°C/W @ 200LFM
218-40CTE5	.40 (10.2)	1.03 (26.2) x .50 (12.7)	62°C rise @ 2W	21°C/W @ 200LFM

Material: Copper, Matte Tin Plated

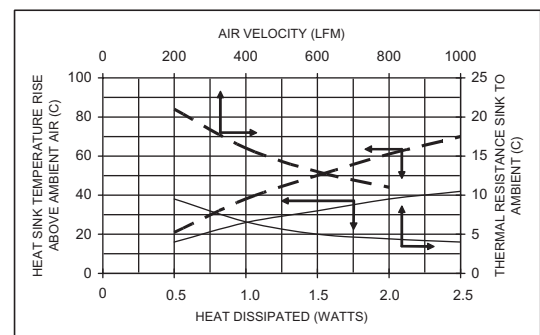
MECHANICAL DIMENSIONS



218-40CT3

218-40CT5

NATURAL AND FORCED CONVECTION CHARACTERISTICS



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

BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS



206 SERIES

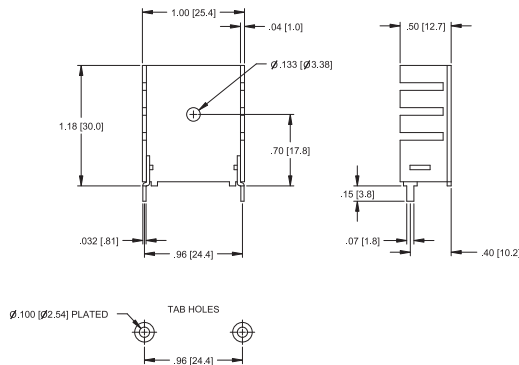
Vertical Mount Heat Sink

TO-220

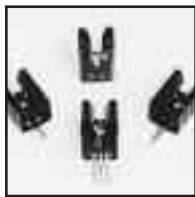
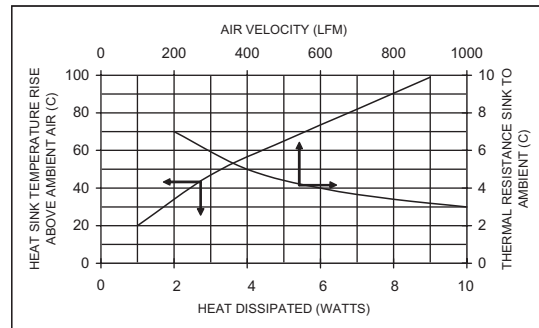
Standard P/N	Height Above PC Board in. (mm)	Maximum Footprint in. (mm)	Thermal Performance at Typical Load	
			Natural Convection	Forced Convection
206-1PABEH	1.18 (30.0)	1.00 (25.4) x .50 (12.7)	56°C rise @ 4W	7.3°C/W @ 200LFM

Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS



NATURAL AND FORCED CONVECTION CHARACTERISTICS



PATENT PENDING

230 & 234 SERIES

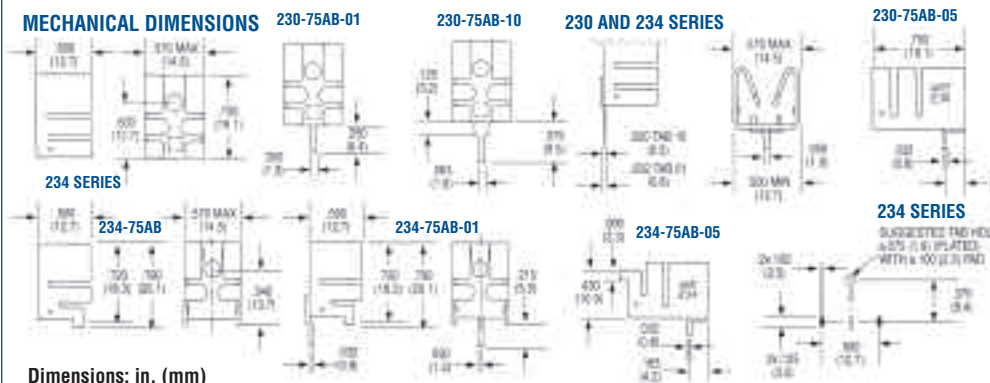
Compact, Wavesolderable Low-Profile Self-Locking Heat Sinks

TO-220

Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuration	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
230-75ABE-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
230-75ABE-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
230-75ABE-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
234-75ABE-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
234-75ABE-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

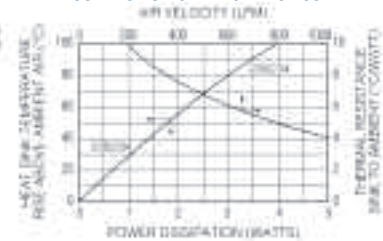
Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS



Dimensions: in. (mm)

NATURAL AND FORCED CONVECTION CHARACTERISTICS



BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS



241 SERIES

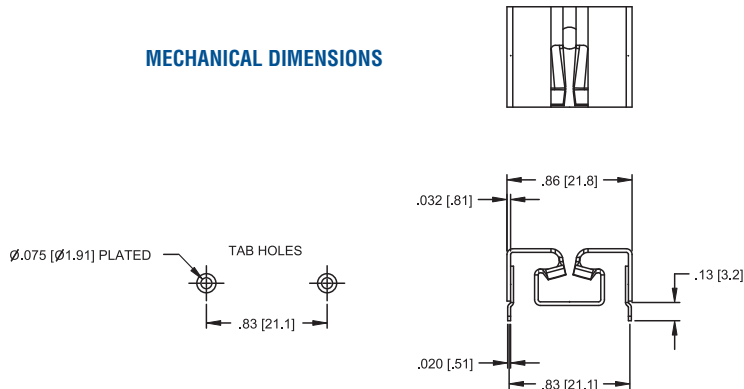
Horizontal Mount Heat Sink

TO-220

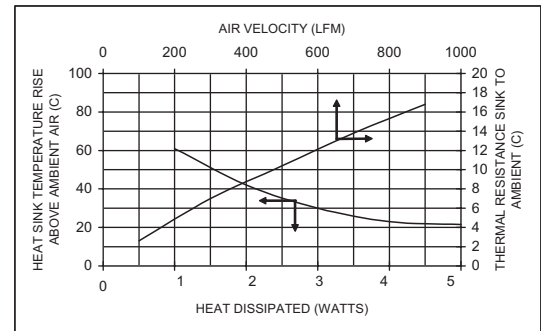
Standard P/N	Height Above PC Board in. (mm)	Maximum Footprint in. (mm)	Thermal Performance at Typical Load	
			Natural Convection	Forced Convection
241-69ABE-03	.39 (9.9)	.86 (21.8) x .69 (17.5)	77°C rise @ 4W	12°C/W @ 200LFM

Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS



NATURAL AND FORCED CONVECTION CHARACTERISTICS



262 SERIES

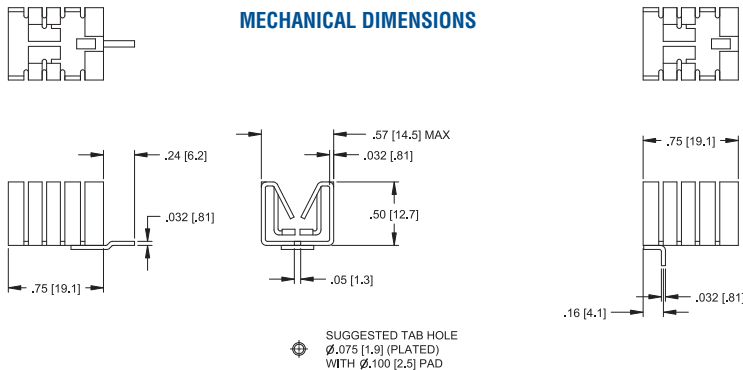
Horizontal and Vertical Mount Heat Sink

TO-220

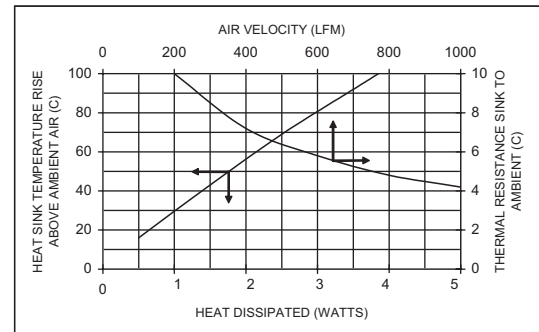
Standard P/N	Height Above PC Board in. (mm)	Maximum Footprint in. (mm)	Thermal Performance at Typical Load	
			Natural Convection	Forced Convection
262-75ABE-05	.53 (13.4)	.75 (19.1) x .50 (12.7)	80°C rise @ 2W	10°C/W @ 200LFM
262-75ABE-01	.75 (19.1)	.53 (13.4) x .50 (12.7)	80°C rise @ 2W	10°C/W @ 200LFM

Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS



NATURAL AND FORCED CONVECTION CHARACTERISTICS



BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS



PATENT PENDING

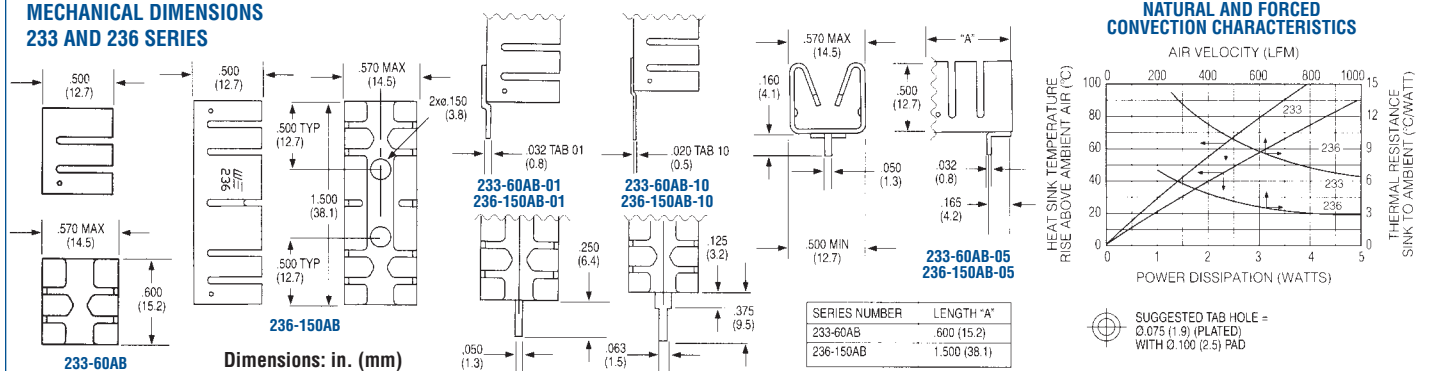
233 & 236 SERIES

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	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
233-60ABE-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
233-60ABE-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
233-60ABE-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	40°C @ 2W	4.80°C/W @ 400 LFM
236-150ABE-01	1.500 (38.1)	.570 (14.5) x .500 (12.7)	Vertical	01	Clip/Mtg Hole	40°C @ 2W	4.80°C/W @ 400 LFM
236-150ABE-05	.500 (12.7)	1.500 (38.1) x .570 (14.5)	Horizontal	05	Clip/Mtg Hole	40°C @ 2W	4.80°C/W @ 400 LFM
236-150ABE-10	1.625 (41.3)	.570 (14.5) x .570 (12.7)	Vertical	10	Clip/Mtg Hole	40°C @ 2W	4.80°C/W @ 400 LFM

Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS
233 AND 236 SERIES

PATENT 5381041

275 & 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	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
275-75ABE-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
275-75ABE-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
231-69PABE	.400 (10.1)	.690 (17.5) x .835 (12.7)	Horizontal	13H	Clip/Mtg Hole	45°C @ 2W	8°C/W @ 400 LFM
231-69PABE-XXX	.690 (17.5)	.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 (19.1)	.835 (21.2) x .400 (14.5)	Vert./Horiz.	No Tab	Clip/Mtg Hole	43°C @ 2W	7.9°C/W @ 400 LFM
231-75PABE	.400 (10.1)	.750 (19.1) x .835 (12.7)	Horizontal	13H	Clip/Mtg Hole	43°C @ 2W	7.9°C/W @ 400 LFM
231-75PABE-XXX	.750 (19.1)	.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 (35)	.835 (21.2) x .400 (12.7)	Vert./Horiz.	No Tab	Clip/Mtg Hole	32°C @ 2W	5.9°C/W @ 400 LFM
231-137PABE	.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
231-137PABE-XXX	1.375 (35)	.835 (21.2) x .400 (12.7)	Vertical	13V, 14V, 15V	Clip/Mtg Hole	32°C @ 2W	5.9°C/W @ 400 LFM

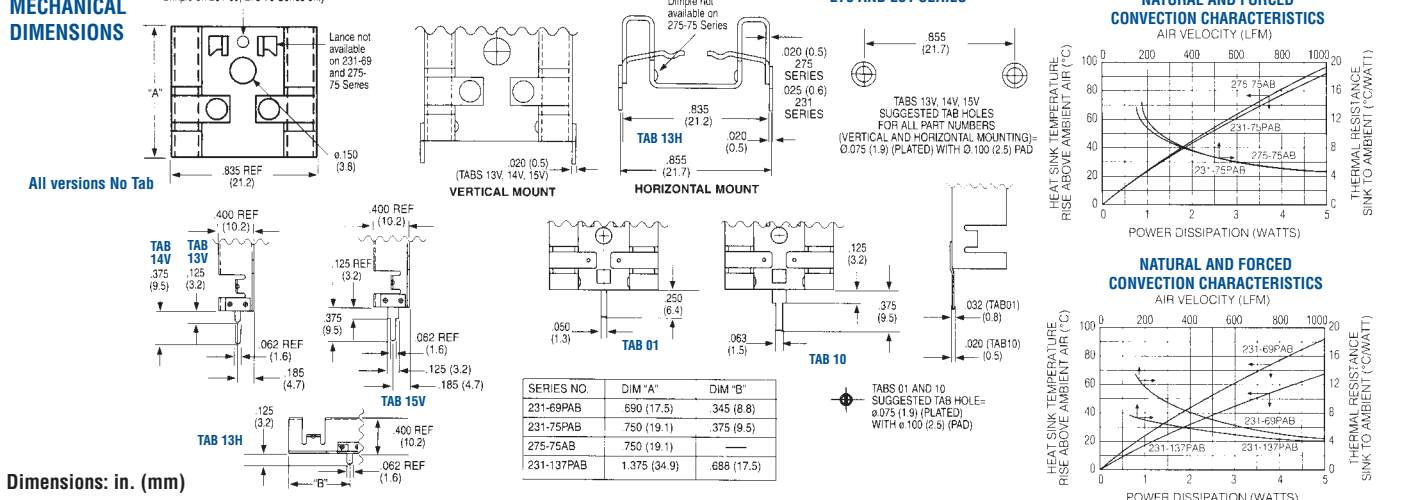
Material: Aluminum, Pre-anodized Black (PAB), Anodized Black (AB)

MECHANICAL DIMENSIONS

Dimple on 231-69, 275-75 Series only

275 AND 231 SERIES

NATURAL AND FORCED CONVECTION CHARACTERISTICS



BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS



PATENT 5381041

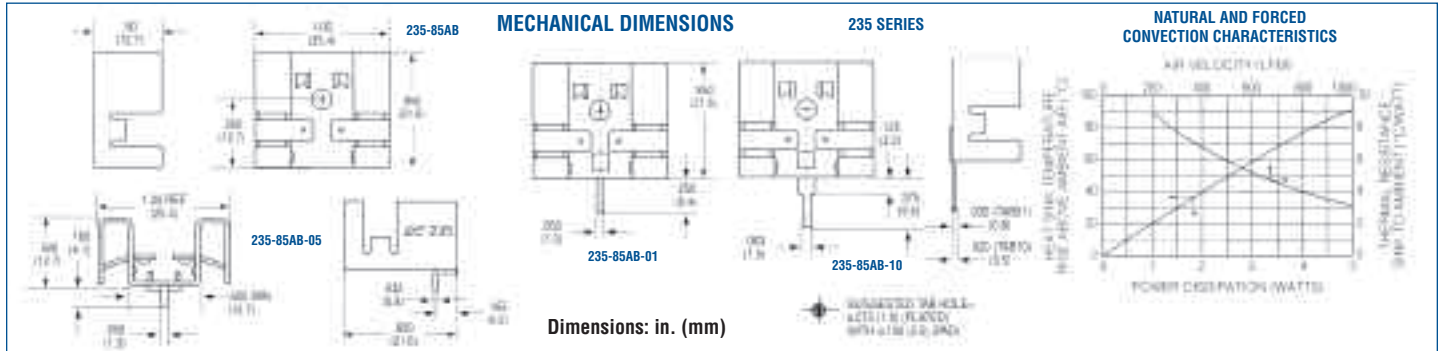
235 SERIES

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	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
235-85ABE-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
235-85ABE-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
235-85ABE-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



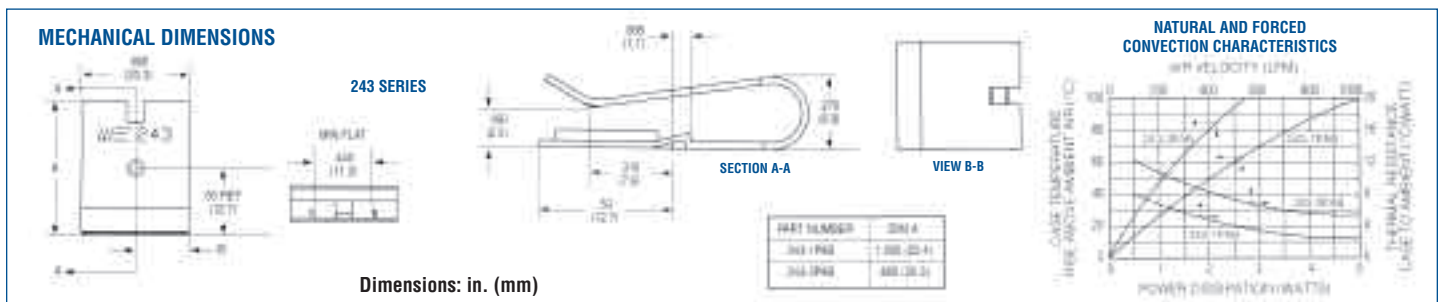
243 SERIES

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	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)	Vert./Horiz.	No Tab	Clip	78°C @ 2W	8.2°C/W @ 400 LFM

Material: Aluminum, Pre-anodized Black



PATENT PENDING

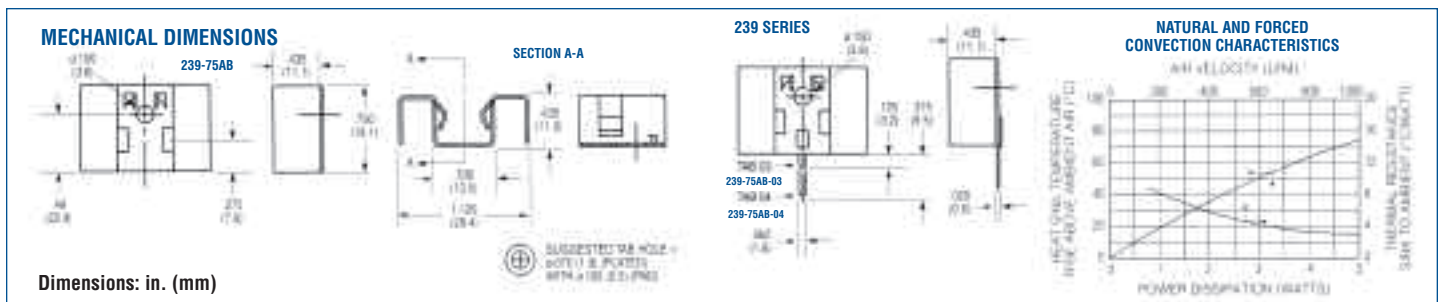
239 SERIES

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	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
239-75ABE-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
239-75ABE-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



BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS



265 SERIES

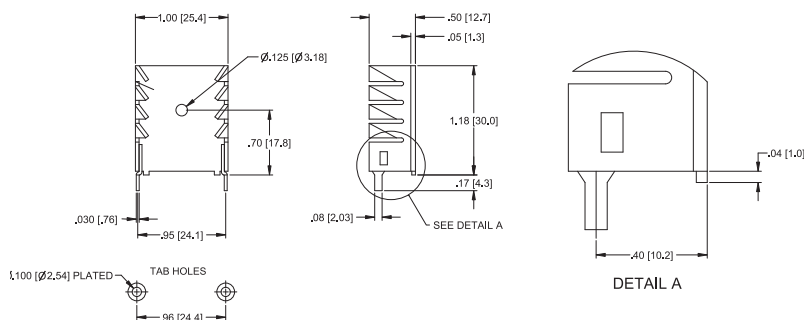
Vertical Mount Heat Sink

TO-220

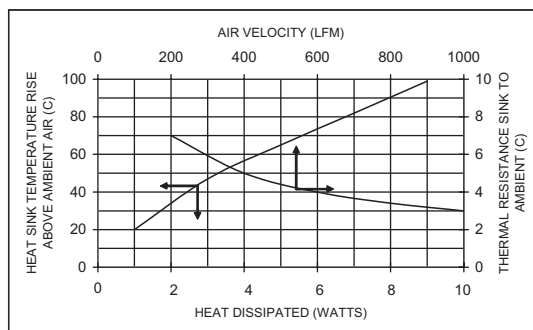
Standard P/N	Height Above PC Board in. (mm)	Maximum Footprint in. (mm)	Thermal Performance at Typical Load	
			Natural Convection	Forced Convection
265-118ABHE-22	1.18 (30.0)	1.00 (25.4) x .50 (12.7)	56°C rise @ 4W	7.0°C/W @ 200LFM

Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS



NATURAL AND FORCED CONVECTION CHARACTERISTICS



286DB SERIES

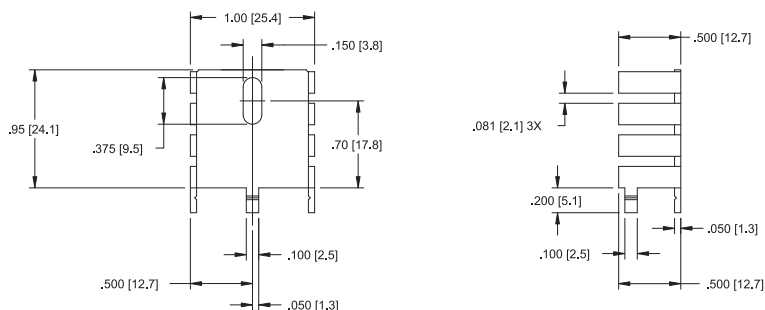
Vertical Mount Heat Sink

TO-220

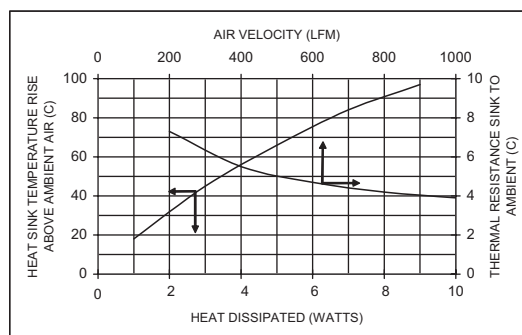
Standard P/N	Height Above PC Board in. (mm)	Maximum Footprint in. (mm)	Thermal Performance at Typical Load	
			Natural Convection	Forced Convection
286DBE	.95 (24.1)	1.00 (25.4) x .50 (12.7)	65°C rise @ 4W	9.0°C/W @ 200LFM

Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS



NATURAL AND FORCED CONVECTION CHARACTERISTICS



BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS



273 SERIES

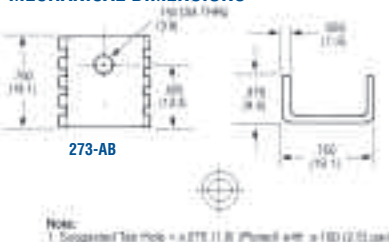
Low-Cost, Low-Height Wavesolderable Heat Sinks

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	Thermal Performance at Typical Load
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-ABE-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-ABE-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

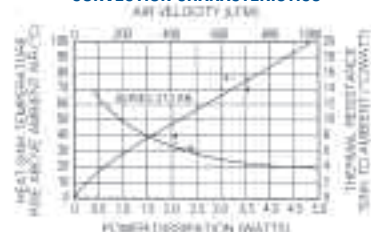


273 SERIES



Dimensions: in. (mm)

NATURAL AND FORCED CONVECTION CHARACTERISTICS



274 & 281 SERIES

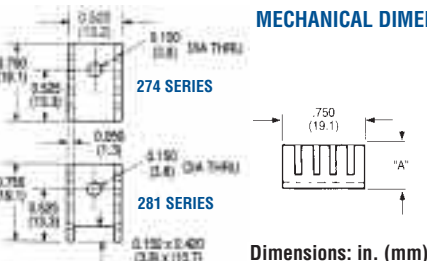
Low-Cost, Low-Height Wavesolderable Heat Sinks

TO-220

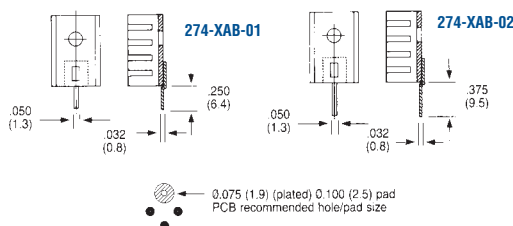
Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuration	Solderable Tab Options	Mounting Style	Thermal Performance at Typical Load	Thermal Performance at Typical Load
274-1AB	.375 (9.5)	.520 (13.2) x .750 (19.1)	Vert./Horiz.	No Tab	Mtg Hole	56°C @ 2W	8.0°C/W @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

Material: Aluminum, Black Anodized

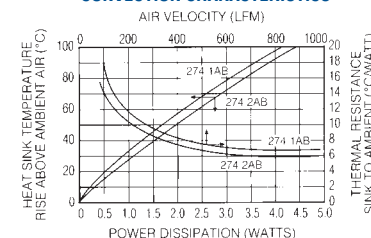
MECHANICAL DIMENSIONS



274 SERIES



NATURAL AND FORCED CONVECTION CHARACTERISTICS



240 SERIES

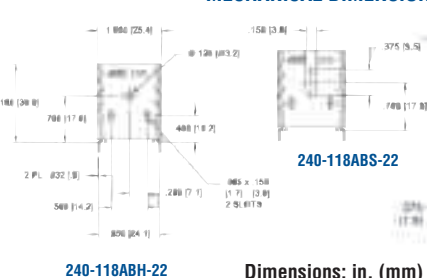
Labor-Saving Twisted Fin Heat Sinks

TO-220

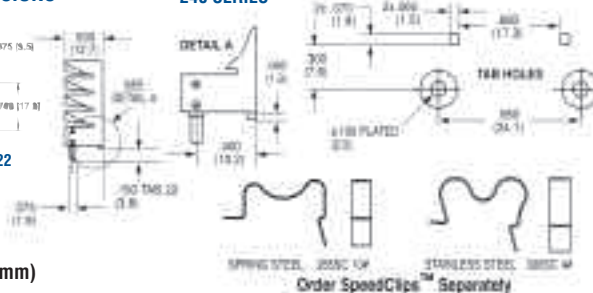
Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuration	Solderable Tab Options	Mounting Style	Thermal Performance at Typical Load	Thermal Performance at Typical Load
240-118ABEH-22	1.180 (30.0)	1.000 (25.4) x .500 (12.7)	Vertical	22	Clip/Mtg Hole	55°C @ 4W	5.3°C/W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

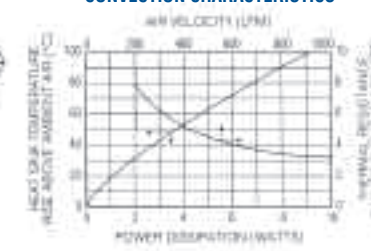
MECHANICAL DIMENSIONS



240 SERIES



NATURAL AND FORCED CONVECTION CHARACTERISTICS



BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS



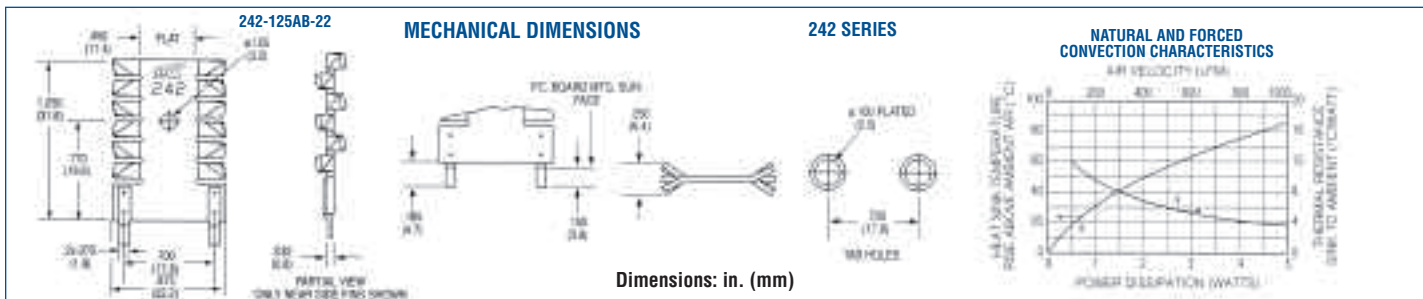
242 SERIES

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
242-125ABE-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



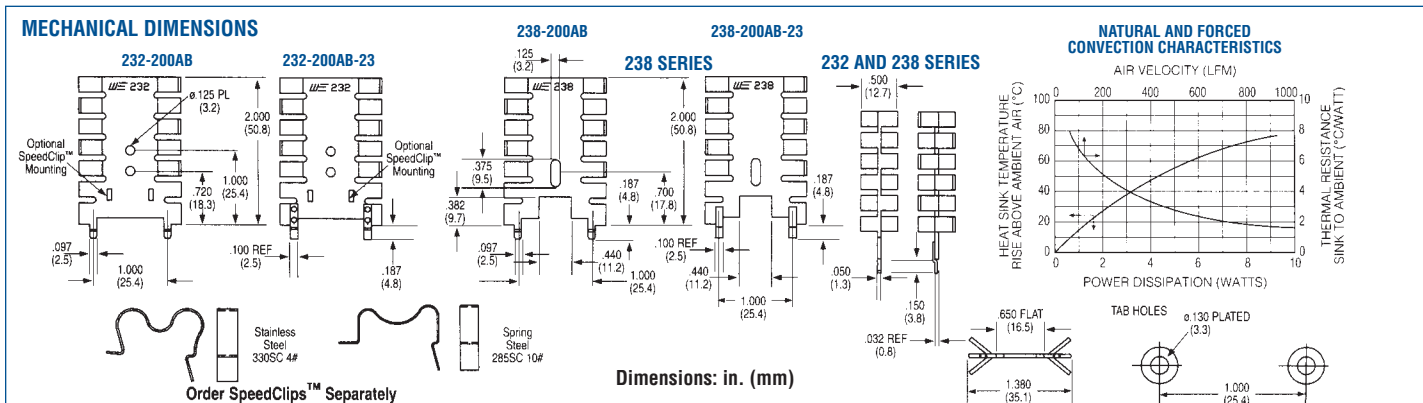
232 & 238 SERIES

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
232-200ABE-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)	Vertical	2, Twisted	Mtg Slot	48°C @ 4W	3.3°C/W @ 400 LFM
238-200ABE-23	2.000 (50.8)	1.380 (35.1) x .500 (12.7)	Vertical	2, Solderable	Mtg Slot	48°C @ 4W	3.3°C/W @ 400 LFM

Material: Aluminum, Black Anodized



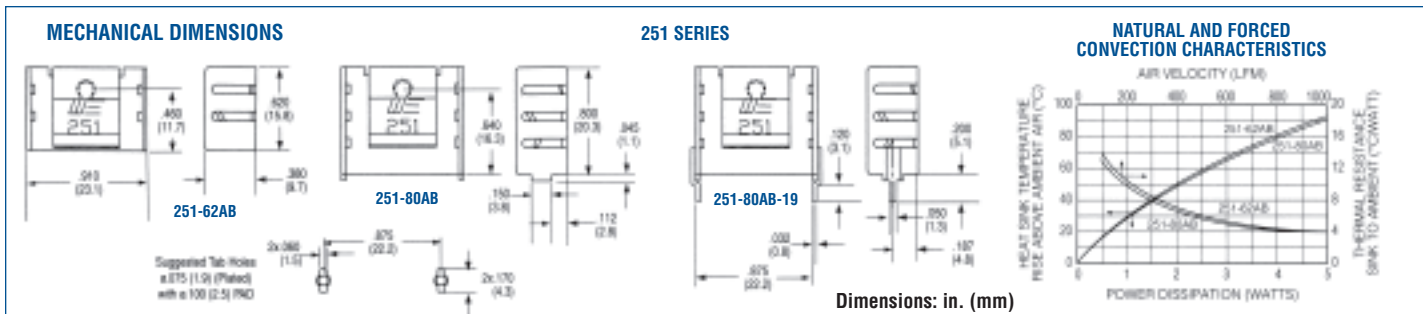
251 SERIES

Slim-Profile Heat Sinks With Integral Clips

15 Lead Multiwat

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
251-80ABE-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



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



244 SERIES

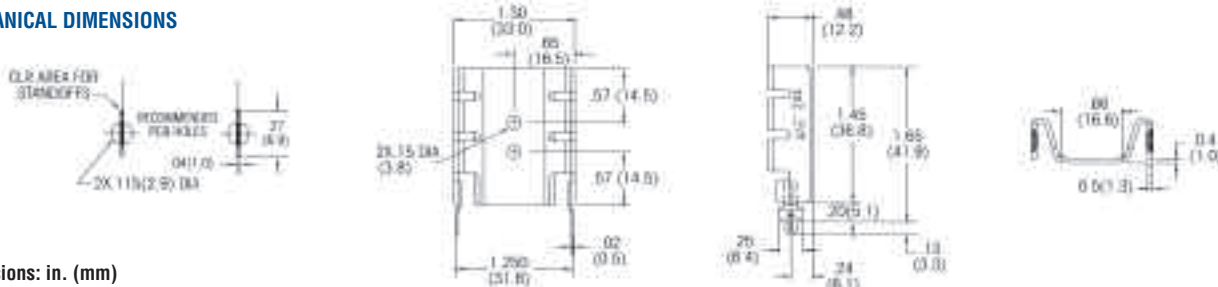
Low Height, Slim Profile Wavesolderable Folded Fin Heat Sinks

MULTIWATT

Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuration	Solderable Tab Options	Thermal Performance at Typical Load		Weight lbs. (grams)
					Natural Convection	Forced Convection	
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)
244-145ABE-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



245 SERIES

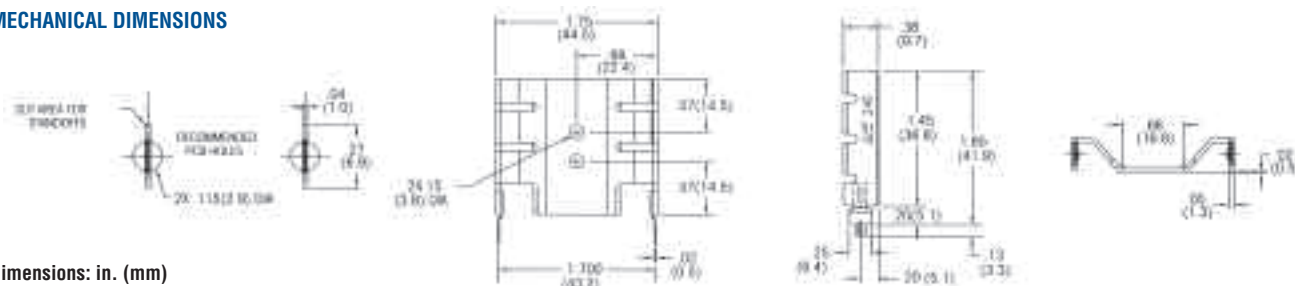
Low Height, Slim Profile Wavesolderable Folded Fin Heat Sinks

MULTIWATT

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



246 SERIES

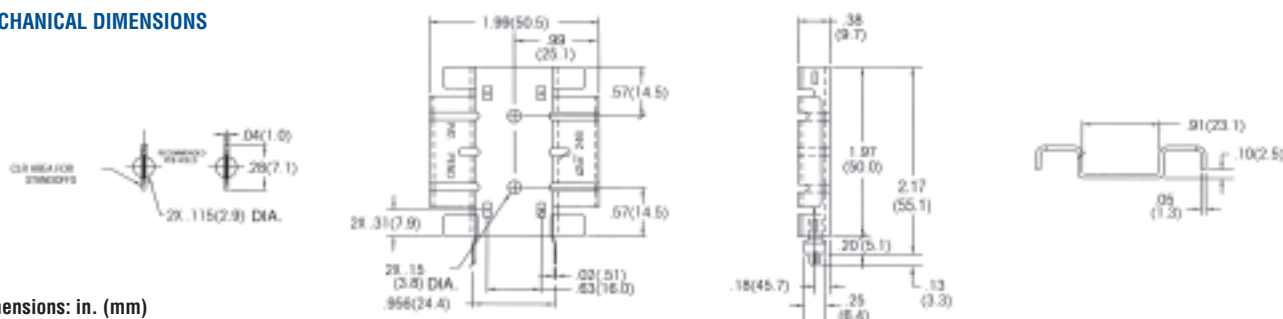
Medium Height, Slim Profile Wavesolderable Folded Fin Heat Sinks

MULTIWATT

Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuration	Solderable Tab Options	Thermal Performance at Typical Load		Weight lbs. (grams)
					Natural Convection	Forced Convection	
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)
246-197ABE-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



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



247 SERIES

Medium Height, Deep Profile Wavesolderable Folded Fin Heat Sinks

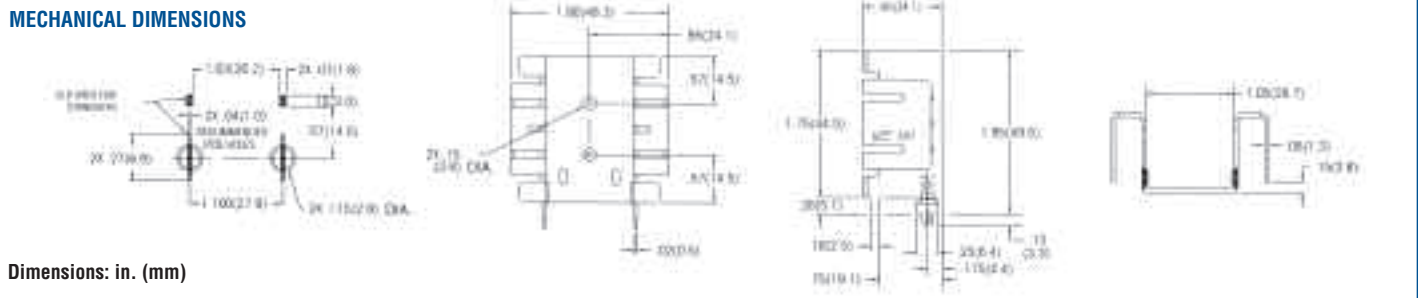
MULTIWATT

Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuration	Solderable Tab Options	Thermal Performance at Typical Load		Weight lbs. (grams)
					Natural Convection	Forced Convection	
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)
247-195ABE-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

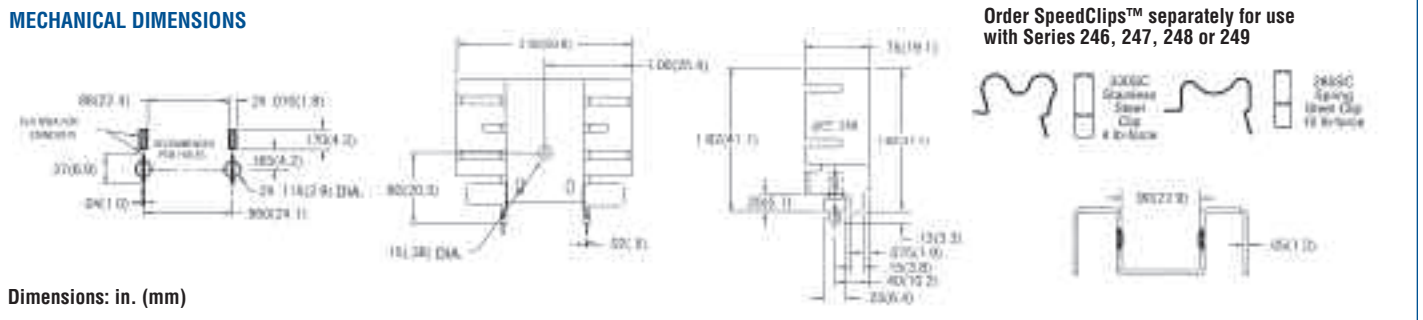
MULTIWATT

Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuration	Solderable Tab Options	Thermal Performance at Typical Load		Weight lbs. (grams)
					Natural Convection	Forced Convection	
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)
248-162ABE-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



Dimensions: in. (mm)



249 SERIES

Medium Height, Deep Profile Wavesolderable Folded Fin Heat Sinks

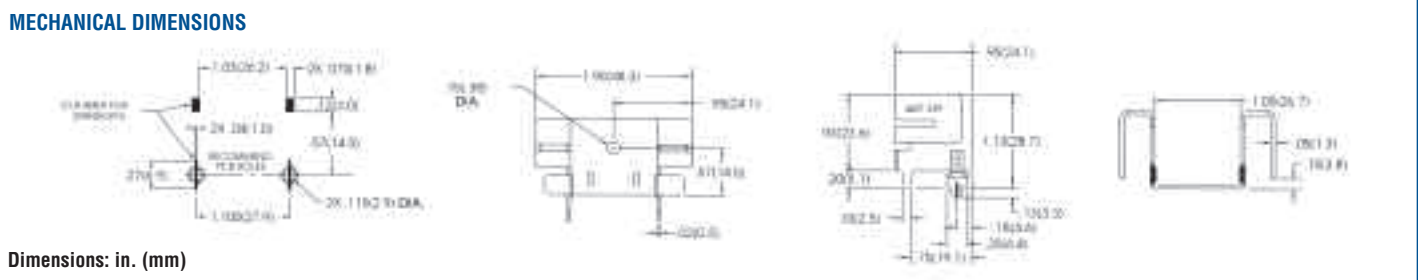
MULTIWATT

Standard P/N	Height Above PC Board in. (mm)	Footprint Dimensions in. (mm)	Mounting Configuration	Solderable Tab Options	Thermal Performance at Typical Load		Weight lbs. (grams)
					Natural Convection	Forced Convection	
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)
249-113ABE-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)

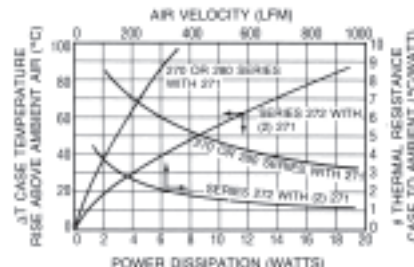
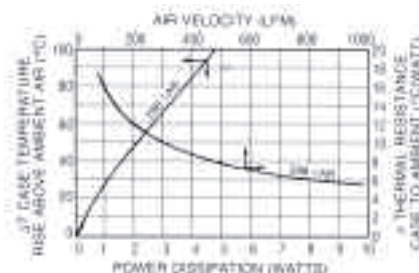
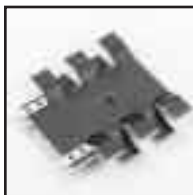
Order SpeedClip™ 285SC or 330SC separately. (See 248 Series section).

Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS



Dimensions: in. (mm)



BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS



270/272/280 SERIES

Small Footprint Low-Cost Heat Sinks

TO-220, TO-202

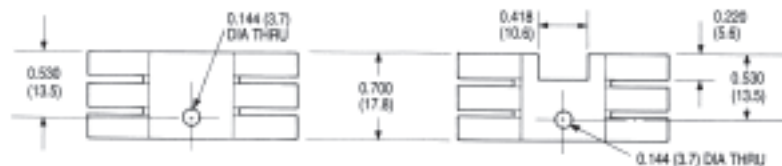
Standard P/N	Height Above PC Board in. (mm)	Horizontal Mounting Maximum Footing in. (mm)	Solderable Tab Options	Thermal Performance at Typical Load		Weight lbs. (grams)
				Natural Convection	Forced Convection	
270-AB	0.375 (9.4)	1.750 (44.5) x 0.700 (17.8)	—	70°C @ 4W	6.0°C/W @ 400 LFM	0.0052 (2.36)
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.

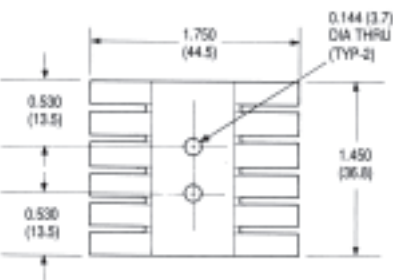
The 270-AB and 280-AB accept one power semiconductor; the 272-AB is designed for two power semiconductors. Specify solderable tab options for the 272 Series by the addition of suffix "01" or "02" to the standard part number (i.e. 272-AB01 or 272-AB02).

MECHANICAL DIMENSIONS

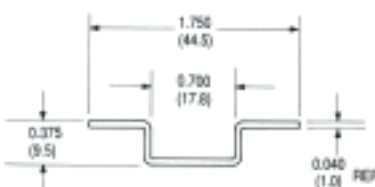


270 SERIES

280 SERIES



272 SERIES

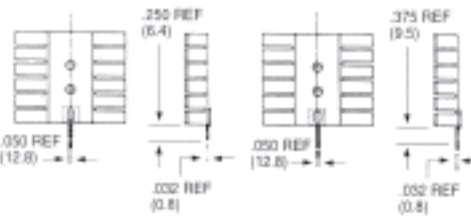
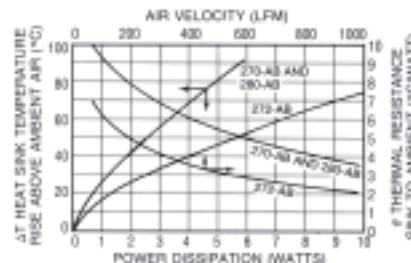


272AB01

272AB02

Dimensions: in. (mm)

NATURAL AND FORCED CONVECTION CHARACTERISTICS



Note:
1. Suggested Tab Hole = 0.075 ±0.003 plated with 0.100 pad



289 & 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		Weight lbs. (grams)
			Natural Convection	Forced Convection	
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

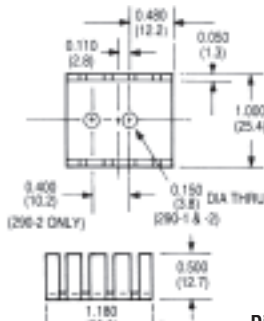
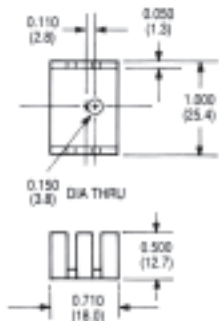
Low in cost and compact in overall dimensions, one 289 Series heat sink can accommodate one semiconductor; the 289 Series is available with a black an-

odized finish (289-AB) or with no finish (289-AP). Two semiconductors can be mounted to the 290-2AB style.

289 SERIES

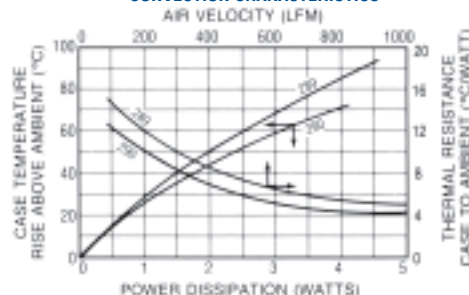
MECHANICAL DIMENSIONS

290 SERIES



Dimensions: in. (mm)

NATURAL AND FORCED CONVECTION CHARACTERISTICS



BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS



250 SERIES

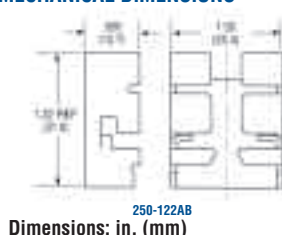
High-Performance Slim Profile Heat Sinks With Integral Clips

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	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
250-122ABE-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
250-122ABE-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

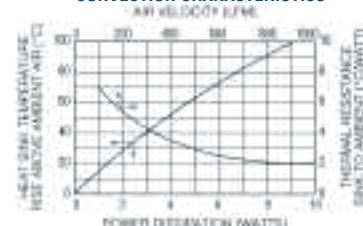
MECHANICAL DIMENSIONS



250-122AB
Dimensions: in. (mm)



NATURAL AND FORCED CONVECTION CHARACTERISTICS



237 & 252 SERIES

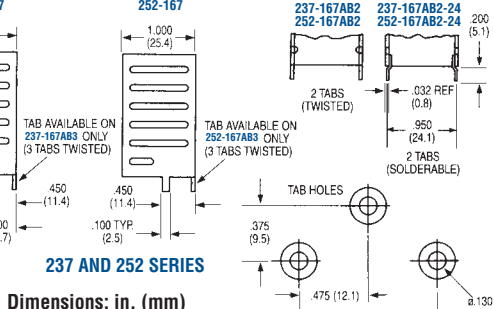
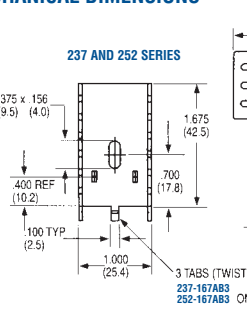
High-Performance, High-Power Vertical Mount Heat Sinks

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	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
237-167ABE2-24	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
252-167ABE2-24	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

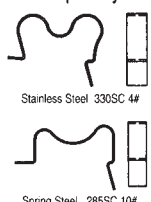
Order SpeedClips™ 285SC or 330SC separately for rapid component installation, lowering manufacturing costs. Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS

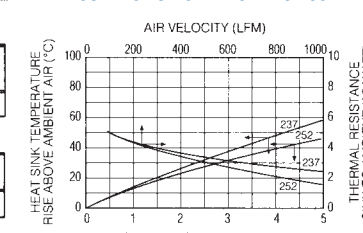


237 AND 252 SERIES
Dimensions: in. (mm)

Order SpeedClips™ Separately



NATURAL AND FORCED CONVECTION CHARACTERISTICS



291 SERIES

Labor-Saving Clip-on Heat Sinks

TO-220

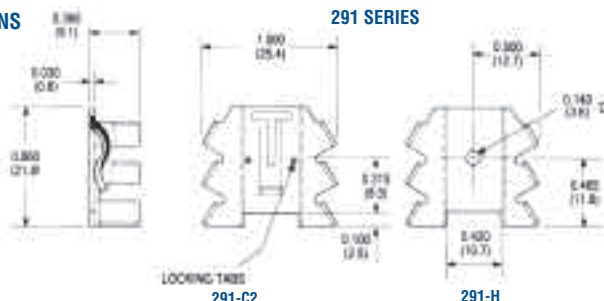
Standard P/N	Height Above PC Board in. (mm)	Vertical Mounting Footprint Dimensions in. (mm)	Mounting Style	Thermal Performance at Typical Load		Weight lbs. (grams)
				Natural Convection	Forced Convection	
291-C236AB	0.860 (21.9)	1.100 (27.0) x 0.360 (9.1)	TO-220 (Clip)	80°C @ 2W	24°C/W @ 600 LFM	0.0026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

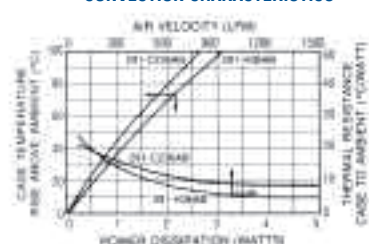
One type is available with a locking clip and one with a 0.140 in. (3.6) diameter mounting hole only.

MECHANICAL DIMENSIONS



Dimensions: in. (mm)

NATURAL AND FORCED CONVECTION CHARACTERISTICS

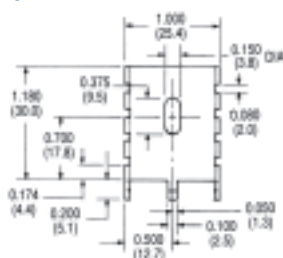


TO-220

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

the board. Material: 286-AB style (aluminum, black anodized), 286-CBT style (copper, black paint tin tabs), and 286-CT style (copper, tinned).

286 SERIES

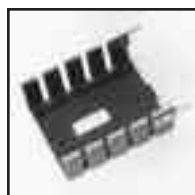


Dimensions: in. (mm)



Figure 1 is a line graph with the following characteristics:

- Y-axis:** Heat Sink Temperature Rise Above Ambient (°C), ranging from 0 to 100 in increments of 20.
- X-axis:** Power Dissipation (Watts), ranging from 0 to 10 in increments of 1.
- Top X-axis:** Air Velocity (fpm), ranging from 0 to 1000 in increments of 100.
- Right Y-axis:** Thermal Resistance (°C/W), ranging from 0 to 10 in increments of 1.
- Curves:**
 - 200 Air:** An upward-sloping curve starting at (0, 0) and reaching approximately 80°C at 10W.
 - 250 Air:** A downward-sloping curve starting at approximately 100°C at 0W and reaching approximately 20°C at 10W.
- Annotations:** Arrows point from the curves to their respective labels '200 Air' and '250 Air'.



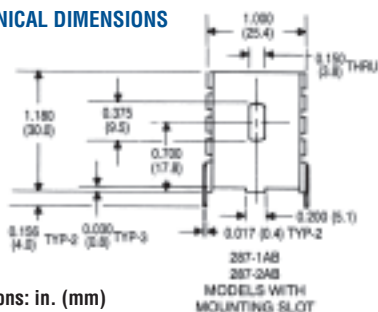
TQ-220

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

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.

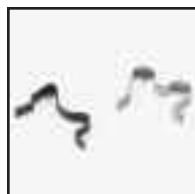
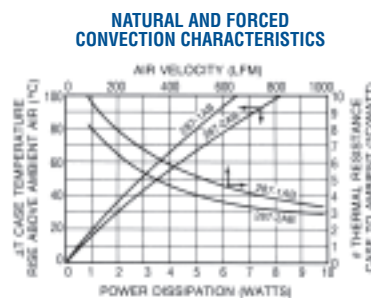
287 SERIES



Dimensions: in. (mm)



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)

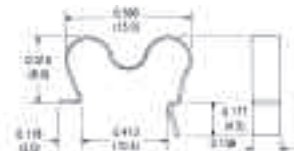


Weight
lbs. (grams)

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)

one SpeedClip™ for each heat sink purchased. Must be purchased with heat sinks.

**Speed
Clip
330 SC**



**4 lb (17.8N)
Nominal Force
Installed**



**Speed
Clip
285 SC**
**10 lb (44.5N)
Nominal Force
Installed**

Dimensions: in. (mm)

BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS



695 SERIES

Space-Saving Heat Sinks for Small Stud-Mounted Diodes

STUD-MOUNT

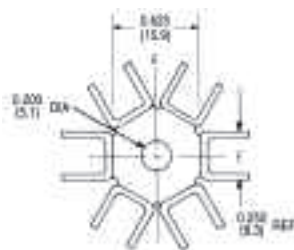
Standard P/N	Maximum Width in. (mm)	Height in. (mm)	Thermal Performance at Typical Load Natural Convection	Forced Convection	Weight lbs. (grams)
695-1B	1.330 (33.8)	0.530 (13.7)	72°C @ 4.0W	5.2°C/W @ 400 LFM	0.008 (4.0)

Mount and effectively heat sink small stud-mounted diodes with the 695 Series space-saving heat sink type. Each unit is black anodized aluminum with an 0.200 in. (5.1) dia. mounting hole centered in the base. The folded fin design

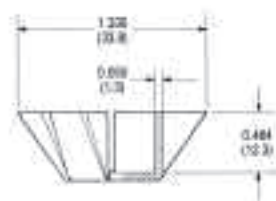
provides good heat dissipation for use where height is limited above the printed circuit board or base plate.

MECHANICAL DIMENSIONS

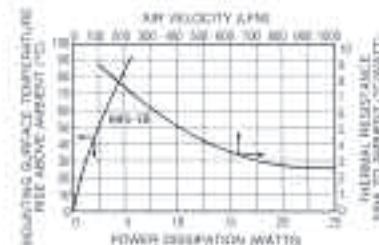
695 SERIES



Dimensions: in. (mm)



NATURAL AND FORCED CONVECTION CHARACTERISTICS



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
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.



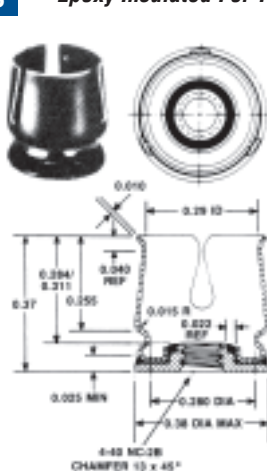
To determine the correct mounting screw lengths, add dimensions as follows:

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

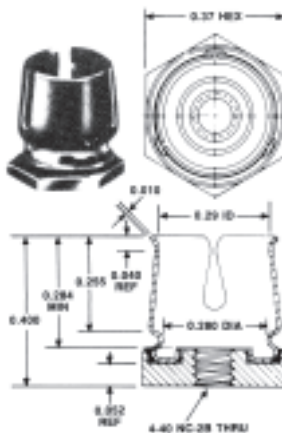
BOARD LEVEL POWER SEMICONDUCTOR HEAT SINKS

260 SERIES

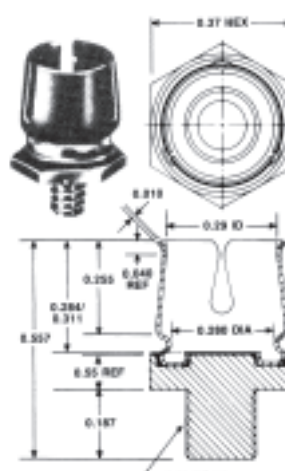
Epoxy Insulated For T0-5



260-4T5E



260-4TH5E



260-6SH5E



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)

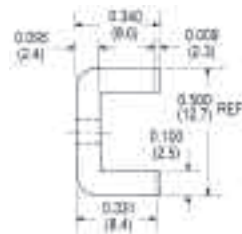
The thermal resistance from diode leads to chassis or heat sink is 12°C/watt, when unit is mounted with TYPE 120 Joint Compound. If a 10°C/watt chassis or

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)

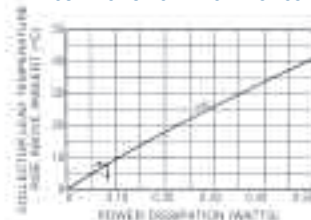
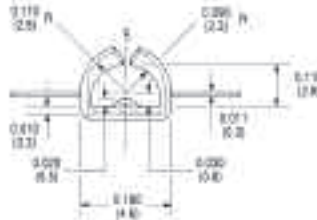
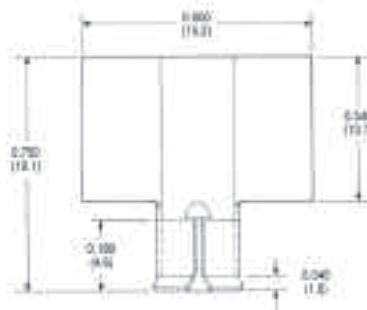
Power semiconductors packaged in a TO-92 style plastic case can be cooled effectively at little additional cost with the addition of the 292-AB heat sink. The

292-AB is effective over the typical power range of such devices.
Material: Aluminum, Black Anodized

MECHANICAL DIMENSIONS

292 SERIES

NATURAL AND FORCED CONVECTION CHARACTERISTICS



Dimensions: in. (mm)