



#### Low-Profile Heat Sinks for All Metal-Case Power Semiconductors

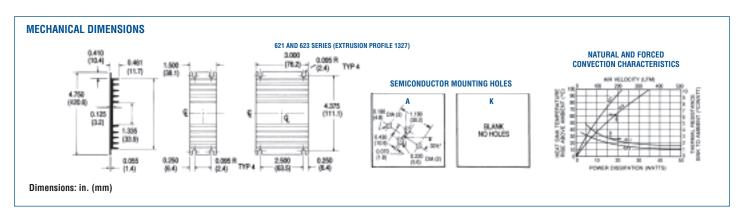
TO-3

	Footprint		Thermal Performance at Typical Load							
Standard P/N	Dimensions in. (mm)	Height in. (mm)	Mounting Hole Pattern	Natural Convection	Forced Convection	Weight lbs. (grams)				
621A	4.750 (120.6) x 1.500 (38.1)	0.461 (11.7)	(1) TO-3	75°C @ 15W	2.0°C/W @ 250 LFM	0.1000 (45.36)				
621K	4.750 (120.6) x 1.500 (38.1)	0.461 (11.7)	None	75°C @ 15W	2.0°C/W @ 250 LFM	0.1000 (45.36)				
623A	4.750 (120.6) x 3.000 (76.2)	0.461 (11.7)	(1) TO-3	52°C @ 15W	1.5°C/W @ 250 LFM	0.2100 (95.26)				
623K	4.750 (120.6) x 3.000 (76.2)	0.461 (11.7)	None	52°C @ 15W	1.5°C/W @ 250 LFM	0.2100 (95.26)				

A general purpose yet efficient heat dissipator for T0-3 and virtually all other styles of metal case power semiconductor package types, the 621 and 623 Series low-profile flat back heat sinks find a wide variety of applications. The central channel between fins measures 1.300 in. (33.0) (min.) in

621/623 SERIES

width, accommodating many types of packages. Mounting hole pattern "A" is predrilled for the standard T0-3 package. Material: Aluminum Alloy, Black Anodized.





#### 301/302/303 SERIES Co

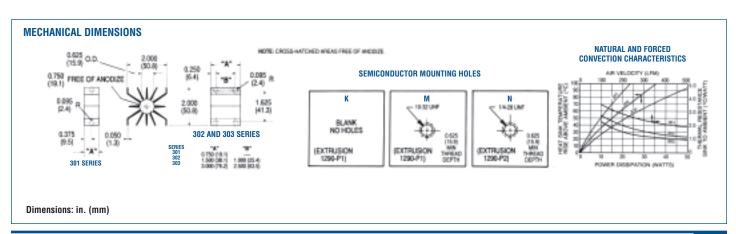
#### Compact Heat Sinks for Dual Stud-Mounted Semiconductor Cases

STUD-MOUNT

	Outline		Mounting		nance at Typical Load	
Standard P/N	Dimensions in. (mm)	Length "A" in. (mm)	Hole (s) Pattern and Number	Natural Convection	Forced Convection	Weight lbs. (grams)
301K	2.000 (50.8) x 2.000 (50.8)	0.750 (19.1)	None	70°C @ 15W	2.5° C/W @ 250 LFM	0.0580 (26.31)
301M	2.000 (50.8) x 2.000 (50.8)	0.750 (19.1)	(1) 10-32UNF, 0.625 in. thread depth	70°C @ 15W	2.5° C/W @ 250 LFM	0.0580 (26.31)
301N	2.000 (50.8) x 2.000 (50.8)	0.750 (19.1)	(1) 1/4 -28UNF, 0.625 in. thread depth	70°C @ 15W	2.5° C/W @ 250 LFM	0.0580 (26.31)
302M	2.000 (50.8) x 2.000 (50.8)	1.500 (38.1)	(1) 10-32UNF, 0.625 in. thread depth	50°C @ 15W	1.8° C/W @ 250 LFM	0.1330 (60.33)
302MM	2.000 (50.8) x 2.000 (50.8)	1.500 (38.1)	(2) 10-32UNF, 0.625 in. thread depth	50°C @ 15W	1.8° C/W @ 250 LFM	0.1330 (6033)
302N	2.000 (50.8) x 2.000 (50.8)	1.500 (38.1)	(1) 1/4 -28UNF, 0.625 in. thread depth	50°C @ 15W	1.8° C/W @ 250 LFM	0.1330 (60.33)
302NN	2.000 (50.8) x 2.000 (50.8)	1.500 (38.1)	(2) 1/4 -28UNF, 0.625 in. thread depth	50°C @ 15W	1.8° C/W @ 250 LFM	0.1330 (60.33)
303M	2.000 (50.8) x 2.000 (50.8)	3.000 (76.2)	(1) 10-32UNF, 0.625 in. thread depth	37°C @ 15W	1.3° C/W @ 250 LFM	0.2680 (121.56)
303MM	2.000 (50.8) x 2.000 (50.8)	3.000 (76.2)	(2) 10-32UNF, 0.625 in. thread depth	37°C @ 15W	1.3° C/W @ 250 LFM	0.2680 (121.56)
303N	2.000 (50.8) x 2.000 (50.8)	3.000 (76.2)	(1) 1/4 -28UNF, 0.625 in. thread depth	37°C @ 15W	1.3° C/W @ 250 LFM	0.2680 (121.56)
303NN	2.000 (50.8) x 2.000 (50.8)	3.000 (76.2)	(2) 1/4 -28UNF, 0.625 in. thread depth	37°C @ 15W	1.3°C/W @ 250 LFM	0.2680 (121.56)

The large fin area in minimum total volume provided by the radial design of the 301/302/303 Series offers maximum heat transfer efficiency in natural convection. All types are available with one tapped mounting hole for rectifiers and other stud-mounting semiconductors; the

302 and 303 Series offer maximum cost savings with dual mounting locations ("MM" and "NN" mounting hole patterns) for two stud-mount devices. Material: Aluminum Alloy, Black Anodized.







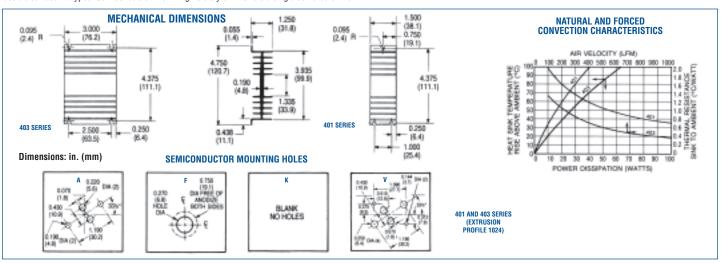
# 401 & 403 SERIES Double-Surface Heat Sinks for TO-3 Case Styles

TO-3; Stud-Mount

Standard	Width	Overall Dimensions	Height	Semiconductor	Thermal Performa	nce at Typical Load	Weight
P/N	in. (mm)	in. (mm)	in. (mm)	Mounting Hole Pattem	Natural Convection	Forced Convection	lbs. (grams)
401A	4.750 (120.7)	1.500 (38.1)	1.250 (31.8)	(1) TO-3	80°C @ 30W	1.5° C/W @ 250 LFM	0.1500 (68.04)
401F	4.750 (120.7)	1.500 (38.1)	1.250 (31.8)	0.270 in. (6.9)-Dia Hole	80°C @ 30W	1.5° C/W @ 250 LFM	0.1500 (68.04)
401K	4.750 (120.7)	1.500 (38.1)	1.250 (31.8)	None	80°C @ 30W	1.5° C/W @ 250 LFM	0.1500 (68.04)
403A	4.750 (120.7)	3.000 (76.2)	1.250 (31.8)	(1) TO-3	55°C @ 30W	0.9° C/W @ 250 LFM	0.3500 (158.76)
403F	4.750 (120.7)	3.000 (76.2)	1.250 (31.8)	0.270 in. (6.9)-Dia Hole	55°C @ 30W	0.9° C/W @ 250 LFM	0.3500 (158.76
403K	4.750 (120.7)	3.000 (76.2)	1.250 (31.8)	None	55°C @ 30W	0.9° C/W @ 250 LFM	0.3500 (158.76)

With fins oriented vertically in cabinet sidewall applications, 401 and 403 Series heat sinks are recommended for critical space applications where maximum heat dissipation is required for high-power T0-3 case styles. Forced convection performance is also exemplary with these double surface fin types. Semiconductor mounting hole style "F" offers a single centered 0.270

in. (6.9)-diameter mounting hole (with a 0.750 in. (19.1)-diameter area free of anodize) for mounting stud-type diodes and rectifiers. Hole pattern "V" available upon request. Material: Aluminum Alloy, Black Anodized.





### 413/421/423 SERIES

### Low-Height Double-Surface Heat Sinks for TO-3 Case Styles and Diodes

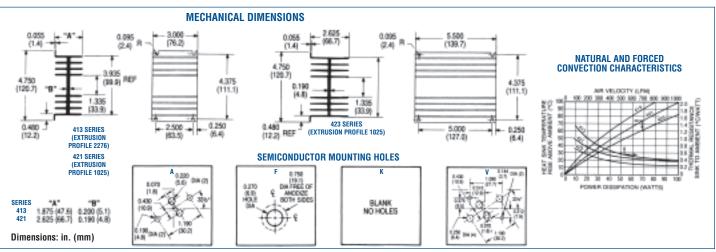
TO-3; DO-5; Stud-Mount

		ominai Dimension:					
Standard	Width	Length	Height "A"	Semiconductor	Thermal Performa	nce at Typical Load	Weight
P/N	in. (mm)	in. (mm)	in. (mm)	Mounting Hole Pattern	<b>Natural Convection</b>	Forced Convection	lbs. (grams)
413A	4.750 (120.7)	3.000 (76.2)	1.875 (47.6)	(1) TO-3	72°C @ 50W	0.85° C/W @ 250 LFM	0.6300 (285.77)
413F	4.750 (120.7)	3.000 (76.2)	1.875 (47.6)	0.270 in. (6.9)-Dia Hole	72°C @ 50W	0.85° C/W @ 250 LFM	0.6300 (285.77)
413K	4.750 (120.7)	3.000 (76.2)	1.875 (47.6)	None	72°C @ 50W	0.85° C/W @ 250 LFM	0.6300 (285.77)
421A	4.750 (120.7)	3.000 (76.2)	2.625 (66.7)	(1) TO-3	58°C @ 50W	0.7° C/W @ 250 LFM	0.6300 (285.77)
421F	4.750 (120.7)	3.000 (76.2)	2.625 (66.7)	0.270 in. (6.9)-Dia Hole	58°C @ 50W	0.7° C/W @ 250 LFM	0.6300 (285.77)
421K	4.750 (120.7)	3.000 (76.2)	2.625 (66.7)	None	58°C @ 50W	0.7° C/W @ 250 LFM	0.6300 (285.77)
423A	4.750 (120.7)	5.500 (140.2)	2.625 (66.7)	(1) TO-3	47°C @ 50W	0.5°C/W @ 250 LFM	1.1700 (530.71)
423K	4.750 (120.7)	5.500 (140.2)	2.625 (66.7)	None	47°C @ 50W	0.5° C/W @ 250 LFM	1.1700 (530.71)



Space-saving double surface 413, 421, and 423 Series utilize finned surface area on both sides of the power semiconductor mounting surface to provide maximum heat dissipation in a compact profile. Ready to install on popular power components in natural and forced convection applications. Apply Wake-

field Type 126 silicone-free thermal compound or Wakefield DeltaPad™ interface materials for maximum performance. Material: Aluminum Alloy, Black Anodized.







### 431 & 433 SERIES High-Performance Heat Sinks for 30-100W Metal Power Semiconductors

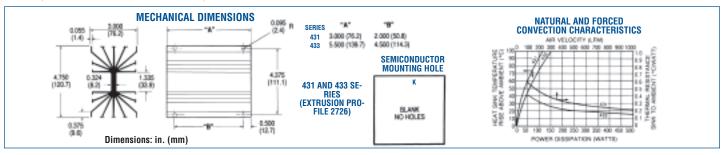
TO-3; Stud-Mount

Standard P/N	Width in. (mm)	Nominal Dimensions Length "A" in. (mm)	Height	Semiconductor Mounting Hole Pattern	Thermal Performa Natural Convection	nce at Typical Load Forced Convection	Weight lbs. (grams)
431K	4.750 (120.7)	3.000 (76.2)	3.000 (76.2)	None	55°C @ 50W	0.40°C/W @ 250 LFM	0.7800 (353.81)
433K	4.750 (120.7)	5.500 (139.7)	3.000 (76.2)	None	42°C @ 50W	0.28°C/W @ 250 LFM	1.4900 (675.86)

Need maximum heat dissipation from a TO-3 rectifier heat sink in minimum space? The Wakefield 431 and 433 Series center chan-

nel double-surface heat sinks offer the highest performance-to-weight ratio for minimum volume occupied for TO-3, diode, and stud-mount metal power semiconductors in the 30- to

100-watt operating range. Additional interface resistance reduction for maximized overall performance can be achieved with proper application of Wakefield Type 126 silicone-free thermal compound. Material: Aluminum Alloy, Black Anodized.





#### 435 SERIES Lightweight Quadruple Mount Heat Sink for TO-3 Case Styles

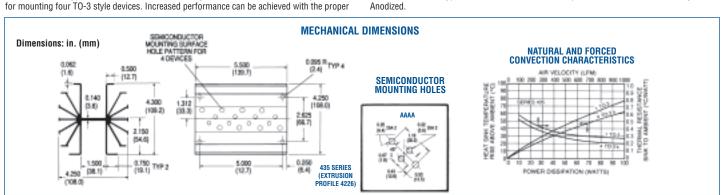
Nominal Dimensions

TO-3

Standard	Width	Length	Height	Semiconductor		nce at Typical Load	Weight
P/N	in. (mm)	in. (mm)	in. (mm)	Mounting Hole Pattern		Forced Convection	lbs. (grams)
435AAAA	4.250 (108.0)	5.500 (139.7)	4.300 (109.2)	(4) TO-3	37°C @ 50W 54°C @ 80W	0.38°C/W @ 250 LFM 0.24°C/W @ 600 LFM	1.1500 (521.64)

This lightweight high-performance heat sink is designed to mount and cool efficiently one to four TO-3 style metal case power semi-conductors. The Type 435AAAA is the standard configuration available from stock, predrilled

selection and installation of a Wakefield Type 175 DeltaPad Kapton™ interface material for each power semiconductor or, for maximum reduction of case-to-sink interface loss, the application of Wakefield Type 126 silicone-free thermal compound. Material: Aluminum Alloy, Black Anodized.





#### **441 SERIES**

#### High-Performance Natural Convection Heat Sinks for Rectifiers and Diodes

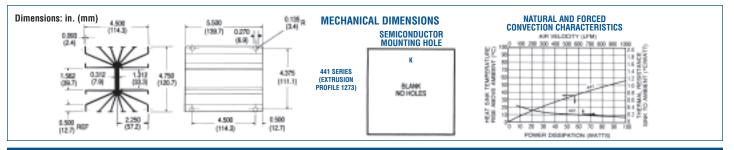
Stud-Mount

Nominal Dimensions									
Standard P/N	Width in. (mm)	Length in. (mm)	Height in. (mm)	Semiconductor Mounting Hole Pattern	Thermal Performa Natural Convection	nce at Typical Load Forced Convection	Weight lbs. (grams)		
441K	4.750 (120.7)	5.500 (139.7)	4.500 (114.3)	None	34°C @ SOW 47°C @ 80W	0.30°C/W @ 250 LFM 0.19°C/W @ 600 LFM	1.9700 (893.59)		

Designed for vertical mounting within a power supply enclosure or equipment cabinet without forced airflow available. This Wake-

field 441 Series heat sink will dissipate up to 100 watts efficiently in natural convection with a maximum 55°C heat sink temperature rise above ambient. When applied in a forced convec-

tion environment, the 441K Type will achieve thermal resistance of 0.18°C/W (sink to ambient) at 1000 LFM. Supplied with no predrilled device mounting hole pattern. Material: Aluminum Alloy, Black Anodized.







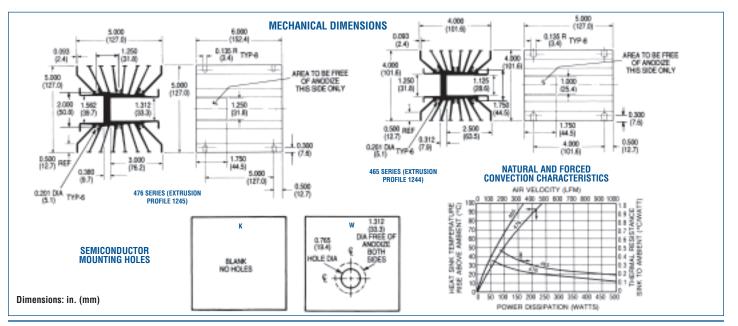
### 465 & 476 SERIES High-Power Heat Sinks for Medium Hex-Type Rectifiers and Diodes

Stud-Mount

Standard	-	Length	Height	Hex Style	Mounting	Thermal Performa	nce at Typical Load	Weight
P/N		in. (mm)	in. (mm)	Type	Hole Pattern	Natural Convection	Forced Convection	lbs. (grams)
465K	4.000 (101.6)	5.000 (127.0)	4.000 (101.6)	1.060 in. Hex	None	38°C @ 50W	0.27°C/W @ 500 LFM	1.9300 (875.45)
476K	5.000 (127.0)	6.000 (152.4)	5.000 (127.0)	1.250 in. Hex	None	25°C @ 50W	0.19°C/W @ 500 LFM	2.8200 (1279.15)
476W	5.000 (127.0)	6.000 (152.4)	5.000 (127.0)	1.250 in. Hex	0.765 in. (19.4) Dia. Center Mount	25°C @ 50W	0.19°C/W @ 500 LFM	2.8000 (1270.08)

Wakefield Engineering has designed four standard heat sink types for ease of installation and efficient heat dissipation for industry standard hex-type rectifiers and similar stud-mount power devices: 465, 476, 486, and 489 Series. The 465 and 476 Series shown here are de-

signed for 1.060 in. Hex (465 Type) and 1.250 in. Hex (476 Type). The 476W Type is available predrilled for an 0.765 in. (19.4) dia, mounting hole, Material: Aluminum Alloy, Black anodized.





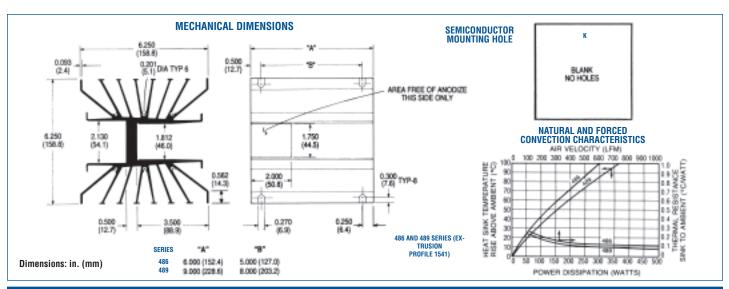
# 486 & 489 SERIES Heat Sinks for High-Power Hex-Type Rectifiers and Diodes

Stud-Mount

04		Nominal Dimension	-	II 04-I-	B	The survey I Desiferance	and at Touteal Load	Wataka
Standard P/N	Width in. (mm)	Length in. (mm)	Height in. (mm)	Hex Style Type	Mounting Hole Pattern	Natural Convection	nce at Typical Load Forced Convection	Weight lbs. (grams)
486K	6.250 (158.8)	6.000 (152.4)	6.250 (158.8)	1.750 in. Hex	None	24°C @ 50W 86°C @ 250W	0.20° C/W @ 250 LFM 0.13° C/W @ 500 LFM	4.2100 (1909.66)
489K	6.250 (158.8)	9.000 (228.6)	6.250 (158.8)	1.750 in. Hex	None	19°C @ 50W 75°C @ 250W	0.15° C/W @ 250 LFM 0.10° C/W @ 500 LFM	6.1400 (2785.10)

These two heat sink types accept industry standard 1.750 in. (44.5) hex-type devices for mounting and efficient heat dissipation. Each type is provided with a 1.750 in. (44.5) x 2.000

in. (50.8) area on the semiconductor base mounting surface which is free of anodize. Material: Aluminum Alloy, Black Anodized.





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### 490 SERIES

King Size Heat Sinks for High-Power Rectifiers

GENERAL PURPOSE

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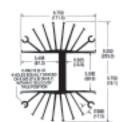
Standard P/N	Width in. (mm)	Length "A" in. (mm)	Height in. (mm)	Semiconductor Mounting Hole Pattern	Thermal Performa Natural Convection	nce at Typical Load Forced Convection	Weight lbs. (grams)
490-35K	9.250 (235.0)	3.500 (88.9)	6.750 (171.5)	None	84°C @ 200W	0.18° C/W @ 600 LFM	3.2400 (1469.66)
490-6K	9.250 (235.0)	6.000 (152.4)	6.750 (171.5)	None	60°C @ 200W	0.13°C/W @ 600 LFM	5.4700 (2481.19)
490-12K	9.250 (235.0)	12.000 (304.8)	6.750 (171.5)	None	45°C @ 200W	0.09° C/W @ 600 LFM	10.6200 (4817.23)

The 490 Series can be used to mount a single high-power rectifier or a grouping of smaller power devices. The semiconductor device mounting surface is free of anodize on the entire surface on one side only; finish overall is black anodize. Use Type 109 mounting brackets (see accessories section) for mounting to enclosure wall and for electrical isolation. The anodizefree mounting surface is milled for maximum contact area. The 490 Series Can also be drilled for mounting and cooling IGBTs and other isolated power modules. Material: Aluminum Alloy, Black Anodized.

#### **MECHANICAL DIMENSIONS**

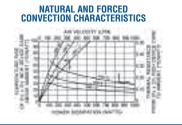
490 SERIES (EXTRUSION PROFILE 2131)

Dimensions: in. (mm)









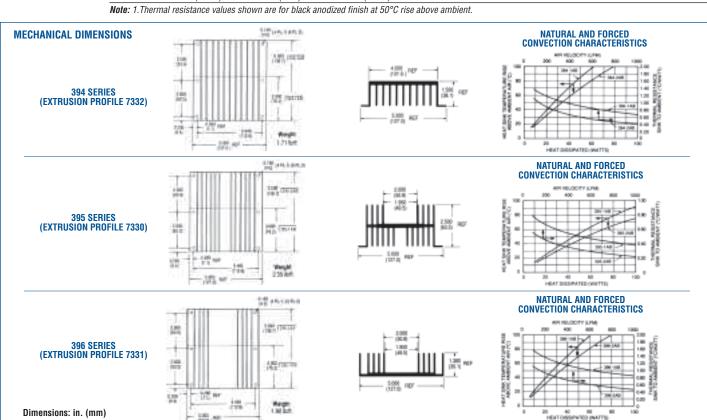
Thermal Registance at Typical Load

# PERFORMANCE, LOW PROFILE HEAT SINKS FOR POWER MODULES & IGBT'S



### 394, 395, 396 SERIES

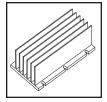
	Ove	rall Dimensions: in. (r	nm)	Device Base		Natural	Forced
Standard P/N	Length in. (mm)	Height in. (mm)	Width in. (mm)	Mounting Area (mm)	Base Mounting Holes	Convection (Øsa) <sup>(1)</sup> (°C/W)	Convection (Øsa) (°C/W @ 500 LFM)
394-1AB	3.000 (76.2)	1.500 (38.1)	5.000 (127.0)	101 x 76	4	1.85	0.90
394-2AB	5.500 (139.7)	1.500 (38.1)	5.000 (127.0)	101 x 139	6	1.51	0.60
395-1AB	3.000 (76.2)	2.500 (63.5)	5.000 (127.0)	50 x 76	4	1.10	0.50
395-2AB	5.500 (139.7)	2.500 (63.5)	5.000 (127.0)	50 x 139	6	0.90	0.32
396-1AB	3.000 (76.2)	1.380 (35.1)	5.000 (127.0)	50 x 76	4	1.85	1.07
396-2AB	5.500 (139.7)	1.380 (35.1)	5.000 (127.0)	50 x 139	6	1.51	0.64





**Natural Convection** 

### EXTRUDED HEAT SINKS FOR DC/DC CONVERTERS



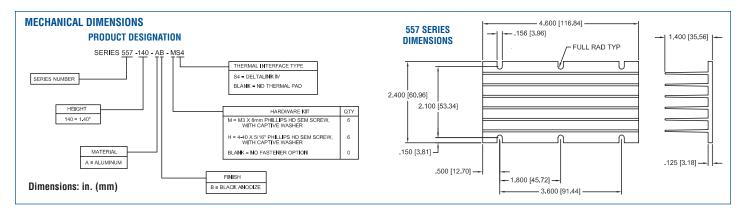
#### **SERIES 557, 558 & 559**

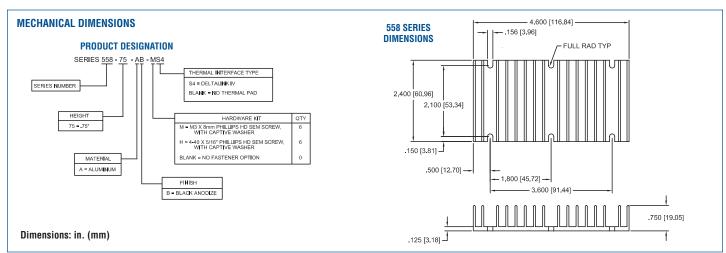
Heat Sinks for "Full-Brick" DC/DC Converters

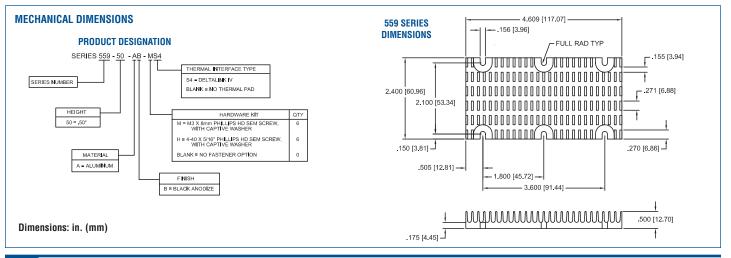
Standard P/N	Footprint Dimensions in. (mm)	Height in. (mm)	Fin Orientation	Number of Fins	Forced Convection Thermal Resistance at 300 ft/min (C/W)	Power Dissipation (Watts) 40°C Rise Heat Sink to Ambient
557-140AB	4.60 (116.8) x 2.40 (61.0)	1.40 (35.6)	Horizontal	6	1.3	14
558-75AB	2.40 (61.0) x 4.60 (116.8)	0.75 (19.1)	Vertical	16	1.8	12
559-50AB	2.40 (61.0) x 4.60 (116.8)	0.50 (12.7)	Vertical	27	2.2	10

Material: Aluminum, Black Anodized

- Standard mounting hole pattern mates with Vicor DC/DC converters. Aluminum extruded fin construction keeps DC/DC converter modules cool in both forced and natural convection applications. Three fin heights, two flow direction options. Black anodized finish standard.
- Integral thermal interface pad option eliminates need to order and install pad separately.
- Ordering a single part number with the hardware kit option provides everything necessary to keep your converter cool.

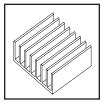








# EXTRUDED HEAT SINKS FOR DC/DC CONVERTERS



### SERIES 517, 527, 518 & 528

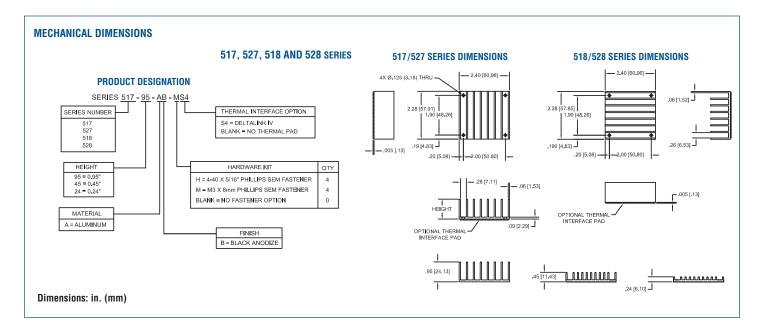
Heat Sinks for "Half-Brick" DC/DC Converters

					THERMAL PERFORMANCE		
Standard P/N	Footprint Dimensions in. (mm)	Height in. (mm)	Fin Orientation	Number of Fins	Natural Convection Power Dissipation (Watts) 60°C Rise Heat Sink to Ambient	Forced Convection Thermal Resistance at 300 ft/min (C/W)	
517-95AB	2.28 (57.9) x 2.40 (61.0)	0.95 (24.1)	Horizontal	8	11W	2.0	
527-45AB	2.28 (57.9) x 2.40 (61.0)	0.45 (11.4)	Horizontal	11	7W	3.2	
527-24AB	2.28 (57.9) x 2.40 (61.0)	0.24 (6.1)	Horizontal	11	5W	5.8	
518-95AB	2.40 (61.0) x 2.28 (57.9)	0.95 (24.1)	Vertical	8	11W	2.0	
528-45AB	2.40 (61.0) x 2.28 (57.9)	0.45 (11.4)	Vertical	11	7W	3.2	
528-24AB	2.40 (61.0) x 2.28 (57.9)	0.24 (6.1)	Vertical	11	5W	5.8	

Material: Aluminum, Black Anodized

• Standard mounting hole patterns mate with the majority of "half-brick" DC/DC converters on the market. • Aluminum extruded fin construction keeps DC/DC converter modules cool in both forced and natural convection applications. • Vertical and horizontal fin configurations

available in a variety of heights. • Black anodized finish standard. • Integral thermal interface pad option eliminates need to order and install pad separately. • Ordering a single part number with the hardware kit option provides everything necessary to keep your converter cool.

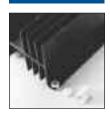


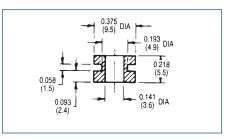
## MOUNTING HARDWARE FOR EXTRUDED HEAT SINKS

#### 100 SERIES Teflon Mounting Insulators

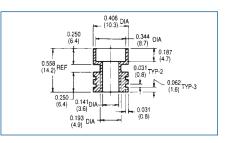
Standard P/N	Description	For Use with Series	Mounting Hardware	Material	Hipot Rating (VAC)	Weight lbs. (grams)
103	Spool-shaped insulator	300, 400, 600, 111, 113	#6-32 screw	Teflon	1500	0.00012 (0.05)
107	Spool-shaped insulator	300, 400, 600, 111, 113	#6-32 screw, nut	Teflon	5000	0.0034 (1.54)

#### **103 SERIES**



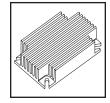








# EXTRUDED HEAT SINKS FOR DC/DC CONVERTERS



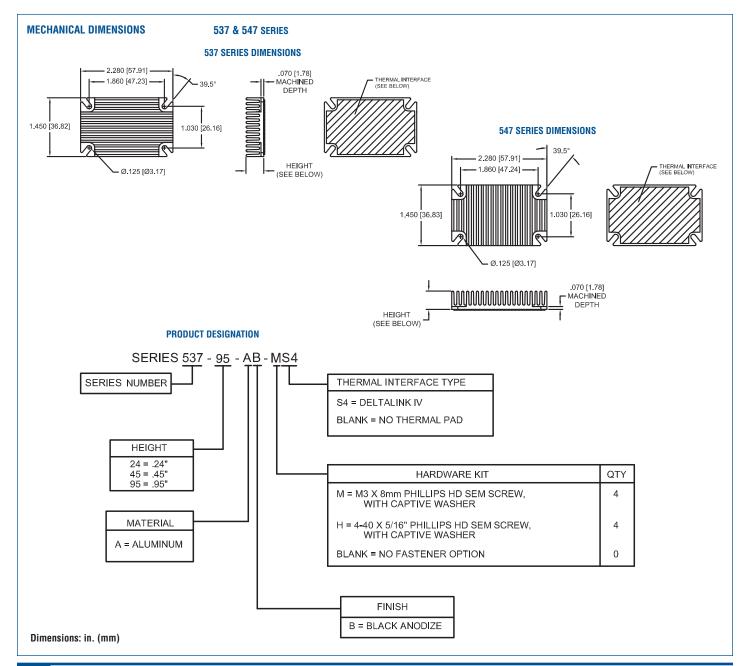
#### 537 & 547 SERIES

#### Heat Sinks for "Quarter-Brick" DC/DC Converters

Standard P/N	Footprint Dimensions in. (mm)	Height in. (mm)	Fin Orientation	Number of Fins	Forced Convection Thermal Resistance at 300 ft/min (C/W)
537-95AB	2.28 (57.9) x 1.45 (36.8)	0.95 (24.1)	Horizontal	8	2.1
537-45AB	2.28 (57.9) x 1.45 (36.8)	0.45 (11.4)	Horizontal	13	2.3
537-24AB	2.28 (57.9) x 1.45 (36.8)	0.24 (6.1)	Horizontal	14	4.2
547-95AB	1.45 (36.8) x 2.28 (57.9)	0.95 (24.1)	Vertical	11	2.2
547-45AB	1.45 (36.8) x 2.28 (57.9)	0.45 (11.4)	Vertical	20	2.1
547-24AB	1.45 (36.8) x 2.28 (57.9)	0.24 (6.1)	Vertical	22	3.5

Material: Aluminum, Black Anodized

heights. • Black anodized finish standard. • Integral thermal interface pad option eliminates need to order and install pad separately. • Ordering a single part number with the hardware kit option provides everything necessary to keep your converter cool.



<sup>•</sup> Mounting slots accommodate two hole patterns: 1.86" x 1.03" and 2.00" x 1.20", fitting the vast majority of quarter-brick converters on the market. • Designed for optimum use in forced convection applications. • Vertical and horizontal fin configurations available in a variety of