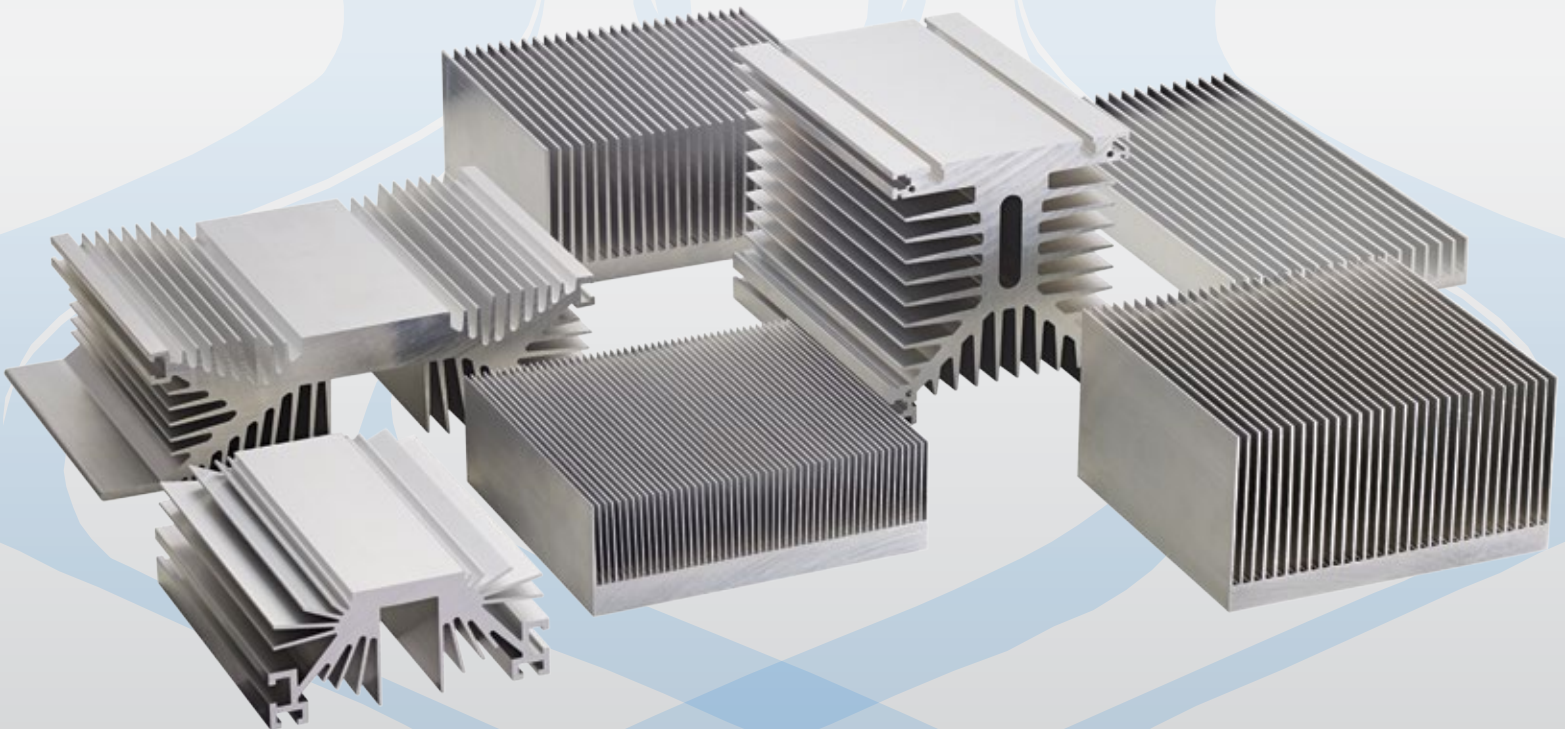




# **Air-Cooled Thermal Management Solutions**



**SPECIALISTS IN POWER ELECTRONIC COMPONENTS AND ASSEMBLIES**

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# C&H Technology, Inc.

## Introduction

### C&H Technology - Air Cooled Thermal Solutions

Today's power electronic applications require thermal management solutions early in the design to support the higher switching frequencies and increasing power densities. C&H Technology engineers are available to assist and help choose a heatsink for your system or application. Our thermal solutions include extruded and bonded fin heat sinks, as well as a variety of liquid chilling solutions.

The thermal management of air cooled systems tends to be less costly in comparison to liquid cooled systems. Our extruded heatsink profiles have been handpicked from common shapes in the industry and are customizable to fit specific applications. These heat sinks come in several shapes and sizes with varying surface area perimeters, weights, and thermal performance ratings. Furthermore, our extruded heat sinks are cut to your desired length with the options of drilling & tapping of holes, flycut for surface flatness, plating, and more.

When space is at a premium, our selection of bonded fin heat sinks offer low thermal resistances at a fraction of the size. Additional customizations include mounting feet, baffle plates, and single, double, or triple fans based on selected model complete with a fan shroud.

### Standard Materials

#### Heat Sink Extrusions:

Aluminum 6063  
Aluminum C57B-T5

#### Bonded Fin Heat Sinks:

Base Plates: Aluminum 6063-T5 or 6061-T5  
Fins: Aluminum 1100-H14, 3003 or 6061

### Standard Tolerances

**Flatness:** 0.001 in/in

**Roughness:** #63 or better

**Saw Cut:**  $\pm 0.020$

**Cut to Width:**  $\pm 0.010$  in

#### Place Values:

X	$\pm .1$
.X	$\pm .05$
.XX	$\pm .01$
.XXX	$\pm .005$

#### Finishes:

Natural Finish  
Clear Alodine 5200 - RoHS Compliant  
Clear Anodized – MIL-A-8625, Type II  
Black Anodized – MIL-A-8265, Type II  
Gold Iridite – MIL-C-5441, Type III  
Clear Chromate – MIL-C-5441  
Type II Trivalent Chromate – RoHS Compliant  
MIL-DTL-5541F

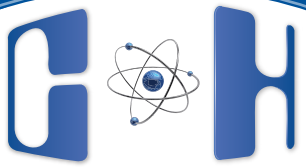
*The information presented in this book is believed to be accurate and reliable. However, C&H Technology, Inc. can assume no responsibility for its use, nor any infringements of patents, or other rights of third parties which may result from its use. No patent liability shall be incurred for the use of the circuits, devices, or assemblies described herein. We reserve the right to change specifications and data without notice. Rev. Sept. 2017*

# Thermal Management

## Extruded Heat Sinks

Model	Perimeter (in <sup>2</sup> /in)	Width (in.)	Height (in.)	Weight (lbs/ft)	Thermal Resistance (°C/W/3in.)	Device Type	Assembly Profile	Page Number
CHEH0011	105.000	9.80	2.850	12.81	0.710	Puk	Profile G	9
CHEH0012	98.070	6.96	2.670	9.50	0.700	Module	---	9
CHEH0017	85.140	7.00	3.130	7.84	0.800	Puk	Profile F	8
CHEH0023	71.250	4.75	4.500	4.33	1.000	Stud	---	7
CHEH0031	118.250	9.25	6.750	9.60	0.400	Stud	---	10
CHEH0032	48.100	4.75	2.625	2.50	1.500	Stud	---	5
CHEH0051	108.400	9.80	2.920	11.10	0.700	Puk	---	9
CHEH0055	72.000	4.48	2.270	4.32	1.050	Module	---	7
CHEH0057	158.710	6.80	3.035	10.05	0.480	Module	---	10
CHEH0073	91.690	4.96	5.380	9.11	0.820	Module	---	8
CHEH0077	185.000	6.38	3.420	8.86	0.085*	Module	---	11
CHEH0078	137.000	12.58	3.250	23.75	0.550	Puk	Profile H	10
CHEH0090	61.850	5.99	1.107	3.51	1.220	Module	---	7
CHEH0091	167.130	6.46	2.145	7.29	0.094*	Module	---	11
CHEH0332	12.620	2.13	0.687	0.78	4.400	Discrete	---	3
CHEH0711	31.080	4.75	1.250	1.42	1.900	Stud	---	3
CHEH0746	78.580	9.88	1.312	6.22	0.900	Module	---	7
CHEH0871	39.340	4.50	1.400	2.37	1.500	Module	---	4
CHEH0930	27.720	3.25	1.000	1.42	1.800	Module	---	3
CHEH1246	41.460	4.47	1.812	3.94	1.300	Module	---	5
CHEH1484	55.500	4.25	4.300	3.01	1.000	Stud	---	6
CHEH1806	36.060	4.13	1.310	2.71	1.500	Module	---	3
CHEH1822	37.890	4.13	1.750	2.92	1.400	Module	---	4
CHEH1842	56.870	6.75	1.631	4.32	1.000	Module	---	6
CHEH1912	51.268	4.20	2.465	5.78	1.100	Module	---	5
CHEH1916	59.340	8.68	1.470	4.50	1.000	Module	---	6
CHEH2056	53.250	8.37	1.312	4.25	1.100	Module	---	5
CHEH3040	22.560	3.93	0.590	1.41	2.300	Module	---	3
CHEH3286	87.390	6.05	1.650	5.84	0.800	Module	---	8
CHEH3334	39.180	5.80	1.050	3.35	1.300	Module	---	4
CHEH3399	80.450	7.89	1.080	4.33	0.900	Module	---	7
CHEH3415	131.020	8.00	1.630	6.15	0.800	Module	---	10
CHEH3442	38.510	5.29	1.332	3.47	1.400	Module	---	4
CHEH3490	38.970	5.39	1.050	2.98	1.500	Module	---	4
CHEH3515	24.470	2.12	1.015	1.43	2.700	Discrete	---	3
CHEH3589	50.636	3.01	1.015	1.39	2.300	Module	---	5
CHEH3598	94.249	5.93	1.220	4.15	0.900	Module	---	8
CHEH3603	85.901	9.88	2.930	7.86	1.300	Module	---	8
CHEH3647	38.490	2.40	1.650	1.56	1.300	Discrete	---	4
CHEH3648	58.770	5.00	1.650	3.30	1.000	Module	---	6
CHEH3671	215.115	10.00	2.920	13.25	0.350	Module	---	11
CHEH3702	141.970	17.00	1.332	11.04	0.490	Module	---	10
CHEH3728	118.070	6.65	3.170	6.40	1.060	Module	---	10
CHEH3896	78.378	7.20	2.480	5.45	1.400	Module	---	7
CHEH3969	55.940	6.25	2.000	3.44	1.400	Stud	---	6
CHEH3973	97.846	9.75	2.000	7.55	1.400	Module	---	8
CHEH3975	102.191	12.75	1.350	9.10	1.000	Module	---	9
CHEH4025	101.500	10.16	1.876	6.60	0.670	Module	---	9
CHEH13450	49.570	5.00	2.250	4.30	1.400	Puk	Profile D	5
CHEHK1750-12	N/A	5.06	2.060	N/A	0.190*	Stud	---	11
CHEHK18	100.400	4.92	5.310	11.80	0.700	Module	Profile A	9
CHEHK7	58.200	5.13	2.000	6.40	1.200	Puk	Profile E	6

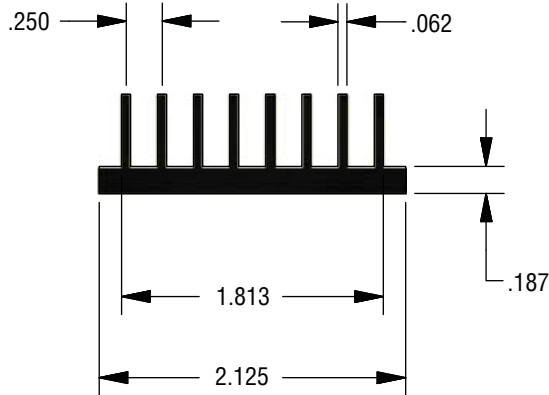
\* Thermal Performances based on forced airflow of 500LFM in units of °C/W/6in.



# Thermal Management

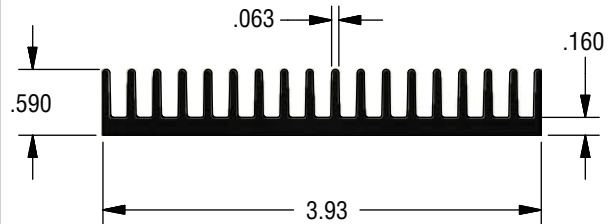
## Extruded Heat Sinks

CHEH0332



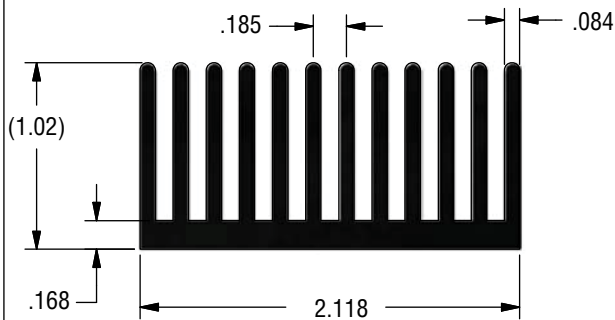
Per. 12.620 IN<sup>2</sup>/IN Wt. 0.78 LB/FT  $\Theta_{sa}$  4.400 °C/W/3"

CHEH3040



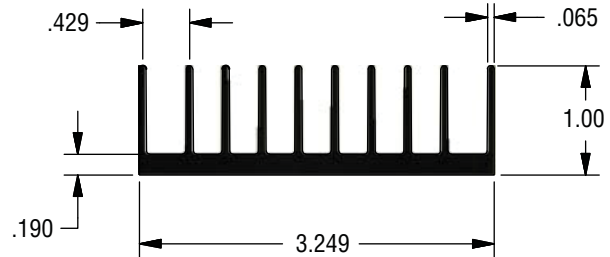
Per. 22.560 IN<sup>2</sup>/IN Wt. 1.41 LB/FT  $\Theta_{sa}$  2.300 °C/W/3"

CHEH3515



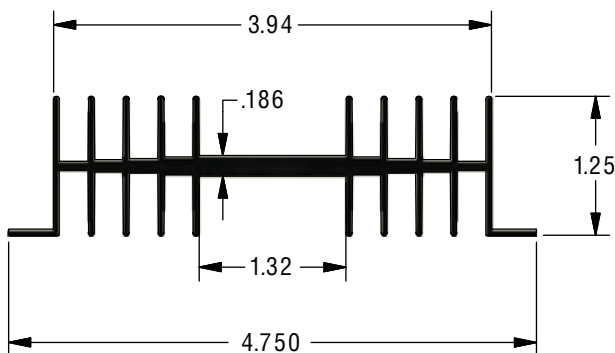
Per. 24.470 IN<sup>2</sup>/IN Wt. 1.43 LB/FT  $\Theta_{sa}$  2.700 °C/W/3"

CHEH0930



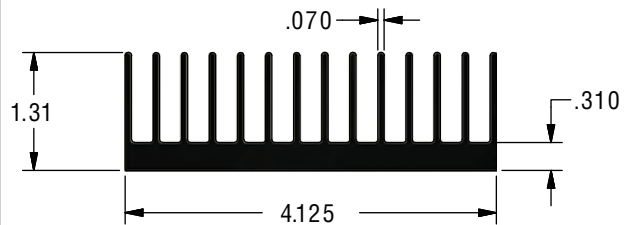
Per. 27.720 IN<sup>2</sup>/IN Wt. 1.42 LB/FT  $\Theta_{sa}$  1.800 °C/W/3"

CHEH0711



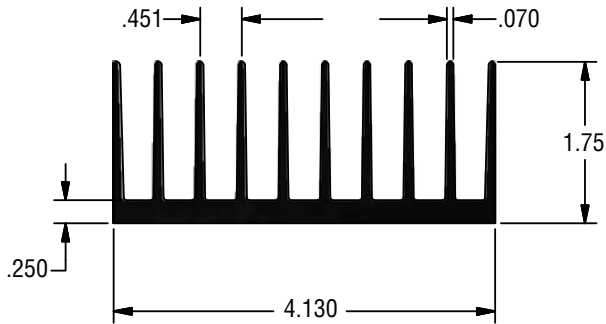
Per. 31.080 IN<sup>2</sup>/IN Wt. 1.42 LB/FT  $\Theta_{sa}$  1.900 °C/W/3"

CHEH1806



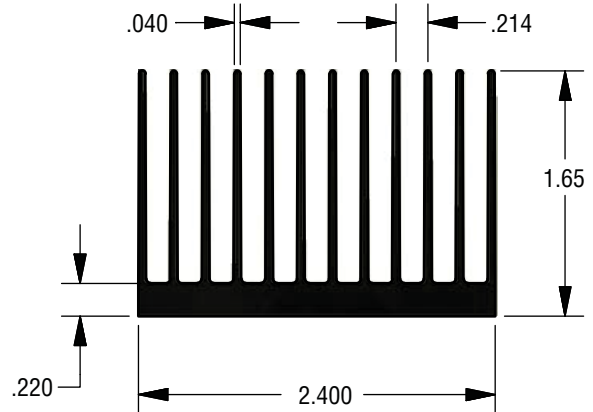
Per. 36.060 IN<sup>2</sup>/IN Wt. 2.71 LB/FT  $\Theta_{sa}$  1.500 °C/W/3"

CHEH1822



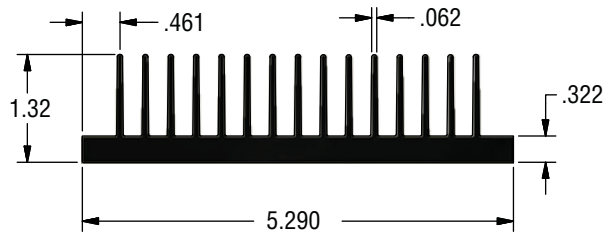
Per. 37.890 IN<sup>2</sup>/IN Wt. 2.92 LB/FT  $\Theta_{sa}$  1.400 °C/W/3"

CHEH3647



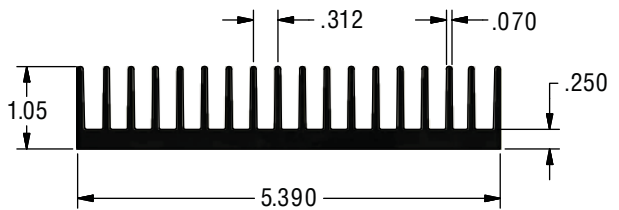
Per. 38.490 IN<sup>2</sup>/IN Wt. 1.56 LB/FT  $\Theta_{sa}$  1.300 °C/W/3"

CHEH3442



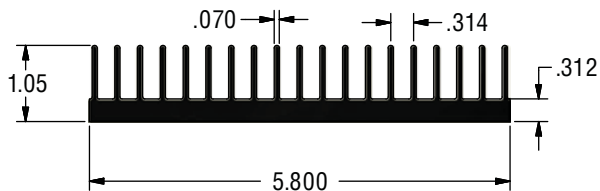
Per. 38.510 IN<sup>2</sup>/IN Wt. 3.47 LB/FT  $\Theta_{sa}$  1.400 °C/W/3"

CHEH3490



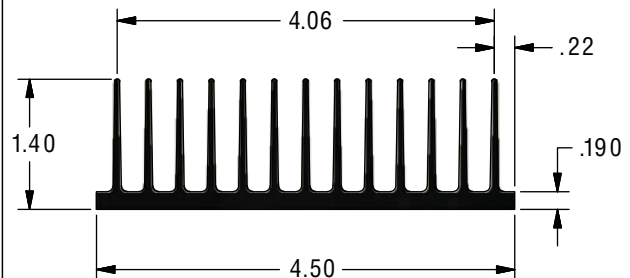
Per. 38.970 IN<sup>2</sup>/IN Wt. 2.98 LB/FT  $\Theta_{sa}$  1.500 °C/W/3"

CHEH3334



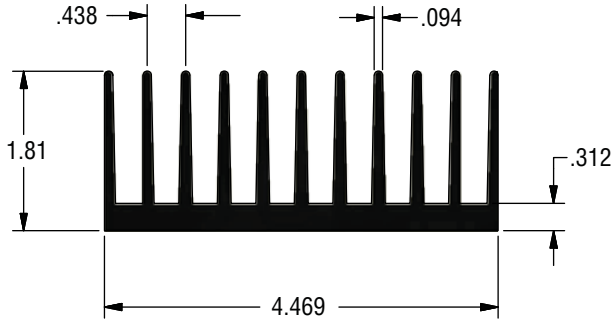
Per. 39.180 IN<sup>2</sup>/IN Wt. 3.35 LB/FT  $\Theta_{sa}$  1.300 °C/W/3"

CHEH0871



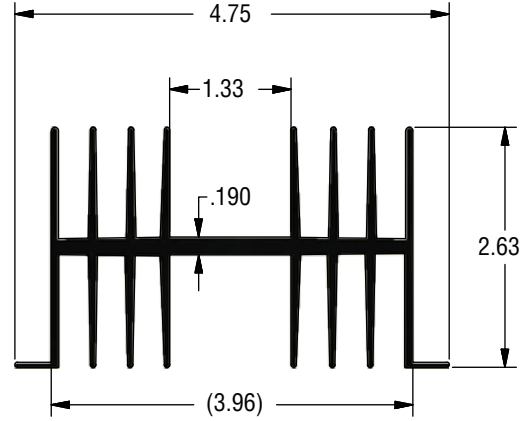
Per. 39.340 IN<sup>2</sup>/IN Wt. 2.37 LB/FT  $\Theta_{sa}$  1.500 °C/W/3"

CHEH1246



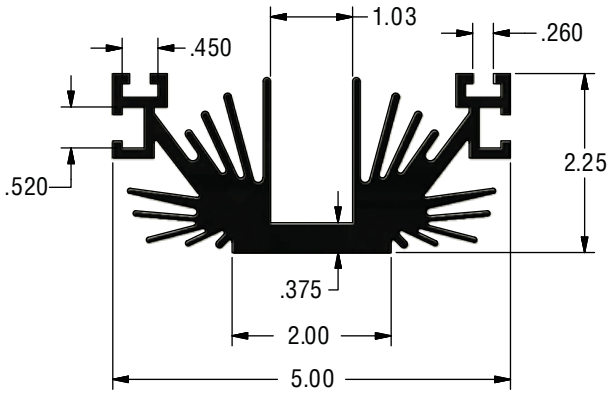
Per. 41.460 IN<sup>2</sup>/IN Wt. 3.94 LB/FT  $\Theta_{sa}$  1.300 °C/W/3"

CHEH0032



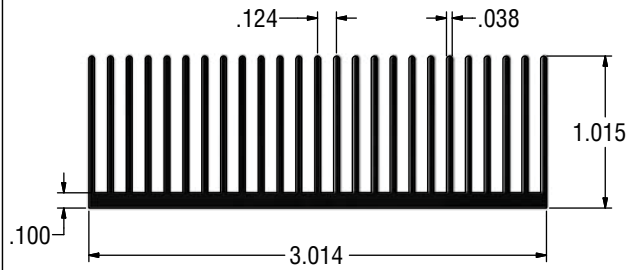
Per. 48.100 IN<sup>2</sup>/IN Wt. 2.50 LB/FT  $\Theta_{sa}$  1.500 °C/W/3"

CHEH13450



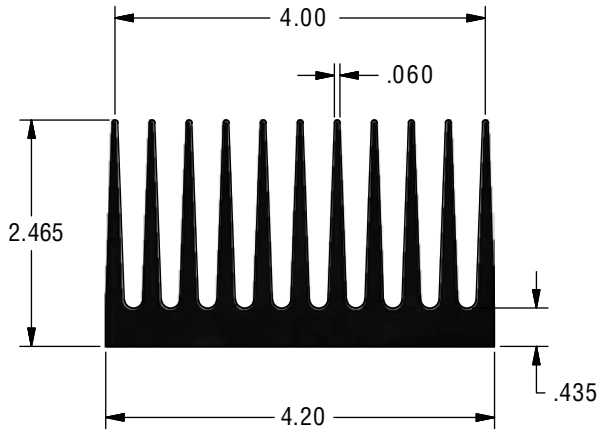
Per. 49.570 IN<sup>2</sup>/IN Wt. 4.30 LB/FT  $\Theta_{sa}$  1.400 °C/W/3"

CHEH3589



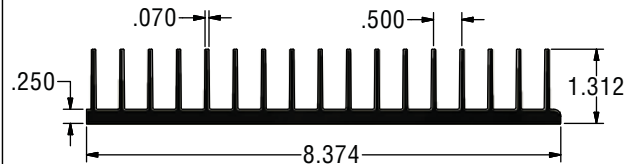
Per. 50.636 IN<sup>2</sup>/IN Wt. 1.39 LB/FT  $\Theta_{sa}$  2.700 °C/W/3"

CHEH1912



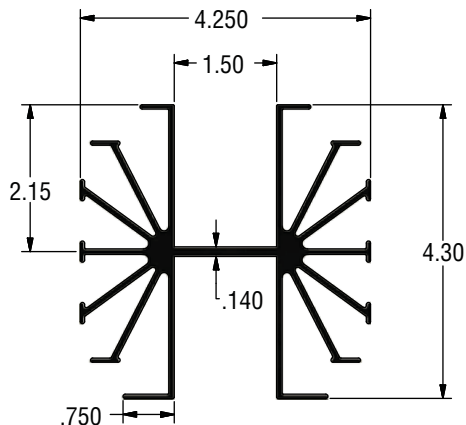
Per. 51.268 IN<sup>2</sup>/IN Wt. 5.78 LB/FT  $\Theta_{sa}$  1.100 °C/W/3"

CHEH2056



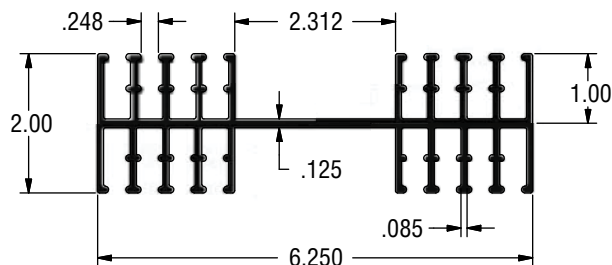
Per. 53.250 IN<sup>2</sup>/IN Wt. 4.25 LB/FT  $\Theta_{sa}$  1.100 °C/W/3"

CHEH1484



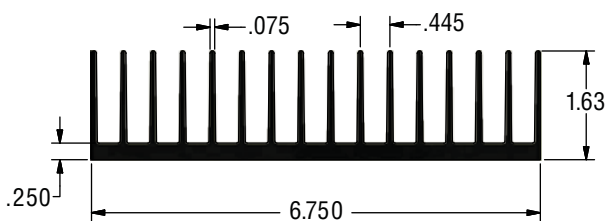
Per. 55.500 IN<sup>2</sup>/IN Wt. 3.01 LB/FT  $\Theta_{sa}$  1.000 °C/W/3"

CHEH3969



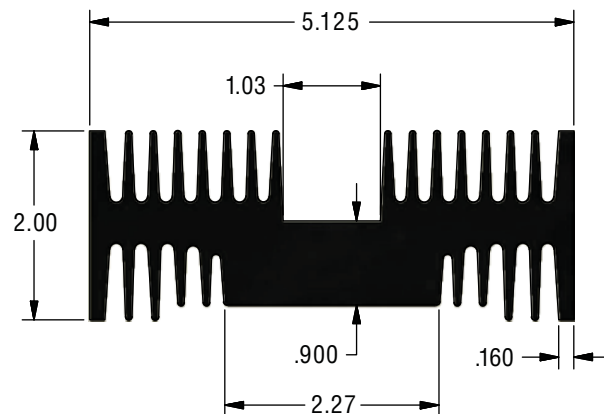
Per. 55.940 IN<sup>2</sup>/IN Wt. 3.44 LB/FT  $\Theta_{sa}$  1.400 °C/W/3"

CHEH1842



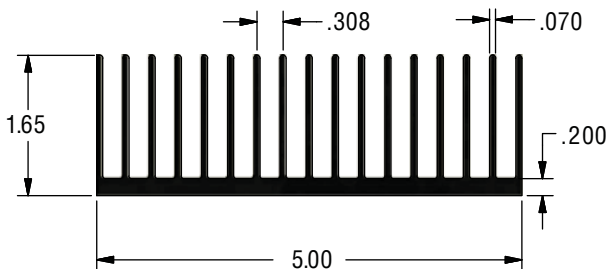
Per. 56.870 IN<sup>2</sup>/IN Wt. 4.32 LB/FT  $\Theta_{sa}$  1.000 °C/W/3"

CHEHK7



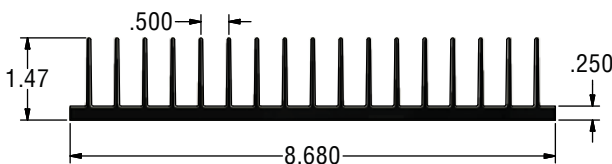
Per. 58.200 IN<sup>2</sup>/IN Wt. 6.40 LB/FT  $\Theta_{sa}$  1.200 °C/W/3"

CHEH3648



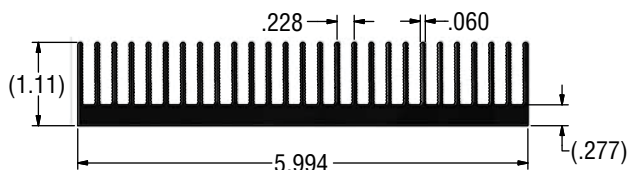
Per. 58.770 IN<sup>2</sup>/IN Wt. 3.30 LB/FT  $\Theta_{sa}$  1.000 °C/W/3"

CHEH1916



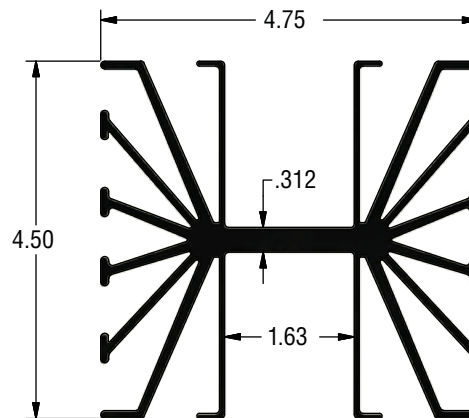
Per. 59.340 IN<sup>2</sup>/IN Wt. 4.50 LB/FT  $\Theta_{sa}$  1.000 °C/W/3"

CHEH0090



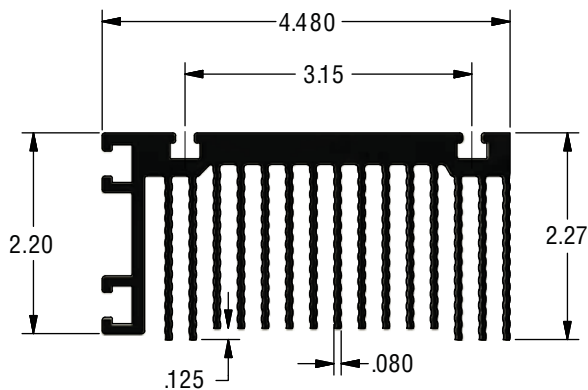
Per. 61.850 IN<sup>2</sup>/IN Wt. 3.51 LB/FT  $\Theta_{sa}$  1.220 °C/W/3"

CHEH0023



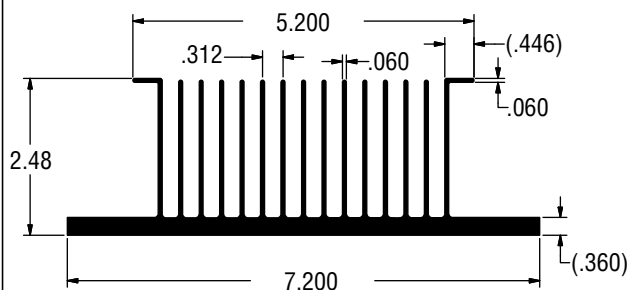
Per. 71.250 IN<sup>2</sup>/IN Wt. 4.33 LB/FT  $\Theta_{sa}$  1.000 °C/W/3"

CHEH0055



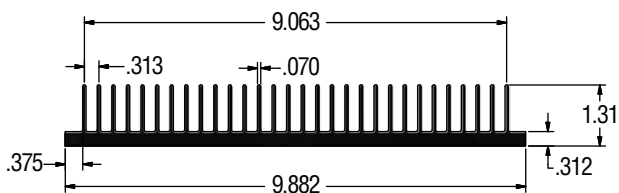
Per. 72.000 IN<sup>2</sup>/IN Wt. 4.32 LB/FT  $\Theta_{sa}$  1.050 °C/W/3"

CHEH3896



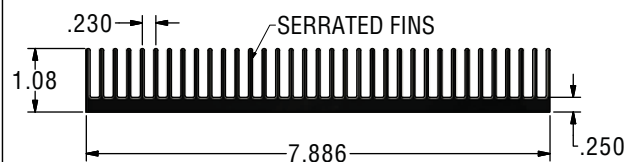
Per. 78.378 IN<sup>2</sup>/IN Wt. 5.45 LB/FT  $\Theta_{sa}$  1.400 °C/W/3"

CHEH0746



Per. 78.580 IN<sup>2</sup>/IN Wt. 6.22 LB/FT  $\Theta_{sa}$  0.900 °C/W/3"

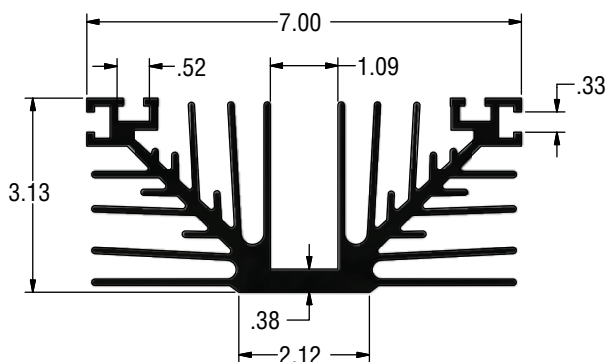
CHEH3399



Per. 80.450 IN<sup>2</sup>/IN Wt. 4.33 LB/FT  $\Theta_{sa}$  0.900 °C/W/3"

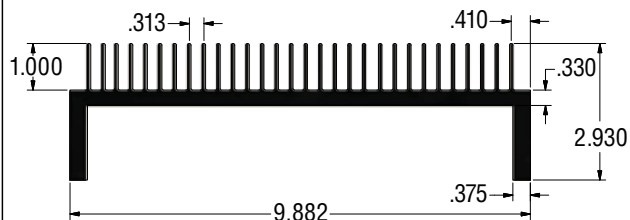


CHEH0017



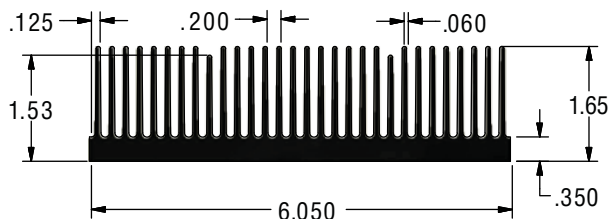
Per. 85.140 IN<sup>2</sup>/IN Wt. 7.84 LB/FT  $\Theta_{sa}$  0.800 °C/W/3"

CHEH3603



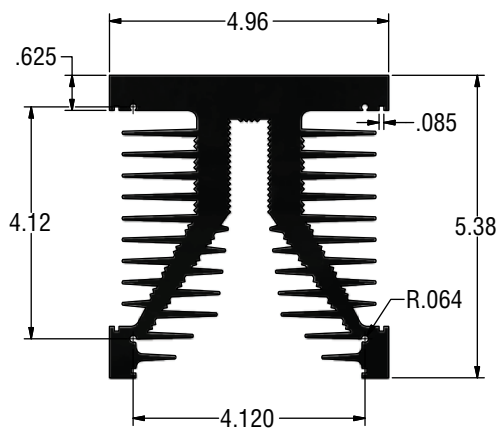
Per. 85.901 IN<sup>2</sup>/IN Wt. 7.86 LB/FT  $\Theta_{sa}$  1.300 °C/W/3"

CHEH3286



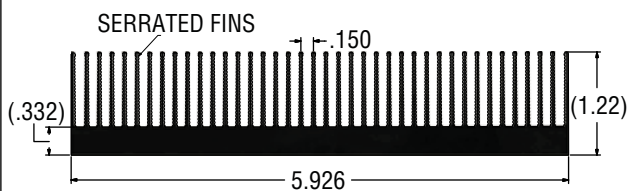
Per. 87.390 IN<sup>2</sup>/IN Wt. 5.84 LB/FT  $\Theta_{sa}$  0.800 °C/W/3"

CHEH0073



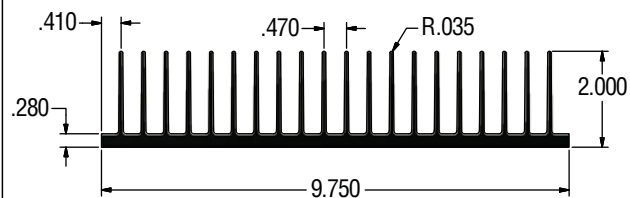
Per. 91.690 IN<sup>2</sup>/IN Wt. 9.11 LB/FT  $\Theta_{sa}$  0.820 °C/W/3"

CHEH3598



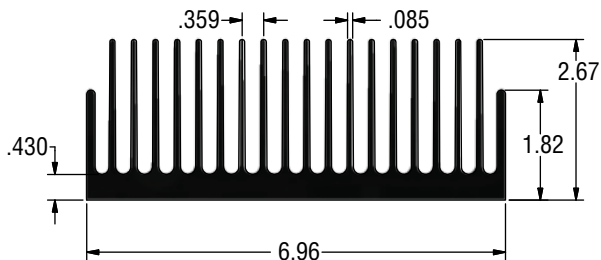
Per. 94.249 IN<sup>2</sup>/IN Wt. 4.15 LB/FT  $\Theta_{sa}$  0.900 °C/W/3"

CHEH3973



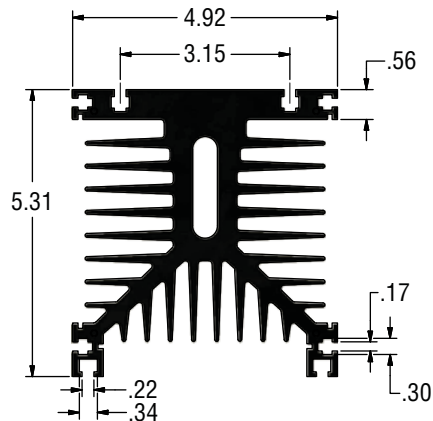
Per. 97.846 IN<sup>2</sup>/IN Wt. 7.55 LB/FT  $\Theta_{sa}$  1.400 °C/W/3"

CHEH0012



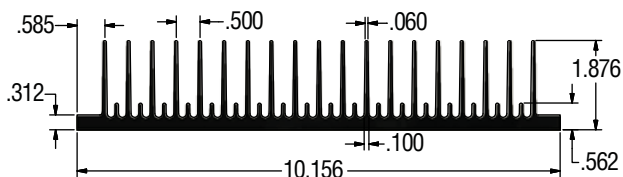
Per. 98.070 IN<sup>2</sup>/IN Wt. 9.50 LB/FT  $\Theta_{sa}$  0.700 °C/W/3"

CHEHK18



Per. 100.400 IN<sup>2</sup>/IN Wt. 11.80 LB/FT  $\Theta_{sa}$  0.700 °C/W/3"

CHEH4025



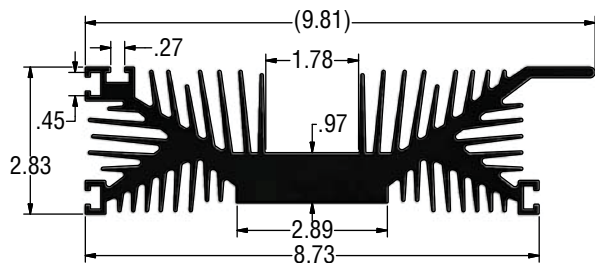
Per. 101.500 IN<sup>2</sup>/IN Wt. 6.60 LB/FT  $\Theta_{sa}$  0.670 °C/W/3"

CHEH3975



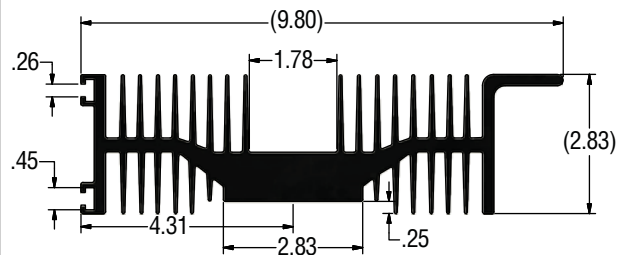
Per. 102.191 IN<sup>2</sup>/IN Wt. 9.10 LB/FT  $\Theta_{sa}$  1.000 °C/W/3"

CHEH0011



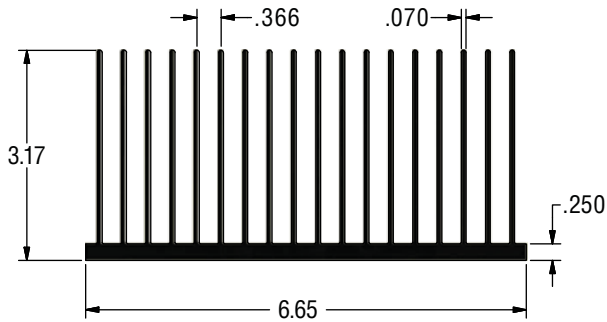
Per. 105.000 IN<sup>2</sup>/IN Wt. 12.81 LB/FT  $\Theta_{sa}$  0.710 °C/W/3"

CHEH0051



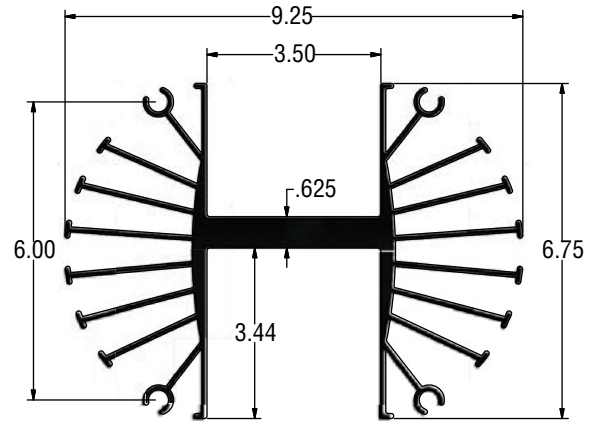
Per. 108.400 IN<sup>2</sup>/IN Wt. 11.10 LB/FT  $\Theta_{sa}$  0.700 °C/W/3"

CHEH3728



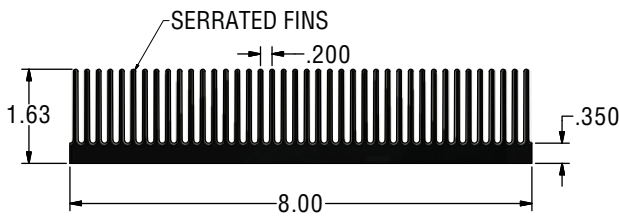
Per. 118.070 IN<sup>2</sup>/IN Wt. 6.40 LB/FT  $\Theta_{sa}$  1.060 °C/W/3"

CHEH0031



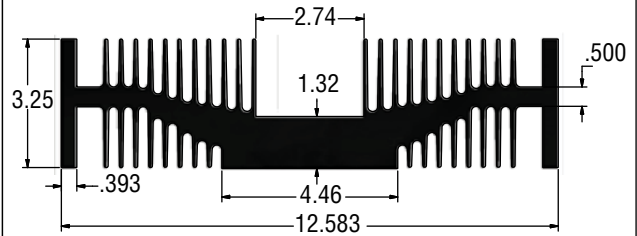
Per. 118.250 IN<sup>2</sup>/IN Wt. 9.60 LB/FT  $\Theta_{sa}$  0.400 °C/W/3"

CHEH3415



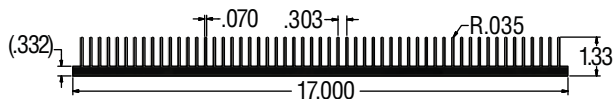
Per. 131.020 IN<sup>2</sup>/IN Wt. 6.15 LB/FT  $\Theta_{sa}$  0.800 °C/W/3"

CHEH0078



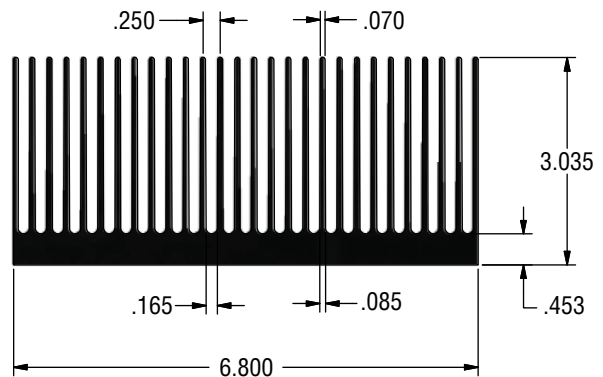
Per. 137.000 IN<sup>2</sup>/IN Wt. 23.75 LB/FT  $\Theta_{sa}$  0.550 °C/W/3"

CHEH3702

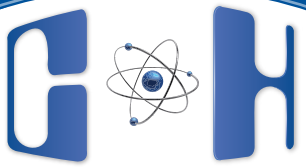


Per. 141.970 IN<sup>2</sup>/IN Wt. 11.04 LB/FT  $\Theta_{sa}$  0.490 °C/W/3"

CHEH0057



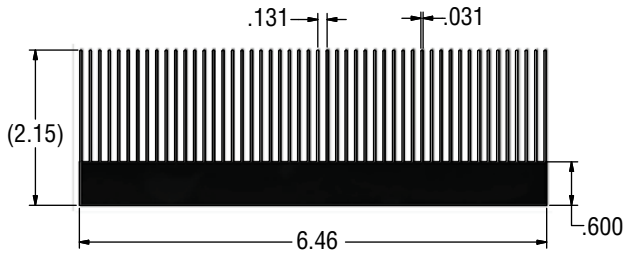
Per. 158.710 IN<sup>2</sup>/IN Wt. 10.05 LB/FT  $\Theta_{sa}$  0.480 °C/W/3"



# Thermal Management

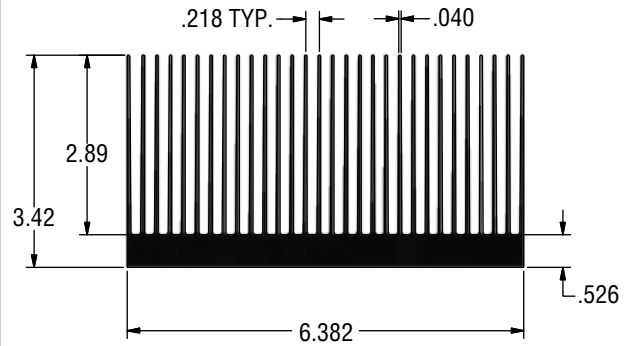
## Extruded Heat Sinks

CHEH0091



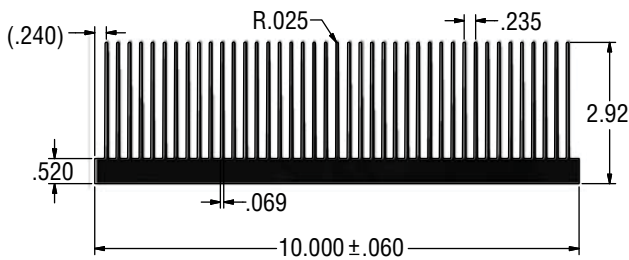
Per. 167.130 IN<sup>2</sup>/IN Wt. 7.29 LB/FT  $\Theta_{sa}$  0.094\* °C/W/6"

CHEH0077



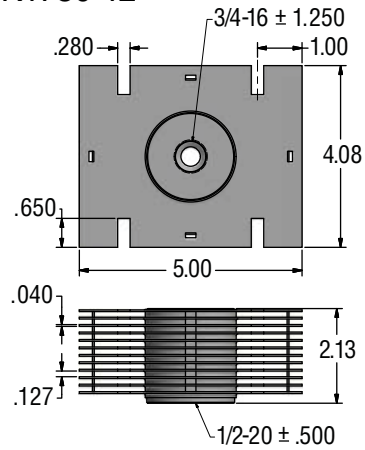
Per. 185.000 IN<sup>2</sup>/IN Wt. 8.86 LB/FT  $\Theta_{sa}$  0.085\* °C/W/6"

CHEH3671



Per. 215.115 IN<sup>2</sup>/IN Wt. 13.25 LB/FT  $\Theta_{sa}$  0.350 °C/W/3"

CHEHK1750-12

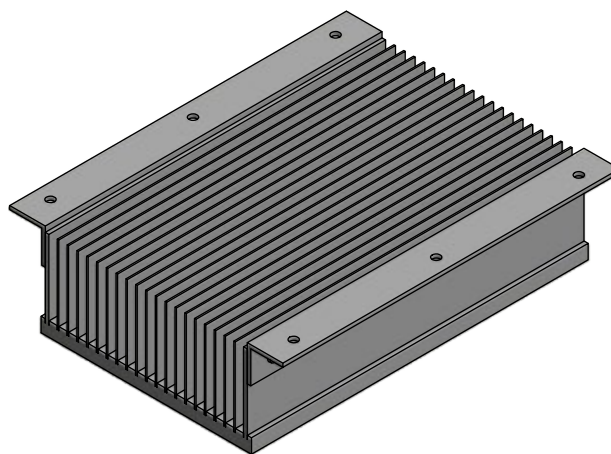
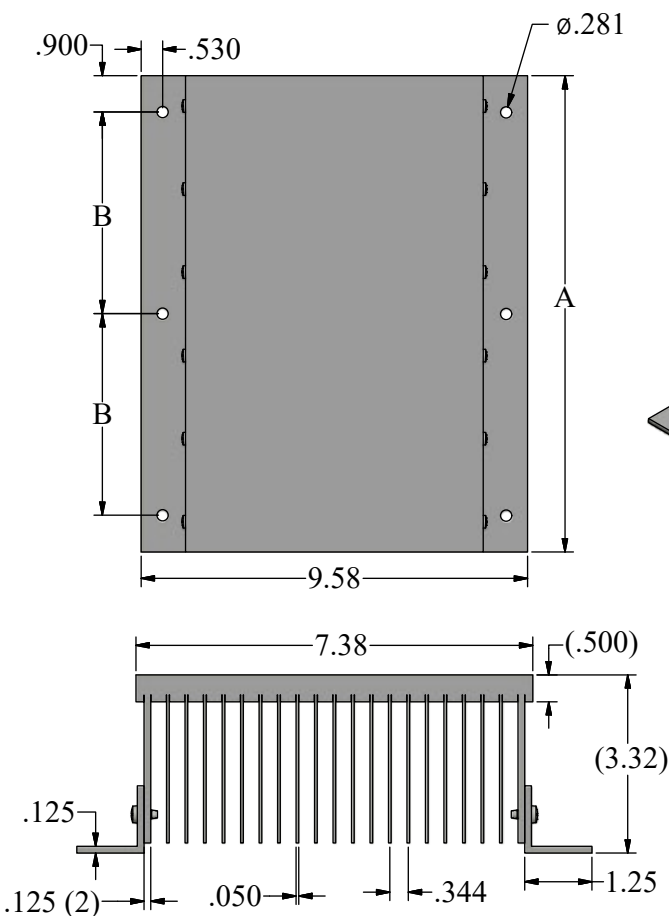


$\Theta_{sa}$  0.280 °C/W at 300 LFM  $\Theta_{sa}$  0.190 °C/W at 500 LFM

\* Thermal Performances based on forced airflow of 500 LFM

### NATURAL CONVECTION MODELS

Ideal for applications where forced air-cooling is not an option. While maintaining a similar thermal resistance, natural convection bonded fin heat sinks require half the amount of space as extruded heat sinks. *Custom designs are available upon request.*



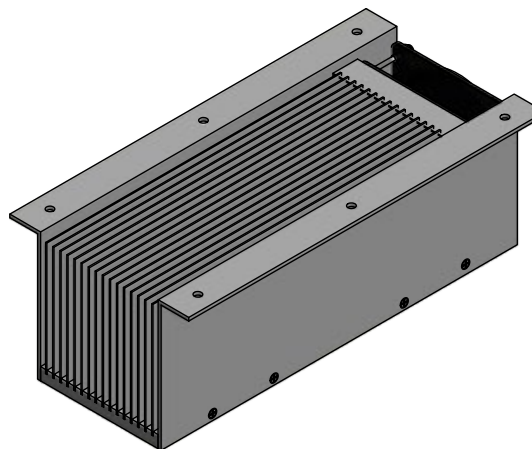
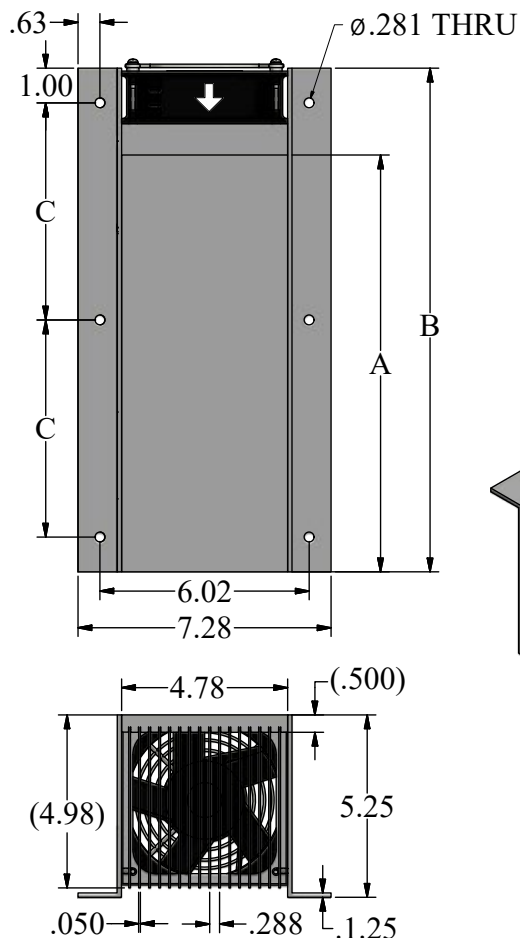
### NATURAL CONVECTION SPECIFICATIONS

MODEL #	CH5111	CH5112	CH5113	CH5114
Dimension A	7.00"	11.81"	7.00"	11.81"
Dimension B	2.50"	5.00"	2.50"	5.00"
Flanges	None	None	1" Wide	1" Wide
Thermal Resistance	0.30°C/W	0.22°C/W	0.30°C/W	0.22°C/W

Information printed in this section has been developed by dimensioning for general applications. C&H Technology is prepared to provide assistance on all Engineered Heat Sinks by utilizing computer software designed specifically for this type of Heat Sink.

### FORCED CONVECTION - SINGLE FAN MODELS

Increased thermal performance over natural convection bonded fin heat sinks. Ideal for applications where high thermal density semiconductors, such as Power MOSFETs and IGBTs, are used. Models available fully equipped with a ball-bearing fan. *Custom designs are available upon request.*



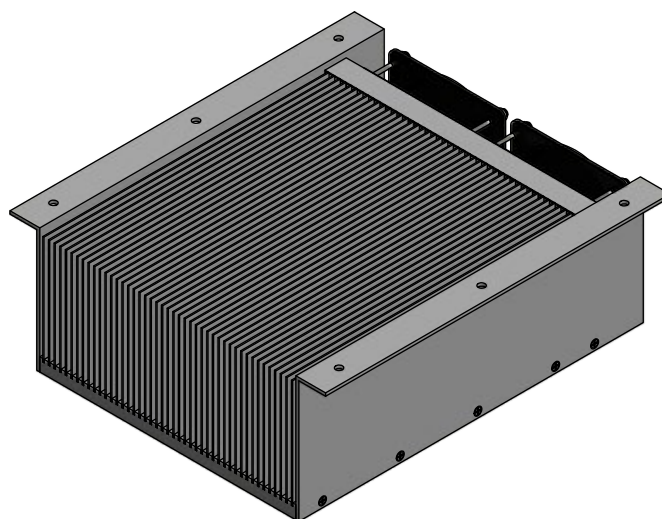
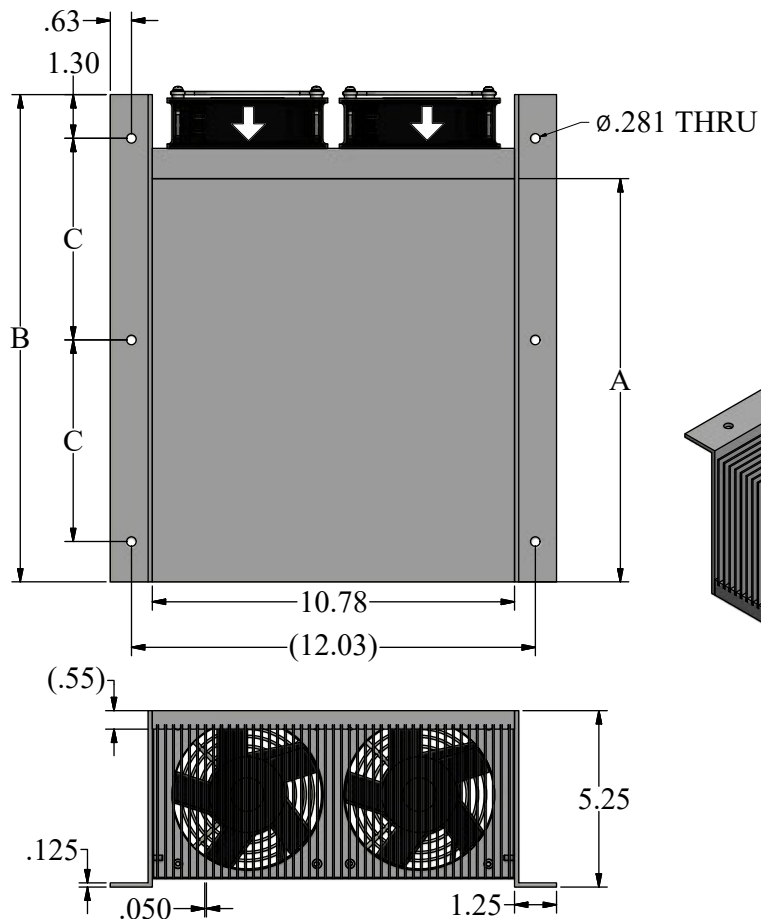
### FORCED AIR CONVECTION - SINGLE FAN MODELS

MODEL #	CH5115	CH5116
Dimension A	7.00"	11.81"
Dimension B	9.50"	14.50"
Dimension C	3.75"	6.25"
Thermal Resistance	0.08°C/W	0.06°C/W

Thermal performances based on 100 CFM fan. Mounting pattern shown fits standard "muffin" fans.

### FORCED CONVECTION - DOUBLE FAN MODELS

Ideal for designs with large IGBT, Diode, and SCR modules in high wattage applications. Exceptional thermal performances as low as  $0.024^{\circ}\text{C}/\text{W}$  – more effective cooling per cubic inch compared to extruded heat sinks. Models available fully equipped with ball-bearing fans. *Custom designs are available upon request.*



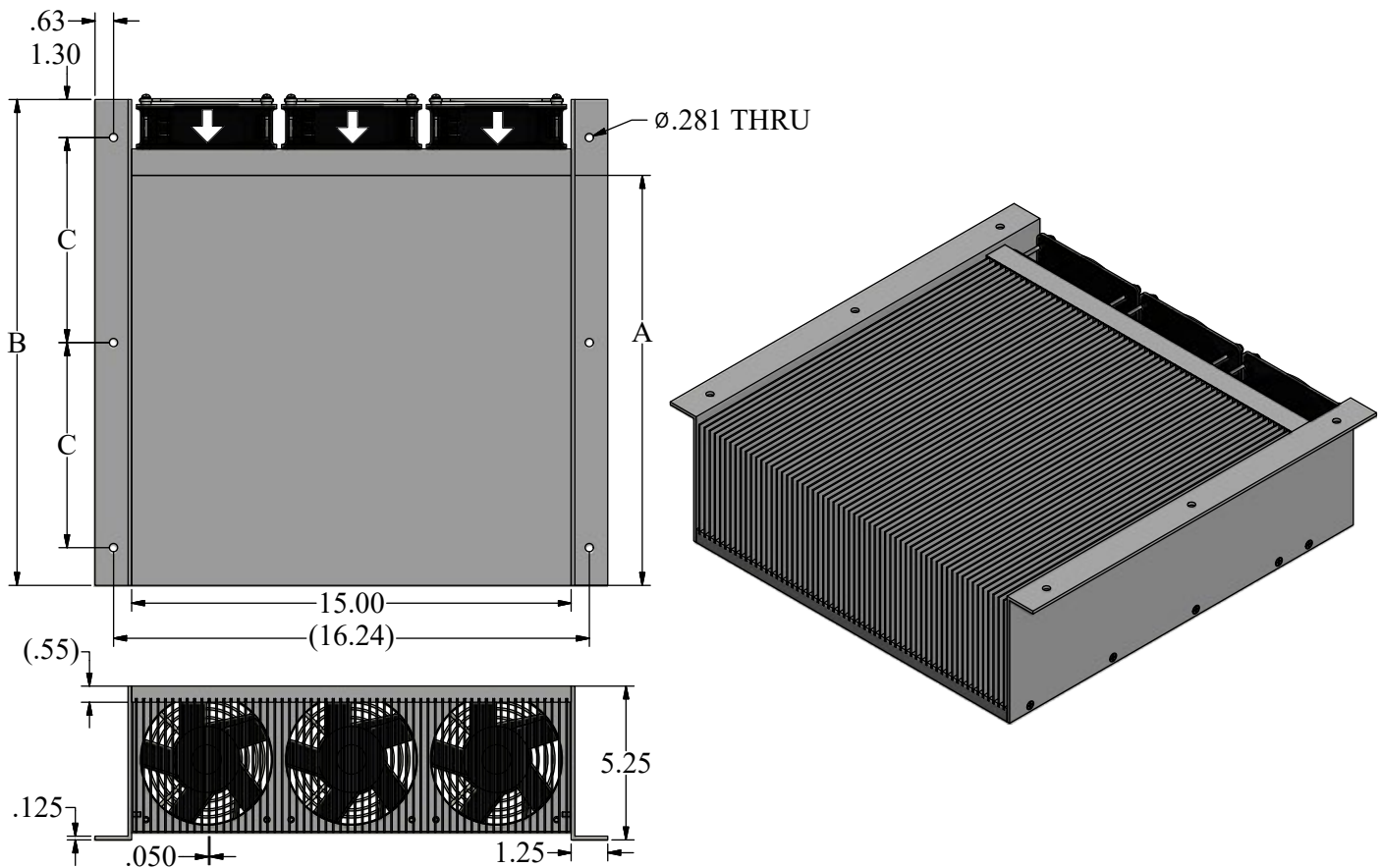
### FORCED AIR CONVECTION - DOUBLE FAN MODELS

MODEL #	CH5117	CH5118	CH5119
Dimension A	11.81"	14.00"	16.00"
Dimension B	14.59"	16.59"	18.59"
Dimension C	6.00"	7.00"	8.00"
Thermal Resistance	$0.028^{\circ}\text{C}/\text{W}$	$0.025^{\circ}\text{C}/\text{W}$	$0.024^{\circ}\text{C}/\text{W}$

Thermal performances based on 100 CFM fan. Mounting pattern shown fits standard "muffin" fans.

### FORCED CONVECTION - TRIPLE FAN MODELS

Triple fan forced convection heat sinks have the highest watt per cubic inch performance over other bonded fin heat sink designs. Semiconductor modules can be mounted parallel to the heat sink fins to eliminate upstream heating effect. This allows for multiple IGBTs, Diodes and SCRs to operate at the same temperature and increase system reliability. Models available fully equipped with ball-bearing fans. *Custom designs are available upon request.*



### FORCED AIR CONVECTION - TRIPLE FAN MODELS

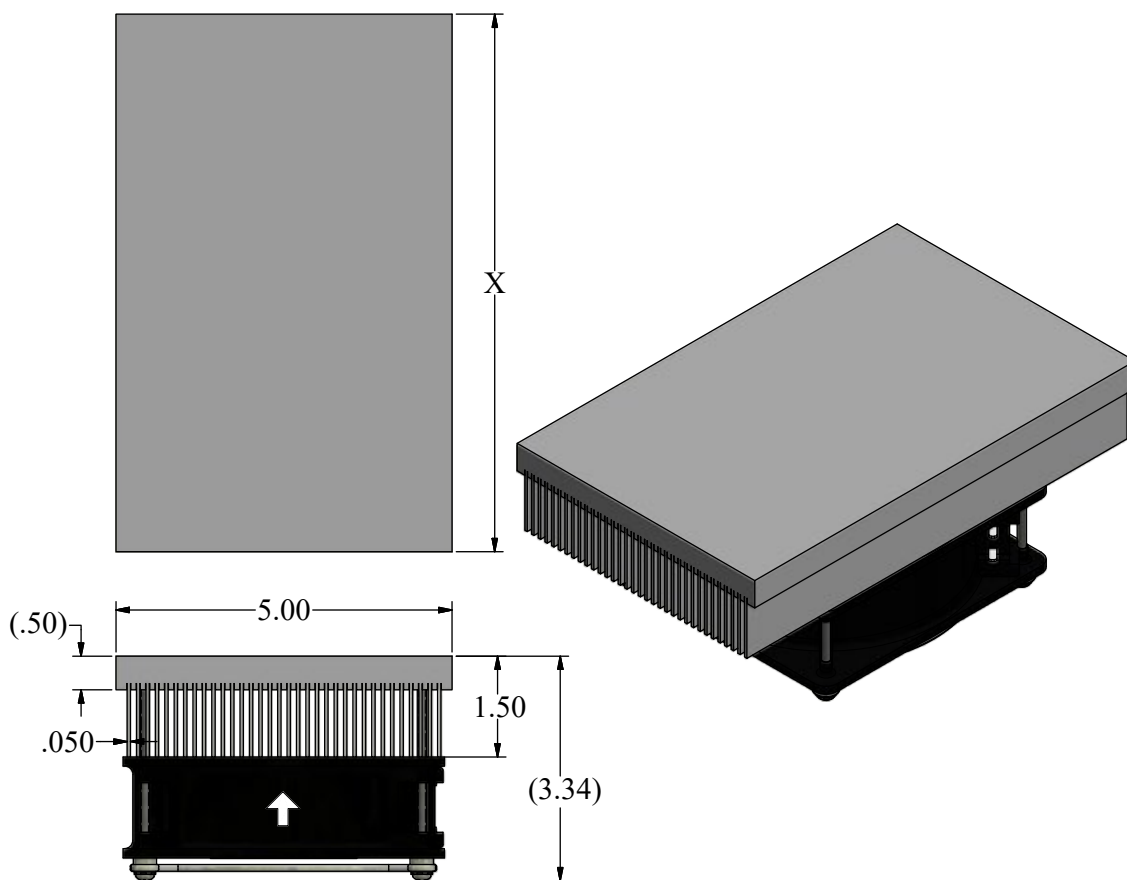
MODEL #	CH5120	CH5121	CH5122
Dimension A	11.81"	14.00"	16.00"
Dimension B	14.59"	16.59"	18.59"
Dimension C	6.00"	7.00"	8.00"
Thermal Resistance	0.02°C/W	0.019°C/W	0.0175°C/W

Thermal performances based on 600 LFM fan. Mounting pattern shown fits standard "muffin" fans.



### IMPINGEMENT HEAT SINK

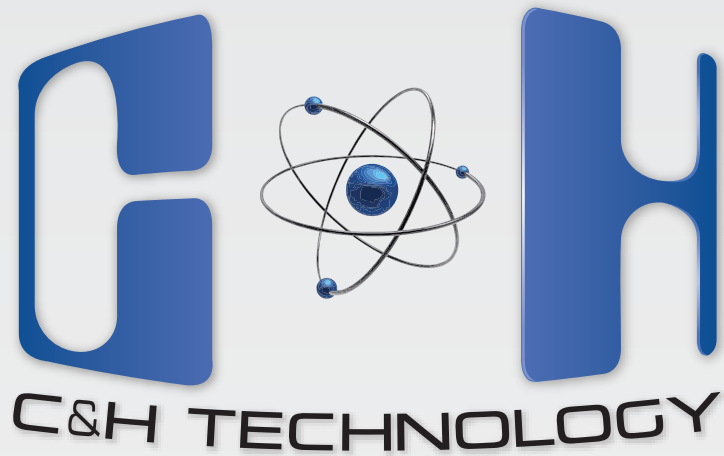
Ideal for IGBT and power MOSFET applications as well as Diode and SCR bridges. The impingement cooling allows modules to be mounted close together while keeping an extremely low cost per watt. This results in all modules in a system to operate at the same temperature increasing system reliability. Additionally, the close mounting structure allows for shorter bus bars that reduces cost and lowers circuit inductance. The impingement style heat sinks provide very high performance cooling in a small package. *Custom designs are available upon request.*



### IMPINGEMENT HEAT SINK MODELS

MODEL #	CH6500	CH6600
Dimension X	5.00"	8.00"
Thermal Resistance	0.10°C/W	0.08°C/W

Thermal performances based on 100 CFM fan. Mounting pattern shown fits standard "muffin" fans.



## Our Partners for Power Electronics:



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**Minnetonka, MN 55345**