# Air Cooled Fabfin® Heatsink

## What you need to know about Fabfin Heatsinks

Welcome to the amazing potential of Fabfin. The design engineer can now leap beyond the limitations of low ratio one piece aluminum extrusions and the thermal barriers of epoxy assemblies by using Fabfin — the high ratio, high performance, immensely rugged, thermal barrier-free aluminum heatsink assembly. Within a broad mechanical envelope lies unlimited possibilities to address your most challenging thermal applications.
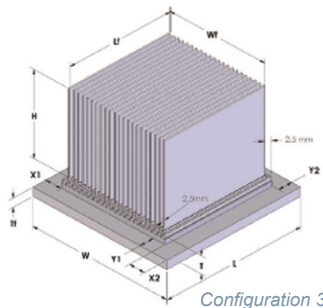
All configurations

- L = Length of baseplate
- Lf = Length of fin
- W = Width of baseplate
- Wf = Width over fins
- T = Thickness of baseplate
- Tf = Thickness of flange

- Baseplate thickness:
  9 mm Min
  64 mm Max

- Non-tooled fin height within each family will be provided by shearing the next taller fin. If quantities dictate we will tool a new fin.

- Max fin height 118 mm except MF which is 49 mm tall. MF equivalent fins can be achieved by selecting the Hollowfin® on 6.86 mm centers.
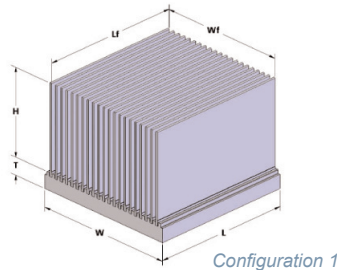
Configuration 1
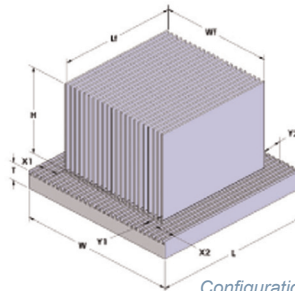
Configuration 2

Configuration 3

Note: Configurable aluminum air cooled assemblies. Four series organized on baseplate slot spacing. Highly flexible width, length and fin arrangement.

Copper options available.

Configuration 1
(without mounting flanges: all slots filled)

- L = Lf =1250
- W = [Wf + (2 x shoulder)] = Wmax (see Fig. 1 Table 2)
- Number of fins = Width indicator (N) corresponding to W (see formulas in Table 3)
- Shoulder Width ≥ 2.5 mm for MF, 3.5 mm ≥ AF, DF and FF

Configuration 2
(with mounting flanges; exposed fin slots)

- L = (Lf + Y1 + Y2) =1250
- If flanges Y1 and Y2 = 0, then Lf = L
- X1 may equal X2 but both must be specified
- W = (Wf + X1 + X2) = Wmax (see Fig. 1 Table 2)
- Flanges X1 and X2 must be ≥ 2.5 mm for MF, ≥ 3.5 mm for AF, DF and FF
- Y1 may equal Y2 but both must be specified
- Number of fins = Width indicator (N) corresponding to Wf (see formulas in Table 3)

Configuration 3
(with mounting flanges; machined surfaces)

- L = [Lf + Y1 + Y2 + (2 x 2.5)] =1250
- If flanges Y1 and Y2 = 0, then Lf = L
- X1 may equal X2 but both must be specified
- W = [Wf + X1 + X2 + (2 x shoulder)] = Wmax (see Fig. 1 Table 2)
- Flanges X1 and X2 must be specified beyond 2.5 shoulder for MF and 3.5 mm for AF, DF and FF
- Y1 may equal Y2 but both must be specified
- Number of fins = Width indicator (N) corresponding to Wf (see formulas in Table 3)
- Tf must be = T – 3.3 in order to remove the fin slots

Air Cooled Fabfin® Heatsink Configurator

9-easy steps to configure a Fabfin

The following represents a sample configuration of Figure 3, page 6

STEP 1: Select a series
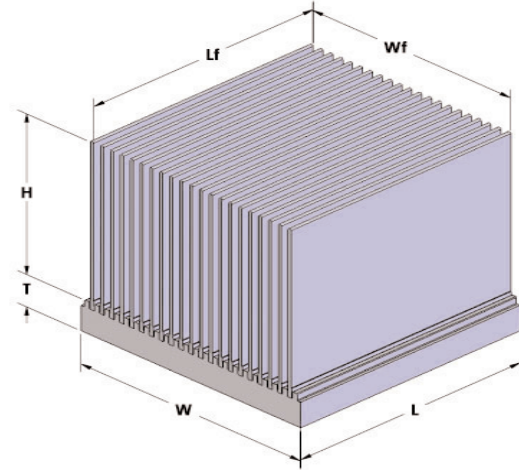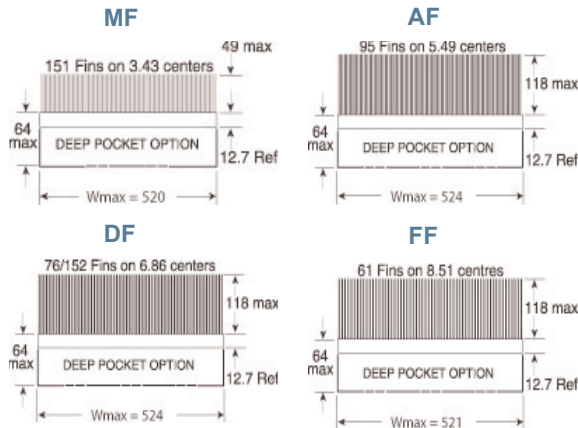Select a series for a fin pitch.

Table 1: Fin Pitch

Series	Fin Pitch (CC) (Center to Center)
MF	3.43 mm
AF	5.49 mm
DF	6.86 mm
FF	8.51 mm

Table 1 (above) and Fig. 1 (below) show the four standard Fabfin series based on Fin Pitch (CC). Variables within each series include length, width and thickness of baseplate as well as height and thickness of fins.

Part Number Example: FF

Fig 1

MF
151 Fins on 3.43 centers
49 max
64 max
DEEP POCKET OPTION
12.7 Ref
Wmax = 520

AF
95 Fins on 5.49 centers
118 max
64 max
DEEP POCKET OPTION
12.7 Ref
Wmax = 524

DF
76/152 Fins on 6.86 centers
118 max
64 max
DEEP POCKET OPTION
12.7 Ref
Wmax = 524

FF
61 Fins on 8.51 centres
118 max
64 max
DEEP POCKET OPTION
12.7 Ref
Wmax = 521

Configuration 1
Fig. 2

STEP 2: Select a configuration
All Fabfin baseplates can be configured with or without a mounting flange. To define the configuration see detailed diagrams on page 3. If configuration 2 or 3 are selected please specify the x and y coordinates for the mounting flange area.

Configuration 1
* fully populated, full length fins and without mounting flanges- all slots filled

Configuration 2
* unmachined exposed flange(s)

Configuration 3
* machined exposed flange(s)

Part Number:

Configuration 1 = no digit required

Configuration 2 = 2

Configuration 3 = 3
(if configurator 2 or 3 is selected the digit/code appears at the very end of the product number)

Part Number Example: FF

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STEP 3: Select a total length

Select the total length in mm *(this is user defined)

eg. L = Lf = 300 mm

Part Number Example: FF300

STEP 4: Select a baseplate thickness

(refer to Table 2)

All Fabfin heatsinks are available with standard 12.7 mm baseplate thickness but many other thicknesses are tooled. The baseplate thickness is typically governed by the mechanical, thermal and cost requirements of the application. Custom baseplate thicknesses can be provided within the range of 9 mm to 64 mm by cutting new extrusion dies or gang slotting of the baseplate. New tooling is coming on-line continuously and we may be able to supply your special needs at no additional cost.

Part Number Example: FF300T13

Table 2 (a-d) Baseplate Thickness

Table 2a - MF Baseplate Options

Thickness Reference	Thickness T (mm)	Maximum Width Wmax(mm)
T13	12.7	Up to 305 mm
T00	to be specified	

Table 2b - AF Baseplate Options

Thickness Reference	Thickness T (mm)	Maximum Width Wmax(mm)
T10	9.9	Up to 222 mm
T13	12.7	Up to 524 mm
T15	14.9	Up to 524 mm
T19	19.0	Up to 343 mm
T00	to be specified	

Table 2c - DF Baseplate Options

Thickness Reference	Thickness T (mm)	Maximum Width Wmax(mm)
T10	9.5	Up to 310 mm
T13	12.7	Up to 524 mm
T14	14.2	Up to 337 mm
T15	15.3	Up to 524 mm
T17	17.3	Up to 324 mm
T18	18.3	Up to 400 mm
T00	to be specified	

Table 2d - FF Baseplate Options

Thickness Reference	Thickness T (mm)	Maximum Width Wmax(mm)
T13	12.7	Up to 520 mm
T00	to be specified	

STEP 5: Select a baseplate material

Choose one of the following materials: A = Aluminum

C = Copper

Part Number Example: FF300T13A

STEP 6: Determine width indicator (N)

To convert baseplate width to width indicator, select desired baseplate total width (W). To determine Width Indicator (N) use the formula at the bottom of each series table. (refer to Table 3)

i.e. If   W = 260 mm

$$N = \frac{260 - 9.4}{-8.51}$$

= 29.4 *(round up to the nearest integer)

N = 30

Refer to Table 3 for standard tooled baseplate widths (W).

Alternatively go to the Fabfin configurator section on the website for a complete listing of all widths and fin counts.

Mersen will manufacture this heatsink by machining the next wider standard baseplate. (refer to Table 3d)

Fin count

Configuration 1: Number of fins = Width indicator (N)
Configuration 2,3: Substitute Wf into the formula at the bottom of each series in Table 3 to obtain fin count.

Wider widths are frequently supplied by welding Fabfin assemblies together. The swaged fin to baseplate joint is unaffected by the elevated welding temperatures.
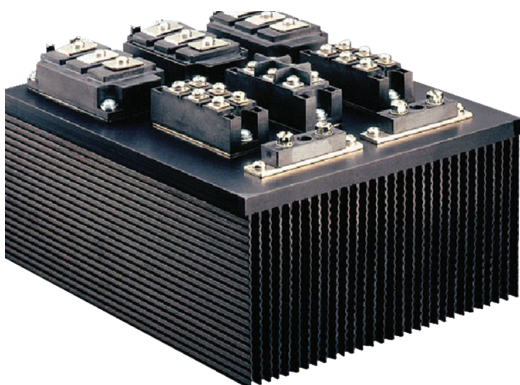
Part Number Example: FF300T13A30

Fig. 3 Sample Heatsink

Table 3 (a-d) Width Indicator

Table 3a - Standard Tooled Baseplates

Width (mm) W	Width Indicator N	Width Fin to Fin (mm) Wf
127	36	121.4
202	58	196.8
237	68	231.1
264	76	258.6
302	87	296.3

Table 3b - AF Standard Tooled Baseplates

Width (mm) W	Width Indicator N	Width Fin to Fin (mm) Wf
223	40	215.4
234	42	226.4
300	54	292.3
343	62	336.2
349	63	341.7
404	73	396.6
525	95	517.4

Table 3c - DF Standard Tooled Baseplates

Width (mm) W	Width Indicator N	Width Fin to Fin (mm) Wf
257	37	249.4
298	43	290.5
310	45	304.2
325	47	318.0
339	49	331.7
401	58	393.4
524	76	516.9

Table 3d - FF Standard Tooled Baseplates

Width (mm) W	Width Indicator N	Width Fin to Fin (mm) Wf
121	14	113.0
190	22	181.1
274	32	266.2
308	36	300.3
393	46	385.4
521	61	513.0

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STEP 7: Select fin

To select fin material, style and height, please refer to Fig. 4 and Table 4 for standard heights and fin height ratios for each series.

Non-standard fin height within each family will be provided by shearing the next taller fin.

The exact fin height in millimeters should substitute the 000 in the Fin Reference in Table 4. If quantities dictate we will tool a new fin.

AC = Aluminum Corrugated
AS = Aluminum Serrated
AH = Aluminum Hollow
CF = Copper Flat
AF = Aluminum Flat

Part Number Example:
FF300T13A30AC118

STEP 8: Select a finish

Choose from the following finishes:
C = RoHS compliant tri-valent clear chrome
B = Black Anodize
A = Clear Anodize
D = Degrease only

Part Number Example:
FF300T13A30AC118B

STEP 9: (Optional)

Choose legs if desired:
Yes = L
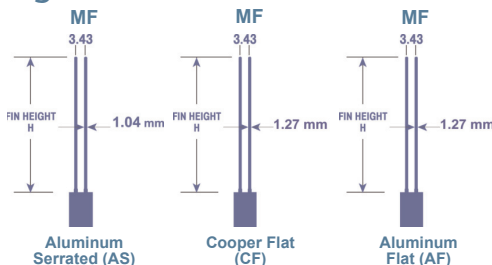No = no digit required
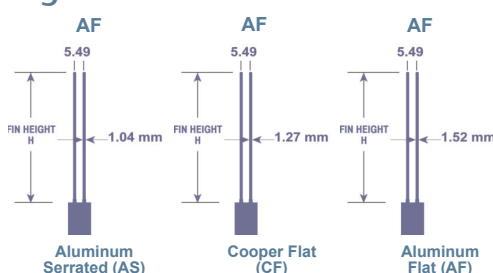
Part Number Example:
FF300T13A30AC118B

Fig.4a

MF 3.43 — Aluminum Serrated (AS) — 1.04 mm
MF 3.43 — Cooper Flat (CF) — 1.27 mm
MF 3.43 — Aluminum Flat (AF) — 1.27 mm

Fig.4b

AF 5.49 — Aluminum Serrated (AS) — 1.04 mm
AF 5.49 — Cooper Flat (CF) — 1.27 mm
AF 5.49 — Aluminum Flat (AF) — 1.52 mm

Fig.4c

DF 6.86 — Aluminum Corrugated (AC) — 1.64 mm
DF 6.86 — Aluminum Serrated (AS) — 2.4 mm
DF 6.86 — Aluminum Hollow (AH) — 0.9 mm

Fig.4d

FF 8.51 — Aluminum Corrugated (AC) — 1.64 mm
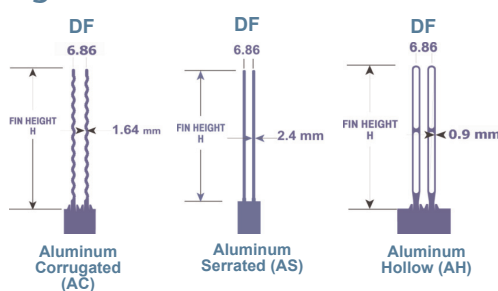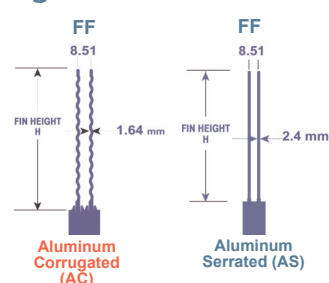FF 8.51 — Aluminum Serrated (AS) — 2.4 mm

*Note: Take this part number and enter into R-Tools to simulate thermal performance using your selected interface materials and semi-conductors. * (refer to Fig. 3 on page 6 for picture of this configured part FF300T13A30AC118B)*

Table 4 (a-d) Fin Styles

Table 4a - MKMF Fin Options

Fin Reference	Fin Style	Fin Height H (mm)	Ratio H to Space
AS035	Serrated	35	15:1
AS049	Serrated	49	20:1
AS000	Serrated	to be specified	
AF000	Flat	to be specified	
CF000	Flat	to be specified	

Table 4b - AF Fin Options

Fin Reference	Fin Style	Fin Height H (mm)	Ratio H to Space
AS037	Serrated	36.5	8:1
AS051	Serrated	50.5	11:1
AS091	Serrated	90.5	20:1
AS120	Serrated	119.5	27:1
AS000	Serrated	to be specified	
AF000	Flat	to be specified	
CF000	Flat	to be specified	

Table 4c - DF Fin Options

Fin Reference	Fin Style	Fin Height H (mm)	Ratio H to Space
AC071	Corrugated	71.4	13:1
AS071	Serrated	71.4	16:1
AC119	Corrugated	119.4	22:1
AS119	Serrated	119.4	26:1
AH060	Hollow	59.5	24:1
AH063	Hollow	63	25:1
AH085	Hollow	85	34:1
AH102	Hollow	101.8	40:1
AH119	Hollow	119.4	46:1
AC000	Corrugated	to be specified	
AS000	Serrated	to be specified	
AH000	Hollow	to be specified	

Table 4d - FF Fin Options

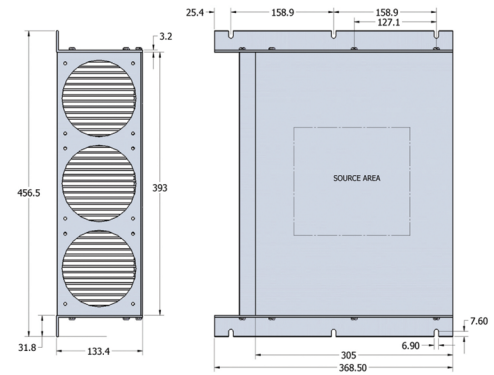| Fin Reference	Fin Style	Fin Height H (mm)	Ratio H to Space
AC070	Corrugated	70	10:1
AS070	Serrated	70	11:1
AC118	Corrugated	118	17:1
AS118	Serrated	118	27:1
AC000	Corrugated	to be specified	
AS000	Serrated	to be specified	

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Air Cooled Fabfin® Standards

The range of standard Fabfin® forced convection cooled heatsinks (FFC series) was developed to incorporate standard 119mm square axial fans. The fin spacing of 8.51 mm was selected to provide a 20:1 ratio, the practical heat transfer limit for cooling Power Semiconductors in typical ambient conditions. The standard FFC series will accept 1, 2, 3 or 4 fans. Available in many finishes. The serrated fin thickness of 2.4mm provides near optimum performance when using industry standard axial fans. If some level of performance de-rating is acceptable (approximately 20%) then we recommend that corrugated fins be used. These have a thickness of 1.5 mm and are designated by ordering the 'AC' part numbers. The use of corrugated fins provides a weight savings of approximately 15% and will increase surface area by 7% compared with a straight fin of the same height. The push/pull (PP) option is common for applications where fan redundancy is important. We recommend the use of ball bearing fan(s), specifically for the "pull" end, in order to maximize the fan life due to the elevated operating temperatures. The additional weight of the fan can be offset by using the corrugated fins, if applicable. The adjacent graphs provide a performance guide for heat generating devices ranging in size from point source to 60% coverage.

1X TYPICAL 119 X 119 mm FAN

FIN THICKNESS
1.5mm FIN REF AC118
2.4mm FIN REF AS118

$R = \dfrac{SOURCE\ AREA}{BASE\ AREA}$ R1=0.1 R2=0.6
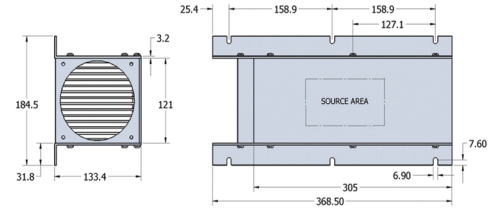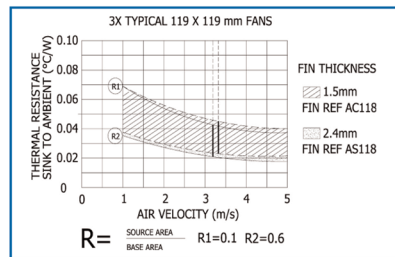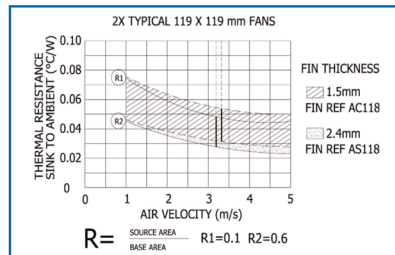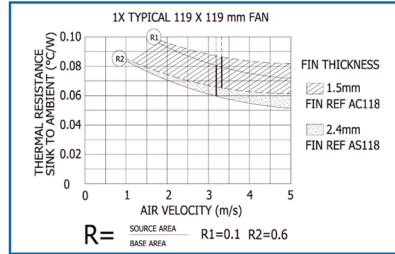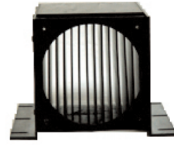
TECHNICAL DATA

MODAL #	FFC305T13A14AS118B		FFC305T13A14AC118B	
FIN STYLE	SERRATED		CORRUGATED	
WT WITHOUT FAN	5.4	kg	4.7	kg
BASE AREA	36,774	mm²	36,774	mm²
TOTAL CSA	5,091	mm²	4,242	mm²
TOTAL PERIMETER	3,683	mm	3,749	mm

2X TYPICAL 119 X 119 mm FANS

FIN THICKNESS
1.5mm FIN REF AC118
2.4mm FIN REF AS118

$R = \dfrac{SOURCE\ AREA}{BASE\ AREA}$ R1=0.1 R2=0.6
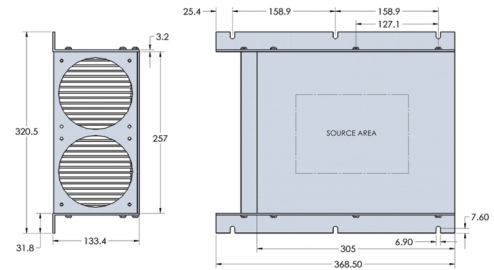
TECHNICAL DATA

MODAL #	FFC305T13A30AS118B		FFC305T13A30AC118B	
FIN STYLE	SERRATED		CORRUGATED	
WT WITHOUT FAN	10.4	kg	8.8	kg
BASE AREA	78,387	mm²	78,387	mm²
TOTAL CSA	10,889	mm²	8,981	mm²
TOTAL PERIMETER	7,800	mm	7,929	mm

3X TYPICAL 119 X 119 mm FANS

FIN THICKNESS
1.5mm FIN REF AC118
2.4mm FIN REF AS118

$R = \dfrac{SOURCE\ AREA}{BASE\ AREA}$ R1=0.1 R2=0.6

TECHNICAL DATA

MODAL #	FFC305T13A46AS118B		FFC305T13A46AC118B	
FIN STYLE	SERRATED		CORRUGATED	
WT WITHOUT FAN	15.5	kg	13.2	kg
BASE AREA	119,865	mm²	119,865	mm²
TOTAL CSA	16,574	mm²	13,766	mm²
TOTAL PERIMETER	11,991	mm	12,578	mm

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