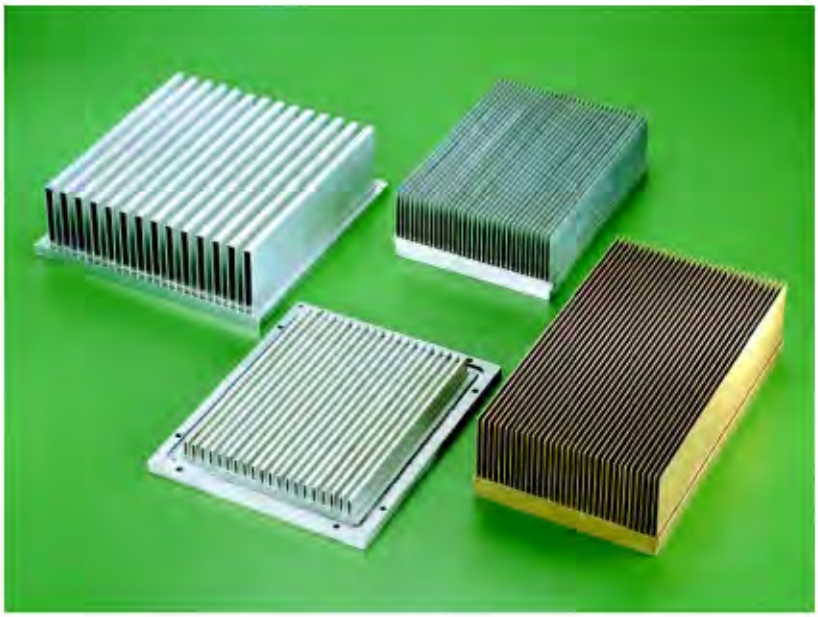
COMPANY
WITH QUALITY SYSTEM
CERTIFIED BY LRQA
= ISO 9001:2000 =

AAVID THERMALLOY

ONE COOL IDEA AFTER ANOTHER



Powerfin

solutions

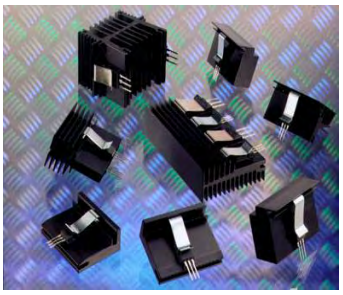
MADEP

Industrie, Electrotechnique & Automatismes

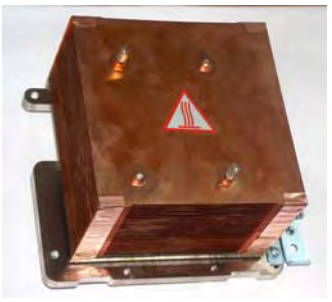
Parc des Bellevues - 2 avenue du Gros Chêne -BP90209- F-95610 ERAGNY S/OISE
Tél : 01.34.30.17.20 - Fax : 01.34.64.99.09 - Email : sales@madep.com

AAVID THERMALLOY

OTHER MAIN PRODUCTS:



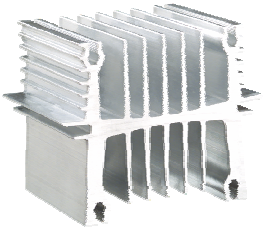
The MAX clip system



BGA-CPU coolers

Board Mounted

Brazedgain



Extrusions

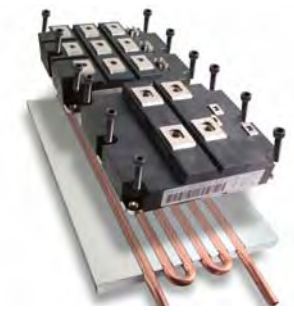
Powergain

Powerpipe solutions

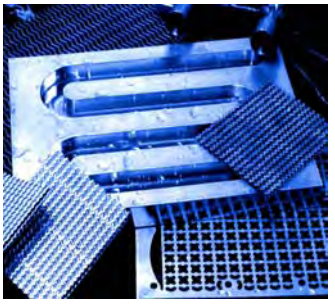
Blister LCP

Remote Heat Exchangers

Powerblock - Powerface



HiContact LCP



Brazed LCP

AAVID THERMALLOY S.r.l. Via XXV Aprile, 32 - 40057 Cadriano (BO) - ITALY Tel. +39-051 764011 - Fax +39-051 764092 e.mail : sales.it@aavid.com
AAVID THERMALLOY Ltd Cheney Manor – Swindon – Wiltshire SN2 2QN - UK Tel. +44-01793 401400 - Fax +39-01793 615396 e.mail : sales.uk@aavid.com

AAVID THERMALLOY S.r.l. Via XXV Aprile, 32 - 40057 Cadriano (BO) - ITALY Tel. +39-051 764011 - Fax +39-051 764090 e.mail : sales.it@aavid.com
AAVID THERMALLOY Ltd Cheney Manor – Swindon – Wiltshire SN2 2QN - UK Tel. +44-01793 401400 - Fax +39-01793 615396 e.mail : sales.uk@aavid.com

AAVID THERMALLOY presents the new POWERFIN heatsink family.

POWERFIN is a very flexible and compact thermal management solution designed for use when space is limited or at a premium and the required thermal performance is not achievable with a standard extrusion.
POWERFIN is an alternative to Powergain™ and is recommended when natural convection is prescribed, when the required thermal solution is not achievable with a standard extrusion or when forced ventilation must be parallel to the fins.
The advantages of POWERFIN are:

- Dense fins configuration for longitudinal forced ventilation.
- High thin fins for natural convection.
- Existing range of designs.
- Low tooling cost for custom applications.
- Fins and base can be made in pure aluminium or copper for optimum thermal performance.
- Fast and flexible custom design with large geometric capabilities.
- Short lead times.

With a very narrow fin pitch it is necessary to use a ducted airflow for optimum thermal performance.
The ducting material may be constructed from plastic or thin metal plates and can incorporate the use of cabinet walls. Careful fan selection is needed to control the air pressure drop.
With operation in natural convection it is important to use a fin pitch from 6 to 9 mm to minimise thermal management losses due to the boundary layer effect. POWERFIN is constructed using bonded fin technology and very high fins (100+ mm) to optimise the thermal exchange surface.
With a very concentrated heat source, POWERFIN can be made with a copper base plate or with embedded heat pipes for faster heat spreading and incorporate aluminium fins to reduce overall weight and cost. In high airflow conditions we recommend copper fins for a reduced fin temperature gradient.
AAVID THERMALLOY looks forward to assisting you in the development of the optimum thermal management and economic solutions for your products.

Thermal epoxy service

The choice of epoxy adhesive is determined by a specialised knowledge of reliability, consistent quality, application economics, specialised plant & equipment, detailed knowledge and experience.
The first step is the correct choice of both resin and hardener. The choice is different for an application mainly requiring electrical isolation from one requiring a particularly high thermal conductivity. A rigid system with high mechanical resistance requires a different choice to one remaining stable to vibration or resistant to thermal cycling. Dust, excessive humidity and contaminants seriously impair the quality of a bonded joint.
Surface preparation is critical. Metal surfaces must be cleaned and perfectly deoxidised to remove surface metal salts that could contaminate the epoxy and prevent good adhesion. Cleaned parts must remain so during the whole process until polymerisation is complete. Epoxy resins are hygroscopic and as such need special care.
AAVID THERMALLOY, with much bonding experience, has developed special techniques for choosing the most suitable compound for each particular application. Above all, our methodology and equipment guarantee the consistent quality of our products.

AAVID THERMALLOY Aluminium Brazed Technology *** NEW ***

AAVID THERMALLOY has implemented the Aluminium Brazed Technology to get a metal to metal joint from base to fins. This technology eliminates the small thermal resistance of the resin and reaches the top performances of the power fin family. Further advantages are:

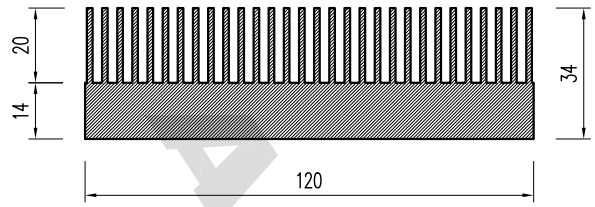
- perfect electrical contact;
- elimination of any mechanical problems due to high thermal stress;
- elimination of any mechanical problem due to shock and vibration stress;
- very high freedom to get the best thermal design;

In the next 6 pages there are examples of **BRAZEDFIN**™ High Fin Ratio heatsinks obtained through the brazing process.

The thermal resistance in natural convection Rthn, is given only when the fins are spaced enough to guarantee a good air flow in natural convection.

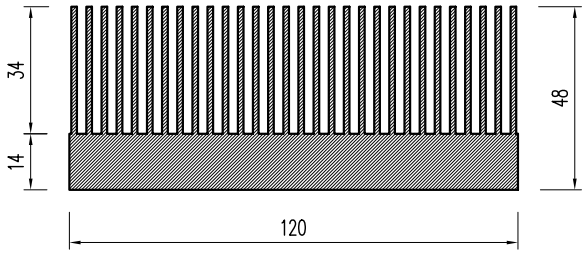
BF1234

△p=62 Pa | Rthn= °C/W | Rthf=0.183 °C/W



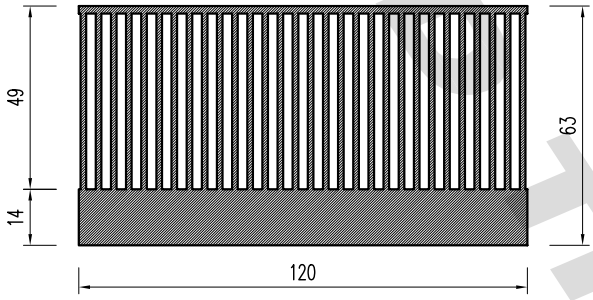
BF1248

△p=37 Pa | Rthn= °C/W | Rthf=0.139 °C/W



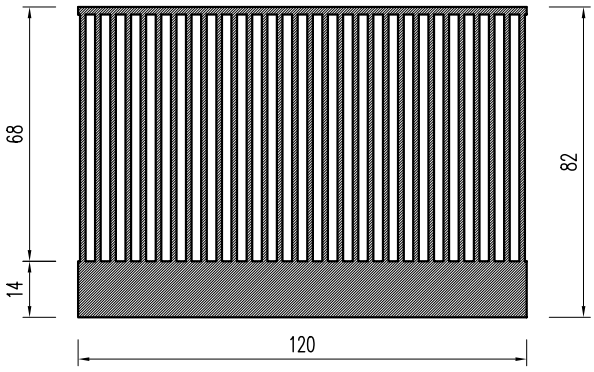
BF1263

△p=31 Pa | Rthf=0.113 °C/W



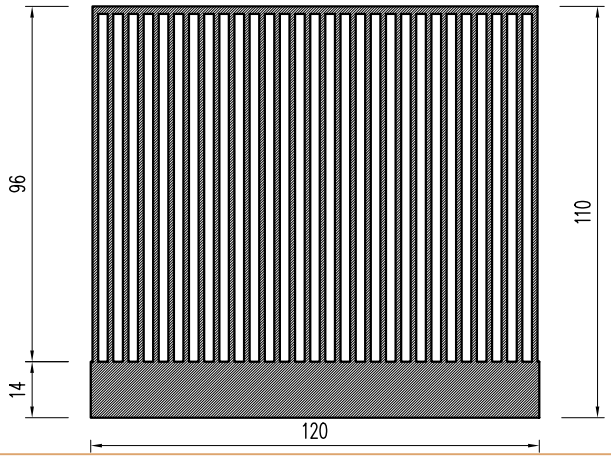
BF1282

△p=27 Pa | Rthn= °C/W | Rthf=0.094 °C/W



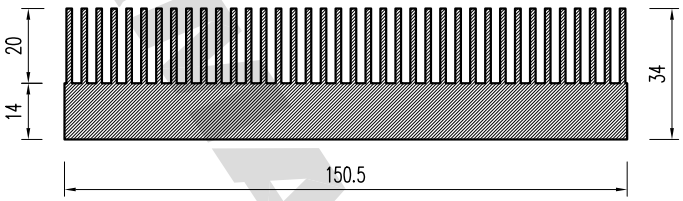
BF12B0

△p=25 Pa | Rthn= °C/W | Rthf=0.082 °C/W



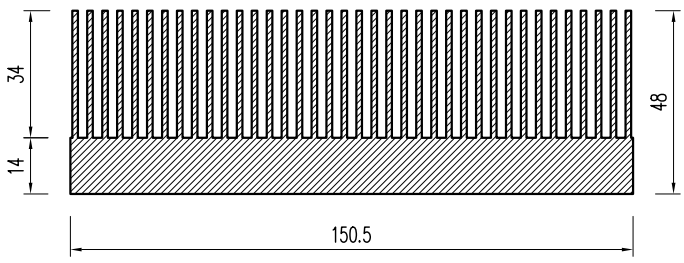
BF1534

△p=62 Pa | Rthn= °C/W | Rthf=0.150 °C/W



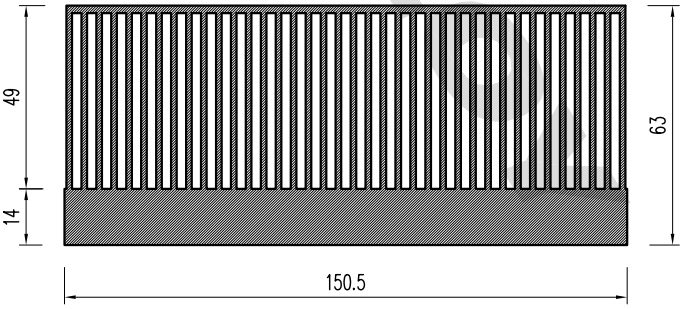
BF1548

△p=37 Pa | Rthn= °C/W | Rthf=0.113 °C/W



BF1563

△p=31 Pa | Rthn= °C/W | Rthf=0.091 °C/W



PF03

e-mail: sales.it@aavid.com
e-mail: sales.uk@aavid.com

Tel. +39-051-764011 - Fax +39-051-764090
Tel. +44-01793-401400 - Fax +44-01793-615396

Via XXV Aprile, 32 - 40057 Cadriano (BO) - Italy
Cheney Manor - Swindon - Wiltshire SN2 2QN - UK

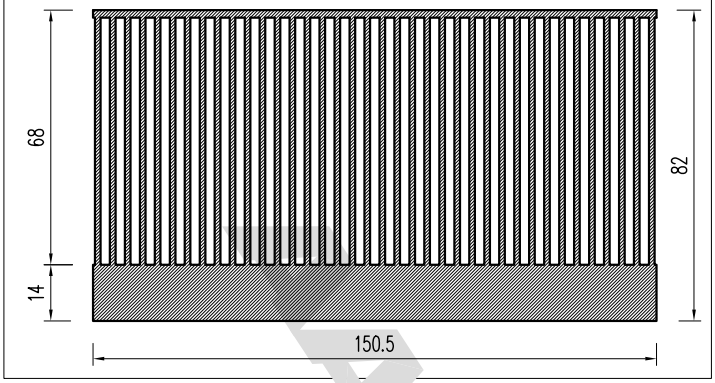
AAVID THERMALLOY

The above are only examples - The choice is limited only by imagination

AAVID THERMALLOY
PF04
Via XXV Aprile, 32 - 40057 Cadriano (BO) - Italy
Tel. +39-051-764011 - Fax +39-051-764090
e-mail: sales.it@aavid.com
Cheney Manor - Swindon - Wiltshire SN2 2QN - UK
Tel. +44-01793-401400 - Fax +44-01793-615396
e-mail: sales.uk@aavid.com

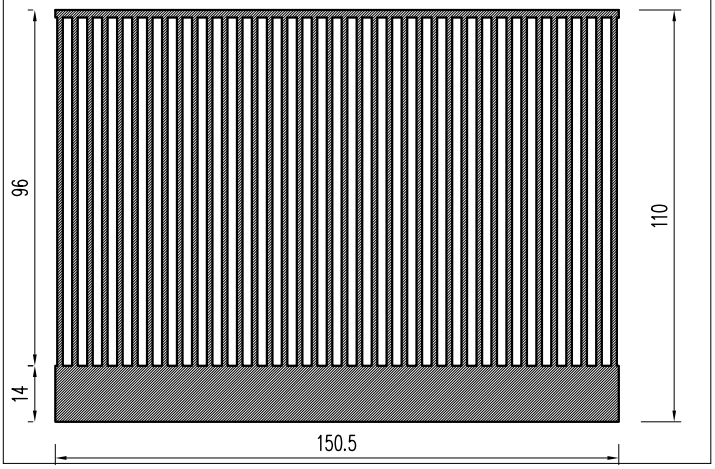
BF1582

△p=27 Pa | Rthn= °C/W | Rthf=0.076 °C/W



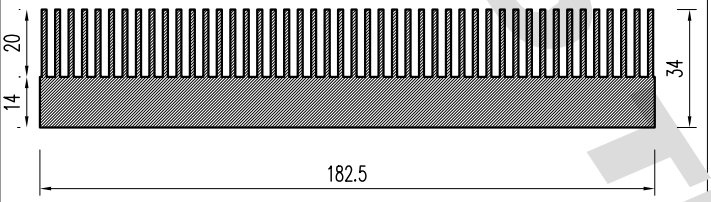
BF15B0

△p=25 Pa | Rthn= °C/W | Rthf=0.066 °C/W



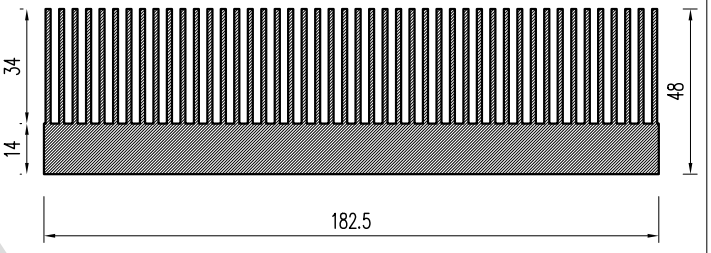
BF1834

△p=62 Pa | Rthf=0.129 °C/W



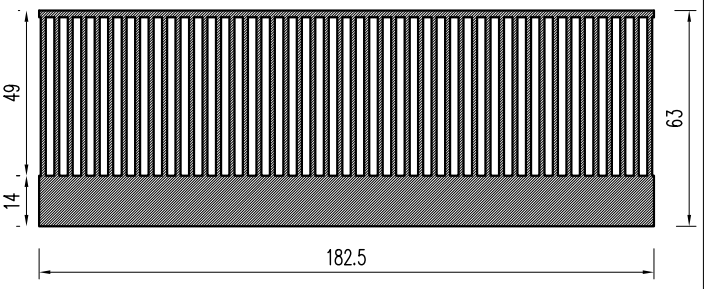
BF1848

△p=37 Pa | Rthn= °C/W | Rthf=0.096 °C/W



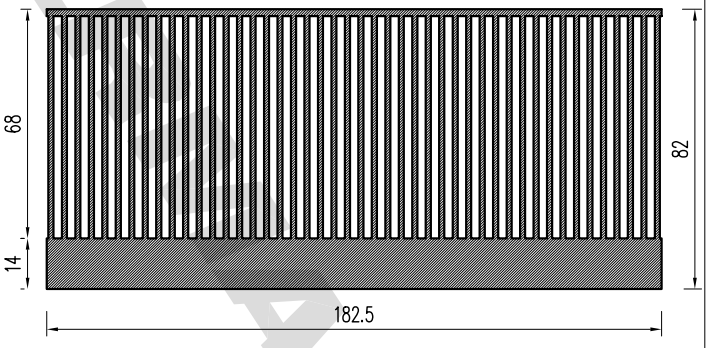
BF1863

△p=31 Pa | Rthn= °C/W | Rthf=0.077 °C/W



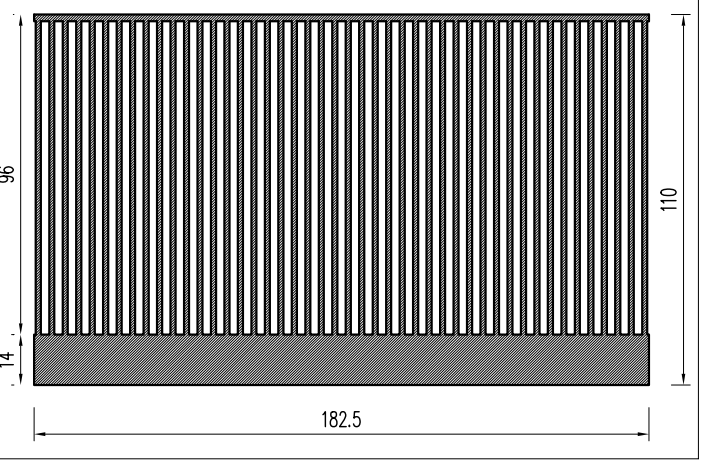
BF1882

△p=27 Pa Rthn= °C/W Rthf=0.064 °C/W

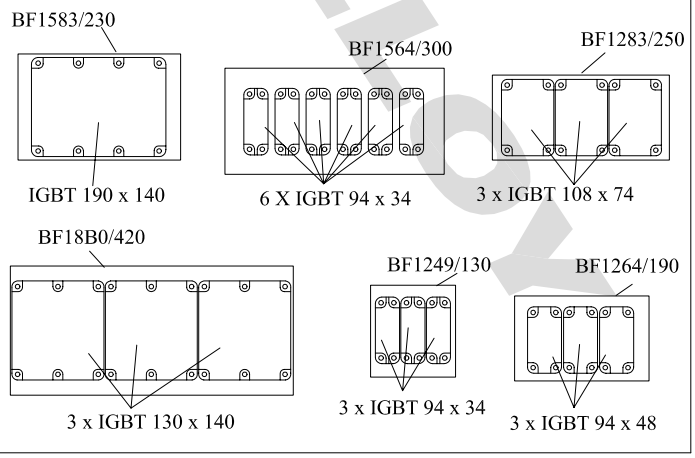


BF18B0

△p=25 Pa | Rthn= °C/W | Rthf=0.056 °C/W



APPLICATION EXAMPLES

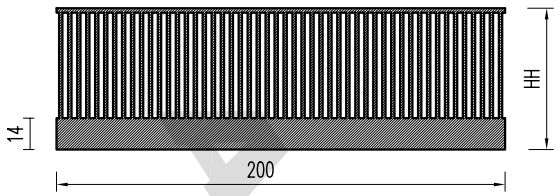


The above are only examples – The choice is limited only by imagination

BF20HH

BF2034 - Rth = 0.111 °C/W
BF2048 - Rth = 0.077 °C/W
BF2063 - Rth = 0.061 °C/W
BF2082 - Rth = 0.051 °C/W
BF20B0 - Rth = 0.043 °C/W

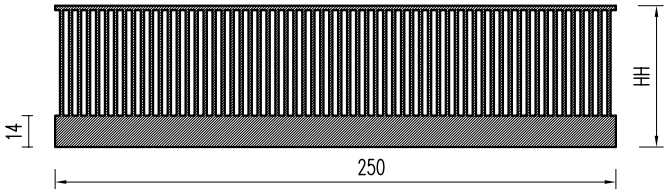
Not yet tooled



BF25HH

BF2534 - Rth = 0.090 °C/W
BF2548 - Rth = 0.062 °C/W
BF2563 - Rth = 0.049 °C/W
BF2582 - Rth = 0.040 °C/W
BF25B0 - Rth = 0.035 °C/W

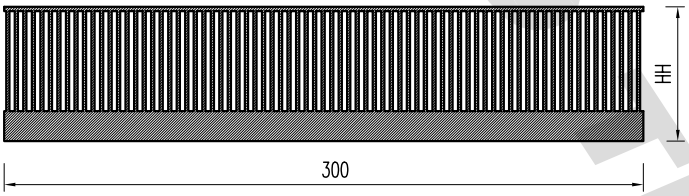
Not yet tooled



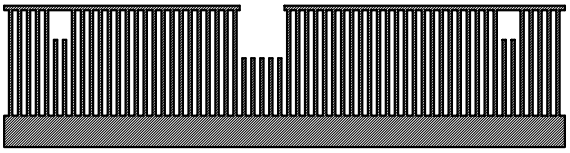
BF30HH

BF3034 - Rth = 0.076 °C/W
BF3048 - Rth = 0.052 °C/W
BF3063 - Rth = 0.041 °C/W
BF3082 - Rth = 0.034 °C/W
BF30B0 - Rth = 0.029 °C/W

Not yet tooled



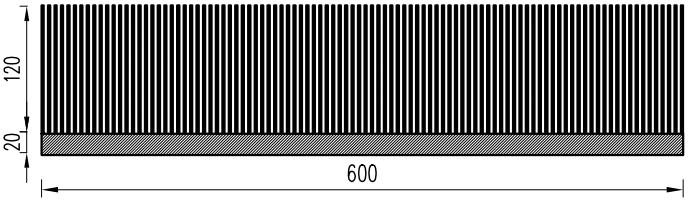
High manufacturing flexibility



△p=15 Pa | Rthn= °C/W | Rthf=0.018 °C/W

Example

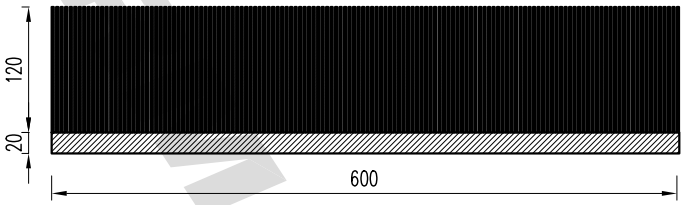
100 fins



△p=36 Pa | Rthn= °C/W | Rthf=0.014 °C/W

Example

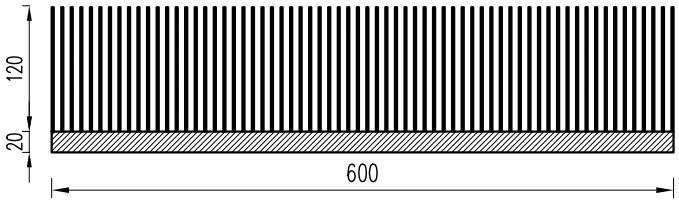
140 fins



△p= 7 Pa | Rthn=0.061 °C/W | Rthf=0.028 °C/W

Example

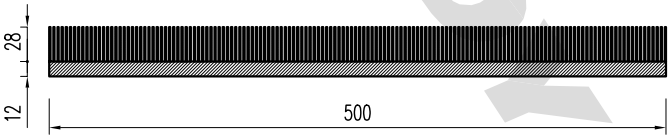
66 fins



△p=67 Pa | Rthn= °C/W | Rthf=0.036 °C/W

Example

150 fins



PF05

e-mail: sales.it@aavid.com
e-mail: sales.uk@aavid.com
Tel. +39-051-764011 - Fax +39-051-764090
Tel. +44-01793-401400 - Fax +44-01793-615396
Via XXV Aprile, 32 - 40057 Cadriano (BO) - Italy
Cheney Manor - Swindon - Wiltshire SN2 2QN - UK

AAVID THERMALLOY

The above are only examples - The choice is limited only by imagination

PF06

e-mail: sales.it@aavid.com
e-mail: sales.uk@aavid.com

Tel. +39-051-764011 - Fax +39-051-764090
Tel. +44-01793-401400 - Fax +44-01793-615396

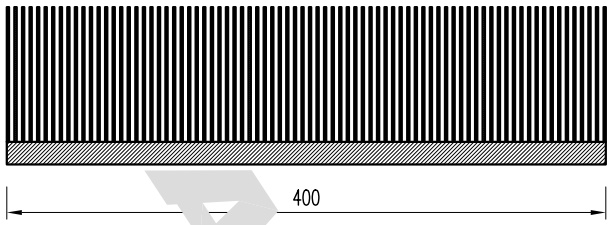
Via XXV Aprile, 32 - 40057 Cadriano (BO) - Italy
Cheney Manor - Swindon - Wiltshire SN2 2QN - UK

AAVID THERMALLOY

△p=16 Pa	Rthn= °C/W	Rthf=0.031 °C/W

Example

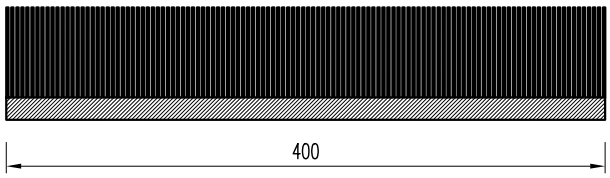
80 fins



△p=53 Pa	Rthn= °C/W	Rthf=0.027 °C/W

Example

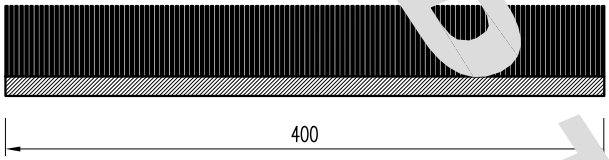
120 fins



△p=56 Pa	Rt. °C/W	Rthf=0.032 °C/W

Example

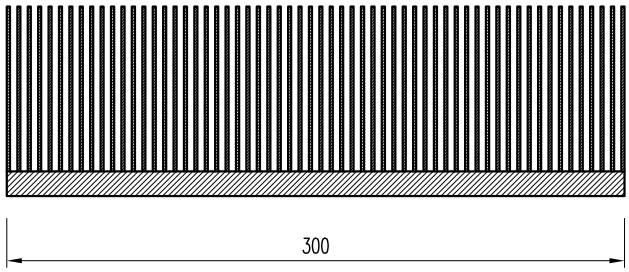
120 fins



△p=16 Pa	Rthn= °C/W	Rthf=0.044 °C/W

Example

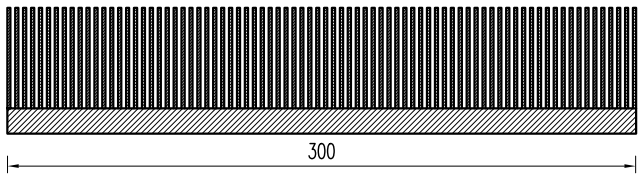
60 fins



△p=43 Pa	Rthn= °C/W	Rthf=0.045 °C/W

Example

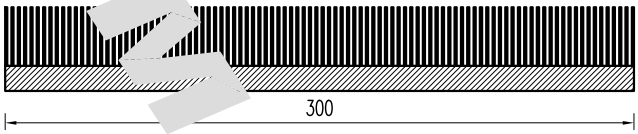
80 fins



△p=57 Pa	Rthn= °C/W	Rthf=0.054 °C/W

Example

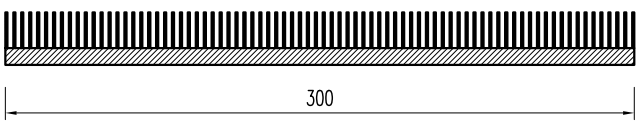
100 fins



△p=51 Pa	Rthn= °C/W	Rthf=0.098 °C/W

Example

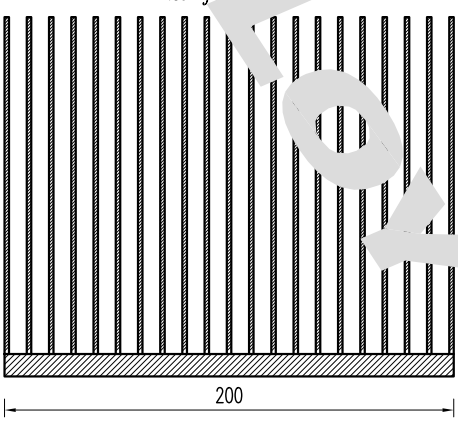
80 fins



△p= 8 Pa	nn=0.140 °C/W	Rthf=0.070 °C/W

Example

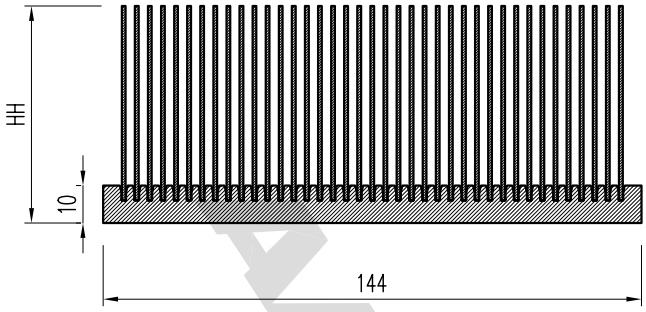
21 fin



The above are only examples - The choice is limited only by imagination

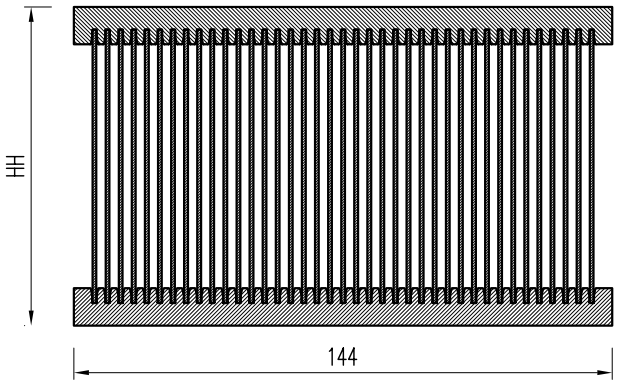
S535*HH

n. 39 fins – Bonded



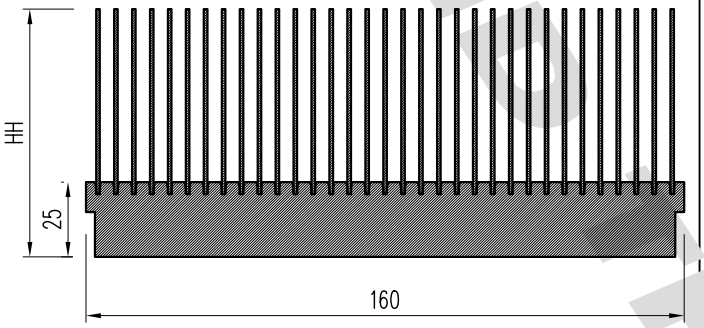
S535D*HH

Bonded



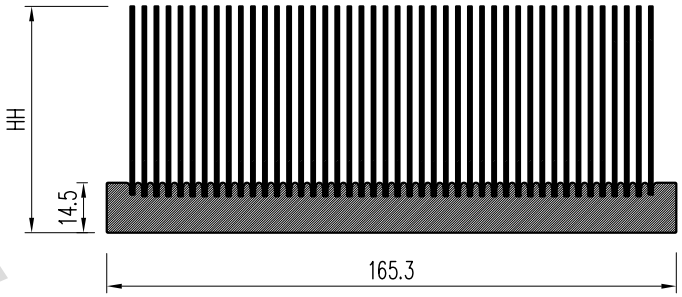
S536*HH

n. 33 fins – Bonded



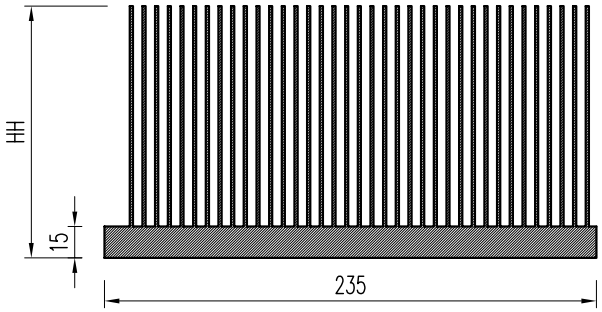
S591*HH

n. 44 fins – Bonded



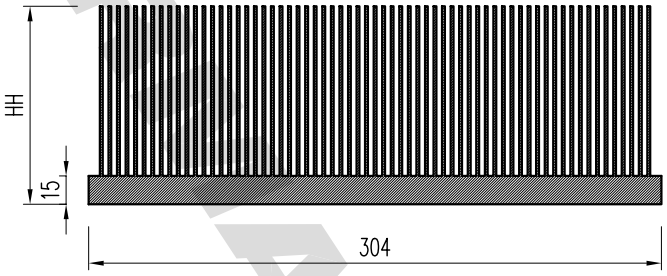
SS125*HH

n. 37 fins – Bonded



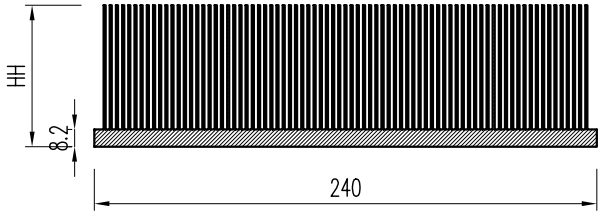
SS130*HH

n. 65 fins – Bonded



SS131*HH

n. 79 fins – Bonded



All the Bonded Fin heatsinks can be with Double base like the S535D example on top of the page.

Other Bonded Fin heatsinks available on request.

PF07

e-mail: sales.it@aavid.com
e-mail: sales.uk@aavid.com

Tel. +39-051-764011 – Fax +39-051-764090
Tel. +44-01793-401400 – Fax +44-01793-615396

Via XXV Aprile, 32 – 40057 Cadriano (BO) – Italy
Cheney Manor – Swindon – Wiltshire SN2 2QN – UK

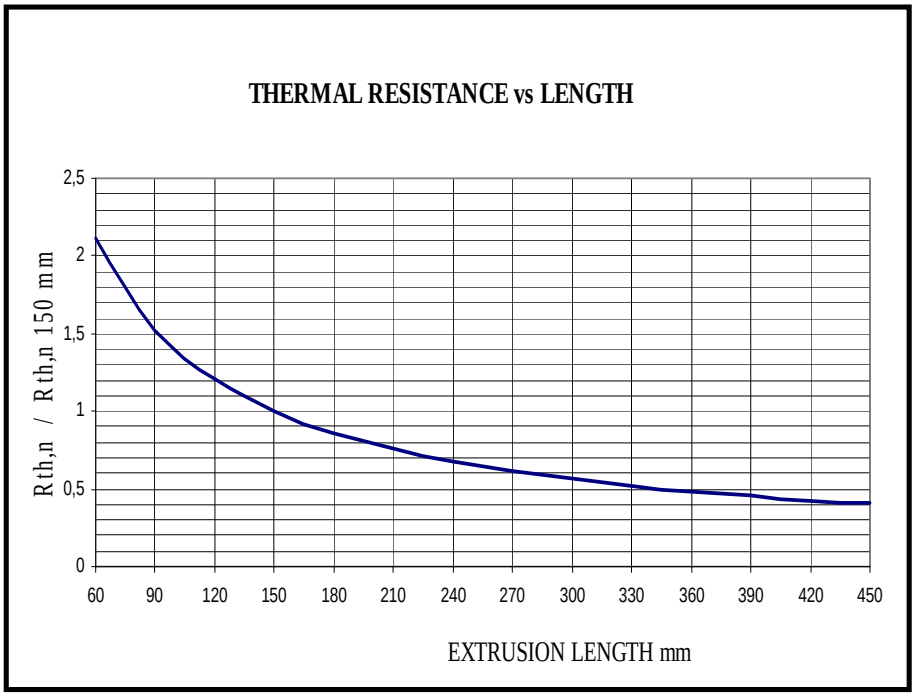
AAVID THERMALLOY

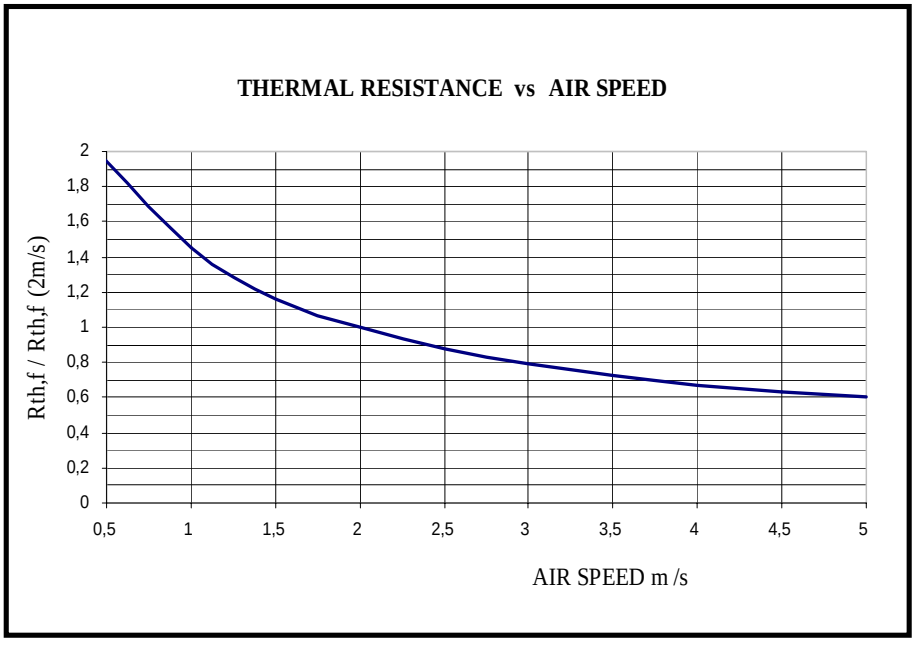
Heatsink thermal performance was evaluated using vertical raw heatsinks, 150 mm long, in natural convection (Rth,n) and in forced convection (Rth,f), at 2 m/s airflow in a complete ducted tunnel.

Evaluation was conducted with a distributed load and a 70ºC temperature rise.

The following curves can be used to calculate the thermal resistance of a heatsink at a different length and/or with different speeds of forced ventilation.

ALL THE REPORTED VALUES ARE INDICATIVE ONLY. THE THERMAL RESISTANCE OF A HEATSINK MUST BE EVALUATED UNDER ACTUAL OPERATING CONDITIONS.





THE BRAZING TECHNOLOGY

Aluminium brazing is an already mature technology, originally used mostly for avionic and for automotive applications, where weight and thermal performances are the most relevant issues.
The brazing of aluminium must be made at about 600 °C in an oxygen-free environment to avoid the very strong oxidation of aluminium at high temperature.
In the first temperature step the flux melts and de-oxidize the aluminium surface, preparing it for brazing; in the second step the filler melts and flows via capillarity effect through the adjoining surfaces; The filler forms a brazed joint only where two surfaces are close together, without clogging the air channels.
The brazing technology provides a pure metal joint, made of aluminium alloy, with a thermal conductivity that is 90% the thermal conductivity of the extruded aluminium.
The joint thickness is only 10 μm and the mechanical strength is the same of the original metal. For High Fin Ratio (HFR) Heatsinks this means the elimination of every thermal barrier amongst base and fins, plus a very flexible and effective thermal design.

Metallographyc analysis of a brazed joint (left) and of a traditional bonded fins (right).

The brazed joint has an average thickness of 10 μm with a thermal conductivity of 160 W/m°K.

The bonded joint has an average thickness of 100 μm with a thermal conductivity of 2 W/m°K.

Thanks to the perfect thermal contact through a small surface, the Brazedgains do not need a deep groove to allow the heat to enter in the fin. A very small groove is used only to facilitate the assembly process. The uniform base without interruptions, allows a more homogeneous distribution of the temperature with concentrated heat sources.

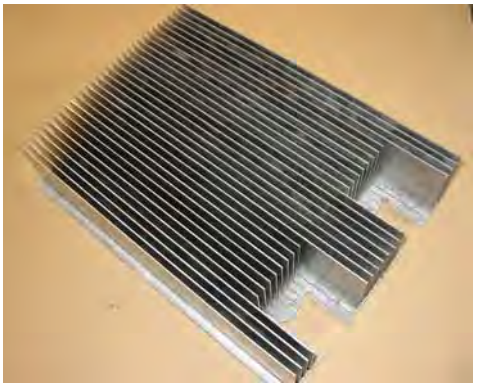
The brazing process is made in dedicated furnaces, with a tight control of the main operating parameters: temperature, moisture, oxygen, process time, heating and cooling speed. Through the control of the process, Aavid Thermalloy can guarantee the product final quality, with no failures.

Aluminium Brazing Equipments

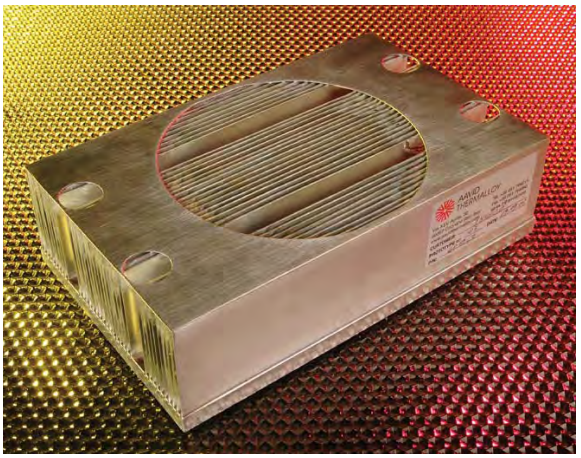
Aavid Thermalloy application Engineers use a proprietary specialized software together with a thermo-fluo-dynamic finite element software (Icepak) to optimize the design of the HFR Heatsinks.

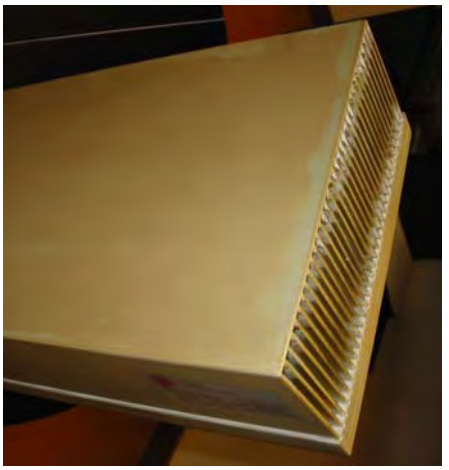
AAVID THERMALLOY S.r.l. Via XXV Aprile, 32 - 40057 Cadriano (BO) - ITALY Tel. +39-051 764011 - Fax +39-051 764090 e.mail : sales.it@aavid.com
AAVID THERMALLOY Ltd Cheney Manor – Swindon – Wiltshire SN2 2QN - UK Tel. +44-01793 401400 - Fax +39-01793 615396 e.mail : sales.uk@aavid.com

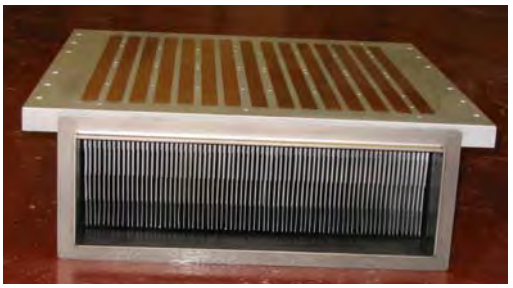
AAVID THERMALLOY S.r.l. Via XXV Aprile, 32 - 40057 Cadriano (BO) - ITALY Tel. +39-051 764011 - Fax +39-051 764090 e.mail : sales.it@aavid.com
AAVID THERMALLOY Ltd Cheney Manor – Swindon – Wiltshire SN2 2QN - UK Tel. +44-01793 401400 - Fax +39-01793 615396 e.mail : sales.uk@aavid.com

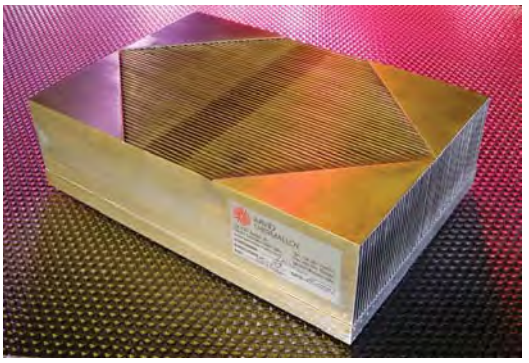


POWERFIN / BRAZEDFIN APPLICATION EXAMPLES









e-mail : sales@madep.com
Web :www.madep.com

ELECTRONIQUE DE PUISSANCE

TRANSISTORS IGBT

FUJI ELECTRIC

MODULES ET PONTS ISOLES
THYR./ DIODES/MOS/

POWERSEM

DIODES ET THYRISTORS
NON ISOLES

DIODES - ELECTRONIQUE

WTE POWER SEMICONDUCTORS

RESISTANCES DE PUISSANCE
RESISTANCES DE FREINAGE
BANCS DE CHARGE

BOBINAGES ET TRANSFOS

CONDENSATEURS ELECTROLYTIQUES

SIRIO Inductive Components

INTERFACES THERMIQUES

LOCTITE®

DISSIPATEURS PROFILES
USINES

Bureau d'Etudes Electroniques®

CLIPS ET DISSIPATEURS
SATNDARD ELECTRONIQUE

AAVID THERMALLOY

DISSIPATEURS FORTE PUISSANCE
NOUVELLES TECHNOLOGIES

MONTAGES DE PUISSANCE
DRIVERS

ACCESSOIRES
COLONNETTES-IISOLATEURS
SUPPORTS BARRES- VENTILATEURS.....

MADEP