INTRODUCTION

The function of a Heat Sink is, to increase the surface area available for the heat transfer or heat from a component or device thereby increasing the amount of heat that can be dissipated.

ABL can offer:-

1 **A range of Standard Heat Sinks and accessories** which permit optimum flexibility in the design of Electrical and Electronic equipment requiring heatsink applications.

2 **A custom design service.** We have facilities available which enable us to provide design and manufacturing of custom and specialised Heat Sinks to your requirement.

HEAT SINK SELECTION

The main factors to consider when selecting a Heat Sink are:-

1 Geometry
2 Thermal Resistance
3 Cost

Defining the necessary Heat Sink performance.

In order to calculate the maximum acceptable thermal resistance for the Heat Sink so that the device being cooled does not overheat it is first necessary to define the thermal parameters under which it is to operate.

The basic equation for thermal equilibrium is:

$$\text{Power dissipated} = \frac{\text{Temperature difference across the system}}{\text{Sum of all the thermal resistances in the heat flow path.}}$$

EQUATION 1

$$\text{Thus} \quad PD = \frac{Tj - Ta}{\text{Øjc} + \text{Øcs} + \text{Øsa}}$$

Where
PD = Power dissipation (W)
Tj = Max allowable junction temp (°K) (specified by device manufacturer)
Ta = Ambient temperature (°K)
Øjc = Thermal resistance, junction to case (°K/W) (specified by manufacturer)
Øcs = Thermal resistance, case to Heat Sink (°K/W)
Øsa = Thermal resistance, Heat Sink to ambient air (°K/W

The maximum value for thermal resistance heat sink to air (sa) is usually determined by rearranging equation 1 to the following:

EQUATION 2

$$\text{Øsa} = \frac{Tj - Ta - (\text{Øjc} + \text{Øcs})}{PD}$$

The result of the above equation provides a thermal resistance value which must be equalled or bettered by the Heat Sink selected.

Example

A semi-conductor device is to be operated with its junction temperature not exceeding 80°K whilst dissipating 16 watts to ambient air at a temperature of 40°K. The thermal resistance, junction to case, is specified by the manufacturer as 1.25°K/W and the thermal resistance, case to sink (using an insulating washer and thermally conductive compound) is taken as 0.50°K/W.

$$\text{Øsa} = \frac{80 - 40 - (1.25 + 0.50)}{16}$$
$$= 0.75°K/W$$

The Heat Sink therefore must have a thermal resistance which does not exceed 0.75°K/W.

ABL HEAT SINK DIVISION • BREARLEY STREET • BIRMINGHAM • B19 3XJ
Tel: 021-359 6380 Fax: 021-359 1103

GENERAL INFORMATION

MATERIAL

Aluminium Alloy to BS1474 6063,T6

DIMENSIONS

Profile Tolerances: All profile dimensions are toleranced within BS1474 and this should be taken into consideration when designing our profiles into your equipment. Further details of specific tolerances can be supplied if required.

Length Tolerances: +/- 0.4mm
Tighter tolerances can be offered if required.

SURFACE FINISH

- Plain
- Matt black anodised
- Alocromed
- Powder Coated
- Wet spray painted
- Clear anodised
- Coloured anodised

HOLE PATTERNS

- Standard hole patterns for popular devices TO3/TO66/TO220 etc.
- Non standard hole patterns to customers own requirements.

PERFORMANCE

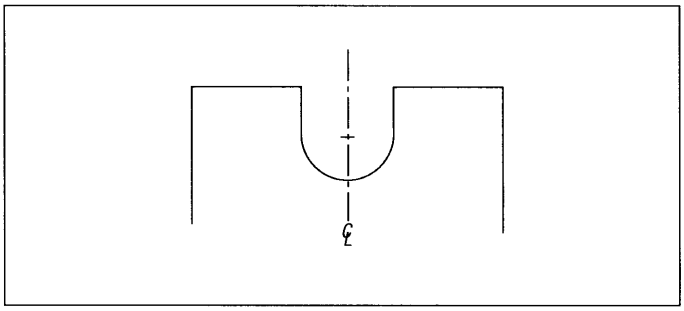
Performance figures given are for natural convention operating conditions and are for a 60° K temperature rise with a centrally mounted heat source and vertically mounted fins. Under general operating conditions the thermal mounting arrangement of devices is not known by ABL and therefore the figures should be used only as a guide to Heat Sinks selection.

SAFETY

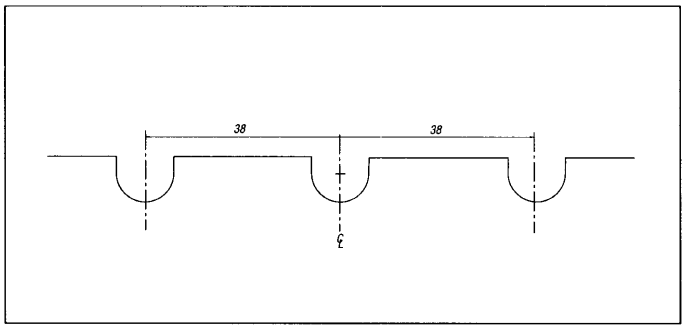
In some circumstances exposed Heat Sink surfaces may become very hot. Contact with these surfaces may cause burns damage to skin.

INSTALLATION NOTCHES

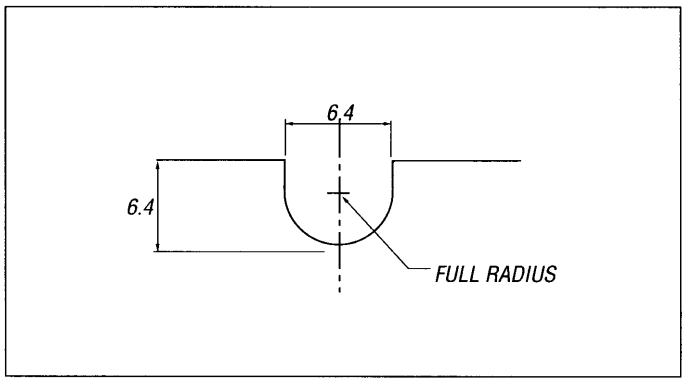
For Heat Sink lengths up to 87.5mm one single notch in each flange centrally along its length.



For Heat Sink lengths from 88mm to 150mm three notches in each flange 38mm apart.



STANDARD NOTCH DIMENSION



STUDS AND SOLDERABLE PINS

Some of our heatsinks have standard solderable pins for flow soldering to circuit boards. Non standard pins and studs can also be fitted.

CLIPS

Clips for some of our heatsinks can be supplied, custom designed clips available if required.

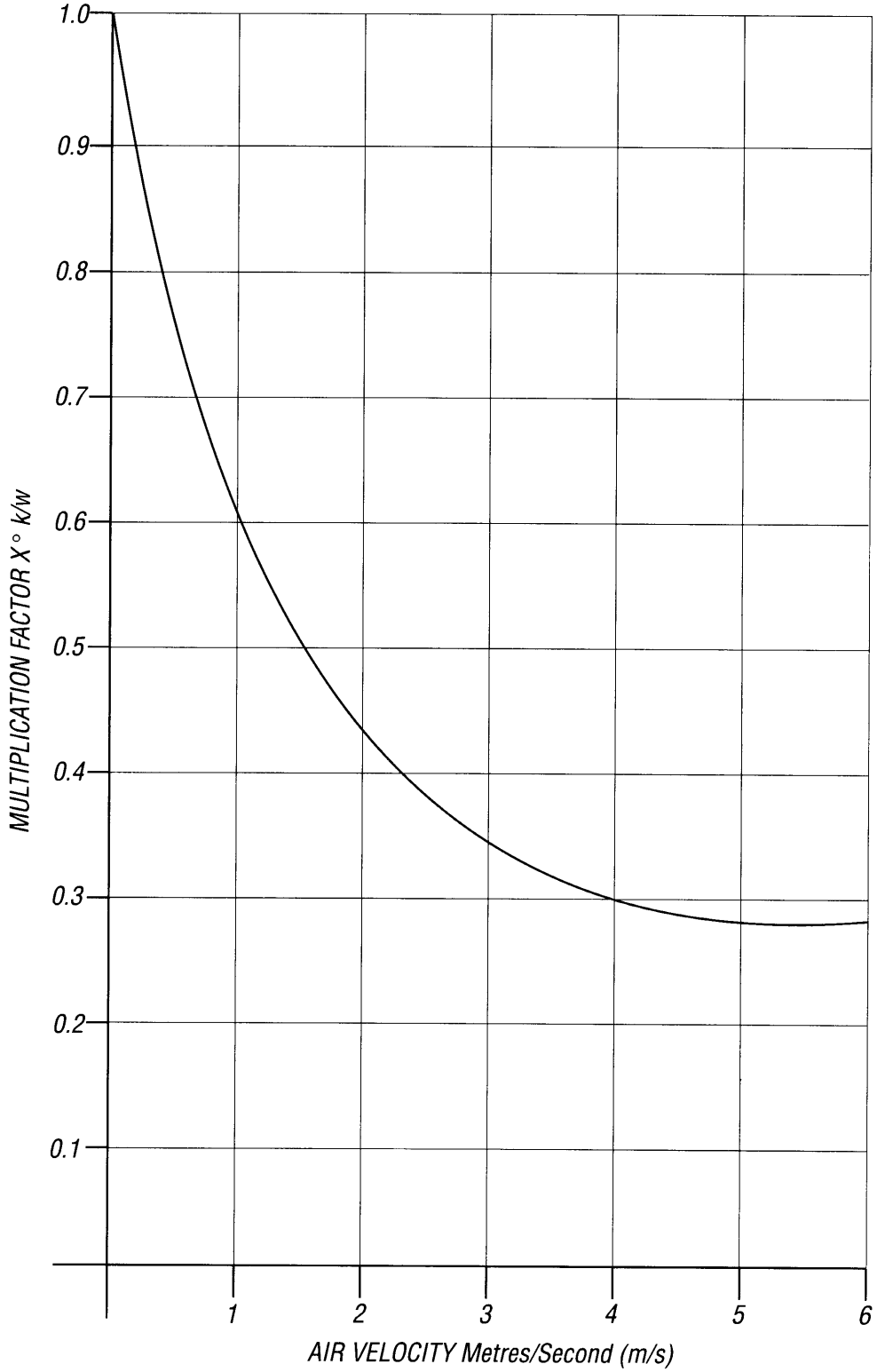
ABL HEAT SINK DIVISION • BREARLEY STREET • BIRMINGHAM • B19 3XJ
Tel: 021-359 6380 Fax: 021-359 1103

FORCED AIR COOLING

This graph may be used as a guide to determine the Thermal resistance of any extruded section with forced convection.

EXAMPLE

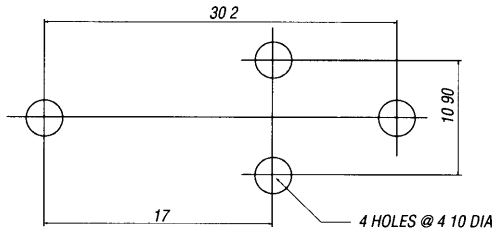
The thermal resistance of a Heat Sink is 0.35°K/W assume the Heat Sink is placed in an air velocity of 4m/s. Then 0.35°K/W x 0.3 becomes 0.105°K/W approx.



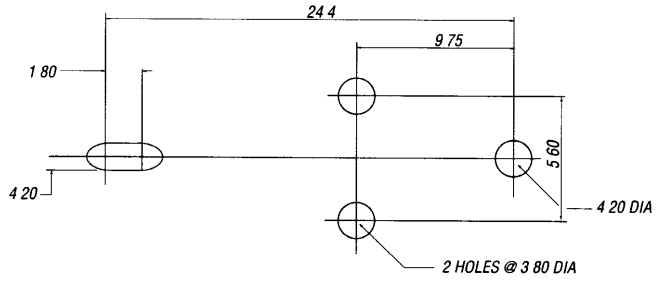
ABL HEAT SINK DIVISION • BREARLEY STREET • BIRMINGHAM • B19 3XJ
Tel: 021-359 6380 Fax: 021-359 1103

STANDARD HOLE PATTERNS

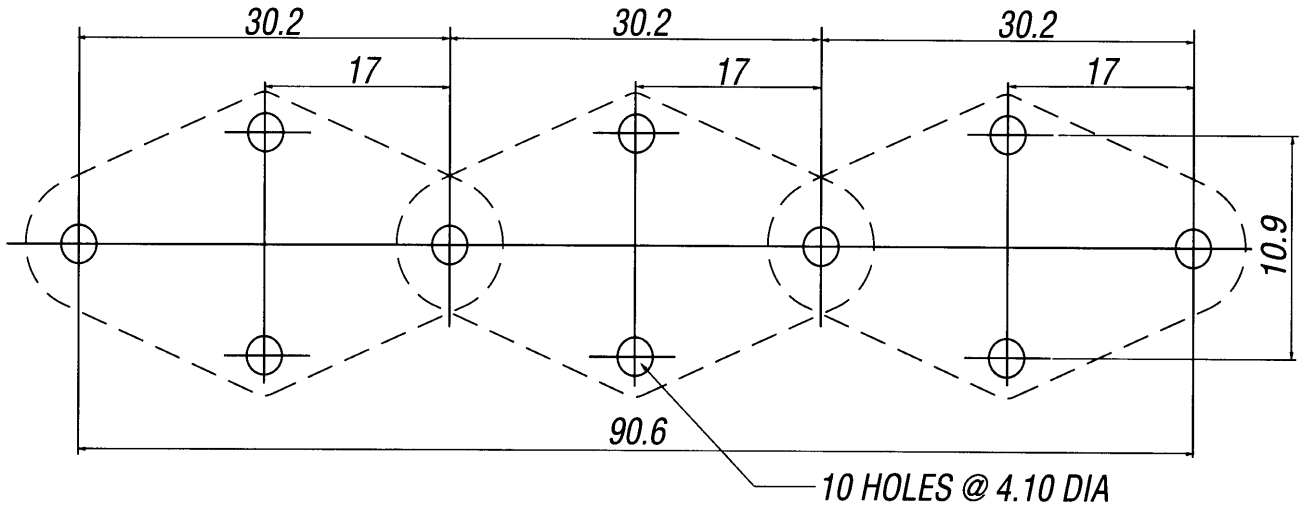
TO3



TO66/TO9



TO3 x 2 (offers a choice of single or double TO3 fixing + fixing holes).



TO220/TO3P/TO2/8

Standard tools are available to pierce single holes to suit plastic packages.

NON STANDARD HOLE PATTERNS

These can be provided if required to customers own drawings either by drilling or pressing.
(Press tools can be manufactured in our own tool making department).

ABL HEAT SINK DIVISION • BREARLEY STREET • BIRMINGHAM • B19 3XJ
Tel: 021-359 6380 Fax: 021-359 1103