Mounting instructions — TO126; SOT82

GENERAL DATA AND INSTRUCTIONS

General rules

1. Fasten the device to the heatsink before soldering the leads.
2. Avoid stress to the leads.
3. Keep mounting tool (e.g. screwdriver) clear of the plastic body.

Mounting methods

CLIP MOUNTING (TO126 AND SOT82)

Mounting with a spring clip gives:

a) A good thermal contact under the crystal area, and slightly lower thermal resistance than screw mounting.

b) Safe insulation for mains operation.

Minimum force for good heat transfer is 10 N.

Maximum force to avoid damaging the device is 80 N.

M2.5 AND M3 SCREW MOUNTING (TO126 ONLY)

It is recommended that a metal washer is inserted between the screw head and the device.

Do not use self-tapping screws.

Mounting torque for screw mounting:

Minimum torque for good heat transfer is 0.40 Nm.

Maximum torque to avoid damaging the device is 0.60 Nm.

When the driven nut is in direct contact with a toothed lock washer the torques are as follows:

Minimum torque for good heat transfer is 0.55 Nm.

Maximum torque to avoid damaging the device is 0.80 Nm.

BODY MOUNTING (SOT82)

The SOT82 envelope can be adhesive mounted or soldered onto a hybrid circuit.
For soldering, a copper plate or an anodised aluminium plate with a copper layer is recommended.

The device may be adhesive mounted directly onto a ceramic substrate.

Heatsink requirements

Minimum thickness: 2 mm.

Flatness in the mounting area: 0.02 mm maximum per 10 mm.

Mounting holes must be deburred, for further information see clip and screw mounting instructions.

Heatsink compound

The thermal resistance from mounting base to heatsink ($R_{th\ mb\text{-}h}$) can be reduced by applying a metallic oxide compound between the contact surfaces. Values given are of thermal resistance using this type of compound. Dow Corning 340 Heat sink compound is recommended. For insulated mounting, the compound should be applied to the bottom of both device and insulator.

Thermal data for heatsink mounting methods

Typical figures, for exact figures see data for each device type.

$R_{th\ mb\text{-}h}$	**Thermal resistance from mounting base to heatsink**	**K/W**	
Mounting method		**clip**	**screw**
TO126, direct with heatsink compound		1.0	0.5
TO126, direct without heatsink compound		3.0	1.0
TO126 with heatsink compound and 0.1 mm maximum mica insulator		3.0	3.0
TO126 without heatsink compound and 0.1 mm maximum mica insulator		6.0	6.0
SOT82, direct with heatsink compound		0.4	-
SOT82, direct without heatsink compound		2.0	-
SOT82 with heatsink compound and 0.1 mm maximum mica insulator		2.0	-
SOT82 without heatsink compound and 0.1 mm maximum mica insulator		5.0	-

Soldering

Recommendations for devices with a maximum storage temperature rating $T_{stg} \leq 150\ ^{\circ}C$:

DIP OR WAVE SOLDERING.

Maximum permissible solder temperature is 260 °C at a distance from the body of > 5 mm and for a total contact time with soldering bath or waves of < 7 s.

HAND SOLDERING.

Maximum permissible temperature is 275 °C at a distance from the body of > 3 mm and for a total contact time with the soldering iron of < 5 s.

The body of the device must not touch anything with a temperature > 200 °C.

Avoid any force on body and leads during or after soldering; do not correct the position of the device or of its leads after soldering.

MOUNTING BASE SOLDERING.

Recommended metal-alloy of solder paste (85% metal weight)
62 Sn/36 Pb/2 Ag or 60 Sn/ 40 Pb.
Maximum soldering temperature 200˚C (tab temperature)
Maximum soldering cycle duration including preheating 30 s.

For good soldering and to avoid damage to the encapsulation, pre-heating at ≤ 165˚C for ≤ 10 s max is recommended.

Lead bending

Lead forming by Philips is available as an option on all products supplied in these outlines.

Maximum permissible tensile force on the body for 5 seconds is 20 N.

The leads can be bent, twisted or straightened. To keep forces within the above mentioned limits the leads should always be clamped rigidly near the body during bending. This is also to prevent damage to the seal of the leads within the plastic body.

Leads can be bent as near to the body as required, but adequate length should always be allowed for clamping. This is a minimum of 1.75 mm from the body to the start of a bend radius.

The internal radius of bend should never be less than the thickness of the lead. A minimum radius of at least 1.5 x lead thickness is preferred. See figure 1. Surface cracks in the dip tin coating on the lead are common when a radius less than 1.5 x lead thickness is used. Although exposing the copper material, these cracks do not affect the mechanical strength of the lead.

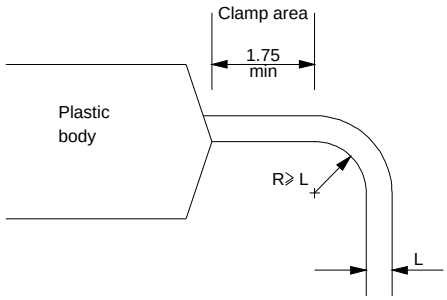
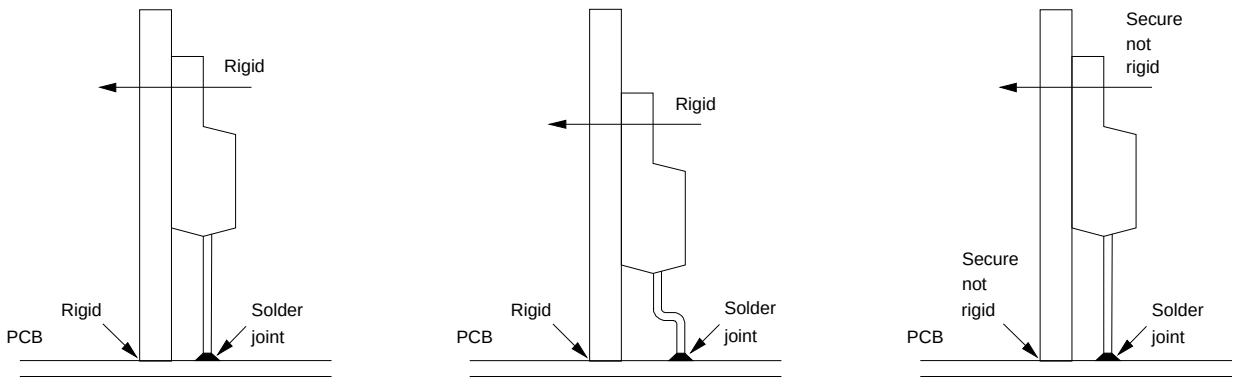


Fig 1. Minimum lead bend radius.

Additional guidelines

It is recommended that where a device is rigidly secured to a heatsink which is in turn rigidly secured to a PCB, that a bend is put in the leads to act as an expansion loop. This will prevent differential expansion of the mounting parts transferring stress to the soldering joint, as shown in figure 2 below. This is only necessary where the device is mounted so rigidly that expansion forces are transmitted through the assembly.



(a) Incorrect (b) Correct (c) Correct

Fig 2. Printed circuit board and heatsink mounting.

INSTRUCTIONS FOR CLIP MOUNTING

Direct mounting with spring clip

1. Apply heatsink compound to the mounting base, then place the device on the heatsink.
2. Push the short end of the clip into the narrow slot in the heatsink with the clip at an angle of 10˚ to 30˚ to the vertical. See figures 3 and 4.
3. Push down the clip over the device until the long end of the clip snaps into the wide slot in the heatsink. The clip should bear on the plastic body, not on the tab. See figure 5.

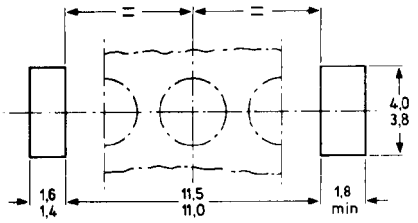


Fig 3. Heatsink requirements.

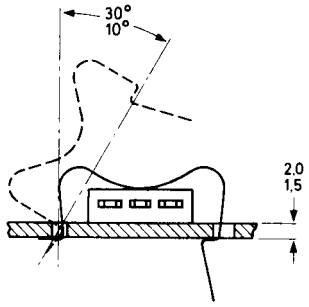


Fig 4. Mounting.

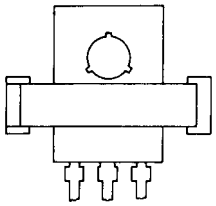


Fig 5. Position of device (top view).

Insulated mounting with clip and insulator

1. Apply heatsink compound to the bottom of both device and insulator, then place the device with the insulator on the heatsink.
2. Push the short end of the clip into the narrow slot in the heatsink with the clip at an angle of 10˚ to 30˚ to the vertical. See figures 6, 7 and 8.
3. Push down the clip over the device until the long end of the clip snaps into the wide slot in the heatsink. The clip should bear on the plastic body, not on the tab. Ensure that the device is centred on the mica insulator to prevent unwanted movement.

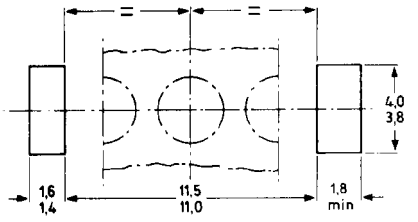


Fig 6. Heatsink requirements.

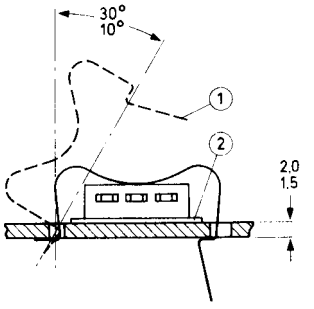


Fig 7. Mounting.
(1) spring clip
(2) insulator

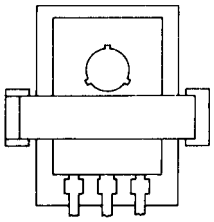


Fig 8. Position of device (top view).

INSTRUCTIONS FOR SCREW MOUNTING (TO126 ONLY)

Direct mounting with screw and spacing washer

THROUGH HEATSINK WITH NUT

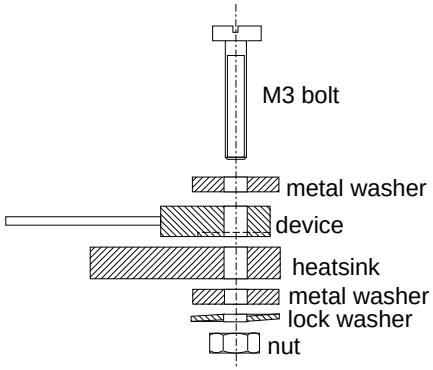


Fig 9. Assembly

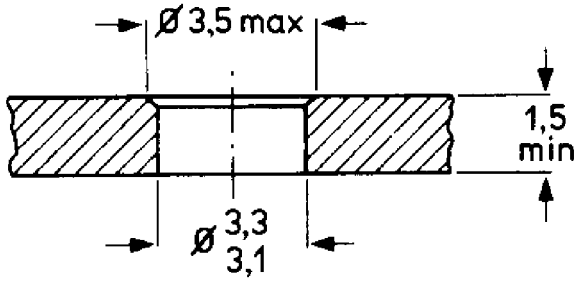


Fig 10. Heatsink requirements.

INTO TAPPED HEATSINK

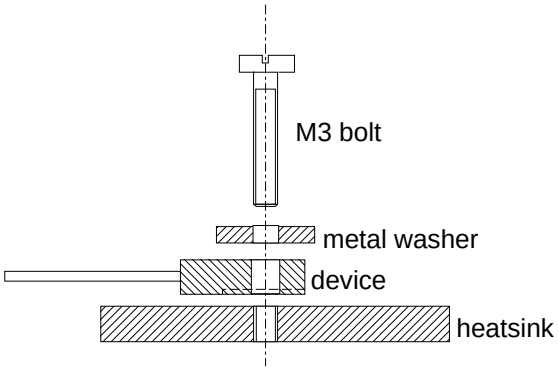


Fig 11. Assembly.

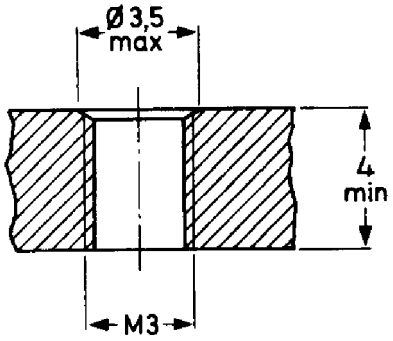


Fig 12. Heatsink requirements.

Insulated mounting with screw and spacing washer

Not recommended where mounting tab is at mains voltage.

THROUGH HEATSINK WITH NUT

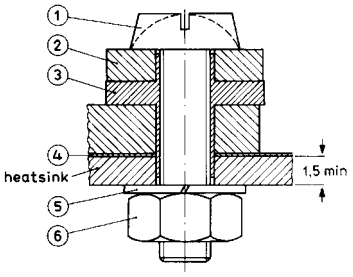


Fig 13. Insulated screw mounting with rectangular washer.

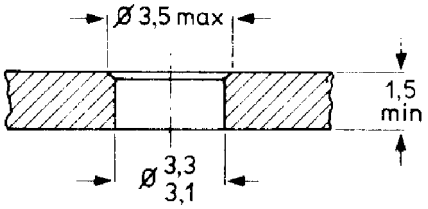


Fig 14. Heatsink requirements.

(1) M2.5 screw
(2) metal washer
(3) insulating bush
(4) insulating washer
(5) lock washer
(6) M2.5 nut

INTO TAPPED HEATSINK

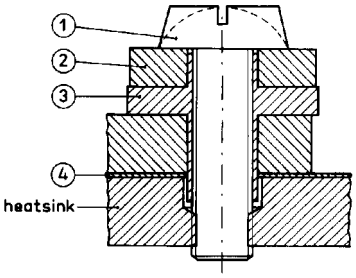


Fig 15. Insulated screw mounting with rectangular washer into tapped heatsink.

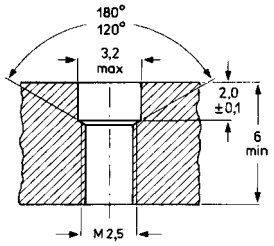


Fig 16. Heatsink requirements.

(1) M2.5 screw
(2) metal washer
(3) insulating bush
(4) insulating washer