PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Semiconductor Arrangement

We, TEXAS INSTRUMENTS INCORPORATED, of 6000, Lemmon Avenue, Dallas, Texas, United States of America, a Corporation organized and existing under the Laws of the State of Delaware, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a semiconductor arrangement. The term "semiconductor arrangement" as used herein and in the claims is to be construed as meaning an arrangement which includes an element made of semiconductor material; that is, a material which has, at room temperature, an electrical conductivity less than that of conductive material, such as copper, and greater than that of insulating material, such as porcelain.

In one form of semiconductor arrangement now in frequent use, a semiconductor unit is attached to a header support consisting essentially of a metal plate through which pass leads insulated by glass beads. A can encloses the semiconductor unit and has its open end sealed to the marginal edge of the header. The term "header" as used herein and in the claims, means a disc of insulating material having electrical leads passing in insulated relationship therethrough, the disc being surrounded by a metal ring or contained in a dished plate or the like so as to permit electrical energy to pass freely from one side of the disc to the other.

Although these designs have been successful in use, a number of difficulties have been experienced especially when the arrangement is mounted on a conductive support such as a printed circuit board. The principal problem encountered is shorting out or shunting of one or more of the header leads due to solder bridging from the support to the header conductive leads or a conductive lead and the metal portions of the header. It is to the solution of this problem that the present invention is directed.

The present invention is a semiconductor arrangement comprising a semiconductor unit mounted on header means and insulating frangible spacer means extending outwardly from said header means to contact a supporting surface for the semiconductor arrangement in such manner as to hold said header means and said semiconductor unit spaced from said surface, said frangible spacer means being easily separable from said header means.

Preferably said spacer means is of a frangible material, such as glass or ceramic.

Preferably, also said spacer means is scored closely adjacent the point where said spacer means joins said header means to facilitate the breaking of said spacer means close to said header means.

The central region of one surface of said header means is preferably formed of insulating material and said spacer means joined to said central region of said one surface.

The header means may comprise a metal shell filled with insulating material and said spacer means be partially embedded in said insulating material.

Other objects of the present invention will become more fully apparent from the following detailed description when taken in conjunction with the sole figure of the accompanying drawing which shows the structure embodied in the present invention in a vertical sectional view.

Referring now to the drawing, a portion of a printed circuit board is indicated generally at 10 and it is understood that any desired electrical circuit may be preformed on the board in a manner well known in the printed circuit art. The board 10 is formed with suitably positioned and dimensioned openings into which are positioned eyelets 12 and 14 to receive the leads of a semiconductor device generally referenced as 16. A con-

ductive strip 15 is shown on the top surface of board 10 with eyelet 14 making contact to it. Eyelet 12 is shown contacting a strip 17. The semiconductor device 16 includes a metal can or housing 18 having a flange 20 which is attached to flange 26 of a header assembly generally indicated at 22. The header assembly 22 includes a dish-shaped metal shell 24 defining holes 27 and 28 and having an out-turned annular rim or flange 26. The space within the shell 24 is filled with suitable insulating material 36. Electrical leads, indicated at 30 and 32, extend through the header assembly 22 via the openings 27 and 28, respectively, and are insulated from shell 24 by insulating material 36. The leads 30 and 32 project into the interior of the metal can or housing 18 and are electrically connected, through suitable means, to a semiconductor element, indicated at 34. The particular arrangement shown is purely for purposes of illustration as the contents of the can or housing 18 beyond the fact that it includes a semiconductor unit, forms no part of the invention.

The leads 30 and 32 are formed of a conducting material and are critically spaced, usually quite close together and due to the small dimensions generally involved, quite close to the flange of the metal shell 24 of the header assembly 22. If the assembly 16 were placed in contact with the upper surface of the printed circuit board 10, a solder employed to attach leads 30 and 32 to eyelets 12 and 14, respectively, as indicated by reference numeral 31, could bridge any of the conductive parts of the assembly, causing either shunting or shorting or both. In order to avoid any possibility of solder bridging conductive parts, a "stand-off" spacer or peg 38 is provided. The "stand-off" peg 38 is formed of a frangible material, such as glass or ceramic and is fused or partially embedded into the insulating material 36 in a way that it projects outwardly from the bottom surface substantially normal thereto.

Although it is desirable to utilize the peg 38 as a "stand-off." insulating means, there are circumstances which make it preferable to position the device directly in contact with its support whereby the rim 26 is disposed in substantially flush engagement therewith. For this purpose, the peg 38 is formed with a nick or score mark 40 closely adjacent to its point of attachment to the insulating material 36. Since the peg 38 is formed of a frangible material, the projecting portion thereof may be readily detached substantially even or flush with the bottom surface of the insulating material 36, when desired.

Although the arrangement described hereinabove is considered a preferred embodiment of the invention, it will be appreciated that other arrangements are possible which do not depart from the novel concepts herein taught. For example, in place of the dish-shaped metal shell 24, a ring of metal may be bonded to a ceramic or glass disc. Also, a projection similar to peg 38 may be formed integrally with the insulating material 36 during the casting thereof. The projecting portion of the peg 38 may also be cast with a nick or score mark to permit breaking off of the projecting portion. Basically the preferred arrangement for the novel header of the present invention contemplates using insulating material to form the central region of the bottom surface of the header.

Although the present invention has been shown and described in terms of a single preferred embodiment, nevertheless various other changes and modifications, such as obvious to one skilled in the art, are deemed to be within the scope of the present invention.

WHAT WE CLAIM IS:—

1. A semiconductor arrangement comprising a semiconductor unit mounted on header means and insulating frangible spacer means extending outwardly from said header means to contact a supporting surface for the semiconductor arrangement in such manner as to hold said header means and said semiconductor unit spaced from said surface, said frangible spacer means being easily separable from said header means.

2. A semiconductor arrangement according to Claim 1, wherein said spacer means consists of a frangible material such as glass or ceramic.

3. A semiconductor arrangement according to Claim 1 or 2, wherein said spacer means is integral with said header means.

4. A semiconductor arrangement according to any preceding claim, wherein said spacer means is scored closely adjacent the point where said spacer means joins said header means to facilitate the breaking of said spacer means close to said header means.

5. A semiconductor arrangement according to any of the preceding claims, wherein the central region of one surface of said header means is formed of insulating material and said spacer means is joined to said central region of said one surface.

6. A semiconductor arrangement according to Claim 1 or 2, or Claim 1 or 2 and Claim 4 or 5, wherein said header means comprises a metal shell filled with insulating material and wherein said spacer means is partially embedded in said insulating material.

7. A semiconductor arrangement substantially as herein described with reference to the accompanying drawing.

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3. A semiconductor arrangement according to Claim 1 or 2, wherein said spacer means is integral with said header means.

4. A semiconductor arrangement according to any preceding claim, wherein said spacer means is scored closely adjacent the point where said spacer means joins said header means to facilitate the breaking of said spacer means close to said header means.

5. A semiconductor arrangement according to any of the preceding claims, wherein the central region of one surface of said header means is formed of insulating material and said spacer means is joined to said central region of said one surface.

6. A semiconductor arrangement according to Claim 1 or 2, or Claim 1 or 2 and Claim 4 or 5, wherein said header means comprises a metal shell filled with insulating material and wherein said spacer means is partially embedded in said insulating material.

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