Likewise, the drawings showing embodiments of the invention are semi-diagrammatic and not to scale and, particularly, some of the dimensions are for the clarity of presentation and are shown greatly exaggerated in the FIGs. In addition, where multiple embodiments are disclosed and described having some features in common, for clarity and ease of illustration and description thereof like features one to another will ordinarily be described with like reference numerals.

Referring now to FIG. 1, therein is shown a top view of a thermally enhanced integrated circuit (IC) package system 100 in accordance with an embodiment of the present invention. The system 100 includes a substrate 102 having a mold compound 104 topped by a heat slug 106.

Referring now to FIG. 2, therein is shown a close-up view of the structure of FIG. 1 taken along line 2--2. The system 100 has heat slug support pillars 200 on the substrate 102 to support the heat slug 106 prior to encapsulation.

The heat slug pillars 200 are on the substrate 102 only around a periphery of a plurality of dies 202. Between the substrate 102 and the heat slug 106 are the dies 202 containing integrated circuits. The dies 202 are attached to the substrate 102 by die attach epoxy 204. The dies 202 are further electrically connected by wires 206 to the substrate 102, and by through vias and further wiring (not shown) to solder balls 208.

The heat slug support pillars 200 are of a material such as epoxy, eutectic ball materials, metal, and other materials, which preferably have elastic characteristics, a high aspect ratio formation, and adhesive characteristics. The elasticity is aimed at reducing mechanical stress when the heat slug 106 is pressed by the mold during molding of the mold compound 104. The high aspect ratio provides a thin pillar. The adhesive characteristics hold the heat slug 106 in place during the molding process.

The exposed area of the heat slug 106 after encapsulation is larger than a conventional heat slug when the encapsulation body size is the same.

Referring to FIG. 3, therein is shown the integrated circuit package system 100 in an intermediate stage of manufacture. The dies 202 are attached to the substrate 102 by the die attach adhesive 204 and wires 206 are wire bonded between the dies 202 and the substrate 102. It will be understood that the dies 202 can also be ball bonded, another electrical connection technique, to the substrate 102.

Referring now to FIG. 4, therein is shown the structure of FIG. 3 after forming heat slug support pillars 200. The heat slug support pillars 200 can be deposited by a droplet building technique of dropping drops of adhesive on top of each other to the desired height.

1622; and singulating the substrate, the die, and the heat slug into an integrated circuit package system in block 1624.

Referring now to FIG. 17, therein is shown a flow chart of an integrated circuit package system 1700 for manufacturing a package system 100 in accordance with a still further embodiment of the present invention. The system 1700 includes: providing a substrate having a die attached and electrically bonded thereto in a block 1702; forming heat slug pillars on the substrate in a block 1704; positioning a heat slug on the heat slug pillars in a block 1706; encapsulating the die and the heat slug pillars between the substrate and the heat slug ~~the substrate, the die, the heat slug pillars, and the heat slug~~ in a mold compound in a block 1708; and singulating the substrate, the die, the heat slug, and the mold compound in a block 1710.

While the invention has been described in conjunction with a specific best mode, it is to be understood that many alternatives, modifications, and variations will be apparent to those skilled in the art in light of the aforegoing description. Accordingly, it is intended to embrace all such alternatives, modifications, and variations which fall within the spirit and scope of the included claims. All matters set forth herein or shown in the accompanying drawings are to be interpreted in an illustrative and non-limiting sense.

WHAT IS CLAIMED IS:

1. An integrated circuit package system comprising:

a substrate;

a plurality of dies attached to the substrate and electrically bonded thereto;

heat slug pillars on the substrate only around a periphery of the plurality of dies;

a heat slug on the heat slug pillars; and

a mold compound encapsulating the die and the heat slug pillars between the substrate and the heat slug wherein the die and the heat slug pillars are encapsulated in the mold compound for a package without the heat slug pillars.~~the substrate, the die, the heat slug pillars, and the heat slug encapsulated in a mold compound.~~

~~2. The system as claimed in claim 1 wherein the substrate, the die, the heat slug pillars, and the heat slug encapsulated in a mold compound are packages without the heat slug pillars.~~

~~3.~~2. The system as claimed in claim 1 wherein the heat slug includes indentations provided therein for heat dissipation thereby.

~~4.~~3. The system as claimed in claim 1 wherein the heat slug has a groove around the periphery thereof inside the heat slug pillars.

~~5.~~4. The system as claimed in claim 1 wherein the heat slug includes the heat slug with lines for individual heat slugs connected by tie bars.

~~6.~~5. The system as claimed in claim 1 further comprising:

electrical bonds for electrically bonding dies to the substrate;

pillars of adhesive for forming heat slug pillars around the periphery of the substrate;

placing a heat slug on the pillars of adhesive; and

~~the heat slug, the pillars of adhesive, the dies, and the substrate in a molding compound; and~~

solder balls on the substrate electrically connected to the dies.

~~7.~~6. The system as claimed in claim ~~6~~5 wherein the heat slug is above the dies and electrical bonds.

~~8.~~7. The system as claimed in claim ~~6~~5 wherein the heat slug has indentions provided therein.

~~9.~~8. The system as claimed in claim ~~6~~5 wherein placing the heat slug includes a groove around the periphery thereof inside the heat slug pillars and out side the electrical bonds when positioned.

~~10.~~9. The system as claimed in claim ~~6~~5 wherein the heat slug has full-etched lines for individual heat slugs connected by tie bars.