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(12) **United States Patent**
Shimanuki

(10) **Patent No.: US 8,115,298 B2**
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(54) **SEMICONDUCTOR DEVICE**

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(73) Assignees: **Renesas Electronics Corporation**, Kanagawa (JP); **Hitachi Yonezawa Electronics Co., Ltd.**, Yonezawa (JP)

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(21) Appl. No.: **12/897,221**

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(65) **Prior Publication Data**

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Related U.S. Application Data

(60) Continuation of application No. 12/610,900, filed on Nov. 2, 2009, now Pat. No. 7,821,119, which is a division of application No. 12/222,099, filed on Aug. 1, 2008, now Pat. No. 7,777,312, which is a division of application No. 10/879,010, filed on Jun. 30, 2004, now Pat. No. 7,804,159, which is a continuation of application No. 10/227,817, filed on Aug. 27, 2002, now abandoned, which is a continuation of application No. 09/623,344, filed as application No. PCT/JP00/04340 on Jun. 30, 2000, now abandoned.

(30) **Foreign Application Priority Data**

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(51) **Int. Cl.**
H01L 23/495 (2006.01)

(52) **U.S. Cl.** **257/692**; 257/666; 257/E23.043; 438/123

(58) **Field of Classification Search** 257/692, 257/666, E23.043; 438/123
See application file for complete search history.

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(57) **ABSTRACT**

A semiconductor device is disclosed which includes a tab (**5**) for use in supporting a semiconductor chip (**8**), a seal section (**12**) as formed by sealing the semiconductor chip (**8**) with a resin material, more than one tab suspension lead (**4**) for support of the tab (**5**), a plurality of electrical leads (**2**) which have a to-be-connected portion as exposed to outer periphery on the back surface of the seal section (**12**) and a thickness reduced portion as formed to be thinner than said to-be-connected portion and which are provided with an inner groove (**2***e*) and outer groove (**2***f*) in a wire bonding surface (**2***d*) as disposed within the seal section (**12**) of said to-be-connected portion, and wires (**10**) for electrical connection between the leads (**2**) and pads (**7**) of the semiconductor chip (**8**), wherein said thickness reduced portion of the leads (**2**) is covered by or coated with a sealing resin material while causing the wires (**10**) to be contacted with said to-be-connected portion at specified part lying midway between the outer groove (**2***f*) and inner groove (**2***e*) to thereby permit said thickness reduced portion of leads (**2**) and the outer groove (**2***f*) plus the inner groove (**2***e*) to prevent occurrence of any accidental lead drop-down detachment.

14 Claims, 38 Drawing Sheets

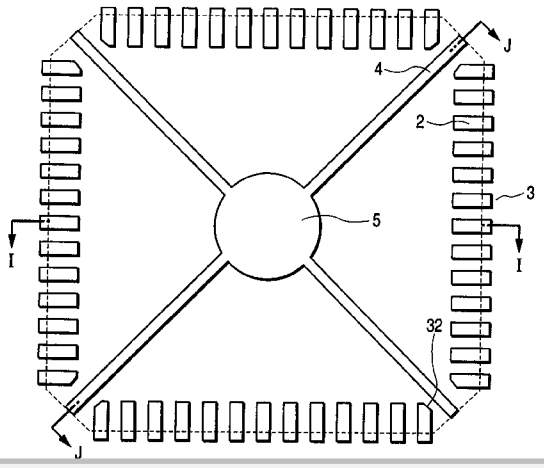

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FIG. 1

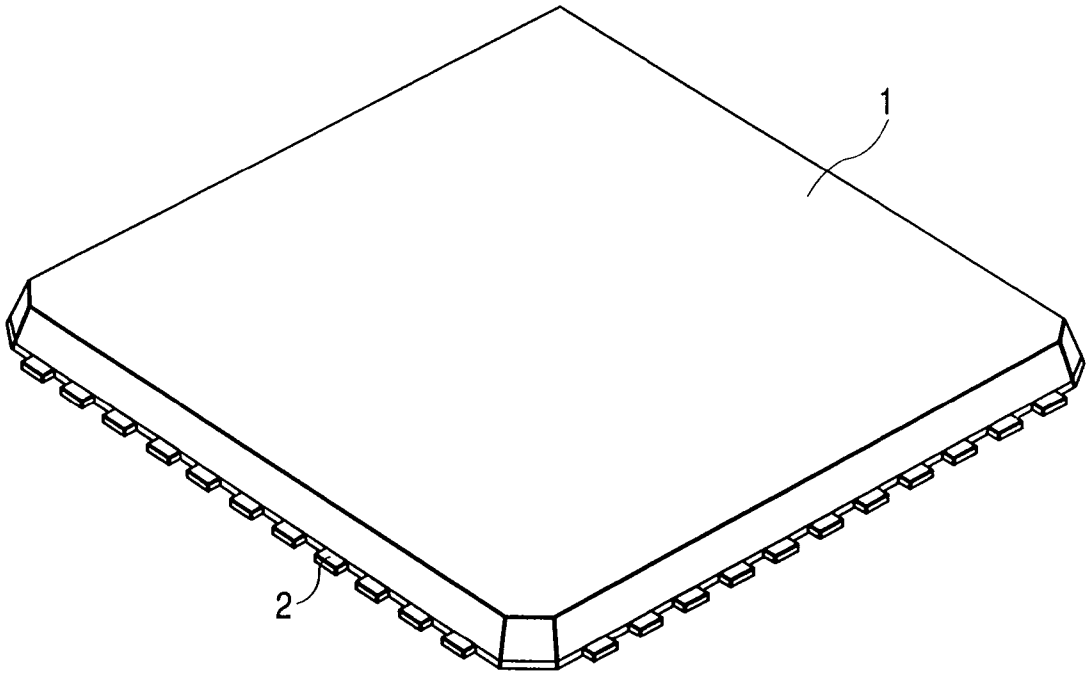


FIG. 2

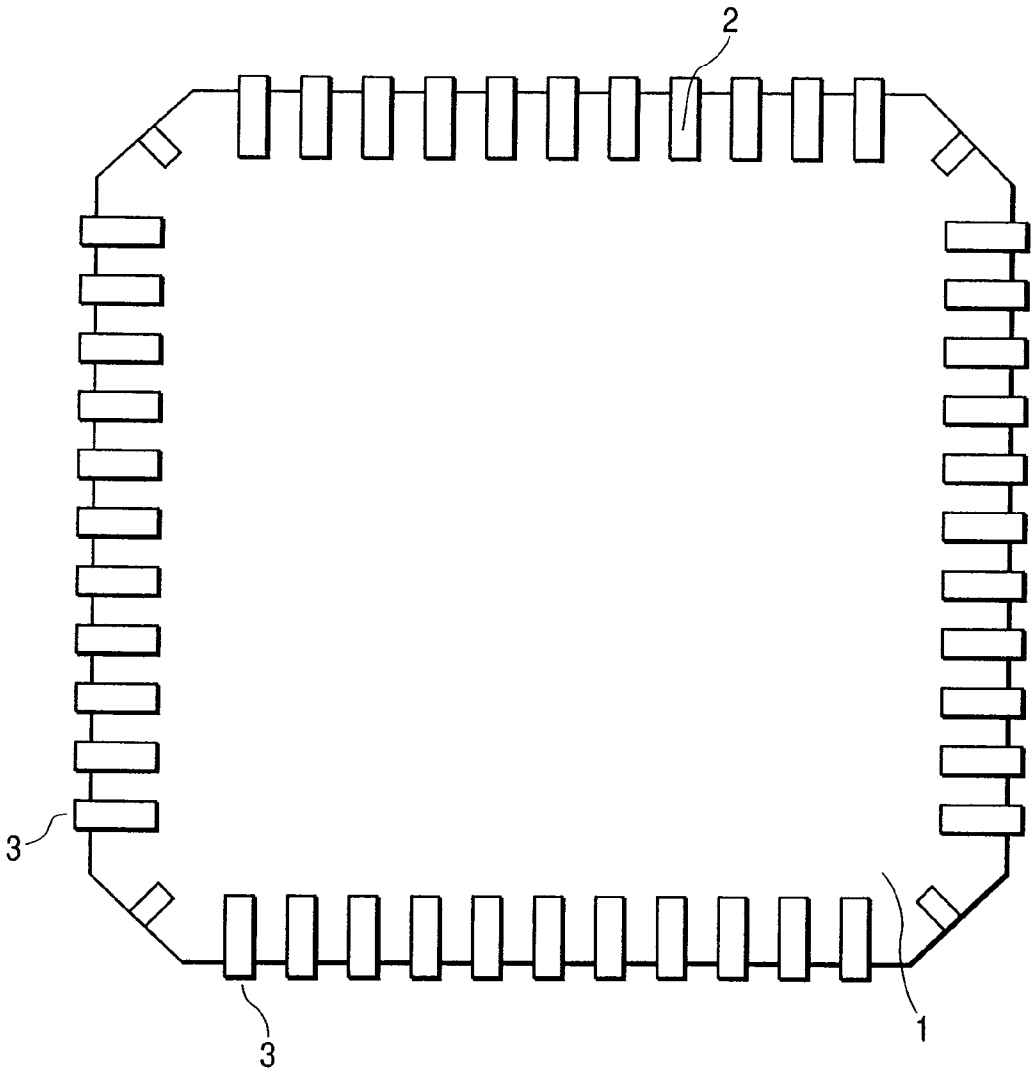


FIG. 3

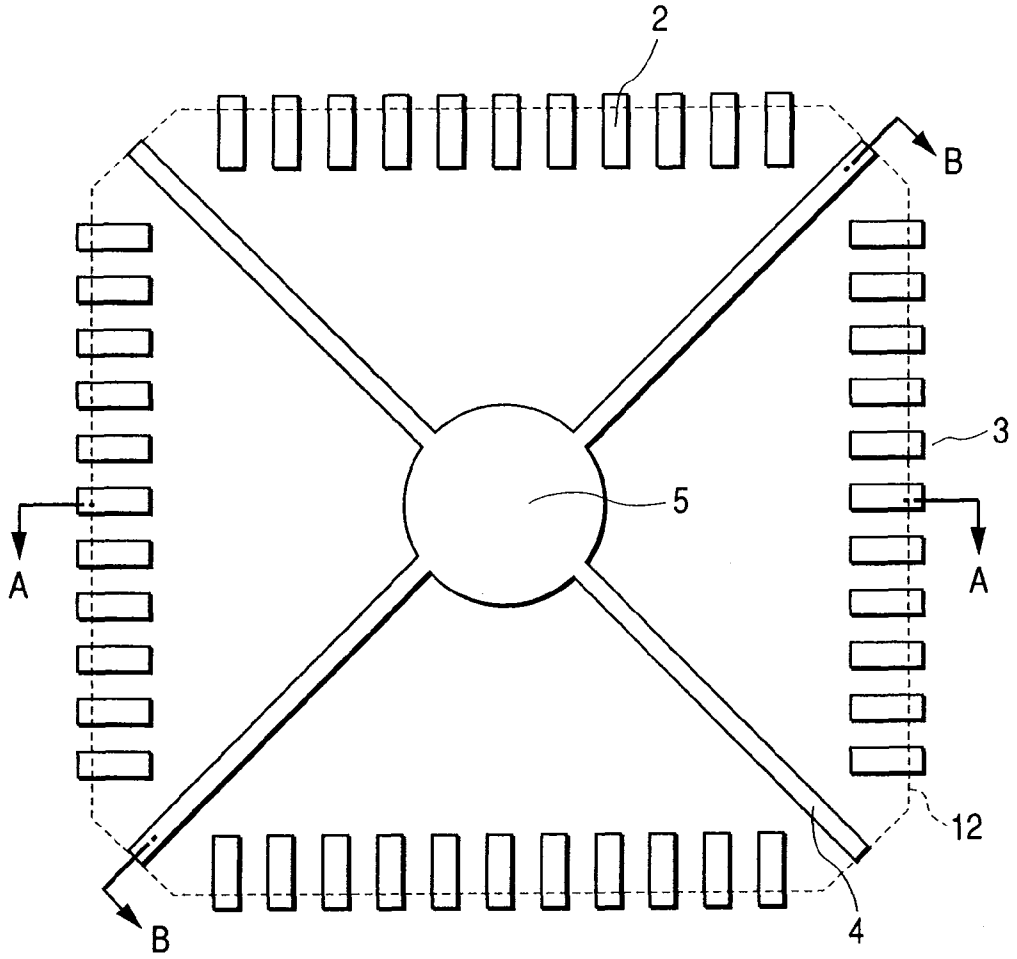


FIG. 4

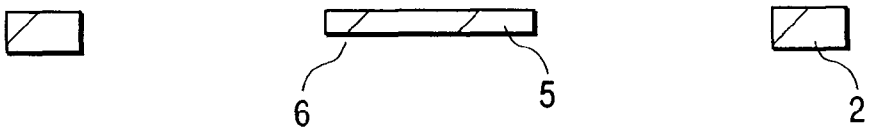
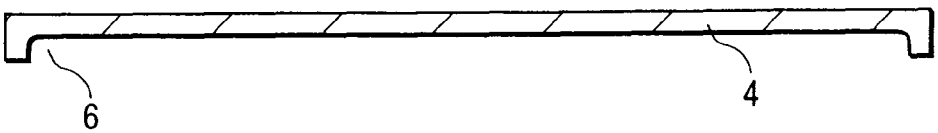


FIG. 5



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