

(12) **United States Patent**  
**Chung et al.**

(10) **Patent No.:** **US 6,680,218 B2**  
(45) **Date of Patent:** **Jan. 20, 2004**

(54) **FABRICATION METHOD FOR VERTICAL ELECTRONIC CIRCUIT PACKAGE AND SYSTEM**

6,495,912 B1 \* 12/2002 Huang et al. .... 257/700  
6,555,920 B2 4/2003 Chung et al. .... 257/779  
6,556,453 B2 \* 4/2003 Figueroa et al. .... 361/763

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\* cited by examiner

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(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(57) **ABSTRACT**

An electronic circuit package includes a vertical package section (304, FIG. 3) electrically connected to a horizontal package section (306, FIG. 3). The vertical package section includes multiple conductive layers (512, 514, 516, FIG. 5) oriented in parallel with a vertical plane. A first set of bond pads (606, FIG. 6) on the vertical section's horizontal top surface (608, FIG. 6) can be connected to the bond pads (602, FIG. 6) of an integrated circuit (302, FIG. 3). A second set of bond pads (612, FIG. 6) on the vertical section's horizontal bottom surface (614, FIG. 6) can be connected to bond pads (616, FIG. 6) on the horizontal package section. The conductive layers of the vertical section perform a bond pad pitch conversion in a first direction, and conductive structures (906, 908, 910, FIG. 9) within the horizontal package section perform a bond pad pitch conversion in a second direction.

(21) Appl. No.: **10/371,659**

(22) Filed: **Feb. 21, 2003**

(65) **Prior Publication Data**

US 2003/0151146 A1 Aug. 14, 2003

**Related U.S. Application Data**

(62) Division of application No. 09/897,369, filed on Jul. 2, 2001, now Pat. No. 6,555,920.

(51) **Int. Cl.<sup>7</sup>** ..... **H01L 21/44**

(52) **U.S. Cl.** ..... **438/108**

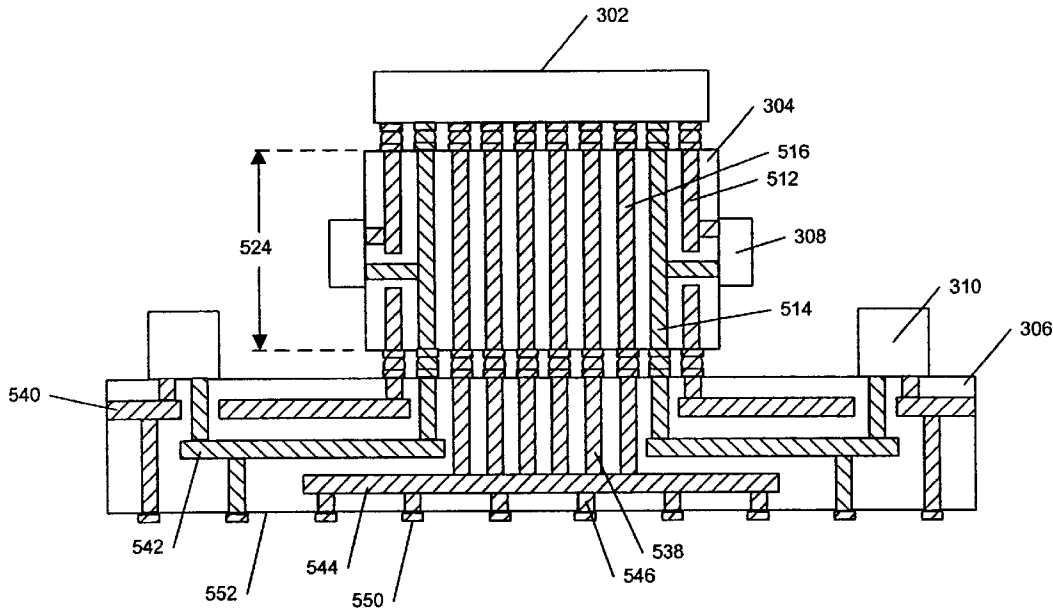
(58) **Field of Search** ..... 438/108, 106; 257/778

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

6,031,282 A 2/2000 Jones et al. .... 257/692

**21 Claims, 10 Drawing Sheets**



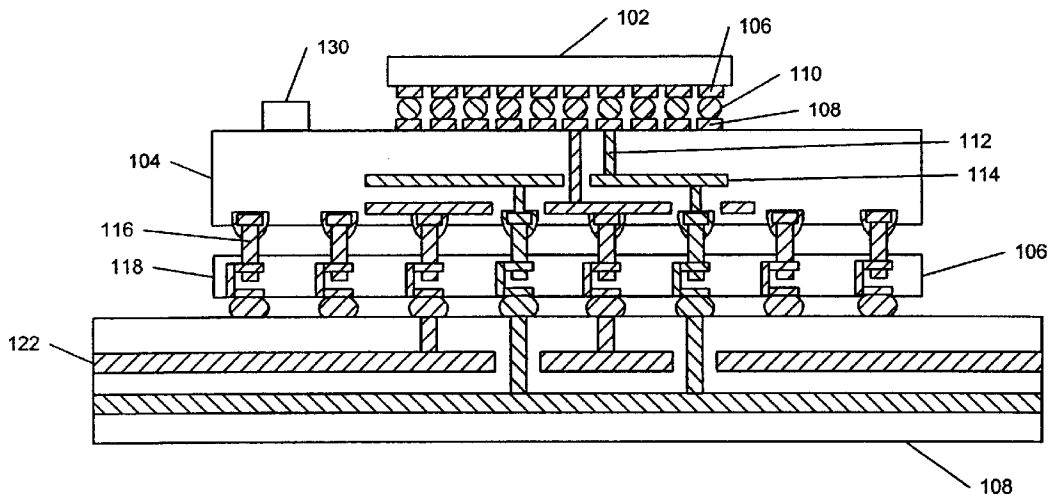


FIG. 1 PRIOR ART

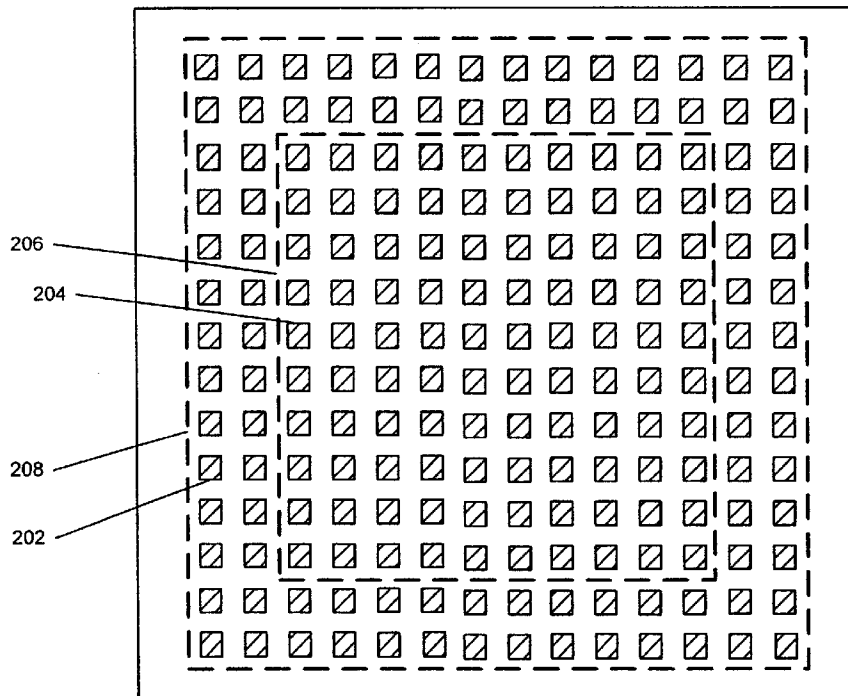


FIG. 2 PRIOR ART

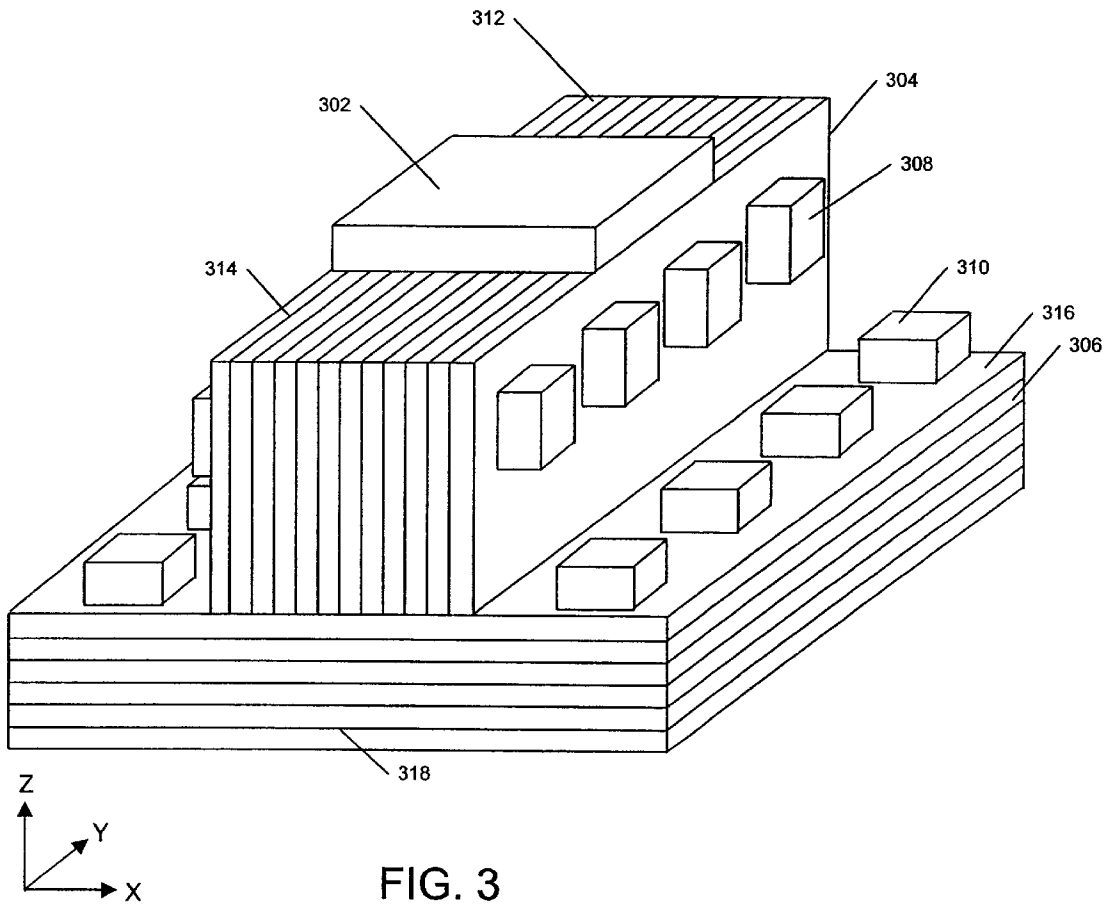


FIG. 3

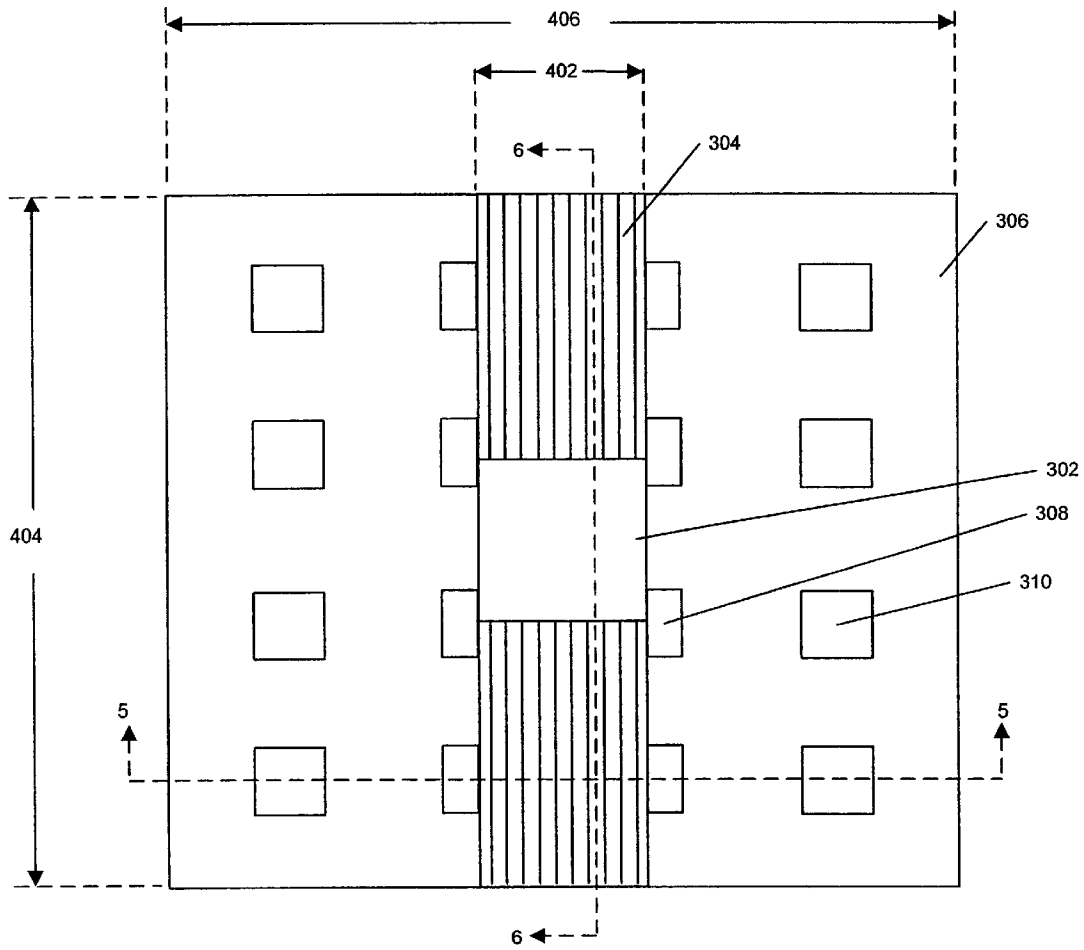


FIG. 4

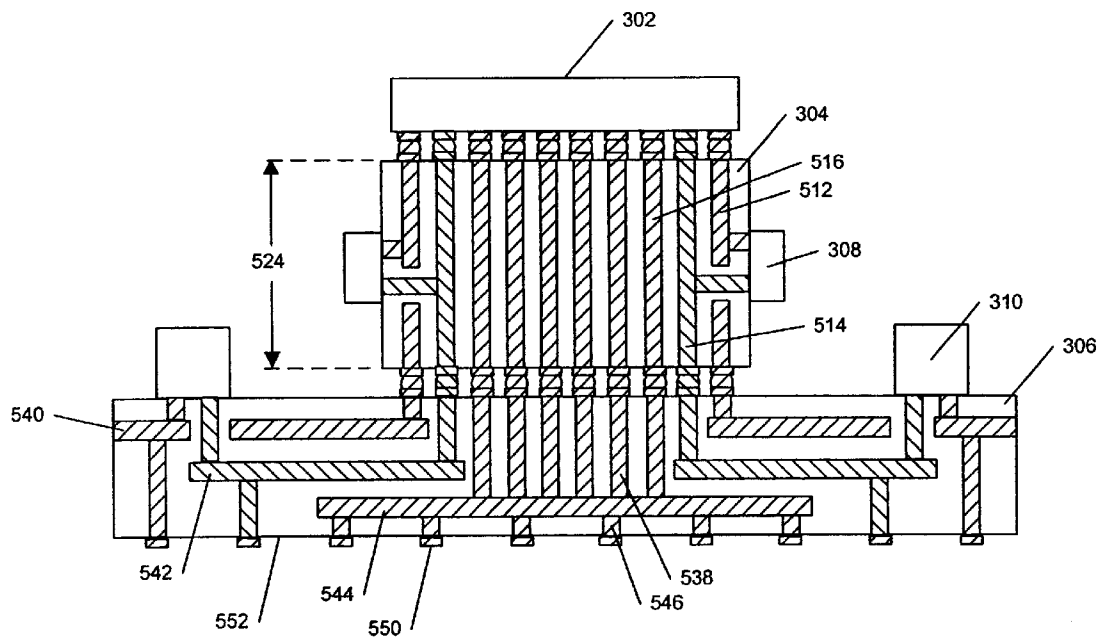


FIG. 5

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